W. 1.b.
SUPPLEMENTAL MATERIAL
PA 1210

SUPPLEMENTAL MEMO

DATE OF MEMO: August 18, 2004

TO: Board of County Commissioners

FROM: Jerry Kendall/Land Management Division

THIRD READING AND DELIBERATION/Ordinance No. PA 1210 Amending the Rural Comprehensive Plan to Redesignate Land From "Agricultural" to "Marginal Land" and Rezoning That Land From "E-40/Exclusive Farm Use" to "MI/Marginal Land", and Adopting Savings and Severability Clauses (File PA 02-5838; Ogle)(NBA & PM 6/23/04 & 7/14/04)

Scheduled board date for third reading/deliberation, August 25, 2004

The Board held the public hearing for this item on July 14, then closed the hearing and left the record open in the following manner:

- Until July 28 for any party to comment on any aspect of the proposal.
- Until August 11 for any party to comment on materials received during the 1st comment period above.
- Until August 18 for the applicant's final rebuttal.

All materials received are attached and indexed below. The crux of the submittals, from staff's perspective, is discussed below.

Merchantability. Much of the discussion in Mr. Just's submittals in opposition to the proposal concerns the provision in (1991) ORS 197.247(b)(C), specifically the second, underlined portion:

> *The proposed marginal land is composed predominantly of soils in capability classes V through VIII in the Agricultural Capability Classification System in use by the United States Department of Agriculture Soil Conservation Service on October 15, 1983, and is not capable of producing 85 cubic feet of merchantable timber per acre per year in those counties west of the summit of the Cascade Range.*

For example, in his submittal of August 9, Mr. Just critiques the productivity calculations for Ponderosa Pine done by Marc Setchko, the applicant's consultant forester. However, staff views this discussion as relatively moot, based on the definition of "merchantability":

> *Merchantable: of commercial quality: acceptable to buyers: salable.* (See attachment #1, excerpt from *Webster's Third New International Dictionary,* 1981)

Mr. Setchko is already on record as to the merchantability of other tree species. Refer to his letter in attachment #5 for a summary. He has testified that hardwoods are not merchantable because of a lack of market (cottonwood, ash and poplar), or slow growth rate and low value (Oregon white oak), low yield (maple), or moisture constraints (red alder). Conifers fare no better due to moisture constraints (red cedar, grand fir), moisture stress (hemlock), slow growth (incense cedar). Mr. Setchko has also offered testimony as to the merchantability of hybrid poplar (no current market and slow growth rate on natural stands) and KMX trees (slow growing, low commercial value). He concludes that Dog fir is the optimum merchantable species for the property, and has calculated that the proposed marginal land cannot produce more than 85 cu.ft./ac./year. Staff views this as meeting the requirement of ORS 197.247(b)(C).

Aside from the issue above, the bulk of discussion within the submittals is a repetition of issues discussed prior to the close of the July 14 hearing, so there is no need for further discussion in this memo.

Applicant's Final Rebuttal. See attachment #9 for the applicant's final rebuttal. The applicant's attorney, Mr. Farthing, claims that Mr. Just created a procedural error by entering new exhibits in his August 9 submittal (attachment #6). Mr. Farthing suggests two cures: either the Board remove the new materials from the record, or reopen the record for parties to comment on those new materials. While staff is not so inclined to agree that a procedural error was committed, a reopening of the record would eliminate the possibility of a remand, should LUBA agree with Mr. Farthing's contention. The two options will be discussed further at the third reading.

Staff Recommendation: Reopen the record for written comments, affording the applicant and other parties to fully respond to attachment #6, thus eliminating the potential for procedural error, and conduct a fourth reading and deliberation at a date to be established at this (August 25) reading.

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

Attachments
Dates indicate when the material was received.

1. June 14, from LMD staff, Definition of "merchantable" –2pp.
2. July 14, from J. Just—47pp.
3. July 23, from J. Just—5pp.
4. July 23, from Division of State Lands—1p.
5. July 28, from M. Farthing—11pp.
6. August 9, from J. Just—51pp.
7. August 10, from J. Just—1p.
8. August 11, from M. Farthing—6pp.
9. August 18, from M. Farthing--11pp.

mer·cer \'mərsər; 'mə̄sə(r, 'məis-\ *n* -s [ME, fr. OF *mercier*, fr. (assumed) VL *mercarius*, fr. L *merc-*, *merx* ware, merchandise) + *-ier* -er — more at MARKET] *Brit* : a dealer in textile fabrics

mer·cer·i·za·tion \,ˌsərsə'zāshən, -,rī'z-\ *n* -s : the act or process of mercerizing

mer·cer·ize \'ˌˌ,rīz\ *vt* -ED/-ING/-S *see -ize in Explan Notes* [John *Mercer* †1866 English calico printer + E *-ize*] **1** : to give (cotton yarn or cloth) luster, strength, and receptiveness to dyes by treatment under tension with caustic soda — compare CAUSTICIZE 2 **2** : to steep (wood pulp) in a caustic soda solution during the manufacture of viscose rayon

mer·cer·iz·er \-,rīzə(r)\ *n* -s **1** : a textile worker who mercerizes **2** : a machine for mercerization

mer·cers·burg \'mərsərz,bərg\ *adj, usu cap* [fr. *Mercersburg*, Pa., the former site of the Theological Seminary of the German Reformed Church, where the doctrine was in part formulated] : of or relating to a system of American theology developed in the German Reformed Church in the middle and late 19th century and marked by Christocentrism, a Calvinist view of the Lord's Supper, and emphasis on the liturgical element in worship

mer·cery \'mərs(ə)rē, 'mə̄s-,'məis-, -ri\ *n* -ES [ME *mercerie*, fr. OF *merserie, mercerie*, fr. *mers, merz* merchandise + *-erie* -ery] **1** *Brit* : a mercer's wares or shop **2** *Brit* : a mercer's occupation or dealings

merch *abbr* merchantable

mer·chan·dis·able \'mərchən,dīzəbəl, 'mə̄ch-,'məich-, ,ˌˌ-'ˌˌˌ\ *adj* [²*merchandise* + *-able*] : MERCHANTABLE

¹**mer·chan·dise** \'ˌˌ,dīz, -īs\ *n* -s [ME *marchaundise*, fr. OF *marcheandise*, fr. *marcheant* merchant — more at MERCHANT] **1 a** : the commodities or goods that are bought and sold in business : the wares of commerce **b** *obs* : an article of merchandise **2** *archaic* : the buying and selling of goods for profit : the occupation of a merchant : business activity

²**mer·chan·dise** *also* **mer·chan·dize** \-īz\ *vb* -ED/-ING/-S [ME *marchaundisen*, fr. *marchaundise*, n.] *vi* : to carry on commerce : TRADE, TRAFFIC ~ *vt* **1** : to buy and sell : deal in : make merchandise of **2** : to carry on sales promotion of : advertise, publicize, or present attractively or effectively — **mer·chan·dis·er** \-zə(r)\ *n* -s

merchandise freight *n* : goods in less than carload lots for expedited movement in merchandise trains

merchandising *n* -s [fr. gerund of ²*merchandise*] : sales promotion as a comprehensive function including market research, development of new products, coordination of manufacture and marketing, and effective advertising and selling

¹**mer·chant** \'mərchənt, 'mə̄ch-,'məich-\ *n* -s [ME *marchaunt, marchand, marchant*, fr. OF *marcheant*, fr. (assumed) VL *mercatant-, mercatans*, fr. pres. part. of (assumed) VL *mercatare*, fr. L *mercatus*, past part. of *mercari* to trade, deal in commodities, fr. *merc-, merx* ware, merchandise — more at MARKET] **1 a** : a buyer and seller of commodities for profit : TRADER **b** : the operator of a retail business : STOREKEEPER **2** *Scot* : CUSTOMER **3** *archaic* : FELLOW, GUY **4** *obs* : MERCHANTMAN **5** : a person conspicuous for ideas or activities of a particular kind : PURVEYOR, SPECIALIST ⟨his guess is likely to be as accurate as that of the ~ of doom —Harrison Smith⟩ ⟨had been . . . acquiring among musical-comedy orchestrators a reputation as a speed ~ —H.W.Wind⟩

²**merchant** \"\ *adj* [ME *marchaund, marchant*, fr. *marchaunt, marchaund, marchant*, n.] **1 a** : of, relating to, or used in commerce **b** : of or relating to a merchant marine **c** : having a merchant's traits or qualities **2 a** : of ordinary or standard shape or size : not made to special order : STOCK — used of metal bars and ingots ⟨~ pig iron⟩ **b** : producing metal bars or ingots in standard shapes and sizes ⟨~ mill⟩

³**merchant** \"\ *vb* -ED/-ING/-S [ME *marchaunden*, fr. MF *marchander*, fr. OF *marcheandier*, fr. *marcheant* merchant] *vi, archaic* : to deal or trade as a merchant ~ *vt* : to buy and sell : deal or trade in ⟨something considerably superior to what Broadway usually ~s in these days —G.J.Nathan⟩

mer·chant·able \-təbəl\ *adj* [ME *merchandabull*, fr. *marchaunden* + *-abull, -able* -able] : of commercial quality : acceptable to buyers : SALABLE ⟨it is estimated that a thousand million tons of ~ coal are in reserve —*Canadian Mining Jour.*⟩ — **merchant·able·ness** *n* -ES

merchant adventurer *n, pl* **merchant adventurers** *or* **merchants adventurers** [ME *marchaunt adventurer*] : a merchant who establishes foreign trading stations and carries on business ventures abroad; *esp* : a member of one of the former English companies of merchant adventurers operating from the 14th to the 16th centuries

merchant banker *n* : an acceptance house that also does investment banking

merchant flag *n* : a flag flown by the merchant vessels of a country that is sometimes identical with the national flag

merchantlike \'ˌˌ,ˌ\ *adj* **1** : like or proper to a merchant **2** *obs* : MERCANTILE

merchantly *adj, obs* : of or relating to merchants

mer·chant·man \'ˌˌmən\ *n, pl* **merchantmen** [ME *marchand man*] **1** *archaic* : MERCHANT **2** : a ship commercially operated to carry passengers or freight : a ship used in commerce — called also *merchant ship*

merchant marine *n* **1** : the privately or publicly owned commercial vessels of a nation as distinguished from its navy **2** : the personnel of a merchant marine

merchant middleman *n* : a middleman who takes title to goods purchased for resale

merchant navy *n, Brit* : MERCHANT MARINE

merchant prince *n* : a merchant of great wealth

mer·chant·ry \'mərchəntrē\ *n* -ES : a merchant's dealings : TRADE

merchant seaman *n* : a seaman employed on a merchant ship

merchant service *n* : MERCHANT MARINE

merchant ship *n* : MERCHANTMAN 2

merchant tailor *n* : a custom tailor who owns his business and supplies the fabrics he uses

merchant venturer *n, obs* : MERCHANT ADVENTURER

merchet *var of* MARCHET

¹**mer·cian** \'mərsh(ē)ən\ *adj, usu cap* [*Mercia*, ancient Anglian kingdom in central England + E *-an*] **1 a** : of, relating to, or characteristic of the Anglian kingdom of Mercia **b** : of, relating to, or characteristic of the Mercians **2** : of, relating to, or constituting the Old English dialect of Mercia

²**mercian** \"\ *n* -s *cap* **1** : a native or inhabitant of Mercia **2** : the Old English dialect of Mercia

mercies *pl of* MERCY

mer·ci·ful \'mərsəfəl, 'mə̄s-, 'məis-, -sēf-\ *adj* [ME, fr. *merci*, *mercy* mercy + *-ful* — more at MERCY] : full of mercy : marked, exercising, or disposed to mercy : CLEMENT, COMPASSIONATE, LENIENT ⟨if tried by the manners of his age, Caesar was the most ~ of conquerors —J.A.Froude⟩ ⟨the ~ possibilities of the antibiotics — F.L.Allen⟩ **syn** see FORBEARING

mer·ci·ful·ly \-f(ə)lē, -li\ *adv* [ME, fr. *merciful* + *-ly*] : in a merciful manner : so as to be merciful ⟨struggles that were ~ brief⟩

mer·ci·ful·ness \-fəlnəs\ *n* -ES : the quality or state of being merciful

mer·ci·less \-sēləs, -sələs *sometimes* -sləs\ *adj* [ME *mercyles*, fr. *merci, mercy* mercy + *-les* -less] : having, extending, or showing no mercy : CRUEL, HARSH, PITILESS, REMORSELESS ⟨turns a ~ spotlight on the precocious technicians, the spiritual sophomores, and the hairy-chested muscle men of contemporary literature —Gilbert Highet⟩ — **mer·ci·less·ly** *adv* — **mer·ci·less·ness** *n* -ES

¹**mer·cu·ri·al** \,mər'kyu̇rēəl, ,mə(r)'k-, (')mə̄'k-, (')məi'k-\ *adj* [L *mercurialis* of the god Mercury, of the planet Mercury, fr. *Mercurius* Mercury, ancient Roman god of commerce and messenger of the gods & *Mercurius* Mercury, the planet nearest from the sun (fr. *stella Mercurii*, lit., star of Mercury, after *Mercurius*, the god Mercury; trans. of Gk *astēr tou Hermou*, lit., star of Hermes, Greek messenger of the gods) + *-alis* -al] **1** *usu cap* : of, relating to, or like the ancient Roman god Mercury **2 a** : of or relating to the planet Mercury **b** : born under or influenced astrologically by the planet Mercury **3** : having qualities of eloquence, ingenuity, sharp dealing, or thievishness attributed in myth to the god Mercury and in astrology to the influence of the planet Mercury ⟨more than ~ thievishness —*Sat. Rev.*⟩ **4** : characterized by rapid and unpredictable changeableness or by quick-wittedness : SPRIGHTLY, TEMPERAMENTAL, VOLATILE ⟨a deeply ~ intuitive artist —Christopher Morley⟩ ⟨~ desponds —D.C.Peattie⟩ ⟨~ twists of temperament —T.B.Costain⟩ ⟨the Japanese are ~ — high-strung, touchy, ready to fly into a rage —D.G. Haring⟩ **5** [*Mercury* + *-al*] **a** : of, relating to, containing, or consisting of mercury ⟨~ preparations⟩ **b** : caused by or exhibiting the physiological effect of the use of mercury ⟨~ sore mouth⟩ **syn** see INCONSTANT

²**mercurial** \"\ *n* -s **1** *obs* : a person born under Mercury or having mercurial qualities **2** [L (*herba*) *mercurialis* dog's mercury, lit., Mercurial herb] *obs* : GOOD-KING-HENRY **3** : a pharmaceutical preparation or chemical compound containing mercury ⟨the diuretic action of ~s⟩

mer·cu·ri·a·lis \(,)mər,kyu̇rē'aləs, -āl-, -äl-\ *n* [NL, fr. L (*herba*) *mercurialis* dog's mercury] **1** *cap* : a small genus of slender herbs (family Euphorbiaceae) having opposite pinnately-veined leaves and apetalous flowers in interrupted axillary spikes — see BOYS-AND-GIRLS 2, DOG'S MERCURY **2** -ES : an herb (*Mercurialis annua*) formerly dried for use as a purgative, diuretic, and antisyphilitic

mer·cu·ri·al·ism \(,)ˌˌˌə,lizəm\ *n* -s : chronic poisoning with mercury (as from excessive medication or industrial contacts with the metal or its fumes) — called also *hydrargyrism*

mercurialist *n* -s *obs* : MERCURIAL 1

mer·cu·ri·al·i·ty \(,)ˌˌˌ'alədē\ *n* -ES : the quality or state of being mercurial : VOLATILITY

mer·cu·ri·al·ly \,mər'kyu̇rēəlē, ,mə(r)'k-, (')mə̄'k-, (')məi'k-, -li\ *adv* : in a mercurial manner

mercurial ointment *n* : an ointment containing about 50 percent of finely divided metallic mercury incorporated with wool fat, white wax, mercury oleate, and white petrolatum — compare BLUE OINTMENT

