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"STEWARDSHIP IN FORESTRY"

MEMORANDUM

SUBJECT: 2007 Statewide Aerial Survey

TO: Survey Cooperators & Interested Parties

FROM: Rob Flowers & Mike McWilliams

DATE: January 15, 2008

Maps are generated each year to show the approximate location, size and intensity of areas with tree damage and mortality detected during the 2007 statewide aerial survey. The following summary describes the major damage agents and provides comparison to 2006 results. Maps are available in printed format on request or online.

2007 Aerial Survey Maps @ http://www.fs.fed.us/r6/nr/fid/as/quad07/index.shtml

Survey Description & Objectives

The statewide aerial survey, covering over 28 million acres, is flown during summer and fall of each year, which is the optimum time to detect changes in foliage or other characteristics associated with tree mortality and damaging agents (Figure 1). Ownership over the survey area is approximately 60% federal and 40% state & private.

The survey aircraft flies a grid pattern at an altitude of 1,000-1,500 ft above the ground, with flight lines located 4 miles apart. Each of two aerial observers maps a 2 mile area on one side of the aircraft using a digital sketch-mapping system, consisting of a touch-screen computer linked to a GPS receiver. The system displays topographic maps, satellite imagery and aircraft position, allowing observers to quickly locate and delineate affected areas in the form of polygon figures.

Polygon boundaries indicate the approximate extent of an area with damage, and a code is given to describe the likely agent(s), along with either the number of trees affected (counts) or an intensity measure (L=light, M=moderate, H=heavy), in the case of defoliators. In areas where damaged trees are too numerous to count, the number of affected trees per acre is estimated (1A=1 tree per acre). The key located on each map describes the agent and primary host(s) for each code.

The short-term objective of the survey is to provide the locations and amount of *current year* tree damage and mortality. The long-term objective is to document *trends* over time, and provide this information to assist with forest management activities. The aerial survey is designed to provide estimates only and is *not* able to precisely quantify damage from specific agents; this can only be accomplished by follow-up ground surveys of mapped areas.

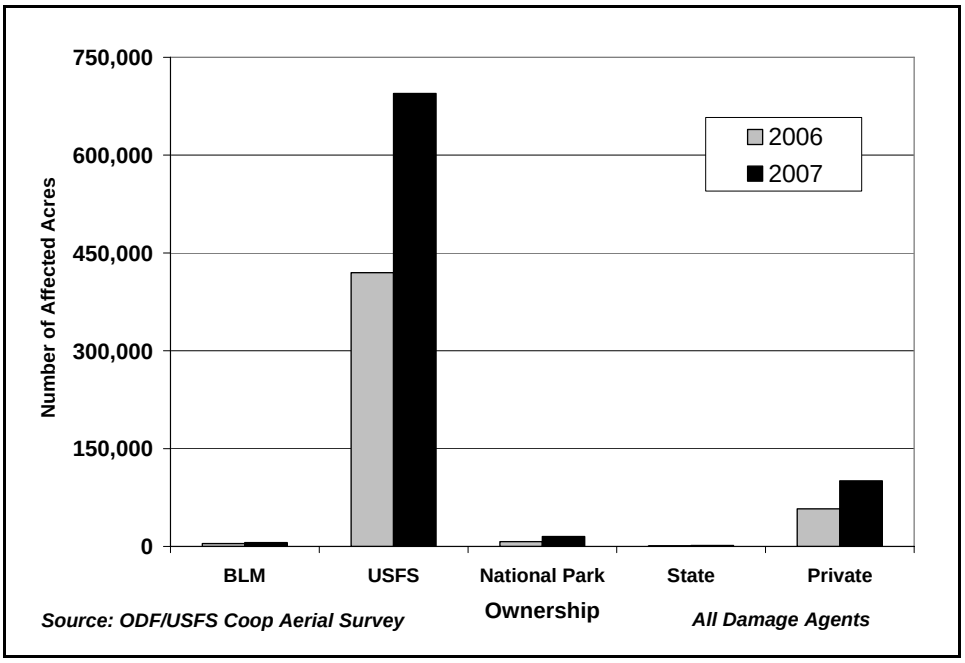
Figure 1: The annual statewide aerial survey covers all forest lands (>28 million acres). Damage estimates are summarized by ODF area and protection districts.

