OREGON SOCIETY OF AMERICAN FORESTERS
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CHAPTERS: Blue Mountain • Capitol • Central Oregon • Central Oregon Community College • Columbia Gorge • Coos • Emerald • Mary's Peak • Mount Hood Community College • Oregon State University • Portland • Shasta-Cascade • Siskiyou • Tillamook-Clatsop • Umpqua

July 10, 2020

Mr. Shane Jeffries
Ochoco National Forest
U.S. Forest Service
Sent via email: SM.FS.EScreens21@usda.gov

Dear Mr. Jeffries:

As the 2020 Chair of the Oregon Society of American Foresters (OSAF), I am writing to express our thoughts on the Eastside 21-inch rule as the Forest Service moves forward in preparing an environmental assessment to consider modifying the rule. The OSAF, with approximately 800 members, is the largest state affiliate of the national Society of American Foresters (SAF). The SAF supports and represents the forestry profession in advancing the science, education, technology, and practice for forestry. OSAF members work throughout the state in a variety of organizations, including local, state, tribal, and federal agencies, higher education, research, and the private sector. As stakeholders in the management of our National Forest lands we are interested in seeing that the managers of these forest have the needed flexibility to exercise their knowledge and professional expertise, based on sound science, to prescribe appropriate treatments to meet forest management plan objectives. We appreciate the Forest Service addressing this important issue and thank you for this opportunity to provide comments.

Our comments reflect some, but not all, of the science about eastern Oregon forest dynamics and the 21-inch diameter limit specified in current forest plans.

Although OSAF understands the interest by some advocacy groups to maintain the 21-inch diameter limit – as it assures that large trees won't be cut – it cannot be stated more clearly: Permanent, fixed diameter (or age) limits are not based on ecological and forest science. Artificial limits remain static, while forests, and larger ecosystems, are constantly changing with fire as the primary change agent. We have repeatedly learned from history that blanket policies of the past (like fire suppression) have dramatic implications to future forests (increased density and changes in composition and structure from fire suppression) that create problems that resources managers are dealing with today and will do so for the foreseeable future.

Restoring old-growth conditions (if that is the future desired condition) and improving forest health and resiliency in younger stands must consider two important ecological truths. First, the amount of resources available to trees on an acre of land – sunlight, water, nutrients, space – is finite. This defines the limits of carrying capacity for the site. Second, the resources a tree needs to survive and grow is roughly proportional to its size (crown size). In other words, big trees with large crowns require more resources. Together these two ecological truths demonstrate that a site can sustainably support only so many trees of a given size at a particular point in time.

With that background, let me talk about historical old-growth structure. Figure 1 is a graph of trees per acre by diameter class for an old-growth mixed conifer stand from 1917 (Munger 1917).