¹**mercurian** *adj* [*Mercury* (god & planet) + E *-an*] *obs* : MERCURIAL

²**mer·cu·ri·an** \(,)mər'kyu̇rēən\ *n* -s *usu cap* **1** : one born under Mercury **2** : one that has a well-developed Mount of Mercury and a long and large finger of Mercury and that is usu. held by palmists to be characterized by shrewdness, quickness, and energy

mercuriate *var of* MERCURATE

mer·cu·ric \,mər'kyu̇rik, ,mə(r)'k-, (')mə̄'k-, (')məi'k-, -rēk\ *adj* [*mercur-* + *-ic*] : of, relating to, or containing mercury — used esp. of compounds in which this element is bivalent

mercuric chloride *n* : MERCURY CHLORIDE b

mercuric cyanide *n* : the mercury cyanide $Hg(CN)_2$

mercuric iodide *n* : MERCURY IODIDE b

mercuric oxide *n* : a slightly water-soluble crystalline poisonous compound HgO known in two forms (1) a yellow finely divided powder obtained usu. by precipitation from solutions of mercury chloride (sense b) and sodium hydroxide and used chiefly in medicine (as in antiseptic ointments), in antifouling paints, and in making other mercury compounds (2) a bright red coarse powder obtained by precipitation from hot solutions or by heating mercurous nitrate and used similarly to the yellow form and also in dry cells — called also *mercury(II) oxide*

mercuric sulfide *n* : an insoluble compound HgS occurring in nature as the red mineral cinnabar and the black mineral metacinnabar and also made synthetically in red and black forms — called also *mercury(II) sulfide*; see VERMILION 1a

mer·cu·ride \'mərkyə,rīd, -,rəd\ *n* -s [*mercur-* + *-ide*] : a binary compound of mercury with a more electropositive element or radical — compare AMALGAM

mer·cu·rize \-,rīz\ *vt* -ED/-ING/-S [*mercur-* + *-ize*] : MERCURATE

mercuro- — see MERCUR-

Mer·cu·ro·chrome \(,)mər'kyu̇rə,krōm\ *trademark* — used for merbromin

mer·cu·ro·phyl·line \,mərkyərō'fi,lēn, -,lən\ *n* -s [*mercur-* + *theophylline*] : a diuretic consisting of a chemical combination of an organic mercurial compound or its sodium salt $C_{14}H_{24}HgNNaO_5$ and theophylline

mer·cu·rous \(')mər'kyu̇rəs, 'mərkyər-\ *adj* [*mercur-* + *-ous*] : of, relating to, or containing mercury — used esp. of compounds in which this element is regarded as univalent ⟨the ~ ion . . . is $Hg{:}Hg^{++}$ rather than Hg^{+} —E.S.Gould⟩

mercurous chloride *n* : CALOMEL

mercurous iodide *n* : MERCURY IODIDE a

mer·cu·ry \'mərkyərē, 'mə̄k-, 'məik-, -k(ə)rē, -ri\ *n* -ES **1** [ME *mercurie*, fr. ML *mercurius*, fr. L *Mercurius* Mercury, ancient Roman god of commerce and messenger of the gods; prob. fr. the comparison of the mobility of the metal to the traditional fleetness of the god] **a** : a heavy silver-white univalent and bivalent poisonous metallic element that is the only metal liquid at ordinary temperatures, that occurs native and in cinnabar, calomel, and a few other minerals, that is prepared usu. by roasting cinnabar and condensing the vapors, and that is used chiefly in scientific instruments (as electrical apparatus, control devices, thermometers, barometers), mercury boilers, mercury pumps, and mercury-vapor lamps — symbol *Hg*; called also *quicksilver*; see AMALGAM, ELEMENT table **b** : the mercury in a thermometer or barometer ⟨in a climate where the ~ sports around 110 the whisky should be only of the best quality —D.D.Martin⟩ **c** : pressure (as in the manifold of an engine) measured in inches or millimeters of mercury ⟨pulling between forty-seven and fifty inches of ~ —J.M. Redding & H.I.Leyshon⟩ **d** : a pharmaceutical preparation containing the metal mercury or a compound of it **e** *often cap*, *obs* : mercurial quality : brilliance, inconstancy, or volatility of mood or attitude **f** : the principle of liquidity and volatility in alchemy **2** [ME *mercurie* fr. *Mercurie* the god Mercury, fr. L *Mercurius*; after L (*herba*) *mercurialis* dog's mercury] : any of several plants: as **a** : a plant of the genus *Mercurialis*; *esp* : DOG'S MERCURY **b** : GOOD-KING-HENRY **c** : POISON IVY **3** [after *Mercury*, messenger of the gods, fr. ME *Mercurie*] **a** *often cap, archaic* : a bearer of messages or news or a conductor of travelers **b** *usu cap, obs* (1) : a statue of Mercury (2) : SIGNPOST (3) : HERM **c** *usu cap, obs* : a hawker of pamphlets

mercury arc *n* : an electric discharge through mercury vapor in a glass or quartz tube emitting a blue-green light rich in actinic and ultraviolet rays and used for various purposes (as for water sterilization, in photography, and in a rectifier)

mercury-arc lamp *n* : MERCURY-VAPOR LAMP

mercury-arc rectifier *n* : an alternating-current rectifier consisting of a mercury arc esp. designed to utilize its rectifying action, one electrode being a pool of mercury with current flowing only during that part of the cycle in which the mercury acts as the cathode

mercury bichloride *n* : MERCURY CHLORIDE b — not used systematically

mercury chloride *n* : a chloride of mercury: as **a** : CALOMEL **b** : a transparent crystalline poisonous compound . . .

acid, and that is used in blasting caps, percussion caps, detonators — called also *fulminating mercury*

mercury glass *n* : thin glass blown with double walls and after silvering of the enclosed surface of the inner wall to produce an ornamental ware — called also *silvered glass*

mercury iodide *n* : either of two iodides of mercury: **a** : a yellow amorphous powder Hg_2I_2 that turns greenish on exposure to light — called also *mercurous iodide* **b** : a crystalline poisonous salt HgI_2 that changes to a yellow crystalline modification when heated above 126° C and is used chiefly in medicine — called also *mercuric iodide*

mercury lamp *n* : MERCURY-VAPOR LAMP

mercury line *n, usu cap M* [after *Mercury*, Roman god of commerce, fr. L *Mercurius*] : LINE OF MERCURY

mercury oxide *n* : an oxide of mercury; *esp* : MERCURIC OXIDE

mercury red *n* : vermilion or a color resembling it

mercury's staff *n, usu cap M* : CADUCEUS 2

mercury sulfide *n* : a sulfide of mercury; *esp* : MERCURIC SULFIDE

mercury switch *n* : a switch in which an electric circuit is closed and opened by tilting a reservoir of liquid mercury

mercury thiocyanate *n* : a thiocyanate of mercury; *esp* : the crystalline poisonous mercuric compound $Hg(SCN)_2$ made by precipitation and used chiefly in fireworks — see PHARAOH'S SERPENT

mercury-vapor lamp \'ˌˌˌ'ˌˌ-\ *n* : a gas-discharge lamp in which the gaseous medium is mercury vapor

mercury weed *n* : THREE-SEEDED MERCURY

mer·cy \'mərsē, 'mə̄s-, 'məis-, -si\ *n* -ES [ME *merci, mercy*, fr. OF *mercit, merci*, fr. ML *merced-, merces*, fr. L, price paid, something, wages, reward, recompense, fr. *merc-, merx* ware, merchandise — more at MARKET] **1 a** : compassion or forbearance shown to an offender or subject : clemency or kindness extended to someone instead of strictness or severity : LENIENCY ⟨the illusion of omniscience . . . brings extreme inhumanity when it leads us to shut the gates of ~ —M.R. Cohen⟩; *esp* : the mercy of God to man ⟨showing ~ unto thousands of them that love me and keep my commandments —Exod 20:6 (AV)⟩ **b** : a sentence of imprisonment rather than of death imposed in clemency on a person convicted of first-degree murder **2 a** : a blessing regarded as an act of divine favor or compassion ⟨seemed oblivious of all the *mercies* of his daily life⟩ **b** : a fortunate event or circumstance ⟨the more open ground was a ~ —Fred Majdalany⟩ **3** : relief of distress : compassion shown to victims of misfortune ⟨ways of performing acts of kindness and ~ abroad —Vera M. Dean⟩

syn CLEMENCY, LENITY, CHARITY, GRACE: MERCY, a word of much emotional force and hence one applicable to many situations, indicates a kindly refraining from inflicting punishment or pain, often a refraining brought about by genuinely felt compassion and sympathy, or a general disposition toward these latter characteristics ⟨earthly power doth then show likest God's when *mercy* season justice —Shakespeare⟩ ⟨a quality of brutality was not isolated in the Japanese . . . the quality of *mercy* unknown to them —Agnes N. . . .⟩ CLEMENCY, a less emotionally colored word, indicates a tendency to be mild and compassionate, to administer only moderate punishment or treatment rather than drastic or severe ⟨*clemency* . . . is the standing policy of constitutional governments, as severity is of despotism —Henry . . .⟩ ⟨Cicero had prophesied so positively that Caesar would throw off the mask of *clemency* . . . that he was disappointed to see him persevere in the same gentleness —J.A.Froude⟩ LENITY may suggest absence of severity, may connote a . . . uninterrupted and unvaried and verging onto softness or careless leniency ⟨whether this indulgence comes from the wisdom and *lenity* of the government —Tobias Smollett⟩ ⟨. . . to be expected that they would show much *lenity* to . . . regarded as the chief of the Rye House Plot —T.B.Macaulay⟩ CHARITY indicates clemency of judgment, a disposition to judge mildly or tolerantly ⟨marriage had begun wh . . . often ends happily, in *charity* of mind —Ellen Glasgow⟩ . . . other, more common uses it suggests a benevolent . . . arising from a feeling of love of others ⟨with malice toward none, with *charity* for all —Abraham Lincoln⟩ In older . . . GRACE may combine the associations of CLEMENCY and . . . ⟨his eyes upraised to sue for *grace* —William Wordsworth⟩ — **at the mercy of** : wholly in the power of ⟨their li . . . *the mercy of* the conqueror —John Locke⟩ ⟨farming . . . risky business, *at the mercy of* weather, pests, limited . . . —*Printers' Ink*⟩

mercy seat *n* [fr. *mercy seat*, gold covering over the ark of the covenant in the Bible (Exod 25:17); trans. of G *gnadenstuhl*, trans. of Heb *kappōreth*] : the throne of God regarded as a place of divine access, communion, or propitiation

merd *n* -s [ME, fr. MF *merde*, fr. L *merda* — more at . . .] *obs* : DUNG

mer·div·o·rous \(ˌ)mər'divərəs\ *adj* [L *merda* excrement + E *-i-* + *-vorous*] : COPROPHAGOUS

¹**mere** \'mi(ə)r, -iə\ *n* -s [ME, fr. OE — more at MARINE] **1** : **a** : SEA **b** : an arm of the sea : CREEK, INLET **2** : a standing water : LAKE, POOL ⟨had seen several bo . . . inland ~ —*Yale Rev.*⟩ **3** : FEN, MARSH

²**mere** \"\ *n* -s [ME, fr. OE *mǣre, gemǣre* — more at . . . TION] *archaic* : BOUNDARY : a mark or line defining a . . . : LANDMARK, LIMIT

³**mere** \"\ *vb* -ED/-ING/-S *vt, archaic* : to mark the boundary of ~ *vi, obs* : to abut on

⁴**mere** \"\ *adj* -ER/-EST [ME, fr. L *merus* pure, bare — more at MORN] **1 a** : done or invoked without assistance or . . . used chiefly in legal contexts in the phrases *mere motion* . . . *will* **b** *law* : having theoretical or legal but no . . . reality ⟨~ right⟩ **2** *obs* : fully realized or developed : ABSOLUTE, TOTAL, UNDIMINISHED **3** : exclusive of or apart from anything else : BARE ⟨if he does not . . . accept his theory of the good on his ~ authority, . . . give us some rational ground for it —M.R.Cohen⟩ . . . above ~ politics —D.W.Brogan⟩ **4** : having no . . . : PURE, UNDILUTED ⟨~ genius —Stanislaus Joyce⟩

⁵**mere** \'merē\ *n* -s [Maori] **1** *Austral* : a Maori war club fashioned from stone . . . **2** *Austral* : a miniature Maori war club fashioned from stone and worn as an ornament

⁶**mere** \'mi(ə)r, -iə\ *n* -s [*-mere*] *zool* : SEGMENT, . . .

-mere \,mi(ə)r, -iə\ *n comb form* -s [F *-mère*, fr. Gk . . . — more at MERIT] **1** *biol* : part : segment ⟨arthromere⟩ **2** *chem* : -MER ⟨isomere⟩

¹**mer·e·dith·i·an** \,merə'dithēən\ *adj, usu cap* [George *Meredith* †1909 Eng. novelist & poet + E *-ian*] : of, relating to, or characteristic of George Meredith or his works

²**meredithian** \"\ *n* -s *usu cap* : a follower of George Meredith or an enthusiast for his works, his style, or his . . .

mer·els \'merəlz\ *n pl but sing in constr* [ME, . . . counter in the game of merels, fr. MF *merel*, . . . token, fr. OF; akin to OF *merele, marele* counter . . .]

mere·ly *adv* [⁴*mere* + *-ly*] **1** *obs* : without admixture . . . **2** : to the full extent : ENTIRELY, QUITE, WHOLLY . . . surprising that . . . one could have been so . . . —Oliver La Farge⟩ **3** : no more than : BA . . .

#1 - 286

1981 COPYRIGHT EDITION

ADOPTED INTO LANE CODE
CHAPTERS 10 + 16
EFFECTIVE 5-17-91

Webster's Third New International Dictionary

UNABRIDGED

ATTACHMENT
DIVIDER

ATTACHMENT DIVIDER

GOAL ONE COALITION

39625 Almen Drive
Lebanon, Oregon 97355
Phone: 541-258-6074
Fax: 541-258-6810
goal1@pacifier.com

July 14, 2004

Lane County Board of Commissioners
125 East 8th Avenue
Eugene, Oregon 97401

RE: PA 02-5838, Ogle marginal lands application

Dear Commissioners:

The Goal One Coalition (Coalition) is a nonprofit organization whose mission is to provide assistance and support to Oregonians in matters affecting their communities. The Coalition is appearing in these proceedings at the request of and on behalf of its membership residing in Lane County. Mr. Just is appearing in these proceedings on behalf of the Coalition, LandWatch Lane County, and himself.

INTRODUCTION

This proposal is to redesignate 73.74 acres of land on two parcels, under separate ownership from "Agricultural Land" to "Marginal Land," and change the zoning from E-40/ Exclusive Farm Use to ML/Marginal Land.

The parcels are identified as Map 18-04-1, TL 303 & 304. TL 303 is 58.40 acres in size, and is owned by Brad and Julie Ogle. TL 304 is 55.34 acres in size, and is owned by Mark and Cindi Childs.

The northern portions of both Tax Lot 304 (TL 304) and Tax Lot 303 (TL 303), totaling 40 acres, were redesignated and rezoned Marginal Land in 1992. The acreage on each separate tax lot proposed for redesignation has not been identified.

Soils on the proposed marginal land portion of TL 303 are as follows:

102C	Panther silty clay loam, 2-12% slopes	12.936 ac.	37.871%
107C	Philomath silty clay, 3-12% slopes	12.853 ac.	37.629%
108F	Philomath cobbly silty clay, 12-45% slopes	5.628 ac.	16.477%
113G	Rittner cobbly silty clay loam, 30-60% slopes	2.741 ac.	08.023%
		34.158 ac.	100%

#2 - 47pp.

Soils on the proposed marginal land portion of TL 303 are as follows:

81D	McDuff clay loam, 3-25% slopes	5.600 ac.	14.150%
102C	Panther silty clay loam, 2-12% slopes	1.747 ac.	04.415%
107C	Philomath silty clay, 3-12% slopes	18.276 ac.	46.176%
108F	Philomath cobbly silty clay, 12-45% slopes	17.792 ac.	17.792%
113E	Ritner cobbly silty clay loam, 12-30% slopes	6.914 ac.	17.468%
		39.579 ac.	100%

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. Although the agenda cover memo states that the applicant intends to pursue a nine-parcel outcome, no subdivision or partition request requiring an inquiry into whether adjacent lands would qualify as marginal lands is part of this proposal.