Survey Results: Eastern Oregon Area

The following survey data are summarized by ownership, protection district and agent category. Agents are grouped by bark beetles, defoliators, and those causing other damage to specific areas or tree species. Estimates are described by *the total number of affected acres* as this provides the best damage description for uneven-aged stands. Volume of affected timber and other measures are also available and can be provided on request.

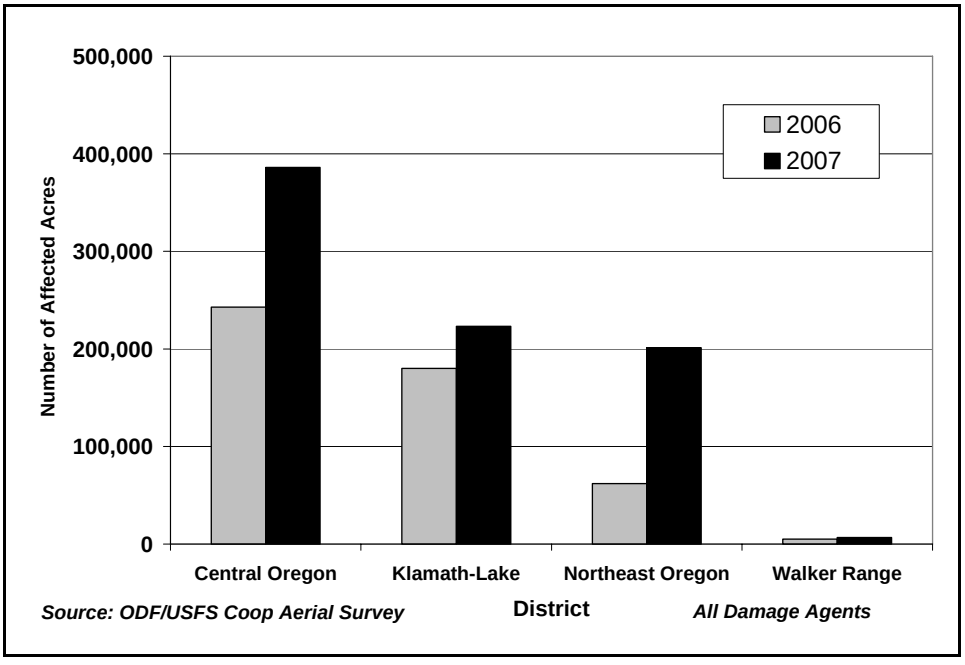
In 2007, detected damage to forest lands in Eastern Oregon increased by 40% overall, with many of the most severe areas located in National forests and designated wilderness areas. Increased damage in comparison to the previous year occurred on all ownerships, but was greatest for U.S. Forest Service (USFS), Private, and National Park lands, while Bureau of Land Management (BLM) and State of Oregon ownerships showed similar levels of damage to 2006 (Figure 2).

Figure 2: Area (acres) affected by damaging agents in Eastern Oregon in 2006 & 2007.



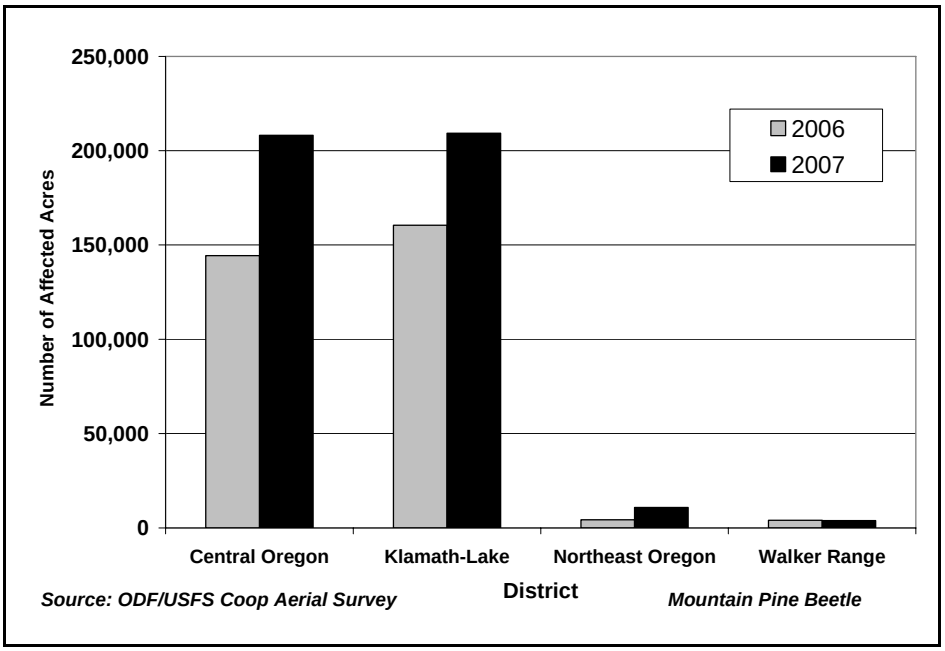
Observed damage increased to varying degrees in all protection districts in 2007 (Figure 3). Greater increases occurred in the Central and Northeast Oregon districts, followed by more moderate increases in the Klamath-Lake district and Walker Range FPA. In central and south-central Oregon, bark beetles were the major damaging agents, while damage from defoliators was more significant in northeast Oregon.