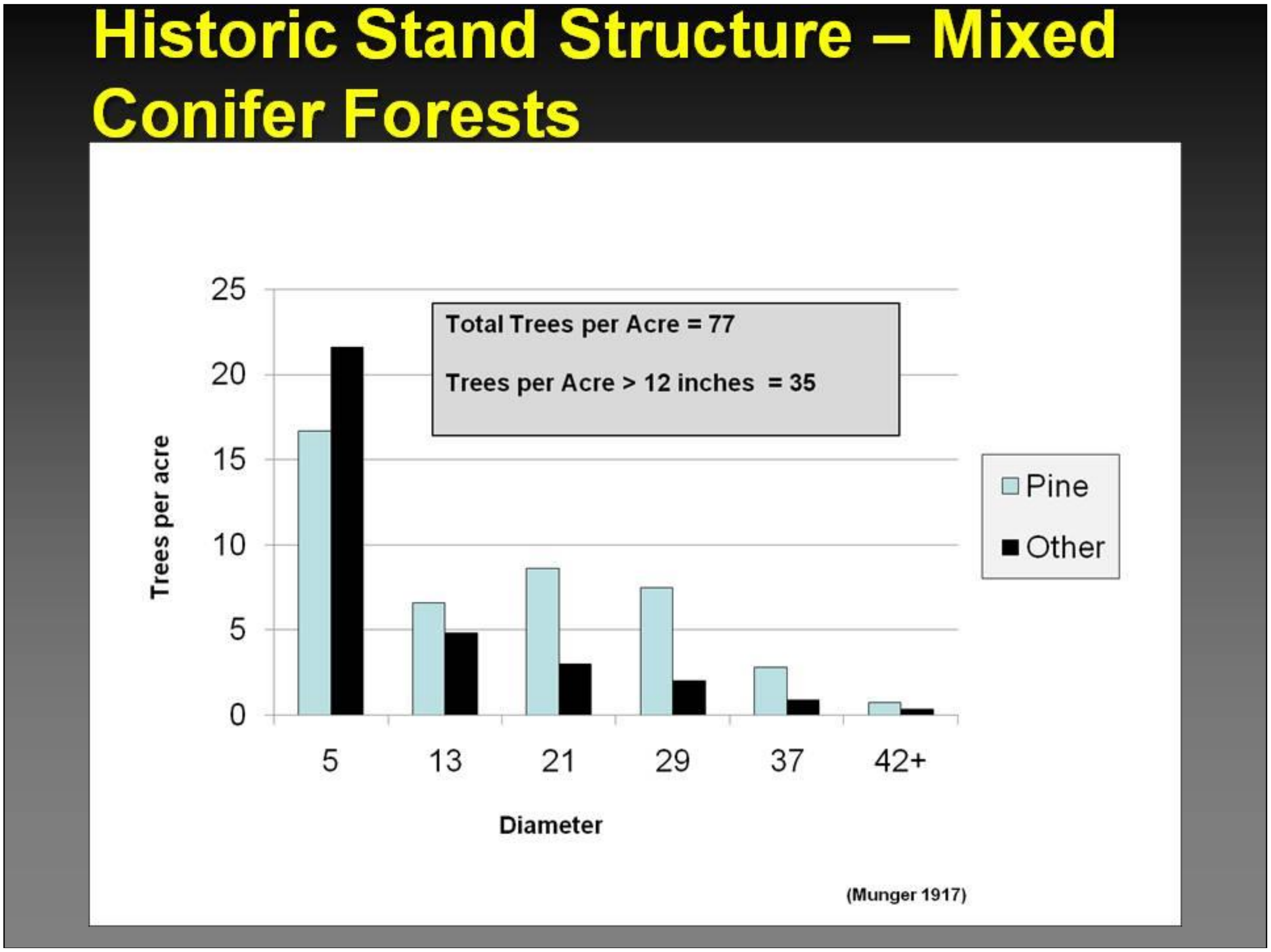


Figure 1 - The diameter distribution of an old-growth mixed-conifer stand in Oregon in 1917.

This old-growth stand contains 77 trees per acre ranging from 5 to 42 inches. Note how the number of trees progressively decreases from the smaller to the larger diameter size classes. This example represents the carrying capacity for this site. Please note: that due to fire exclusion for several decades prior to the time this stand was assessed by Munger, there are likely more trees per acre in 1917, particularly in the "other" species, which were thin-barked fir species, than there would have been there historically On ponderosa pine plant associations, the graph is similar except that the number of trees per acre in each of these diameter classes would be less due to lower site productivity (Munger 1917). In fact, fire history studies have demonstrated that historic stand structures were much more open due to periodic fire of light to moderate severity (Weaver 1943; Bork 1984; Heyerdahl 1997; Youngblood et al., 2004; Hagman et al., 2013).

Because of the wide range of diameters and ages of trees in such forests, old-growth cannot be defined by a single age or diameter. Figure 2 is a graph of tree diameter by age. Looking at the dashed 21-inch diameter line on the graph, notice the large variation around this diameter along with wide variations in age. Others have shown this poor correlation as well (Van Pelt 2008).