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. It is not clear that the 1983 Lane County *Working Paper: Marginal Lands* was adopted by ordinance or is a land use regulation. Even if it were, because the provisions being applied are provisions of state statute, no local interpretation of ORS 197.247 is due deference under ORS 197.829(1), and no county interpretation of local provisions implementing ORS 197.247 will be given deference. *Davenport v. City of Tigard*, 121 Or App 135, 140, 854 P2d 483 (1993); *Holsheimer v. Columbia County,* 28 Or LUBA 279, 282 (1994).

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. 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 chosen to address the "productivity" option of the second prong of the marginal lands test.

ANALYSIS

Because calculation of average income over the growth cycle depends upon assumptions and evidence related to productivity of the proposed marginal lands, this analysis 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).

1. The proposed marginal lands do not meet the "productivity" test.

a. The applicants' information and the Setchko Report inadequately address the requirements of ORS 197.247(1)(b)(C) because they fail to consider productivity for timber species other than Douglas-fir.

ORS 197.247(1)(b)(C) establishes that lands can qualify as marginal lands only if they are not capable of producing "eighty-five cubic feet of merchantable timber per acre per year[.]" "Merchantable stand of timber" means "any stand on forestlands containing living or dead timber which is being or can be harvested." ORS 321.005(8). Thus "timber" means "trees collectively." *Webster's New Universal Unabridged Dictionary*. A forest product is "merchantable" if it is salable, regardless of whether sold for profit or loss. *Ellingson Lumber Co. v. Department of Revenue,* 8 OTR 273 (1980). "Forestland" means "land that is used for the growing and harvesting of forest tree species, regardless of how the land is zoned or taxed or how any state or local statutes, ordinances, rules or regulations are applied." ORS 527.620(7).

The ORS 527.620(6) definition of "forest tree species" provides, in relevant part:

> "Forest tree species" means "any tree species capable of producing logs, fiber or other wood materials suitable for the production of lumber, sheeting, pulp, firewood or other commercial forest products[.]"

Thus "merchantable timber" means any forest tree species that is salable for lumber, sheeting, pulp, firewood or other commercial forest product, whether for profit or loss.

The Court of Appeals has held that the county's consideration of soil productivity for timber cannot be limited to Douglas-fir simply because NRCS has made not other data available:

> "OAR 660-06-005(2) expressly allows alternative methods of determining soil productivity capacities to be used when NRCS data are not available. As petitioners read the rule, however, it would limit the county's consideration to data relating to Douglas fir simply because NCRS has made no other data available. That understanding is contrary to what the rule plainly says." *Carlson v. Benton County,* 154 Or App 62, 68, 961 P2d 248 (1998).

An evaluation of a property's capability for production of merchantable timber must consider productivity for *all* merchantable forest tree species, not just Douglas-fir. Merchantable hardwoods include black cottonwood, Oregon ash, Oregon white oak, red alder, bigleaf maple and hybrid poplar. Merchantable conifers include ponderosa pine, grand fir, western red cedar, western hemlock, and KMX. The Woodland Workbook, R. E. Duddles and C. G. Landgren, Oregon State University Extension Service, EC 1196, November 1999.[1]

---

[1] See Appendix 3-2.

OAR 660-006-0003(1) provides:

> "OAR Chapter 660, Division 006 applies to all forest lands as defined by Goal 4."

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."

OAR 660-006-0005(2) provides:

> "'Cubic Foot Per Acre' means the average annual increase in cubic foot volume of wood fiber per acre for fully stocked stands at the culmination of mean annual increment as reported by the USDA Natural Resources Conservation Service (NRCS). Where NRCS data *are not available or are shown to be inaccurate*, an alternative method for determining productivity may be used. *An alternative method must provide equivalent data and be approved by the Department of Forestry.*" (Emphasis added.)

LUBA has, in the context of a plan amendment and zone change to allow rural residential uses, explained:

> It is capability or potential for production, measured as cf/ac/yr of commercial tree species, that is at issue in determining a property's suitability for commercial forest uses. *Potts v. Clackamas County,* 42 Or LUBA 1 (2002).

LUBA has explained what "equivalent data" means:

> NRCS data are expressed directly in terms of the ultimate legal standard, *i.e.*, cubic feet per acre per year. * * * The rule's [OAR 660-006-0005(2) requirement for "equivalent data" requires that any alternative methodology must be capable of expressing that data as "cubic feet per acre per year," as NRCS does, or as equivalent data." *Carlson v. Benton County,* __ Or LUBA __ [37 Or LUBA 899, 911 (2000)?]. (LUBA No. 99-132, April 2000).

It is well established that lack of a soil productivity rating does not mean that a soil has no capability for forest production. James Hecker, NRCS Resource Conservationist, has stated:

> "There is a misunderstanding when soils are not rated for forest production. It does not mean these soils are 'nonproductive,' but rather are 'typically' used for agriculture and have been rated for that use with predicted yields and given a Capability Class Rating for crop production." [2]

[2] *Carlson v. Benton County,* 34 Or LUBA 140, 149 (1998).

Thor Thorson, NRCS Soil Data Quality Specialist, in response to the question 'Does the lack of [NRCS] data on site productivity indicate a soil is unsuitable for timber production?' has stated:

> "No; only that suitable timber sites were not measured at the time the survey was conducted, or since the survey was completed. The soils therefore may or may not be capable of timber production at some level."[3]

James Johnson, Farm/Forest Coordinator with the Department of Land Conservation and Development, has stated that for purposes of OAR 660-06-005(2):

> "The applicants cannot simply depend on a 'nonrating' to make a case that soils located on a site are not productive. OAR 660-06-005(2) * * * requires the applicants to provide other methods, with equivalent data, to show the productivity of the subject soils. A statement that the soils are unrated does not provide a method with data equivalent to NRCS data used to determine productivity."[4]

Forestry expert Marc Barnes has stated:

> "[T]he lack of wood fiber productivity data in the Soil Survey of Benton County for certain soil types does not mean that the soil type is unsuitable for wood-fiber production, only that at the time the survey was conducted, wood fiber productivity data was not collected for these soil types, since they were being used predominately for other purposes -- mainly agriculture."[5]

Steve Campbell of the U.S. Department of Agriculture has stated:

> "There may be soil map unit components that are capable of supporting stands of commercial forest tree species, but not enough suitable sites were located during the course of the soil survey to make a statistically valid estimate of forest productivity. In these cases there will not be any forest productivity data in the database, but this does not mean the component is not capable of supporting commercial forest stands."[6]

The *Lane County Soil Ratings for Forestry and Agriculture*, explaining Douglas-fir Site Index notations at p. 6, states:

> "'none' Indicates soil map units that lack site index information on Douglas fir. The soil map unit may have the capacity to produce Douglas fir, but this productivity may be very low to very high. No site index has been collected by the NRCS due to lack of suitable sites or lack of time and or funds."

---

[3] *Carlson v. Benton County*, 34 Or LUBA 140, 149 (1998).
[4] *Carlson v. Benton County*, 34 Or LUBA 140, 149 (1998).
[5] *Carlson v. Benton County*, 34 Or LUBA 140, 149 (1998).
[6] See Exhibit 3.

LUBA rulings have established as law that the lack of a NRCS rating provides no information, quantitative or otherwise, pertinent to the statutory test of whether a soil is capable of producing defined levels of wood fiber. *Carlson v. Benton County*, 34 Or LUBA 140, 149 (1998).

There are no NRCS Douglas-fir site indexes or cf/ac/yr ratings for the Panther, Philomath and Steiwer soils. Instead, the Setchko Report relies on soil ratings from an Office of the State Forester Memorandum dated February 8, 1990 (1990 Memo). No cover letter or text of the 1990 Memo is provided. The Coalition contacted Kevin Birch, Planning Coordinator, Forest Resources Planning, Department of Forestry to obtain a copy of the 1990 Memo. Mr. Birch informed the Coalition that no "Office of State Forester Memorandum, February 8, 1990, General File 7-1-1" was to be found in ODF records.

Mr. Birch did provide a copy of a Office of State Forester Memorandum dated January 27, 1989, appended to which were Lane County soil ratings which , while not identical, are very similar to those provided in the Setcho Report. It can be presumed that these ratings, having been provided by the State Forester, are approved by the Department of Forestry.

The applicant has provided no ratings for species other than Douglas-fir. Rather, in the context of the income test, the February 3, 2004 Setchko letter states at p. 1:

> "Timber species other than Douglas-fir not considered. Merchantable hardwood species mentioned include black cottonwood, Oregon ash, Oregon white oak, red alder, bigleaf maple and hybrid poplar. All of these species, except for Oregon white oak and maple, require large amounts of water to grow; which is why they are found primarily in wetland areas and along streams. There is not enough moisture on this parcel to support these trees. Oregon white oak and bigleaf maple are worth very little from a commercial standpoint, particulary the small scrub oak, which is worth almost nothing. Therefore these species were not considered for the income test.
>
> "Merchantable conifer species mentioned included ponderosa pine, grand fir, western red cedar, western hemlock and KMX. Red cedar and hemlock will not grow on this site, due to moisture constraints; the remaining species are worth considerably less money than Douglas-fir. Therefore, they were not considered for the income test."

The Setchko letter addresses the productivity test at p. 2:

> "Goal One states that my report fails to address the timber productivity of soils not rated for Douglas-fir, and the productivity for merchantable species other than Douglas-fir. It further states that these soils could support merchantable hardwoods and other conifers. I have addressed **every** soil on the parcel and assigned a productivity rating to every soil. Nowhere have I denied that a particular soil will not support other tree species; I have used Douglas-fir because it worth (sic) considerably more money than any other species which could be grown."

This reasoning is repeated in the analysis found in the Agenda Cover Memo, which states at p. 4:

> "However, the operative term in ORS 197.247(1)(b)(C) is that of the productivity of 'merchantable timber'. One aspect of the term 'merchantable' means being of commercial quality and acceptable to buyers. The consulting forester did provide substantive evidence that other tree species, including numerous hardwoods as well as conifers, were not 'merchantable' due to lack of water availability and/or the large price difference favoring the growing of Doug fir over the other species."

Thus the applicant's expert and staff have interpreted the term "merchantable" in ORS 197.247(1)(b)(C) to mean only the most valuable species which will grow on a site. This simply is not what the statute says, or what the criterion requires. For purposes of the productivity test, productivity for any or all species which may be sold for gross income must be considered, whether used as lumber, sheeting, pulp, firewood or other commercial forest products.

The Setchko letter dismisses several hardwood species from consideration because "there is not enough moisture on this parcel to support these trees." This statement is conclusory, as it does not point to any data and explain how that evidence supports the conclusion reached.

The Setchko letter's conclusion is incorrect. The Soil Survey indicates that the Panther soils support hardwoods. Hardwoods that qualify as "merchantable timber" include black cottonwood, Oregon ash, white oak, and red alder. In addition, hybrid poplar can be grown in soils such as Panther. Poplar plantations supporting growth rates of 350 to 500 cubic feet per acre per year after eight years are found on the poorly drained, alluvial soils west of the Cascades.[7]

The Panther soil is described in the Soil Survey as a deep, poorly drained alluvial soil found in areas receiving an average of 45 inches of rain per year.[8] The Panther soil unit is one which supports hybrid poplar.

The Setchko letter dismisses Oregon white oak and bigleak maple as "worth very little." While this statement may be true, it is not relevant to the issue of potential productivity. At the very least, these species could be sold as firewood.

Similarly, the Setchko letter dismisses ponderosa pine, grand fir, and KMX as "worth considerably less money." Again, even if true, the conclusion is not relevant to the issue of the proposed marginal lands' potential productivity for those species. The Setchko letter states that cedar will not grow on the site, due to moisture constraints. This is contradicted by the applicant's information that scattered fir, pine and cedar are found on the proposed marginal lands.

The Soil Survey describes Philomath silty clay as "shallow and well-drained," and indicates that it supports Oregon white oak and ponderosa pine. Researchers at Oregon State University have assigned Philomath silty clay loam a 50-yr site index of 104 for ponderosa pine.[9]

---

[7] "Hybrid Poplar in the Pacific Northwest," *Journal of Forestry*, June 2002, p. 29. See App. 1-2.
[8] See Exhibit 1-2.
[9] Fletcher, *Establishing and Managing Ponderosa Pine in the Willamette Valley*, EM 8805. See Appendix 2-3.

b. Calculation of productivity marginal lands potions of TL 303 and TL 304 using available information

It is possible to calculate the productivity of the proposed marginal lands for a combination of Douglas-fir (DF) and Ponderosa pine (PP), using available data. Reasonable management practices would include planting each site within a parcel with species suited to that site; no reasonable person would plant unsuitable species and then complain that they wouldn't grow.

Available information does not readily convert site indexes for Ponderosa pine to cf/ac/yr equivalents. However, information provided by Max Bennett, a OSU forester, enables a calculation of yields. First, the 50-year site index must be converted to a 100-year index. Referring to applicant's Exhibit 8, a 50-year site index of 107 converts to a 100-year site index of 123. Using tables provided by Bennett, a site index of 120 yields 141 cf/ac/yr at stand age 40.[10] Using that number, productivity calculations should be quite conservative. The methodology used is the same as that used by the applicant's expert, Marc Setchko, and in the Ferbruary 11, 2004 staff Supplemental Memo.

Tax Lot 303	Site index	Cf/ac/yr	Species	Acres	Productivity
102C Panther	3 (low)	50	DF	12.936	647
107C Philomath	120	141	PP	12.853	1812
108F Philomath	120	141	PP	5.628	794
113G Ritner	107	149	DF	2.741	408
				34.158	3661
				=	107.18 cf/ac/yr

Tax Lot 304					
81D Mcduff	112	158	DF	5.600	885
102C Panther	3 (low)	50	DF	1.747	87
107C Philomath	120	141	PP	18.276	2577
108F Philomath	120	141	PP	7.042	993
113G Ritner	107	149	DF	6.914	1030
				39.579	5572
				=	140.78 cf/ac/yr

The above calculations do not consider productivity for fast-growing forest tree species such as hybrid poplar or KMX. KMX has been found to grow twice as fast as Douglas-fir or ponderosa pine on the same sites.[11]

Conclusion: the portions of both TL 303 and TL 304 proposed to be redesignated marginal land are capable of producing in excess of 85 cf/ac/yr of merchantable timber. Therefore neither can be approved as marginal land.

---

[10] See Exhibit 2.

[11] Sharrow and Fletcher, *Agrosilvopastoral Experience in Western Oregon*, Agroforestry and Sustainable Systems: Symposium Proceedings, August 1994. See Appendix 4-3.

2. The proposed marginal lands do not meet the "income" test.

TL 303 and 304 were under one ownership in 1983. Therefore income or potential income of the entire 113.74-acre tract must be considered for purposes of addressing the income test of ORS 197.247(1)(a).

The applicant has submitted an affidavit from the owner of the subject properties during the 5-year period preceding January 1, 1983 attesting that the proposed marginal lands were not managed as part of a farm operation producing $20,000 or more in annual income or a forest operation capable of producing an average, over the growth cycle, of $10,000 in gross income.

a. Farm income

The farm income part of the test is based on actual income, and addressing that test is straightforward: did or did not a farm operation produce $20,000 or more in gross income during three of five calendar years preceding 1983? An affidavit attesting that the subject property was not part of a farm operation that grossed $20,000 in income during the relevant period can constitute substantial evidence.

b. Forest income

Addressing the forest income part of the test is more difficult. "Managing" a forest operation can include doing nothing for extended periods of time, while a stand of timber grows and matures. Information provided by the applicants indicates that the property was in fact logged "within the last ten years." Department of Forestry records indicate that the 113-acre tract was logged of approximately 400,000 board feet by Brieden Bros. in 1992, and of approximately 175,000 board feet by Derek Jaros in 1997. The Setchko Report concedes at p. 2 that "[t]he parcel was logged over the last ten years, before the current owners purchased the property." The subject property was managed for timber production within the period 1978-1982 if it was subsequently harvested within a 50-year cycle. The applicants' information further indicates that the property is currently forested with "scattered" Douglas-fir, ponderosa pine and incense cedar. Property tax records indicate that all of the acres on the original, parent TL 300 were forest deferred. On the two new parcels, all of TL 303 is forest deferred, and all but 1.00 acre for the homesite is forest deferred on TL304. For all of these reasons, it cannot be disputed that the proposed marginal land was managed as a forest operation during the 1978-82 period.

i. The Setchko Report erroneously uses 1983 prices to determine average income over the growth cycle.