Figure 3: Area (acres) affected by damaging agents by protection district in 2006 & 2007.



Bark beetles are often the dominant cause of tree mortality in Eastern Oregon, with a great majority of this due to a single species, the mountain pine beetle (*Dendroctonus ponderosae*). The current outbreak, which began in 2001, is continuing to expand in lodgepole stands along east slopes in the Cascades, and is responsible for the majority of the damage observed in Central Oregon and Klamath-Lake districts as well as Walker Range FPA in 2007 (Figure 4). Infestations along Winter Rim, above Summer Lake, have shown some of the most rapid expansion in recent years. The outbreak is projected to continue for up to a decade or more may increase the risk of catastrophic fire in many areas. The expansion is increasingly impacting other susceptible hosts including Ponderosa, sugar, western white, and whitebark pines. While mountain pine beetle occurs in the Northeast Oregon district also, damage due to other bark beetles is often more significant.

Figure 4: Area (acres) affected by mountain pine beetle in Eastern Oregon in 2006 & 2007. Mountain pine beetle accounted for >85% of total bark beetle damage (70% in lodgepole pine).

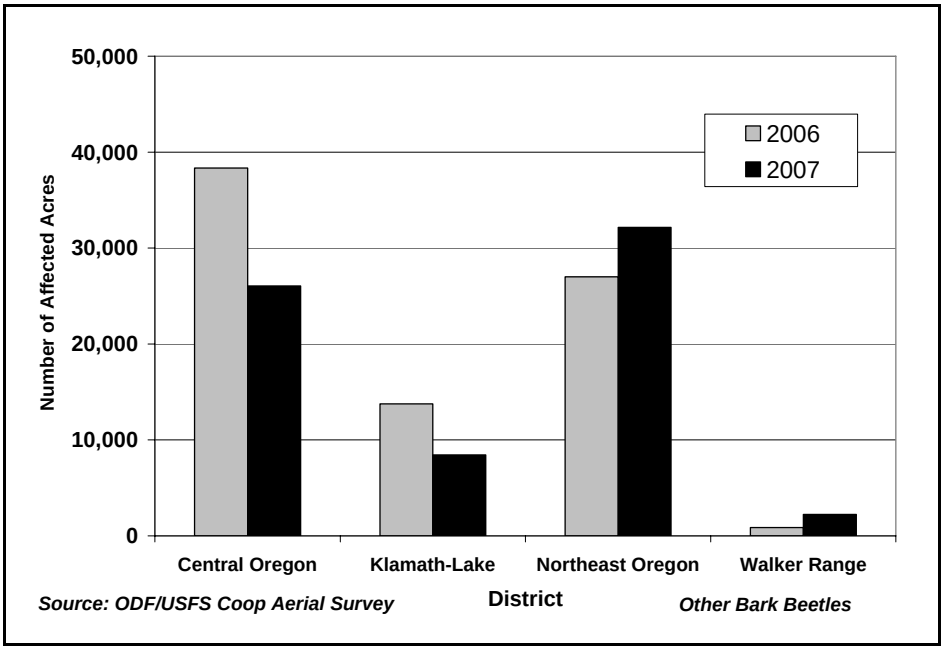


A number of other bark beetles rapidly increase their populations when favorable environmental conditions exist, such as prolonged drought, and therefore tend to show greater variability year-to-year than mountain pine beetle. Damage from several of these beetles was relatively high in Eastern Oregon from 2002-2005, but has since declined in many areas with the return of more normal moisture levels.