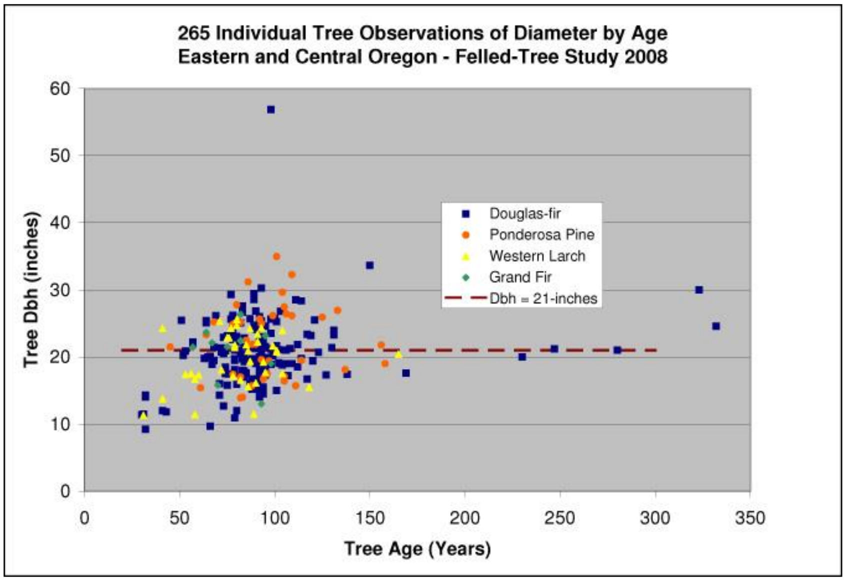


Figure 2. The poor correlation between age and tree diameter for ponderosa pine and other species in central Oregon (courtesy of J.D. Arney (unpublished)).

We know and recognize that large, old tree structure is lacking in dry forest landscapes in central and eastern Oregon. Large trees are important for maintaining or creating old forest structure, fire resiliency, large tree wildlife habitat, aesthetics, and even carbon sequestration. Therefore, old-growth forests, and goals for their development and restoration, should be based upon the structural condition desired within stands and spatially across watersheds. For a given forest type or plant association, this includes: a range of tree diameters; multiple age classes; openings and skips; a mix of tree species; snags and downed wood; and a range of trees per acre. Thus, to improve forest health and resiliency, forest managers need flexibility to develop specific stand structural objectives and metrics based on plant association, historical information, current research, and local experience. Due to the increases in stand density and the change in composition in eastern Oregon ponderosa pine and mix-conifer forests, a substantial amount of grand fir and Douglas-fir, many of which are above 21 inches in diameter, may need to be removed to reduce competition and fire risk to restore more resilient and historically open forest conditions (Kolb et al. 2007, Johnston et al. 2018, Merschel et al. 2019). The increase in stand basal area and thus, leaf area, since the turn of the last century have predisposed mixed conifer stands to drought and pests (Volker et al., 2019).

For dense, even-aged younger forests, it is often unclear what the overall long-term restoration goal is. Is it to eventually move these forests to an old-growth condition? The 21-inch diameter limit seems to reflect that intent, but what might be the outcome of such a permanent diameter limit?

Figure 3a and 3b shows a dense 80-year old ponderosa pine stand (leaving the larger trees) as part of a thinning study to enhance forest resiliency and accelerate large tree development. Because this is National Forest land, the trees were marked under the 21-inch diameter limit. The average tree diameter was only 11 inches before thinning, so the 21-inch limit was not an issue at that time. Figure 4 depicts a Forest Vegetation Simulator (FVS) simulation of this thinning treatment and the subsequent stand growth over four decades when the average tree diameter increases to about 20 inches. At that point, the 120 year-old stand will need another thinning to reduce competition based on stand density guides including some trees over 21 inches, if that was allowed (Fitzgerald 2018, Powell 1999, Cochran et al 1994, Cochran 1992). Although this is a long-term example, there are many stands that are at this stage right now (see Figure 5) and many more that will reach an average diameter of 21 inches in the next two decades. In other words, stand density will increase beyond ecologically sustainable levels (and higher than historical density conditions) and put all trees, including those above 21-inches, at risk for bark beetles and crown fire due to stand and canopy densification. Based on Munger's 1917 assessment, the number of trees over 21 inches historically was 8-10 and 15-25 per acre for ponderosa pine and mixed conifer forests, respectively. For long term forest restoration goals and to maintain forest resilience, especially considering climate change, diameter caps may represent the proverbial “ball and chain.” In the USDA Forest Service southwestern region (R3), an assessment and evaluation report on diameter caps in southwestern ponderosa pine and dry mixed-conifer forests concluded *“that a blanket policy of diameter-limit cutting impairs the ability of resource managers to achieve or maintained desired conditions, and is not sustainable in the mid to long term”* (Triepke et al 2011). It should be noted that as stand densities have increased beyond historic norms (and are still increasing) there are negative effects on understory vegetation, which are important contributors to overall biodiversity in these dry forest ecosystems (Covington et al., 1997; Laughlin et al., 2011). In addition, if climate change continues its current course, the carrying capacity of dry forest ecosystems will decrease and the number of trees, even those above 21 inches, will need to be adjusted downward to remain in balance of what sites can sustain into the future. The current stand density guides, cited previously, do not consider the effects of climate change. Although such climate conditions would take time to develop, forest management prescriptions must change now to develop and accommodate forests of the future.