Forest income is prospective over the growth cycle. The applicants' submitted affidavit, which merely asserts that the proposed marginal lands were not, during the 1978-82 period, part of a forest operation capable of grossing $10,000 in income over the growth cycle, is not substantial evidence given that the subject property was and is in forest deferral and has been harvested for timber. What is required is an evaluation of the ability of the forest operation of which the proposed marginal lands were a part to generate average income of $10,000 from forest operations *over the growth cycle,* based on the potential capability of the lands comprising the forest operation and assuming reasonable management practices.

In *DLCD v. Lane County (Ericcson),* 23 Or LUBA 33, 36 (1992), LUBA explained:

> "ORS 197.247(1)(a) requires a two part inquiry to determine whether a forest parcel may be designated as "marginal" land. First, the county must determine whether the land was managed as part of a forest operation during three of the five years from 1978 through 1982. * * * Second, ORS 197.247(1)(a) requires the county to determine whether the forest operation in question *is* capable of producing an average of $10,000 in annual gross income over the growth cycle. What occurred on the subject parcel during the 1978-1982 time period is not the sole determinant of the "capability" of the subject parcel to produce trees, because the growth cycle of trees may greatly exceed the specified five year period." (Emphasis added.)

Thus LUBA has held that, for purposes of calculating income, it did not make sense to limit the inquiry to the 1978-1982 period. In *Ericcson,* that's exactly what Lane County did, and what LUBA affirmed: the applicant's expert used, and Lane County accepted, (then) current 1988-89 timber values.

Current timber values to calculate potential gross income over the growth cycle. Alternatively, average timber prices over a 50- or 60-year growth cycle, beginning during the 1978-82 period, might be considered appropriate. More recent prices are considerably higher than those used in the Setchko Report. An ODF table showing 1994 and 2004 prices is provided in Exhibit 4. It can be seen that in 1994 prices were almost three times greater than the 1983 prices used in the Setchko Report, and 2004 prices are more than double those used in the Setchko Report.

Because the applicants have failed to use reasonable prices in computing average income over the growth cycle, the information provided is not adequate to establish that ORS 197.247(1)(a) is satisfied.

ii. The use of a 50-year growth cycle does not reflect the use of reasonable management practices.

The first Setchko Report calculated income over the growth cycle assuming a 60-year cycle from planting to harvest. Later reports asumed a 50-year growth cycle, resulting in significantly less average income over the growth cycle.

ORS 197.247 does not specify the number of years to be used to determine the "growth cycle." However, case law has interpreted ORS 197.242 to assume "reasonable management practices." *DLCD v. Lane County (Ericcson),* 23 Or LUBA 33, 36 (1992).

"Reasonable management practices" would include selecting a growth and harvest cycle that would maximize average income over that cycle. The evidence provided by the applicant's expert demonstrates that "reasonable management practices" in this case would mandate the selection of a 60-year cycle rather than a 50-year cycle.

Lane County's March 1997 Supplement to the Marginal Lands Information Sheet states that a 50-year growth cycle should be used, with the option that another standard could be used if substantiated by compelling scientific evidence presented by the applicant. The applicant has presented such evidence.

Regardless, the meaning of "growth cycle" is a matter of statutory interpretation. Any local interpretation of "growth cycle" is due no deference. "Reasonable management practices" would require that the growth cycle resulting in the greatest average income be selected.

iii. The Setchko Report has failed to consider income potential for timber species other than Douglas-fir.

As previously discussed in relation to the "productivity" test, the Setchko reports did not consider productivity for any timber species other than Douglas-fir.

Species not considered in the Setchko Report may yield much more timber than Douglas-fir, as it is conceded that several of the soils are not particularly well suited for Douglas-fir production. Some soil units are productive for other forest tree species. For example, the Philomath soil unit is productive for ponderosa pine, and the Panther soil is productive for hybrid poplar.

The ODF Log Price Information sheets indicates that ponderosa pine can generate substantial income. Current prices for 2S are $850; 1994 prices were $1,250.[12]

iv. Calculation of average income potential

Calculations of potential income for the subject tract for timber production are found below.

Table 1 uses the assumptions of and data in the first Setchko Report[13] A 60-year growth cycle is assumed; however, prices are those given in the ODF Log Price Information tables, using 2004 2nd Quarter and 1994 1st Quarter prices for Douglas-fir.

Table 2 uses the assumptions and data in the February 3, 2004 Setchko Report. A 50-year growth cycle is assumed. As in Table 1, prices are those given in the ODF Log Price Information tables, using 2004 2nd Quarter and 1994 1st Quarter prices for Douglas-fir.

---

[12] See Exhibit 4-3, 4-7.

[13] The Setchko Report contains errors in its calculation of potential income from rated soils. At p. 3 the Setchko Report states that the 100 Year Site Index for McDuff clay loam is 112, and for Ritner cobbly silty clay loam 107. The Setchko Report then "adjusts" to arrive at 50-Year Site Indexes of 98 and 95, respectively.

The source of these site indexes is the *Lane County Soil Ratings for Forestry and Agriculture.* Doulgas-fir site indexes and cf/ac/yr ratings found therein are calculated using 50-year Douglas-fir data unless otherwise noted. See *Lane County Soil Ratings*, p. 6. The Setchko Report has erred in further reducing indexes which are already 50-year indexes. That error has not been corrected in Table 1.

Table 1: Average Income over a 60-year growth cycle

DF	MBF	$/MBF 2004 value		$/MBF 1994 value	
2S	678.36	$600	$ 407,016	$740	$ 501,986
3S	847.95	$575	$ 487,571	$675	$ 572,366
4S	169.59	$510	$ 86,491	$575	$ 97,514
TOTAL			$ 981,078		$1,171,866
AVERAGE (÷ 60)			**$ 16,351**		**$ 19,531**

Table 2: Average Income over a 50-year growth cycle

DF	MBF	$/MBF 2004 value		$/MBF 1994 value	
2S	444.34	$600	$ 266,604	$740	$ 328,812
3S	555.43	$575	$ 319,372	$675	$ 374,915
4S	111.08	$510	$ 86,491	$575	$ 97,514
TOTAL			$ 672,467		$ 801,241
AVERAGE (÷ 50)			**$ 13,449**		**$ 16,025**

Conclusion: Regardless of whether a 50-year or a 60-year growth cycle is used to calculate average income, using reasonable pricing assumptions, the subject tract was managed during three of the five calendar years preceding January 1, 1983 as part of a forest operation capable of producing an average, over the growth cycle, of $10,000 in annual gross income.

CONCLUSION

The portions of both TL 303 and TL 304 proposed to be redesignated marginal land are capable of producing in excess of 85 cf/ac/yr of merchantable timber. Therefore neither can be approved as marginal land.

The subject 113.74-acre tract was managed during three of the five calendar years preceding January 1, 1983 as part of a forest operation capable of producing an average, over the growth cycle, of $10,000 in annual gross income.

The requirements of ORS 197.247 are not met, and this application to redesignate the subject lands as marginal lands must be denied.

The Coalition asks that notice of any decision and a copy of any decision be provided.

Respectfully submitted,

Jim Just
Executive Director, Goal One Coalition

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is clay or silty clay.

McDuff Series

The McDuff series consists of moderately deep, well drained soils on uplands in the Cascade Range. These soils formed in colluvium and residuum derived from volcanic tuff and breccia. Slopes are 3 to 70 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of McDuff clay loam, 25 to 50 percent slopes; from a cutbank above a logging road, in the NE1/4SE1/4SW1/4 of sec. 23, T. 19 S., R. 2 W.

O1-2 inches to 0; litter of decaying needles, leaves, and twigs.

A1-0 to 6 inches; very dark brown (10YR 2/2) clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure and moderate fine granular; slightly hard, friable, sticky and plastic; many very fine, fine, and medium roots; many very fine tubular and irregular pores; 10 percent pebbles and cobbles; strongly acid (pH 5.4); clear smooth boundary.

B1-6 to 14 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; common fine, medium, and coarse roots; many very fine tubular pores; 10 percent pebbles and cobbles; strongly acid (pH 5.1); clear smooth boundary.

B21t-14 to 24 inches; dark brown (10YR 3/3) clay, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; very hard, firm, very sticky and very plastic; common fine, medium, and coarse roots; many very fine tubular pores; few thin clay films on peds and in pores; 5 percent pebbles; extremely acid (pH 4.3); gradual smooth boundary.

B22t-24 to 33 inches; dark brown (10YR 3/3) clay, brown (7.5YR 5/4) dry; moderate medium and fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; many very fine tubular pores; common moderately thick clay films on peds and in pores; 10 percent soft pebbles; very strongly acid (pH 4.5); gradual smooth boundary.

B3t-33 to 37 inches; brown (10YR 4/3) and dark yellowish brown (10YR 3/4) silty clay, pale brown (10YR 6/3) dry; moderate coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; many moderately thick clay films on peds; 10 percent soft pebbles; extremely acid (pH 4.4); clear wavy boundary.

Cr-37 inches; light olive brown (2.5Y 5/4), weathered and fractured tuffaceous bedrock; thick clay films in fractures.

Thickness of the solum and depth to bedrock are 24 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, and it has value and chroma of 2 or 3 when moist. The horizon is 0 to 10 percent coarse fragments.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 3 or 4 when moist and 4 to 7 when dry, and chroma of 3 to 6 when moist or dry. It is clay or silty clay.

The Cr horizon is weathered tuff, breccia, or sedimentary rock.

Meda Series

The Meda series consists of deep, well drained soils on fans and terraces. These soils formed in alluvium and colluvium derived from sedimentary and igneous rock. Slopes are 2 to 12 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Meda loam, 2 to 12 percent slopes, south of U.S. Highway 36, 0.2 mile east of Horton Junction, in the NW1/4SW1/4SW1/4 of sec. 10, T. 16 S., R. 7 W.

A11-0 to 8 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular and irregular pores; 10 percent pebbles; strongly acid (pH 5.4); clear smooth boundary.

B1-8 to 19 inches; dark brown (10YR 3/3) gravelly clay loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; 20 percent pebbles; strongly acid (pH 5.4); clear wavy boundary.

B21-19 to 27 inches; brown (10YR 4/3) gravelly clay loam, pale brown (10YR 6/4) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; 25 percent pebbles; strongly acid (pH 5.2); clear wavy boundary.

B22-27 to 40 inches; brown (10YR 4/3) gravelly clay loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; 20 percent pebbles; strongly acid (pH 5.1); clear wavy boundary.

C1-40 to 60 inches; multicolored, stratified very gravelly sandy loam; massive; slightly hard, friable, nonsticky

Exhibit 1-1

sand or very gravelly sandy loam and is 35 to 60 percent coarse fragments.

Oxley Series

The Oxley series consists of deep, somewhat poorly drained soils in concave areas on terraces. These soils formed in mixed gravelly alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Oxley gravelly silt loam, 100 yards south of the intersection of Valley and Edenvale Roads and 15 feet west of Edenvale Road, in the SE1/4NE1/4 of sec. 28, T. 18 S., R. 2 W.

A11-0 to 10 inches; very dark brown (10YR 2/2) gravelly silt loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky and granular structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine and very fine tubular and irregular pores; 15 percent pebbles; medium acid (pH 5.8); clear smooth boundary.

A12-10 to 17 inches; very dark brown (10YR 2/2) gravelly silt loam, very dark grayish brown (10YR 3/2) dry; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many fine and very fine tubular pores; 15 percent pebbles; medium acid (pH 5.6); clear smooth boundary.

A3-17 to 23 inches; dark brown (7.5YR 3/2) gravelly clay loam, very dark grayish brown (10YR 3/2) dry; weak fine prismatic structure parting to moderate medium and fine subangular blocky; hard, friable, sticky and plastic; common very fine roots; many medium and fine tubular pores; 20 percent pebbles; medium acid (pH 5.8); abrupt smooth boundary.

B2t-23 to 35 inches; dark grayish brown (10YR 4/2) and brown (10YR 5/3) very gravelly clay loam, grayish brown (10YR 5/2) dry; common medium prominent strong brown (7.5YR 5/6) mottles; weak fine and very fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common fine tubular pores; 55 percent pebbles; common black manganese stains and yellowish red (5YR 5/6) stains; continuous moderately thick clay films in pores and on pebbles; medium acid (pH 5.9); clear smooth boundary.

B3t-35 to 41 inches; grayish brown (10YR 5/2) very gravelly loam, brown (10YR 5/3) dry; many large prominent strong brown (7.5YR 5/6) mottles; weak fine and very fine subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; many medium, fine, and very fine tubular pores; 55 percent pebbles; many moderately thick clay films in pores and on peds and coarse fragments; slightly acid (pH 6.4); clear wavy boundary.

C-41 to 60 inches; gray (10YR 6/1) extremely gravelly sandy loam, grayish brown (10YR 5/2) and brown (10YR 5/3) dry; massive; hard, friable, nonsticky and nonplastic; few fine tubular pores; 60 percent pebbles and 10 percent cobbles; light yellowish brown (10YR 6/4) pockets of clay in pores and cavities under some of the larger pebbles and cobbles; neutral (pH 6.9).

Depth to bedrock is more than 60 inches. The mollic epipedon is 12 to 24 inches thick.

The A horizon has hue of 10YR or 7.5YR, value or 2 or 3 when moist or dry, and chroma of 1 or 2 when moist or dry. It is 15 to 25 percent pebbles.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6 when moist or dry, and chroma of 2 or 3 when moist or dry. Mottles are small to large and are strong brown and yellowish brown. The horizon is very gravelly loam or very gravelly clay loam and is 35 to 60 percent coarse fragments.

The C horizon is weakly stratified extremely gravelly sandy loam, very gravelly loam, or extremely gravelly loam. It is 55 to 80 percent coarse fragments.

Panther Series

The Panther series consists of deep, poorly drained soils in swales and on small benches of foothills adjacent to the valleys of the Willamette River and its tributaries. These soils formed in colluvium and residuum derived from sedimentary and basic igneous rock. Slopes are 2 to 12 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Panther silty clay loam, 2 to 12 percent slopes, about 1.5 miles northwest of Marcola, in the NW1/4NE1/4SW1/4 of sec. 12, T. 16 S., R. 2 W.

A1-0 to 10 inches; very dark brown (10YR 2/2) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; hard, firm, sticky and plastic; many fine roots; many fine irregular pores; medium acid (pH 5.6); abrupt smooth boundary.

B21g-10 to 16 inches; very dark grayish brown (10YR 3/2) clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure; very hard, very firm, very sticky and very plastic; common fine roots; common fine tubular pores; few pressure faces; medium acid (pH 5.8); gradual smooth boundary.

B22g-16 to 29 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine prismatic structure and weak medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine tubular pores; common pressure faces; few slickensides; slightly acid (pH 6.2); gradual smooth boundary.

Exhibit 1-2

C1g-29 to 42 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) dry; common medium distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common fine tubular pores; common pressure faces; slightly acid (pH 6.5); clear wavy boundary.

Cr-42 inches; weathered sedimentary rock.

Depth to bedrock is 40 to 60 inches.

The A horizon has value of 2 or 3 when moist, and it has chroma of 1 or 2 when moist or dry. It has none to many, fine, distinct, dark reddish brown or dark yellowish brown mottles in the lower part of the horizon.

The B horizon generally has hue of 2.5Y, but it ranges to 5Y and 10YR. The horizon has value of 3 to 5 when moist and chroma of 1 to 3 when moist or dry. It is 60 to 70 percent clay.

The C horizon is 0 to 50 percent soft rock fragments that are highly weathered and are easily crushed.

Peavine Series

The Peavine series consists of moderately deep, well drained soils on uplands of the Coast and Cascade Ranges. These soils formed in colluvium and residuum derived from sedimentary rock and tuff. Slopes are 3 to 60 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is about 50 degrees F.