Other major bark beetles include Douglas-fir beetle (*Dendroctonus pseudotsugae*), fir engraver (*Scolytus ventralis*), western pine beetle (*D. brevicomis*) and pine engravers (*Ips spp.*). In 2007, the estimated damage from these species decreased by an average of 16% (Figure 5). Declines were observed in the Central and Klamath-Lake districts, while increases were seen in the Northeast Oregon district and Walker Range FPA. The overall decline was driven in large part by reduced fir engraver damage, while increases appeared to be due to greater Douglas-fir beetle attacks.

High levels of mortality from Douglas fir beetle often appear 1-2 years following damage from fire, defoliation or storm events. Given the increased damage from all three factors in the area this year, populations may continue to expand. In contrast, western pine beetle and *Ips spp.* remained at low levels in most areas.

Figure 5: Area (acres) affected by other bark beetles in Eastern Oregon in 2006 & 2007. Fir engraver accounted for >40% of all detections; Douglas-fir beetle increased by 72%.

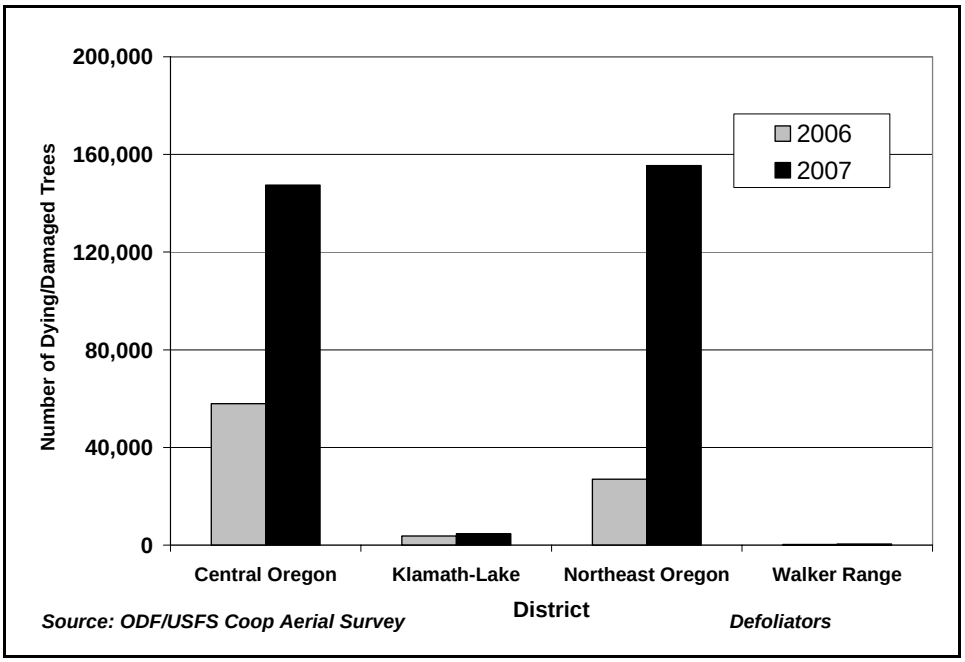


Damage from defoliators increased an average of 70% in Eastern Oregon in 2007. The highest increases were in the Central and Northeast Oregon districts, which have historically suffered the greatest damage (Figure 6). The major agents include two moths, the western spruce budworm (*Choristoneura occidentalis*) and larch casebearer (*Coleophora laricella*), as well as a sucking insect pest, the balsam woolly adelgid (*Adelges piceae*).

Damage to Douglas-fir and true fir species due to Western spruce budworm has been increasing since 2001. Many stands may show greater susceptibility to damage during the current outbreak, as the percentage of shade-tolerant, late-successional species has increased. Expansion from currently infested areas of Central Oregon, which contain >93% of the damage, continued with total acreage increasing to >96,000 acres.