As just mentioned, we know climate change is occurring – and it is expected to get much worse in the coming decades. Sequestration of CO2 by forest is an important climate mitigation strategy. We know that large trees contain more carbon than small trees. However, eliminating the 21-inch diameter limit does not mean all large trees would end up being harvested. No one is advocating for that. However, cutting some large trees (for specific reasons) can move these stands to the desire future condition while also sequestering large amounts of carbon while also <u>not</u> putting these stands at increased risk to stand replacement wildfires (a carbon liberating event) by leaving them alone to accumulate biomass beyond historic norms. Many of our central and eastern Oregon plant associations evolved with periodic fire. These frequent fires were small carbon liberation events that created uneven-aged stand conditions with a wide range of diameters. Stephen Fitzgerald presented a paper at the National SAF Meeting in Spokane, WA in 2012 titled, *Using Uneven-aged Management as a Restoration Strategy in Ponderosa & Dry Mixed Conifer Forests.* In this presentation, Fitzgerald displays the after-treatment stand structure and future growth and development of an uneven-aged prescription using FVS for creating uneven-aged ponderosa pine forests that closely resemble historic old-growth structure. The starting point for these projections comes from a replicated silviculture study with an uneven-aged management treatment (established in 2008) on the Deschutes National Forest by Fitzgerald. To get an idea of how much standing carbon historic pine and mixed conifer stands might contain, Fitzgerald input historical stand data from Munger 1917 into FVS to calculate above-ground carbon stocks for three selected virgin stands (Winlock, LaPine, and Austin-Whitney) shown in Figure 6. Above-ground carbon ranged from 20 to 47 tons per acre. Fitzgerald then took harvest data from his treated uneven-aged study stands from central Oregon (study is located near Sunriver, OR) and calculated the carbon cut from the initial treatment and projected the stand forward 160 years simulating an uneven-aged prescription (a selection cut every 20 years) that would produce or emulate old-growth ponderosa pine forest conditions. The initial stand condition contained 24.2 tons of standing carbon and at the end of the 160-year period it increased to 34.1 tons of carbon (very close to the amount of carbon in the historic LaPine stand in Munger’s 1917 paper). However, the carbon removed in the initial treatment in 2008 and the simulated amount of carbon removed every 20 years from the selection cuts tallied 37.7 tons per acre (Figure 7). This “harvested carbon” could then be converted into short-term, mid-term, and long-term forest products (carbon storage).

Fixed diameter limits are cumbersome and constrain mangers’ ability to adjust stand density as appropriate for each site and set of management objectives, and may compromise the health of large trees, hinder understory vegetation development, and affect tree regeneration (Abella et al. 2006).

They can also have economic implications (Larson and Mirth 2001). In an assessment of timber availability from restoration treatments within the Blue Mountain region of Oregon, Barbour et al. (2008) analyzed the resulting timber volume and acres that could be treated with and without the 21-inch diameter cap. These are presented in table 1. When the 21-inch diameter limit is removed, the number of densely stocked acres with positive net revenues doubled, increasing from 39,900 acre to 79,100 acres treated with corresponding volume increasing from 167MMBF to 356 MMBF, respectively. If timber receipts are reinvested, acres and harvested timber volume increase substantially. Again, without a 21-inch diameter cap does not mean that all trees 21 inches and greater will or would be harvested. Allowing the harvest of some trees over 21 inches, as appropriate for predetermined management objectives, can have important implications for the economic viability of restoration treatments and facilitate the removal of smaller trees in densely stocked stands. Milling infrastructure has decreased over the past few decades in central and eastern Oregon increasing the distance and cost of trucking timber to surviving mills to be made into useful products. The increased hauling costs reduces the economic viability of forest restoration on both Federal and private forest lands and continued loss of mills will have a profound impact on the socio-economic fabric of eastern Oregon communities.