Typical pedon of Peavine silty clay loam, 3 to 30 percent slopes, about 900 feet north and 500 feet east of the southwest corner of sec. 17, T. 16 S., R. 2 W.

O1-0.5 inch to 0; brackenfern duff.

A11-0 to 2 inches; dark reddish brown (5YR 3/2) silty clay loam, brown (7.5YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine irregular pores; medium acid (pH 6.0); clear smooth boundary.

A12-2 to 8 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; common very fine tubular pores; medium acid (pH 5.6); clear smooth boundary.

B1-8 to 15 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; strong medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; common very fine tubular pores; few thin clay films; very strongly acid (pH 5.0); clear wavy boundary.

B21t-15 to 25 inches; yellowish red (5YR 3/6) clay, yellowish red (5YR 4/6) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; very hard, friable, sticky and plastic; common fine roots; common fine and very fine tubular pores; common moderately thick clay films; very strongly acid (pH 4.6); gradual wavy boundary.

B22t-25 to 38 inches; reddish brown (5YR 4/4) and yellowish red (5YR 4/6) silty clay, reddish brown (5YR 5/4) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine and very fine tubular pores; common thick clay films; prominent black manganese stains; very strongly acid (pH 4.6); abrupt wavy boundary.

Cr-38 inches; variegated, weathered bedrock.

Thickness of the solum and depth to bedrock are 20 to 40 inches.

The A horizon has hue of 7.5 or 5YR, and it has value and chroma of 2 or 3 when moist. The horizon is medium acid or strongly acid.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist, and chroma of 4 to 6 when moist. It is silty clay or clay and is strongly acid or very strongly acid.

Pengra Series

The Pengra series consists of deep, somewhat poorly drained soils on toe slopes and fans. These soils formed in stratified alluvium. Slopes are 1 to 4 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Pengra silt loam, 1 to 4 percent slopes, south of Neilson Road, in the NW1/4NW1/4 of sec. 31, T. 17 S., R. 4 W.

Ap-0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (2.5Y 5/2) dry; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; many fine tubular pores; medium acid (pH 5.8); abrupt smooth boundary.

B1-6 to 13 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (2.5Y 5/2) dry; few fine distinct yellowish brown (10YR 5/6, 5/8) mottles; weak coarse subangular blocky structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and plastic; common very fine roots; many very fine tubular pores; medium acid (pH 5.6); clear wavy boundary.

B2-13 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; many distinct yellowish brown (10YR 5/6, 5/8) mottles; moderate coarse prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; medium acid (pH 5.8); abrupt wavy boundary.

Exhibit 1-3

IIC1-21 to 36 inches; very dark grayish brown (2.5Y 3/2) clay, dark gray (5Y 4/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; common small pressure faces; slightly acid (pH 6.4); gradual wavy boundary.

IIC2-36 to 60 inches; dark grayish brown (2.5Y 4/2) clay, gray (5Y 5/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; common small pressure faces; neutral (pH 6.6).

Depth to bedrock is more than 60 inches. Distinct mottles are at a depth of 12 inches or less.

The B2 horizon has hue of 5Y to 10YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 2 or 3 when moist or dry.

The IIC horizon has hue of 2.5Y or 5Y, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 1 to 3 when moist or dry. Below a depth of 16 to 30 inches, the horizon is 60 to 70 percent clay.

Philomath Series

The Philomath series consists of shallow, well drained soils on foothills adjacent to the Willamette Valley. These soils formed in colluvium and residuum derived from basic igneous rock. Slopes are 3 to 45 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Philomath cobbly silty clay, 12 to 45 percent slopes, 2 miles east of Hayden Bridge, in the SE1/4 NE1/4NW1/4 of sec. 21, T. 17 S., R. 2 W.

A11-0 to 6 inches; very dark brown (10YR 2/2) cobbly silty clay, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, sticky and plastic; many fine roots; many fine irregular pores; 20 percent cobbles; medium acid (pH 5.6); gradual smooth boundary.

A12-6 to 14 inches; very dark brown (7.5YR 2/2) cobbly silty clay, dark brown (7.5YR 4/2) dry; moderate fine subangular blocky structure; hard, firm, very sticky and plastic; common fine roots; common very fine tubular pores; 20 percent cobbles; medium acid (pH 5.8); clear wavy boundary.

IICr-14 inches; weathered andesitic bedrock.

Depth to bedrock is 12 to 20 inches. The profile is medium acid or slightly acid.

The A horizon has value of 2 or 3 when moist, and it has chroma of 1 or 2 when moist or dry. It is clay, silty clay, or cobbly silty clay and is 0 to 30 percent coarse fragments.

Preacher Series

The Preacher series consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium and residuum derived from sedimentary rock. Slopes are 0 to 75 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of a Preacher loam in an area of Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes, near South Inlet, in the NW1/4SW1/4 of sec. 31, T. 18 S., R. 11 W.

A11-0 to 4 inches; very dark gray (10YR 3/1) loam, dark brown (7.5YR 4/2) dry; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 10 percent pebbles; very strongly acid (pH 4.4); clear smooth boundary.

A12-4 to 18 inches; very dark grayish brown (10YR 3%2) loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky and granular structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine tubular and irregular pores; 10 percent pebbles; very strongly acid (pH 4.6); clear wavy boundary.

B2-18 to 38 inches; dark yellowish brown (10YR 4/6) loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; 10 percent soft pebbles and 10 percent hard pebbles; very strongly acid (pH 4.6); gradual smooth boundary.

B3-38 to 52 inches; dark yellowish brown (10YR 4/6) loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; 20 percent soft pebbles; very strongly acid (pH 4.6); clear wavy boundary.

C1-52 to 58 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/6) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; 40 percent soft pebbles; very strongly acid (pH 4.6); clear wavy boundary.

Cr-58 inches; weathered, fractured sandstone.

The solum is 36 to 54 inches thick. Depth to bedrock is 40 to 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 to 3 when moist or dry. It is 0 to 10 percent coarse fragments.

The B horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 3 to 6 when moist or dry. It is loam or clay loam that is 25

Exhibit 14

to 35 percent clay. The horizon is 0 to 25 percent pebbles, of which less than 15 percent is hard and is not easily crushed.

The C horizon has colors similar to those of the B horizon. The C horizon is sandy loam, loam, or clay loam. It is 0 to 50 percent pebbles, of which less than 15 percent is hard and is not easily crushed.

Ritner Series

The Ritner series consists of moderately deep, well drained soils on foothills. These soils formed in cobbly colluvium derived from basic igneous rock. Slopes are 2 to 60 percent. The average annual precipitation is about 50 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Ritner cobbly silty clay loam, 30 to 60 percent slopes, south of Wallace Creek Road, in the SE1/4 of sec. 12, T. 18 S., R. 2 W.

O1-1 inch to 0; undecomposed litter of needles, leaves, and twigs.

A1-0 to 7 inches; dark reddish brown (5YR 3/3) cobbly silty clay loam, reddish brown (5YR 4/3) dry; moderate and strong fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and medium roots; many fine tubular pores; 20 percent cobbles and pebbles; medium acid (pH 6.0); clear wavy boundary.

B21-7 to 21 inches; dark reddish brown (5YR 3/4) very cobbly silty clay loam, reddish brown (5YR 4/4) dry; weak coarse subangular blocky structure parting to moderate very fine subangular blocky; hard, friable, sticky and plastic; many medium and few fine roots; many fine tubular pores; 45 percent cobbles and pebbles; medium acid (pH 5.8); clear wavy boundary.

B22-21 to 32 inches; yellowish red (5YR 4/6) very cobbly silty clay loam (5YR 4/6) dry; moderate very fine subangular blocky structure; hard, firm, sticky and plastic; common medium and fine roots; many fine irregular and tubular pores; 55 percent cobbles and pebbles; medium acid (pH5.6); abrupt irregular boundary.

R-32 inches; highly fractured basalt; few thin tongues of soil material in fractures; red clay films on fractures; roots along some fractures to a depth of about 60 inches.

Depth to bedrock is 20 to 40 inches.

The(A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 to 4 when moist or dry. It is 15 to 35 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is very gravelly silty clay or very cobbly silty clay loam and is 35 to 50 percent clay. The horizon is 35 to 60 percent coarse fragments.

Salander Series

The Salander series consists of deep, well drained soils on ridgetops and side slopes on uplands in the Coast Range. They formed in colluvium and residuum weathered from igneous and sedimentary rocks with additions of volcanic ash. Slopes are 12 to 60 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees.

Typical pedon of Salander silt loam, 12 to 30 percent slopes, in a cutbank of a private road, in the NW1/4NW1/4 of sec. 10, T. 17 S., R. 12 W.

O1-3 inches to 0; litter of decaying needles, leaves, and twigs.

A11-0 to 8 inches; very dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 4/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent pebbles and concretions; strongly acid (pH 5.5); clear wavy boundary.

A12-8 to 18 inches; very dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 4/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine irregular pores; 10 percent pebbles; dark brown (7.5YR 3/2) coatings on some peds; strongly acid (pH 5.4); clear wavy boundary.

B21-18 to 28 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 4/2) dry; weak medium and coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots, common fine roots, and few coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 5.0); gradual wavy boundary.

B22-28 to 41 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 5.0); gradual wavy boundary.

B23-41 to 53 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and few medium and coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 4.9); clear wavy boundary.

IIB24-53 to 62 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable,

Exhibit-5

Jim Just

From: "Bennett, Max" <max.bennett@oregonstate.edu>
To: "Fletcher, Rick" <rick.fletcher@oregonstate.edu>; "Jim Just" <goal1@pacifier.com>
Sent: Tuesday, January 27, 2004 5:09 PM
Subject: RE: ponderosa pine soils ratings

Jim & Rick:

I don't have any SW OR volume tables for ponderosa pine I can lay my hands on easily. Not sure they even exist per se. Maybe the closest we can come is from the following two pubs:

Oliver, W.W. and R.F. Powers. 1978. Growth models for ponderosa pine: I. Yield of unthinned plantations in northern California. Research Paper PSW-133. Berkeley CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, USDA. 21 p.
Powers, R.F. and W.W. Oliver. 1978. Site classification of ponderosa pine stands under stocking control in California. Research Paper PSW-128. Berkeley CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, USDA. 9 p.

I don't have copies, they are probably at the OSU library.
On the modelling front, there is SYSTUM-1, which models young stands up to age 20, at which point ORGANON takes over. Actual or hypothetical stand data is required. These models are calibrated with SW OR and N. CA stand data.

As a rough approximation, the Silvics handbook has the following yield table. To calculate the cubic ft/ac/year, determine the mean annual increment (MAI, = total stand volume divided by age) for a given site index. For example, for SI=120, the MAI at age 40 is 5,650 cubic ft / 40 years = 141 cubic ft per acre per year. FOr a 50 year base site index, would have to first convert to 100-base value.

Max

Table 1- Total volume inside bark of ponderosa pine 1.5 cm (0.6 in) and larger in d.b.h. (*39*)

Age	Site index at base age 100 years[1]			
	18 m or 60 ft	27 m or 90 ft	37 m or 120 ft	46 m or 150 ft
yr	m³/ha			
20	28	94	168	262
40	122	238	396	588
60	192	340	570	861
80	238	413	696	1060
100	273	472	794	1204
120	308	518	868	-
140	336	556	928	-
yr	ft³/acre			
20	400	1,350	2,400	3,750

Exhibit 2

40	1,750	3,400	5,650	8,400
60	2,750	4,850	8,150	12,300
80	3,400	5,900	9,950	15,150
100	3,900	6,750	11,350	17,200
120	4,400	7,400	12,400	-
140	4,800	7,950	13,250	-
[1]Height of dominant and codominant trees of average d.b.h.				

: Fletcher, Rick
Sent: Tuesday, January 27, 2004 9:40 AM
To: Jim Just
Cc: Bennett, Max
Subject: RE: ponderosa pine soils ratings

Jim:

There are no published yield tables for Valley ponderosa like there are for Douglas-fir and other species. One logical approach would be to use the volume tables for ponderosa in SW Oregon. Max Bennett, our agent in Medford has some experience with Valley ponderosa and ponderosa in SW Oregon, so he may be able to help with this. I have included him in this email. Let's see what he might suggest.

Rick

From: Jim Just [mailto:goal1@pacifier.com]
Sent: Mon 1/26/2004 3:51 PM
To: Fletcher, Rick
Subject: ponderosa pine soils ratings

Rick,
How would you convert a site index for ponderosa pine into a cf/ac/yr rating? i.e. for Philomath soils, what cf/ac/yr rating could be expected from a site index of 104?

Thanks for your help.

Jim Just, Executive Director
Goal One Coalition
39625 Almen Drive
Lebanon, OR 97355
phone/fax: 541.258.6074

Championing the role of citizens in decisions affecting the livability of their communities and the sustainability of the natural environment

United States Department of Agriculture

NRCS Natural Resources Conservation Service

101 SW Main Street; Suite 1300
Portland, Oregon 97204

Phone: (503) 414-3009
Fax: (503) 414-3101

January 14, 2004

Mr. Wayne McKy
Hugo Neighborhood Association & Historical Society
6497 Hugo Road
Grants Pass, Oregon 97256

Dear Mr. McKy:

This is in response to your request for clarification on forest productivity data in the Josephine County Soil Survey in your letter dated December 17, 2003.

In your letter reference is made to "Table 6, Woodland Management and Productivity" and "Table 5, Yields Per Acre of Crops and Pasture" in the published Josephine County Soil Survey Report. This report was published in 1983. Since that time the Natural Resources Conservation Service has adopted an electronic database as the official source of soil survey data. To be sure that your organization is using the current official soil survey data, you should visit our web site at http://www.or.nrcs.usda.gov/pnw_soil/or_data.html. A Microsoft Access database for the Josephine County soil survey is available to download from this web site. The site also has tables for forest productivity and crop yields with land capability classes in portable document format (pdf) that can be printed or downloaded. I have enclosed these tables. It's probable that some of the forest productivity, crop yield, and land capability class data has been updated in the Josephine County electronic database and may not agree with some of the entries in the 1983 report.

In your letter you asked about the meaning of a "non-rating" in the forest productivity table. During the time that field work is conducted on a soil survey project, suitable stands of commercial forest trees are located. The height and age of at least 5 trees are measured and the soil map unit component where the trees are located is verified by a soil scientist. Generally we do not make an estimate of forest productivity for a soil map unit component unless at least three suitable stands can be located and measured. Suitable stands are normally between about 40 and 80 years of age and relatively free of disease and insect damage.

There may be soil map unit components that are capable of supporting stands of commercial forest tree species, but not enough suitable sites were located during the course of the soil survey to make a statistically valid estimate of forest productivity. In these cases there will not be any forest productivity data in the database, but this does not mean the component is not capable of supporting commercial forest stands.

Exhibit 3-1

You also asked about the relationship between crop yields in the soil survey report and the potential of soil map unit components to support commercial forests. There is no direct relationship between crop yields and forest productivity. For example, many map unit components are on slopes that are generally considered to be too steep for most crops to be grown, but they may be highly productive for commercial forests.

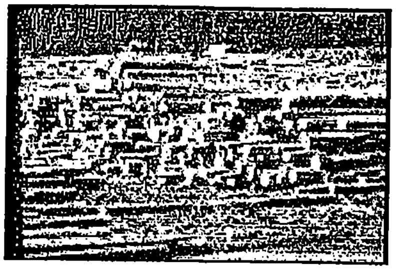
Please contact me at 503-414-3009 if you have any questions.