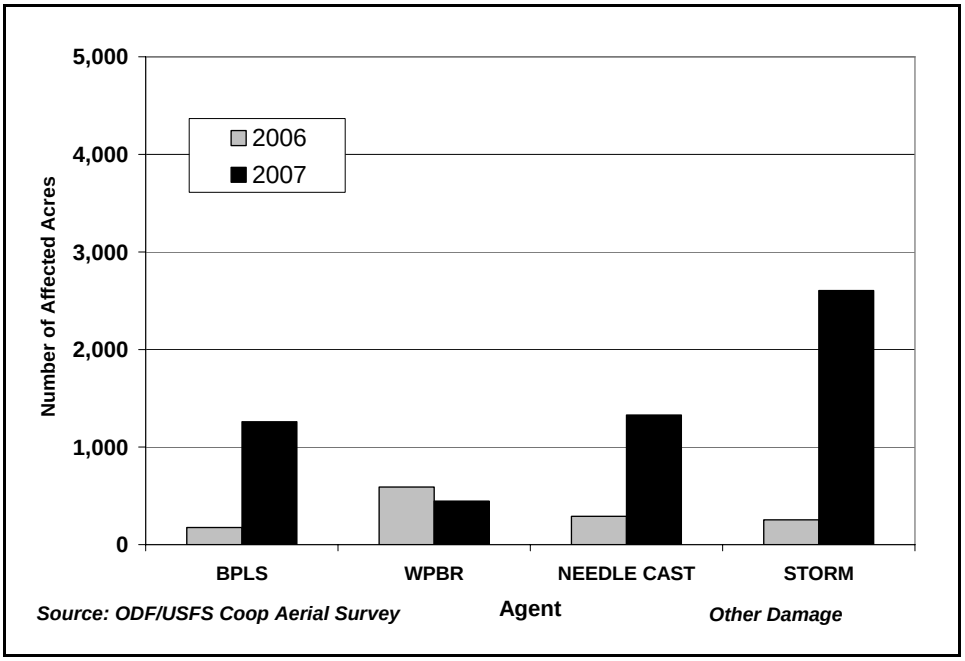
Damage from non-native species, primarily larch casebearer and balsam woolly adelgid, also showed significant increases this year. While increased detection was due in part to expansion of infested areas, it was also the result of much improved survey timing and weather conditions in 2007. Although widespread in distribution, damage intensity from larch casebearer is generally low and mortality is rarely observed. Ground surveys in many infested areas also indicated the presence of larch needle cast and blight. Damage from balsam woolly adelgid, which is most apparent in subalpine fir stands, appears to be increasing in intensity, with greater tree mortality observed in declining stands this year than has been previously observed.

Figure 6: Area (acres) affected by defoliators in Eastern Oregon in 2006 & 2007. Western spruce budworm, larch casebearer & balsam woolly adelgid were the primary agents.



A number of other damaging agents, which are often restricted in terms of area or species, were also observed to cause moderate levels of damage in 2007. These included a sucking insect pest, the black pineleaf scale (BPLS), as well as white pine blister rust (WPBR) and needle casts. Damage from winter storms (STORM) also appeared to be greater this year.

Figure 7: Area (acres) affected by other damaging agents in Eastern Oregon in 2006 & 2007.



Damage to Ponderosa pine due to black pineleaf scale has increased in distribution and intensity in many areas this year. While damage is primarily on pine hosts, low-elevation Douglas-fir at drier sites has become increasingly affected. Increases of populations to damaging levels are poorly understood, but appear to be related to tree stress from poor site conditions or in response to natural enemy declines from vector control operations. The non-native white pine blister rust also continues to expand, and appears to be significantly impacting the regeneration of whitebark pines in high-elevation areas. Native needle casts of Ponderosa pine and Western larch were also more apparent this year. Infection severity is often localized as it is driven by moisture levels in spring, warm winter temperatures and other factors. Damage can be highly variable, but is usually short-lived. Lastly, although there were 66 gypsy moths found near Bend in 2006 during annual trapping surveys, no additional moths have been detected this year following an eradication program completed in spring 2007.

Survey Discussion

It is important to consider that the comparisons presented here cover only a one-year interval and may not reflect long-term trends. In addition, the survey can only detect mortality or damage that is visible at the time the area is flown. Attempts are made to coordinate flights with the peak visibility of mortality and damaging agents, but this may be confounded by environmental conditions. Still, aerial surveys represent the best method available for obtaining reasonable depictions of the extent of forest lands affected by damaging agents, and serve to continually update managers as to changing conditions in these areas.

Acknowledgments

The statewide aerial survey was conducted by the Oregon Department of Forestry, Forest Health and Air Operations units in cooperation with the USDA Forest Service. We thank our pilot Jim Baranek, as well as our federal cooperators: Bob Schroeter, Ben Smith, Keith Sprengel, Julie Johnson and Sundi Sigrist.

Additional Notes

We greatly appreciate feedback in regard to the location, agent or damage intensity of mapped areas. As we are only able to conduct limited ground surveys each year, information from affected areas can be very valuable in improving mapping accuracy.

For additional information, please contact:

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