So, what are some options?

The OSAF strongly supports a preferred alternative that has no diameter or age limits. No diameter or age limit provides the most flexibility to managers to achieve long term land management objectives. Forest Service needs to define the desired future conditions they want for a given area (with a range of plant associations), landscape, or subwatershed, etc. Setting diameter or age limits is arbitrary and has no basis in science. The alternative should include direction to recruit and retain large trees where there is a deficient number, not to exceed the carrying capacity of the site and stand.

An option could be considered is to increase the diameter limit to 30+ inches, just as an example, and allow for exceptions to remove such trees (big tree may have mistletoe and, therefore, threaten the health of other large trees, regeneration and future stand structure). If there is a diameter limit and the Forest Service builds in a process for exemptions, say, to a 30-inch limit, what would the conditions and the process be for allowing an exemption? Would they need to get buy-in from a collaborative? Would they need to visit every single tree above 30 inches (marked to be cut) to get approval?

Again, we appreciate the Forest Service addressing the Eastside 21-inch rule. There has been so much learned over the last 25 years on how to manage these dynamic dry forest ecosystems and it is time to allow the professional foresters and resource specialists the flexibility to apply that science.

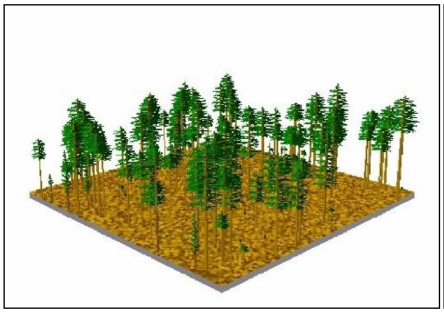
Sincerely,

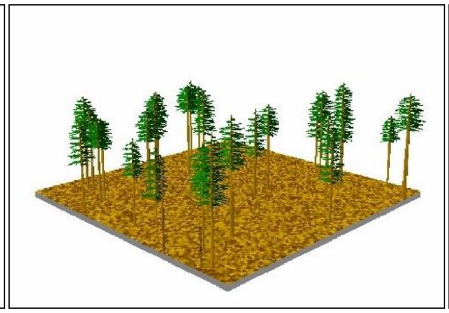
Jeffrey R. Grogan
Jeff Grogan, Chair
Oregon Society of American Foresters

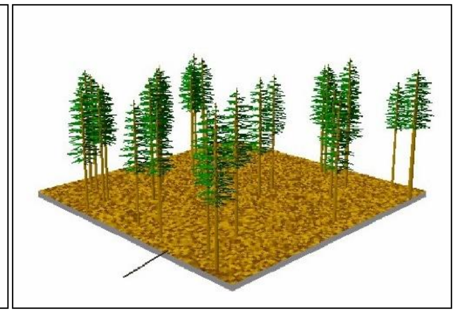
cc: Emily Platt, Project Manager
Glenn Cassamassa, Regional Forester

Figure 3a – Second-growth ponderosa pine stand before thinning. Trees marked with orange paint are marked to leave.

Figure 3b – After thinning.







Age 80, before thinning 2002 **After thinning 2005** **2042--Age 120, 40 years after thinning**

Figure 4 – Simulated thinning of an 80-year old ponderosa pine stand in central Oregon, and conditions 40 years after treatment. (adapted from Fitzgerald et al. 2005)

Wide Thin

YEAR	Trees/Ac.	Avg. Diam.
2002	148	10.7
2005	44	15.4
2012	43	16.3
2032	41	18.7
2042	40	19.8

Figure 5 – Thinning needed in this 130-year old ponderosa pine stand where most of the trees are at or above 21 inches.