Steve Campbell

Steve Campbell
Soil Scientist

Exhibit 3-2

Log Price Information



Oregon Department of Forestry
Forest Management Division, Salem
503-945-7381

LOG PRICES
Domestically Processed Logs
(Delivered to a mill; "Pond Value")

2004 2nd QUARTER

REGION 1 - NORTHWEST OREGON & WILLAMETTE

Species & Grade	2nd QUARTER 2004 POND VALUE	NUMBER OF QUOTES
Douglas-Fir		
1P	$ 890	5 or less
2P	$ 825	5 or less
3P	$ 755	5 or less
SM	$ 650	9
2S	$ 600	22
3S	$ 575	16
4S	$ 510	15
SC	$ 250	5 or less
Utility	$ 70	5 or less
Hemlock		
P	$ 395	5 or less
SM	$ 385	5 or less
2S	$ 375	12
3S	$ 365	12
4S	$ 335	13
Utility	$ 115	5 or less
Spruce		
SM	$ 350	5 or less
2S	$ 350	5 or less
3S	$ 310	5 or less
4S	$ 300	5 or less
Utility	$ 115	5 or less

EXHIBIT 4-1

Western Red Cedar		
1S	$ 1100	5 or less
2S	$ 1100	5 or less
3S	$ 1100	5 or less
4S	$ 1100	5 or less
Utility	$ 75	5 or less
Wormy	$ 250	5 or less

Red Alder		
CR	$ 520	5 or less
Pulp	$ 300	5 or less
2S	$ 600	5 or less
3S	$ 580	5 or less
4S	$ 560	5 or less

REGIONS 2&3 - COOS (COOS, CURRY, DOUGLAS COUNTIES & ROSEBURG MARKET

Species & Grade	2nd QUARTER 2004	
Douglas-Fir	POND VALUE	NUMBER OF QUOTES
1P	$ 965	7
2P	$ 925	9
3P	$ 750	8
SM	$ 665	9
2S	$ 615	11
3S	$ 580	9
4S	$ 545	9
SC	$ 240	9
Utility	$ 65	10
Hemlock-White Fir		
P	$ 415	5 or less
SM	$ 405	5 or less
2S	$ 400	6
3S	$ 395	6
4S	$ 390	5 or less
Utility	$ 75	5 or less
Red Cedar		
2S	$ 985	5 or less
3S	$ 985	5 or less
4S	$ 700	5 or less
Utility	$ 100	5 or less
Wormy	$ 200	5 or less
Red Alder		
CR	$ 560	5 or less
Pulp	$ 195	5 or less
Port Orford Cedar		
CR	$ 550	5 or less

REGION 4 - GRANTS PASS UNIT

Species & Grade   2nd QUARTER 2004

EXHIBIT 4-2

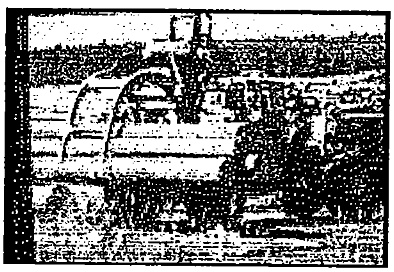
Douglas-Fir	POND VALUE	NUMBER OF QUOTES
1P	$ 835	5 or less
2P	$ 785	5 or less
3P	$ 720	5 or less
SM	$ 660	5 or less
2S	$ 640	5 or less
3S	$ 600	5 or less
4S	$ 575	5 or less
Utility	$ 130	5 or less
Hemlock		
CR (+12")	$ 385	5 or less
CR (12")	$ 330	5 or less
Sugar Pine		
SM	$ 850	5 or less
1S	$ 1000	5 or less
2S	$ 950	5 or less
3S	$ 850	5 or less
4S	$ 650	5 or less
5S	$ 550	5 or less
6S	$ 350	5 or less
Utility	$ 100	5 or less
Ponderosa Pine		
SM	$ 750	5 or less
1S	$ 950	5 or less
2S	$ 850	5 or less
3S	$ 750	5 or less
4S	$ 600	5 or less
5S	$ 500	5 or less
6S	$ 300	5 or less
Utility	$ 100	5 or less
Incense Cedar		
CR (+12")	$ 740	5 or less
CR (12")	$ 715	5 or less

REGION 5 - KLAMATH UNIT

Species & Grade	2nd QUARTER 2004	
Ponderosa Pine	POND VALUE	NUMBER OF QUOTES
6"-8"	$ 245	5 or less
8"-14"	$ 315	5 or less
14"-22"	$ 525	5 or less
22"+	$ 620	5 or less
True Fir		
6"-8"	$ 320	5 or less
8"-14"	$ 325	5 or less
14"-22"	$ 330	5 or less
22" +	$ 330	5 or less
SC	$ 50	5 or less
Utility	$ 50	5 or less

Ex. 4-3

Lodgepole Pine		
CR	$ 290	5 or less
Douglas-Fir		
6"-8"	$ 485	5 or less
8"-14"	$ 500	5 or less
14"-22"	$ 510	5 or less
22"+	$ 510	5 or less
Incense Cedar		
6"-8"	$ 600	5 or less
8"-14"	$ 600	5 or less
14"-22"	$ 600	5 or less
22"+	$ 600	5 or less
Sugar Pine		
6"-8"	$ 250	5 or less
8"-14"	$ 350	5 or less
14"-22"	$ 550	5 or less
22"+	$ 575	5 or less



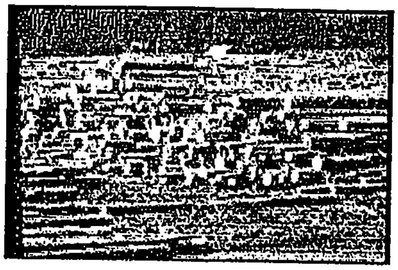
This page is updated by:
Dan Corgan, ODF Forest Management Division
d.corgan@odf.state.or.us

Last Update: Friday, July 2, 2004 3:00 p.m.

Return to the Log Price Sales Information page. ODF HOME Return to the ODF Home Page

EXHIBIT 4-4

Log Price Information



Oregon Department of Forestry
Forest Management Division, Salem
503-945-7381

LOG PRICES
Domestically Processed Logs
(Delivered to a mill; "Pond Value")

1994 1st QUARTER

REGION 1 - NORTHWEST OREGON & WILLAMETTE

Species & Grade	1st QUARTER 1994	
Douglas-Fir	POND VALUE	NUMBER OF QUOTES
1P	$1,800	3
2P	$1,450	3
3P	$1,125	3
SM	$ 795	5
2S	$ 740	8
3S	$ 675	8
4S	$ 575	7
SC	$ 350	4
Utility	$ 150	5
Hemlock		
P	$ 600	2
SM	$ 560	4
2S	$ 525	6
3S	$ 440	6
4S	$ 430	6
Utility	$ 140	4
Spruce		
SM	$ 550	2
2S	$ 540	4
3S	$ 440	4
4S	$ 360	4

Ex 4-5

Utility	$ 125	3
Western Red Cedar		
1S	$ 800	1
2S	$ 650	2
3S	$ 575	3
4S	$ 475	3
Utility	$ 150	1
Wormy	$ 180	2
Red Alder		
CR	$ 425	3
Pulp	$ 260	2

REGIONS 2&3 - COOS (COOS, CURRY, DOUGLAS COUNTIES & ROSEBURG MARKET

Species & Grade	1st QUARTER 1994	
Douglas-Fir	POND VALUE	NUMBER OF QUOTES
1P	$1,880	6
2P	$1,690	6
3P	$1,390	6
SM	$ 955	6
2S	$ 795	6
3S	$ 695	6
4S	$ 575	6
SC	$ 375	7
Utility	$ 205	7
Hemlock-White Fir		
P	$ 800	3
SM	$ 715	3
2S	$ 640	3
3S	$ 565	3
4S	$ 475	3
Utility	$ 175	5
Red Cedar		
2S	$ 775	3
3S	$ 685	3
4S	$ 550	3
Utility	$ 155	5
Wormy	$ 325	4
Red Alder		
CR	$ 365	4
Pulp	$ 185	4

REGION 4 - GRANTS PASS UNIT

Species & Grade	1st QUARTER 1994	
Douglas-Fir	POND VALUE	NUMBER OF QUOTES
1P	$1,500	3
2P	$1,335	4

Ex. 4-6

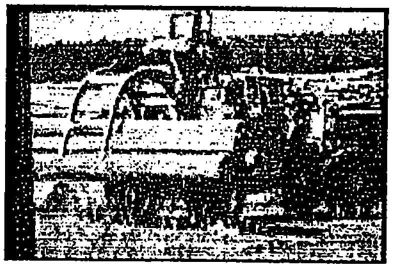
3P	$1,115	4
SM	$ 865	4
2S	$ 740	4
3S	$ 650	4
4S	$ 600	4
Utility	$ 185	4
Hemlock		
CR (+12")	$ 650	4
CR (12")	$ 600	3
Sugar Pine		
SM	$ 965	3
1S	$1,440	3
2S	$1,290	3
3S	$1,115	3
4S	$ 800	3
5S	$ 665	3
6S	$ 455	3
Utility	$ 155	3
Ponderosa Pine		
SM	$ 925	3
1S	$1,400	3
2S	$1,250	3
3S	$1,075	3
4S	$ 775	3
5S	$ 650	3
6S	$ 465	3
Utility	$ 155	3
Incense Cedar		
CR (+12")	$ 700	5
CR (12")	$ 610	5

REGION 5 - KLAMATH UNIT

Species & Grade	1st QUARTER 1994	
Ponderosa Pine	POND VALUE	NUMBER OF QUOTES
8"-14"	$ 0	0
14"-22"	$ 0	0
22"+	$ 0	0
True Fir		
8"-14"	$ 455	2
14"-22"	$ 475	2
22" +	$ 475	2
SC	$ 160	1
Utility	$ 160	1
Lodgepole Pine		
CR	$ 0	0
Douglas-Fir		
8"-14"	$ 490	1
14"-22"	$ 500	1
22"+	$ 500	1

Ex. 47

Incense Cedar			
8"-14"	$	0	0
14"-22"	$	0	0
22"+	$	0	0
Sugar Pine			
8"-14"	$	0	0
14"-22"	$	0	0
22"+	$	0	0



This page is updated by:
Dan Corgan, ODF Forest Management Division
dan.corgan@state.or.us
Last Update: Friday, March 15, 1996 3:00 p.m.

Return to the Log Price Sales Information page. ODF HOME

Ex 4-8

Kirk Wallace

Hybrid Poplar in the Pacific Northwest

The Effects of Market-Driven Management

Brian Stanton, Jake Eaton, Jon Johnson, Don Rice, Bill Schuette, and Brian Moser

ABSTRACT

Hybrid poplar is a new addition to the Northwest's agricultural economy, with over 50,000 acres currently in production. Originally conceived as feedstock for the energy industry, poplar has been grown primarily as raw material for the paper business. However with falling prices for wood chips, efforts are now under way to manage poplar for the solid wood market. Poplar's utility also extends to its use in the treatment of municipal and industrial wastewater, nutrient removal from agricultural runoff, and phytoremediation of industrial landfills. Future applications are likely to exploit its carbon sequestration ability in the developing markets for tradable pollution credits.

Keywords: forest products; plantation forestry; silviculture

The cultivation of hybrid poplar in the Pacific Northwest has advanced during the past 20 years, from research and development to a commercial enterprise occupying roughly 50,000 acres. Throughout this period, the strategy of poplar management has evolved as landowners have responded to changing commodity prices and advances in environmental amelioration technology. Envisioned originally as an energy crop during the petroleum crisis of the 1970s, hybrid poplar was instead first commercialized by the pulp and paper industry in the mid-1980s. Today, with chip prices at near-record lows, hybrid poplar plantations are being retooled to provide a variety of commodities, including those destined for the solid wood market. In addition, this relatively new crop is tak-

Above: Hybrid poplar plantations are only cultivated two years out of eight, far less than the annual cropping systems they replace. The less frequent tillage reduces soil erosion.

APP - 1 - 1

ing an innovative role in environmental and pollution-control technologies that ultimately may be of significant societal consequence with far-reaching economic implications.

Plantation Management

West of the Cascade Mountains, the largest concentration of poplar plantations is found on the poorly drained silt-loam alluvial soils of the lower Columbia River floodplain. The climate there is relatively mild, and ample rainfall supports growth rates of 350 to 500 cubic feet per acre per year after eight years. Plantations also have been established east of the Cascades on well-drained, loamy, fine sands in the mid–Columbia River basin. Drip irrigation of up to 40 inches per growing season is required under the extremely arid conditions, as is fertilization with nitrogen, phosphorus, zinc, and iron. Compared with the west side's alluvial plantations, those of the mid–Columbia River basin achieve superior growth rates of 600 cubic feet per acre per year on six- to seven-year rotations due, in part, to warmer temperatures and virtually cloudless days throughout the growing season.

Nearly all of the acreage on which poplar is now being grown previously had been hayed, pastured, or farmed for a variety of agronomic crops (e.g., corn, wheat, and potatoes). Precise tree spacing, vegetative propagation of selected varieties, and the use of intensive farming practices provide for an extraordinary level of crop uniformity that approaches that of the typical grain or row crop. Stocking rates typically vary from 200 to 900 trees per acre, depending on the intended product. The mainstay of the planting stock derives from first-generation crosses involving four species: native black cottonwood *(Populus trichocarpa)*, eastern cottonwood *(P. deltoides)* from the Midwest, Japanese poplar *(P. maximowiczii)*, and European black poplar *(P. nigra)*. Adventitious rooting by hardwood cuttings of the six possible interspecific combinations is a reliable and inexpensive method of stand establishment that affords the selection and commercial propagation of productive individual hybrid varieties. Although hybridization of first-generation parental selections is still used to increase yields and replace those hybrids culled from commercial use because of susceptibility to pests, cold, frost, and windthrow, several breeding programs also focus on parental species improvement to sustain genetic gains in future hybridization programs.

Brian Stanton

Hog fuel is ground for use in cogeneration boilers. Multiple markets, including energy feedstock, are important to the future profitability of hybrid poplar plantations.

Energy Feedstock

The use of hybrid poplar for energy feedstock in the Pacific Northwest has been limited to area pulp and paper mills that have periodically used hog fuel residuals from wood-chipping operations to fire their cogeneration boilers. However, electrical generating plants that integrate 50,000 acres of hybrid poplar biomass plantations currently are being sited elsewhere in Minnesota. The configuration of such plantations was at one time designed to follow the woodgrass or silage sycamore model: stands planted at extremely high densities (45,000 stems per acre), harvested annually, and managed by coppice regeneration. Although coppicing greatly reduces the cost of second-rotation site preparation, the need for year-round harvesting (including the summer months when stump sprouting is inconsistent and insubstantial) has mostly precluded its use. More widely spaced stands and longer rotations also have been shown to be much more productive (DeBell et al. 1993, 1997). The yield of biomass from commercial west-side plantations stocked at 900 trees per acre and managed on six-year rotations have averaged 37 dry tons per acre, with selected varieties yielding as much as 55 tons.

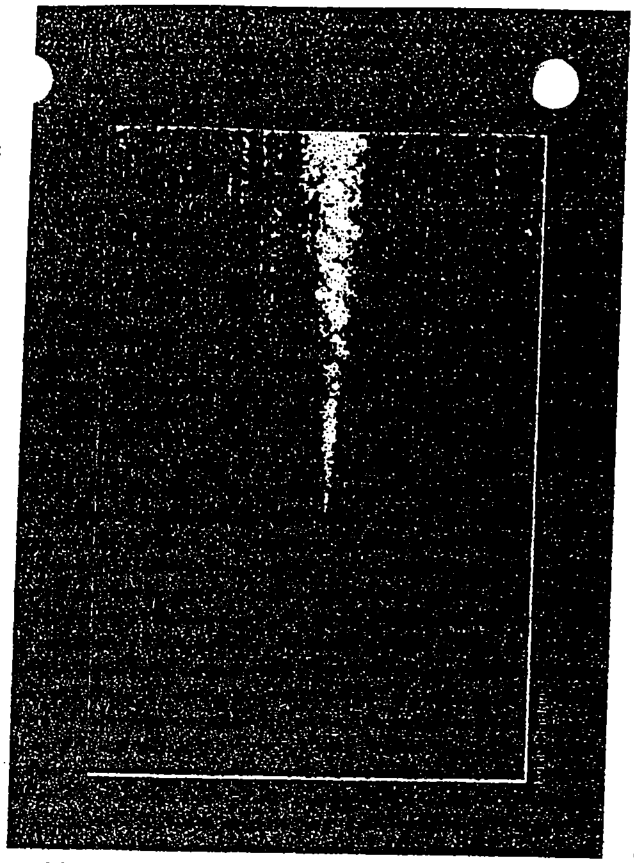
Burning ground biomass in place of coal or cofiring with coal to produce electricity is a well-developed technology. Although thermal conversion efficiencies for coal and poplar biomass are nearly equivalent, more poplar is required to produce the same quantity of electricity because of its lower caloric content (9 MBtu per ton at a 45 percent moisture content) when compared with coal (20 MBtu per ton) (Wright et al. 1992; Lamarre 1994). The expense of harvesting and chipping operations further contributes to the higher cost of poplar biomass, although a new scheme based on whole-tree processing may significantly lower production and handling costs while improving boiler efficiency (Lamarre 1994; Perlack et al. 1996). However, existing cost comparisons have not accounted for reductions in carbon dioxide, sulfur dioxide, and nitrogen oxide emissions realized through the quantity of coal offset by sustainable management for renewable biomass, an analysis that could be forthcoming if taxes

App.1-2

on greenhouse gas emissions or credits for pollution mitigation are enacted in the near future (Hohenstein and Wright 1994).

Pulp and Paper

Twenty-five years ago, the pulp fiber market in the Northwest—historically dependent on residual chips and sawdust from area lumber mills—was notoriously cyclical, tied as it was to the ebb and flow of the construction industry. Beginning in the late 1970s, some papermakers identified short-rotation plantations located near their mills as providing an opportunity to moderate the fluctuations in fiber pricing. In light of its fast growth and the timely genetic and silvicultural research of R.F. Stettler and P.E. Heilman at the University of Washington and Washington State, hybrid poplar emerged as the prime plantation candidate. The decision to use poplar was reinforced by a concomitant shift toward paper grades that required hardwood fiber at a time when regional forecasts were projecting drastic shortages in red alder *(Alnus rubra)* fiber, the region's only commercial hardwood (Huddy et al. 1983). In 1982, Crown Zellerbach Corporation began planting hybrid poplar on the lower Columbia River floodplain near Clatskanie, Oregon, and in the mid–Columbia River basin near Boardman, Oregon. Ultimately, James River Corporation developed an 11,000-acre plantation near Clatskanie, while Boise Cascade and Potlatch Corporations independently established a combined total of 40,000 irrigated plantation acres in the Boardman, Oregon, and Wallula, Washington, area. By the mid-1990s, MacMillan Bloedel had planted 6,000 acres of hybrid poplar in the Skagit River Valley.



An eight-year-old stand of hybrid poplar (variety 20-68-183) growing on the lower Columbia River floodplain for wood chips for papermaking. Established at 622 trees per acre, the stand carries 165 square feet of basal area per acre.

Plantations managed for clean wood chips often are stocked at a rate of 600 trees per acre and harvested after eight years. A major factor in the determination of rotation length was the transition to desirable pulp characteristics (e.g., heightened kraft yields and improved pulp strength and drainage) that occurs in poplar during the fifth through eighth years when periodic stand growth rates also are culminating. Trees are sheared and piled with a feller-buncher, forwarded to a landing with skidders, debarked with a chain flail, chipped, and blown into vans for truck delivery to the pulp mills. Processing in the field is cost-effective and allows for just-in-time delivery that maintains the inherent brightness of poplar wood by lessening the time chips are stored in piles. Commercial yields of clean chips vary between 28 and 45 dry tons per acre depending on site quality, with an additional yield of 10 to 15 tons of hog fuel (i.e., combined dry weight of upper stemwood, limbs, bark, and foliage).

Both refiner mechanical and kraft chemical pulping processes have made use of hybrid poplar. It is well-suited to the mechanical process, where the comparatively low wood density of 18 to 21 pounds per cubic foot conserves refining energy. When pulped via the kraft process, however, the low wood density reduces digesting efficiency, which yields less pulp per unit of digester volume. Lignin chemical reactions somewhat darken kraft pulps, rendering them less suitable for high-value communication papers without a measure of chlorine-based bleaching. Conversely, poplar's bright wood character is preserved in mechanical pulps with minimal hydrogen peroxide bleaching.

Mechanical pulp has been used to make a wide range of coated and uncoated grades of specialty newsprint. Poplar's short (less then one millimeter) and relatively wide (23–30 micrometers), thin-walled (2.1–2.7 micrometers) fibers of kraft pulp, on the other hand, have proved ideal for the manufacture of bond paper grades. These fibers easily collapse during sheet formation, resulting in a smooth, dense, opaque formation with few surface voids. The same morphologies that lend themselves to collapsible fiber formations also give poplar a low bulk capacity, making it poorly suited to towel and tissue products that place a premium on softness.

Lumber and Engineered Wood Products

Although some shortages have occurred in various years, a sustained shortfall of red alder fiber has not yet taken hold in the region. Today, as Asian papermakers move their hardwood supply toward eucalyptus and acacia plantations from the Southern Hemisphere, thus curtailing the export market for alder chips, prices for hardwood chips are near all-time lows, and many growers are adopting a multiple-product plantation strategy focused primarily on solid wood commodities. One traditional outlet is the plywood market, which uses the native black cottonwood for core veneer stock. A potentially more lucrative market is the use of hybrid poplar as a substitute for species such as red alder, American basswood *(Tilia americana)*, and yellow-poplar *(Liriodendron tulipifera)* in

App. 1.3

the manufacture of decorative molding, window casings, boxes, frame stock, blinds, and several furniture components (Mater Engineering 1998). The acceptance of hybrid poplar in conventional solid wood markets has not been wholly proven, but mill trials have demonstrated that hybrid poplar machines well, accepts a wide range of finishes, glues well, and does not warp when adequately dried (Carlson and Berger 1998). Furthermore, the wood's bright, light color; light weight; and smooth-grain appearance are all quite desirable. For the time being, hybrid poplar is forging its own niche market in specialty wood products such as edge-glued panels used in the construction of cabinetry, paneling, and doors. Broadacres Nursery, an Oregon poplar grower, has constructed a 1,500-square-foot building in which 95 percent of the building materials were derived from poplar and featured engineered joists as framing, structural grade plywood, and finish molding. Poplar's relatively low strength and surface hardness will, however, preclude most structural applications, although the wood of selected varieties may have a commercial potential for some construction uses (e.g., web members of trusses, studs of walls) (Kretschmann et al. 1999).

Sawlogs and peeler logs will be grown at stocking rates of 200 to 300 trees per acre for 12 to 15 years. (Under current Oregon guidelines, poplar rotations are limited to 12 years if they are to be regulated and taxed as an agricultural crop. Fifteen-year rotations are consistent with an agricultural designation in Washington, after which hybrid poplar is considered a timber crop subject to regulations of the Forest Practices Act.) Log yields of 6,800 to 7,500 cubic feet per acre (five-inch small-end diameter) and up to 12 dry tons of residual chips have been estimated for 12-year-old stands. Based on mill trials of small-diameter poplar logs (Carlson and Berger 1998), the total yield of sawn lumber could be as high as 20,000 to 30,000 board feet per acre. Presently, some landowners are thinning five-year-old pulpwood plantations to enable the production of sawlogs on an extended rotation (five-year-old stands will respond to release while yielding a sufficient quantity of wood chips to cover the cost of stand improvement). Pruning to 21–24 feet in four annual lifts beginning in the second year is likely to become routine given the premium placed on high-quality, clear wood.


Brian Stanton

In-field delimbing, debarking, and chipping of trees from an eight-year-old hybrid poplar stand along the lower Columbia River floodplain. The yield of clean wood chips is 40 bone-dry tons per acre.

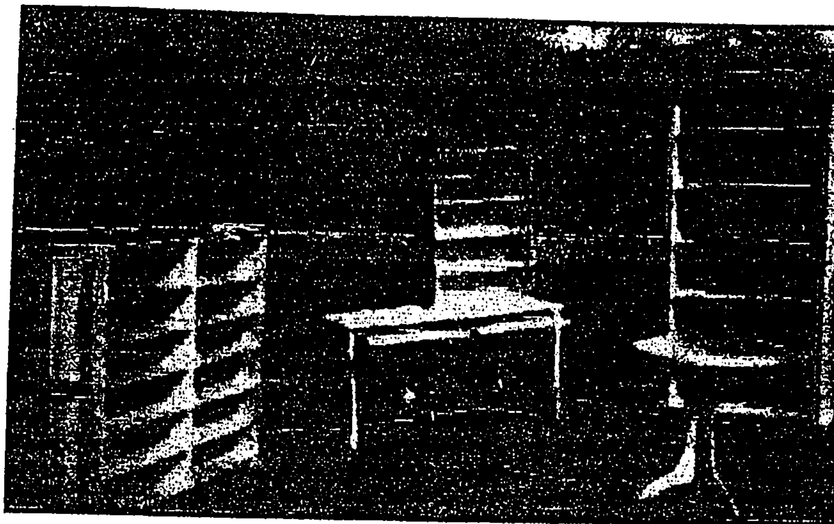
Hybrid poplar also has been tested in the manufacture of oriented strand board (OSB) and laminated veneer lumber (LVL). Closely related to aspen, which has been the quality standard for OSB manufacture, hybrid poplar has proved a good substitute requiring some modifications in resin and press time specifications. Hybrid poplar is often blended with other species to compensate for its low wood density, which improves the strength characteristics of OSB and LVL products.

Environmental Applications

The economic impact of hybrid poplar culture in the Northwest extends well beyond commodity production to its role in pollution abatement projects. Poplar stands have proved highly effective in removing nutrients from effluent when irrigated with municipal and industrial wastewater and in nutrient removal from farm runoff (O'Neill and Gordon 1994; Schultz et al. 1995; US Environmental Protection Agency 1999). Hybrids are well-suited to each of these applications by virtue of an extensive root system that ensures good soil percolation and a free-growth pattern of shoot development that helps in maintaining a large leaf area into the fall, thus prolonging the irrigation season. Moreover, the superior rates of biomass accumulation and elevated leaf area indices maximize rates of transpiration and nutrient uptake.

A large number of environmental plantings are now evident throughout the region. These include the cities of Woodburn and McMinnville, Oregon, and Vernon, British Columbia, each of which has used poplar in treating their municipal effluent or in containing landfill leachate. Riparian buffer plantings also are being used in the Tillamook basin to protect the water quality of anadromous fish-bearing streams from the runoff from adjacent dairy farms. In the industrial sector, a fish processing plant in Shelton, Washington, a vegetable cannery in Brooks, Oregon, and a potato processing plant in Caldwell, Idaho, also have incorporated poplar plantings into their treatment of waste process water, while a pulp mill in Halsey, Oregon, is testing poplar plantings in the treatment of secondary pulp sludge. A related application uses hybrid poplar's ability to metabolize certain toxic chemicals (Burken and Schnoor 1997; Gordon et al. 1997) in removing trichloroethylene from an industrial landfill near Bremerton, Washington, with consid-

Appl-4



Michael Carlson

A variety of solid wood products, including furniture, can be made from hybrid poplar as management looks for higher-value markets to increase plantation profitability.

Bill Schuette

When irrigated with municipal and industrial effluent, hybrid poplar stands have proved highly effective in wastewater treatment and water quality improvement. Shown here is a wastewater pumping station and a closeup of an irrigation stake.

erable cost savings compared to alternative methods of soil removal and decontamination.

Hybrid poplar plantations often are mentioned as potential carbon sinks in the discussion of global warming; the annual growth of an acre of poplar requires five to eight tons of atmospheric carbon, approximately double the carbon fixed by agronomic crops (Ranney et al. 1991). However, because of their relatively short harvest cycles, poplar's real impact on climate change will come from their sustainable management as a renewable energy crop that offsets substantial carbon, sulfur, and nitrogen emissions from fossil fuels (Ranney et al. 1991). Nonetheless, poplar plantations could figure prominently in tradable pollution allowances in what may become the world's largest commodity market (Foroohar 2001). The Climate Trust of Oregon now considers funding for carbon dioxide sequestration projects including current and recent proposals to plant 400 acres of abandoned pasture in the Sandy River delta using local black cottonwood selections (Sandy River Delta Gallery Forest Restoration) and 3,100 acres along the lower Columbia River with a diverse mix of hybrid varieties (Jefferson Poplar Carbon Sink). Moreover, the Tree Canada Foundation (on behalf of Shell Oil) has purchased nearly a quarter-million hybrid poplar trees being established by Alberta-Pacific Forest Industries in return for future carbon credits.

Although treating municipal, industrial, and farm effluents and sequestering atmospheric carbon dioxide are beneficial environmental roles for poplar plantations, their large-scale propagation has raised concerns over their long-term effect on wildlife habitat and biodiversity. Poplar plantations do not contain the diversity nor the stability of habitats found in riparian forests west of the Cascade Mountains or in the east side's shrub-steppe biome. However, the abundance and diversity of bird and small mammal populations both appear to be richer in plantations than the agricultural cropping systems they replace (Hanowski et al. 1997; Moser et al. 2002). What remains unknown, however, is the long-term habitat value of poplar plantations, including their effect on wildlife reproduction. Yet this value could be appreciable—plantations extend the size and utility of disconnected native west-side riparian forests (Hanowski et al. 1997) and add habitat diversity to the landscape of the east side's mid–Columbia River basin.

Organizational Approaches

Straddling the division between agronomy and forestry, the cultivation of hybrid poplars has developed several innovative approaches to the organization, management, and marketing of plantation operations.

Industrial approach. The most prominent approach is that of the pulp and paper industry: sizable acreages, contiguous parcels, mostly fee lands with a smaller proportion managed under leases of sufficient length to allow for two or three rotations. The efficiency of plantation operation is the advantage here; the distribution of age classes is configured to allow for well-planned cultivation and harvest operations, and the composition of hybrid varieties is diversified and balanced so as to minimize the risk of unforeseen pest and weather events. The pulp and paper industry has conducted much of the applied cultivation research, equipment testing, and tree improvement work that has fostered hybrid poplar's commercialization.

Partnerships and cooperatives. Farmer-

App 1-5

based partnerships and grower's cooperatives have more lately come into their own as alternative approaches. The partnerships are adjuncts of the larger industrial plantations in which individual landowners manage their own stands with planting material and technical advice provided by the larger operation in exchange for a first right-of-refusal to the wood at harvest. Cooperatives, on the other hand, are associations of independent farmers sharing information while working together with greater flexibility to develop new markets that can be met collectively by their constituents. The pooling of resources greatly extends farming experiences, equipment, and marketing expertise. The two main regional cooperatives are the Hybrid Poplar Growers' Association operating west of the Cascades and the Agricultural Wood Producers' Association in the mid–Columbia River basin. The lack of annual cash flow (inherent in all multiyear rotation poplar management scenarios) and unpredictable markets have been the biggest obstacles to wider farmer participation in partnerships and cooperatives. These obstacles are not likely to be overcome in the near future.

Conclusion

The long-term importance of hybrid poplar to the Pacific Northwest's agricultural economy will become proportionally larger if projected shortages in alder sawtimber materialize. Poplar plantations could take on an added imperative if domestic wood supplies come to depend on hardwood plantations of the Southern Hemisphere (Kellison 2000), in the same way that a significant portion of Oregon and Washington's agricultural economy (e.g., apples, pears, grapes, berries, and salmon) now struggles to remain competitive with South American growers. Whether hybrid poplar can maintain an economically competitive position at home and abroad will depend on increasing profitability in five main areas:

- Sustained-yield improvement through ongoing hybridization and varietal selection.
- Reduction in harvesting and processing costs.
- Development of more cost-efficient methods of plantation silviculture.
- Increased consumer acceptance in the all-important solid wood market.
- Value from improvements in water and air quality.

The future profitability of regional plantations also could be secured by recognition of their place in responsible land management, a designation already awarded to Potlatch Corporation's poplar farm by the Forest Stewardship Council. To the degree that hybrid poplar achieves success through commodity production and novel applications in environmental and pollution control services, it will also help to diversify and sustain the region's indispensable rural economies.

Literature Cited

BURKEN, J.G., and J.L. SCHNOOR. 1997. Uptake and metabolism of atrazine by poplar trees. *Environmental Science and Technology* 31:1399–1406.