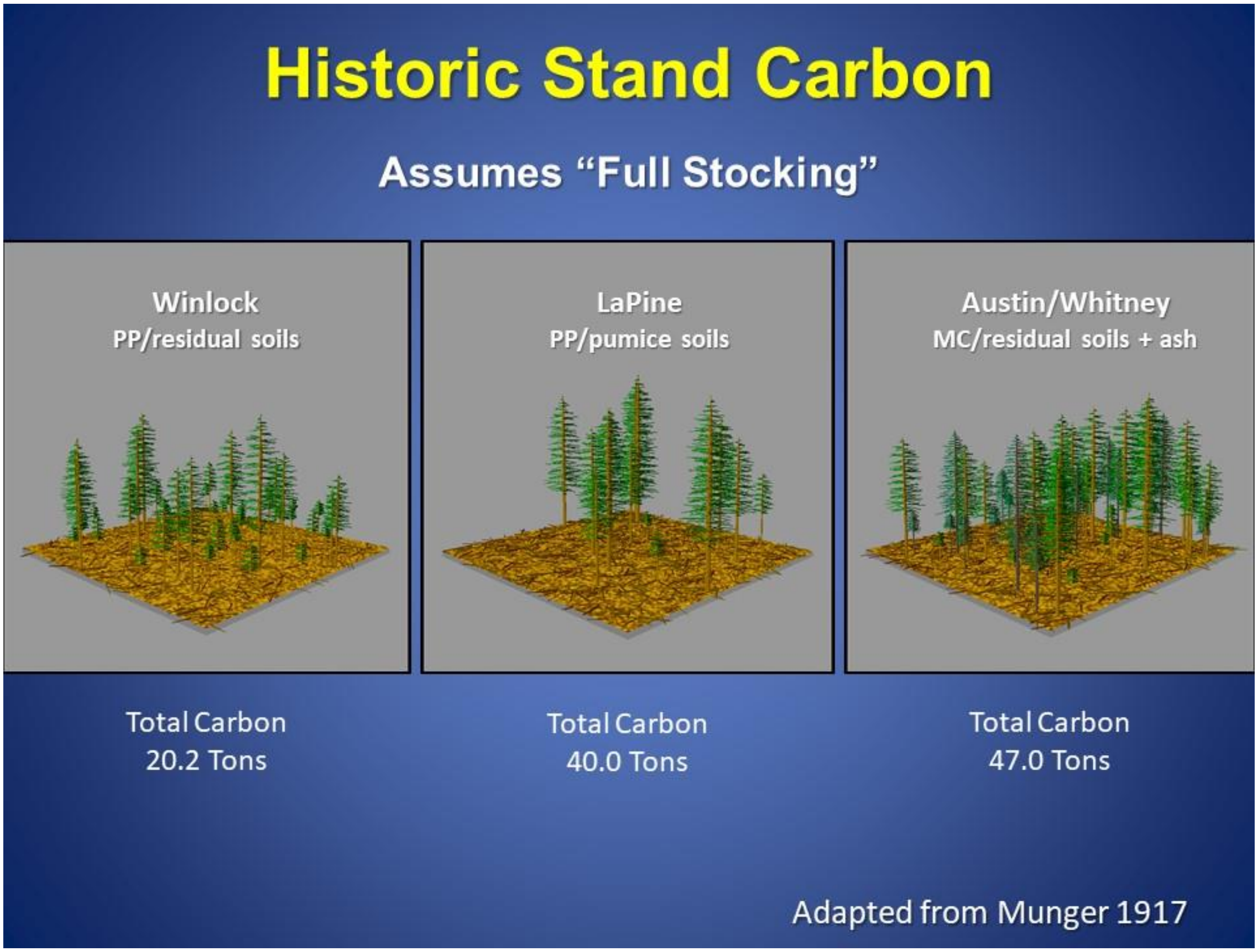


Figure 6 – Above-ground carbon stocks from three stands in central and eastern Oregon. Stand data taken from Munger 1917.