CARLSON, M., and V. BERGER. 1998. *Solid wood product opportunities from short rotation hybrid poplar trees.* Final Report, Forest Renewal BC Research Award TO97203-4RE. Vernon: British Columbia Ministry of Forests.

DEBELL, D.S., G.W. CLENDENEN, and J.C. ZASADA. 1993. Growing *Populus* biomass: Comparison of woodgrass versus wider-spaced short-rotation systems. *Biomass and Bioenergy* 4:305–13.

DEBELL, D.S., C.A. HARRINGTON, G.W. CLENDENEN, and J.C. ZASADA. 1997. Tree growth and stand development of four *Populus* clones in large monoclonial plots. *New Forest* 14:1–18.

FOROOHAR, R. 2001. The new green game. *Newsweek,* August 27, p. 62.

GORDON, M., N. CHOE, J. DUFFY, G. EKUAN, P. HEILMAN, I. MUIZNIEKS, L. NEWMAN, M. RUSZAJ, B. SHURTLEFF, S. STRAND, and J. MILMOTH. 1997. Phytoremediation of trichloroethylene with hybrid poplars. In *Phytoremediation of soil and water,* eds. E. Kruger, T. Anderson, and J. Coats, 177–85. ACS Symposium Series 664. Washington, DC: American Chemical Society.

HANOWSKI, J.M., G.J. NIEMI, and D.C. CHRISTIAN. 1997. Influence of within-plantation heterogeneity and surrounding landscape composition on avian communities in hybrid poplar plantations. *Conservation Biology* 11:936–44.

HOHENSTEIN, W.G., and L.L. WRIGHT. 1994. Biomass energy production in the United States: An overview. *Biomass and Bioenergy* 6:161–73.

HUDDY, M.D., R.D. GUSTAFSON, and R.F. STRAND. 1983. *Short-rotation hardwood plantations: A fiber supply option for Columbia River Mills.* Wilsonville, OR: Crown Zellerbach Corporation, Forestry Research Division.

KELLISON, R.C. 2000. A global forestry perspective. In *Symposium proceedings, Hybrid poplars in the Pacific Northwest: Culture, commerce, and capability,* eds. K.A. Blatner, J.D. Johnson, and D.M. Baumgartner, 9–13. Pullman: Washington State University.

KRETSCHMANN, D.E., J.G. ISEBRANDS, G. STANOSZ, J.R. DRAMM, A. OLSTAD, D. COLE, and J. SAMSEL. 1999. *Structural lumber properties of hybrid poplar.* Research Paper FPL-RP-573. Madison, WI: USDA Forest Service, Forest Products Laboratory.

LAMARRE, L. 1994. Electricity from whole trees. *EPRI Journal* January–February:16–24

MATER ENGINEERING, LTD. 1998. *Marketing study for a multi-region plantation hybrid poplar project.* Corvallis, OR.

MOSER, B.W., M.J. PIPAS, G.W. WITMER, AND R.M. ENGEMAN. 2002. Small mammal use of hybrid poplar plantations relative to stand age. *Northwest Science* 76(2):158-65.

O'NEILL, G., and A. GORDON. 1994. The nitrogen filtering capability of Carolina poplar in an artificial riparian zone. *Journal of Environmental Quality* 23:1218–23.

PERLACK, R.D., M.E. WALSH, L.L. WRIGHT, and L.D. OSTLIE. 1996. The economic potential of whole-tree feedstock production. *Bioresource Technology* 55: 223–29.

RANNEY, J.W., L.L. WRIGHT, and C.P. MITCHELL. 1991. Carbon storage and recycling in short rotation energy crops. In *Bioenergy and greenhouse effect,* ed. C.P. Mitchel, 39–60. Proceedings of a seminar organized by the International Energy Agency/Bioenergy Agreement and National Energy Administration of Sweden, Stockholm.

SCHULTZ, R., J. COLLETTI, T. ISENHART, W. SIMPKINS, C. MIZE, and M. THOMPSON. 1995. Design and placement of a multi-species riparian buffer strip system. *Agroforestry Systems* 29:201–26.

US ENVIRONMENTAL PROTECTION AGENCY. 1999. *Biological aspects of hybrid poplar cultivation on floodplains in western North America: A review.* EPA Document 910-R-99-002. Washington, DC.

WRIGHT, L.L., R.L. GRAHAM, A.F. TURHOLLOW, and B.C. ENGLISH. 1992. Opportunities to mitigate carbon dioxide buildup using short-rotation woody crops. In *Forests and global warming,* eds. R.N. Sampson and D. Hairs. Washington, DC: American Forestry Association.

Brian Stanton (bstanton@greenwoodresources.com) is director, Tree Improvement Operations and Don Rice is director, Farm Operations, Greenwood Resources, 349 NW 7th Avenue, Camas, WA 98607; Jake Eaton is plant materials manager and Brian Moser is wildlife biologist, Potlatch Corporation, Boardman, Oregon; Jon Johnson is associate professor of intensive forestry, Washington State University, Puyallup; Bill Schuette is consulting services manager, Broadacres Nursery, Hubbard, Oregon.

App. 1.6

EM 8805 • May 2003
$24.00

Establishing & managing ponderosa pine

in the Willamette Valley

OREGON STATE UNIVERSITY
EXTENSION SERVICE

App 2-1

Managing stands of Willamette Valley ponderosa pine

R. Fletcher

Both natural and planted stands of ponderosa pine can be managed using thinning, pruning, and fertilization, although little research has been done on these practices for the Willamette Valley race of ponderosa pine. What is known has been gathered from general observation, from small test plots, and from a survey of native stands by OSU Extension forester Max Bennett.

Natural stand development

It is difficult to define what normal stand development means for ponderosa pine in the Willamette Valley.

Historical stands apparently were either scattered groves of large trees in grassy bottoms or mixed-species stands in the foothills. In either case, the indigenous tribes' broad-scale burning shaped those forests in ways not available today.

Current stands have come about by colonizing neglected areas or soils with severe limitations for other tree species. The stands we see today are much denser than their counterparts in the past. What this means for future development and growth is uncertain. However, because ponderosa pine is a shade-intolerant species, preferring open spaces, it is likely that the high stocking will be reduced over time, either through insect and disease outbreaks, or some weather-related event, or by selective thinning.

Expected growth of Valley ponderosa pine stands

Anderson's 1938 study on central Willamette Valley ponderosas reported young ponderosas grew rapidly, but growth rates peaked by about 30 years of age. The small sample of trees had a 20-year-old tree with a 15-inch diameter at breast height (DBH), while a 100-year-old tree was only 34 inches in diameter. The pine races study that Munger began in 1928 showed a height growth spurt between 20 and 30 years of age, but the trees from the best seed source in the study have continued to grow well in height up to their last measurement at 65 years of age.

Max Bennett's recently completed study of 16 native Willamette Valley ponderosa stands on 12 different soil types found a wide variety of growth rates, depending on soil type (Table 3, page 12). Site indexes (estimates of site productivity based on

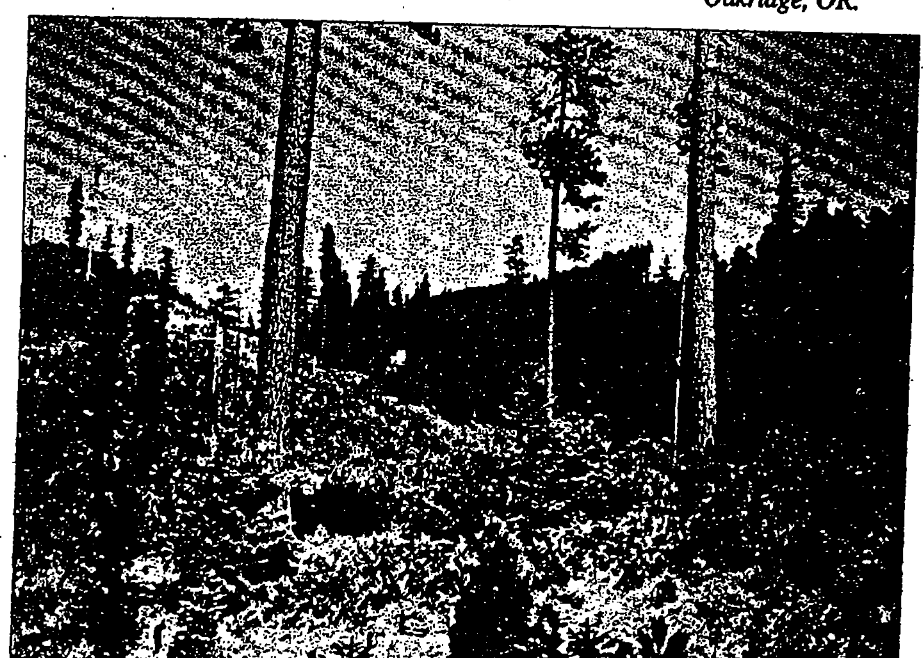


Figure 13.—Regeneration of a natural stand of ponderosa pine old growth on Willamette National Forest, near Oakridge, OR.

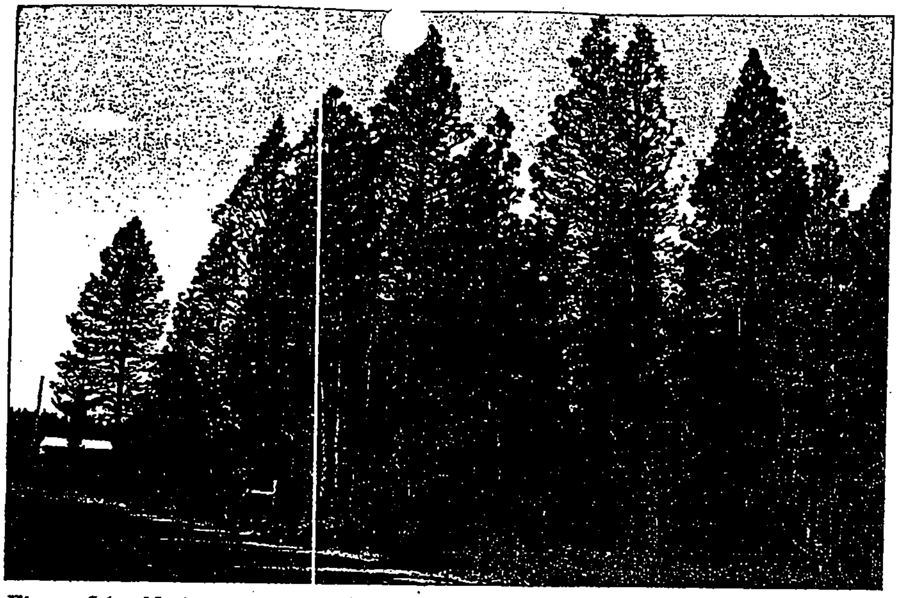


Figure 14.—Native, 40-year-old ponderosa pine stand on wet soil near Lacomb, OR.

how tall a tree of a given species will grow on a site in a given number of years) for each site were extrapolated from existing site index curves from ponderosa pine in southwest Oregon, based on expected total height at 50 years.

On most sites, ponderosas are expected to grow nearly 100 feet in the first 50 years. Exceptions were on very severe sites where the high water table and shallow soils converged. When these trees will slow down or stop growing taller is not known and undoubtedly will vary widely by soil type, but large specimen trees on suitable soils have grown up to 150 feet tall.

Table 2. Growth of Willamette Valley natural stands

Soil type	Height	Age	Site index (50)
Bashaw silty clay loam	98	59	92
Dayton silt loam	84	42	98
Dixonville/Hazelair/Philomath	96	98	63
Dupee silt loam	110	56	101
Hazelair silty clay* loam	93	52	92
McBee silty clay loam	104	59	92
Philomath cobbly, silty clay*	87	42	104
Ritner cobbly, silty clay loam	101	54	95
Salem gravelly loam	111	63	93
Waldo silty clay loam	83	41	96
Witzel very cobbly loam	92	98	59

* An average of more than one site

(...) studies of volume growth per acre have been done. Currently, large stands of ponderosa are few, but they appear to have volumes similar to local Douglas-fir stands of similar ages. The exception may be on the very severe (either wet or dry) sites, where volumes per acre will be less.

Managing natural stands of Valley ponderosa pine

If you are one of the lucky Willamette Valley landowners with a natural stand of ponderosas on your property, your trees might benefit from thinning or possibly pruning if they are still pole size.

Thinning

Thinning spaces out trees and improves the health and vigor of the overall stand. The key feature is not what you cut but the stand left behind after harvest. It is these trees, generally referred to as crop trees, that will determine future growth and overall stand health. In deciding which will be crop trees, and which ones you'll remove, consider the following factors.

1. Overall stand age and stocking Stands that respond best to thinning are young, moderately stocked ones. Older stands (50 years plus) likely have passed the time when thinning will greatly benefit growth rates, unless the stand was previously thinned. Thinning an older stand still might make sense, however, if you want to reduce longer term competition for crop trees or to remove unhealthy trees. Very dense stands may need several light thinnings, spaced by recovery periods, to move the stand gradually to a healthy density.

Possibly the most important thinning is a very early one, while the trees are not yet of merchantable size. This precommercial thinning sets the growth curve for the future stand and can have a dramatic, positive impact on growth if done at the right time.

2. Type of future stand desired If you want an even-age stand, then it makes sense to space crop trees evenly for maximum

App 2-3

growth. If you want to develop an uneven-age stand, your selection may be more in groups, to provide open areas for young trees to establish.

3. Individual tree characteristics The arboricultural principle of "right tree, right place" works well for forest thinning, also. If your need in a particular spot is high growth, then leave the best growers. If you want to leave a wildlife tree, look for one with big branches and good nesting opportunities. Even trees with obvious defects can be valuable in providing habitat for cavity-nesting birds such as woodpeckers. If you plan a continual-selection thinning system to promote natural regeneration, then you want to get rid of the super-dominant trees and keep the vigorously growing medium-size trees that have narrow crowns and fine branches.

4. Individual tree spacing As trees get larger, they need more room to grow. Foresters' rule of thumb for this size–space relationship is based on diameter of the tree at breast height (DBH).

For example, a tree 12 inches in diameter might need 16 feet of space to be happy, while a 20-inch-diameter tree might need 24 feet. This often is referred to as the "D+ rule."

Although there is no known D+ relationship for Valley ponderosa pine, they likely need a bit more space than Douglas-fir because of their intolerance of shade. Ponderosa might be more comfortable at a minimum spacing of D+2 or D+3. For a tree 12 inches in diameter, this means the next closest 12-inch tree should be at least 14 or 15 feet away. You might want to space your 12-inch trees 18 to 20 feet apart (i.e., at D+6 or D+8), anticipating that they will continue to grow in diameter over time and eventually get back to the minimum D+2 spacing.

Other ways to keep track of tree spacings:

- On a per-acre basis, either by total number of trees, or
- Some other measure of density such as basal area (the cross sectional area of a tree, measured at breast height), or
- Relative density (the amount of basal area on a given stand compared to the maximum that can possibly grow)

For more information on measuring stand density, refer to OSU Extension publication EC 1190, "Stand Volume and Growth: Getting the Numbers" (see page 39).

As more becomes known about the Valley ponderosas, better per-acre guidelines will be developed.

Managing plantations of Valley ponderosa pine

During the past decade, thousands of acres of Valley pine plantations have been established in the Willamette Valley. These represent a very different type of forest stand than has ever existed naturally.

Historical records indicate that natural stands were widely spaced groves of large trees, intermixed with hardwood species such as oak and ash. The pine plantations of today represent fast-growing monocultures whose growth far exceeds that of their natural cousins. No management history of similar stands exists, so only time will reveal how these plantations will develop. Experience to date, however, suggests some practices that are useful in tending young plantations.

Thinning

One genetic trait in the Valley pine population is a wide variance in tree forms. Progeny from various parent trees differ vastly in such characteristics as forking, branch angle, number of branches, and growth rate. By years 5 to 10, characteristics of individual trees in plantations are easily distinguishable, and you can favor trees with characteristics suited to your objectives. For example, if timber production is a primary goal, trees with high wood-to-branch ratios and good growth can be favored in thinning programs. Likewise, in riparian plantings where lots of branching can be good for

Figure 15.—Five-year-old pine plantation on a good site near Albany, OR.