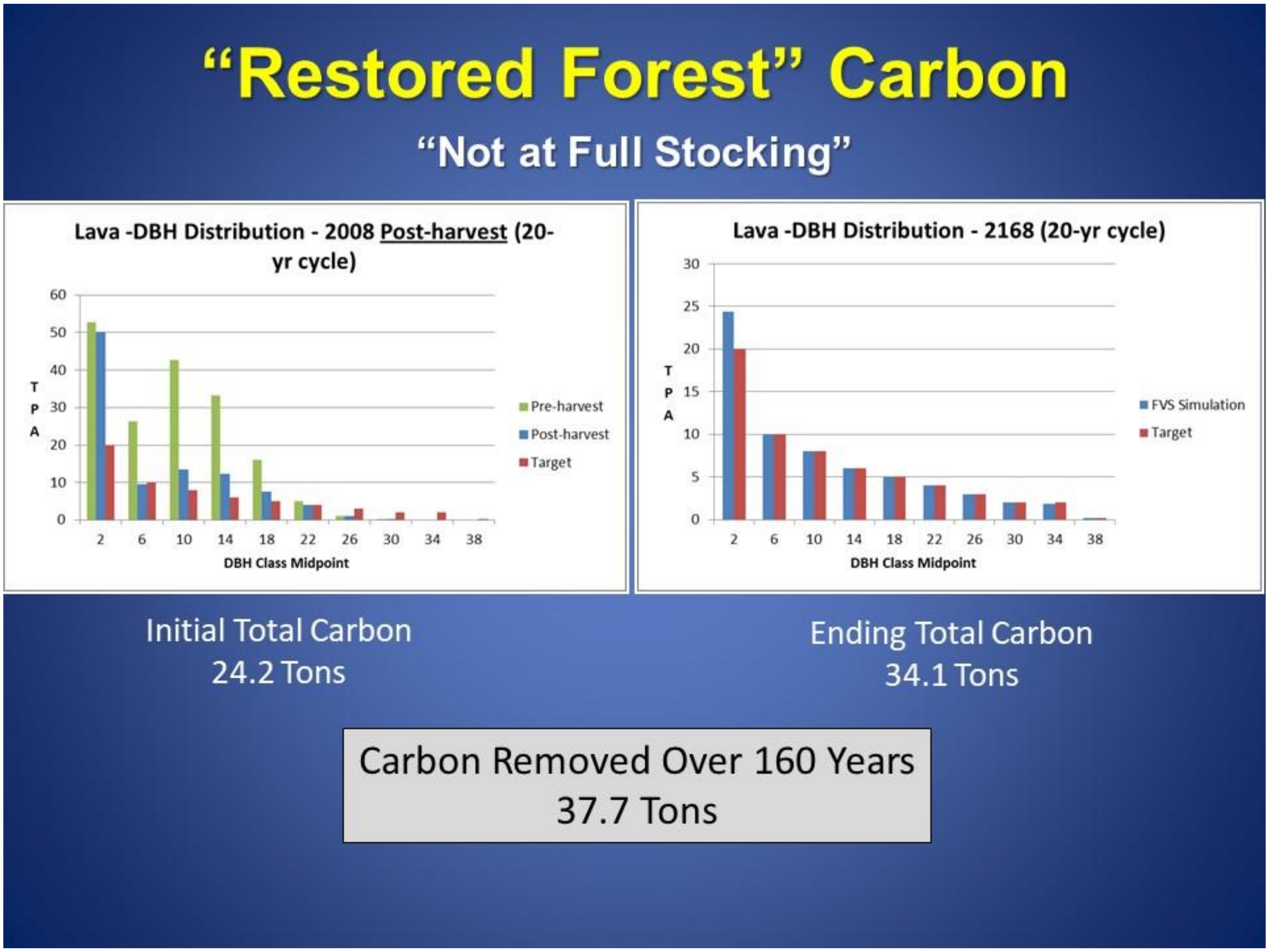


Figure 7 – Beginning, ending, and removed carbon per acre from uneven-aged management regime in central Oregon ponderosa pine forest.

Table 1 – Effect of 21-inch diameter cap on treatable acres and timber volumes from restoration treatments in the Blue Mts of Oregon with and without reinvestment of receipts.

Scenario	Without Reinvestment of Receipts: Treatable acres	Without Reinvestment of Receipts: Volumes harvested	With Reinvestment of Receipts: Treatable acres	With Reinvestment of Receipts: Volume harvested
	Thousands	*Million board ft.*	*Thousands*	*Million board ft.*
With 21-inch limit	39.9	167	114.9	392
Without 21-inch limit	79.1	356	223.1	807

(Barbour et al. 2008)

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