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"STEWARDSHIP IN FORESTRY"

MEMORANDUM

SUBJECT: 2007 Statewide Aerial Survey Summary

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.

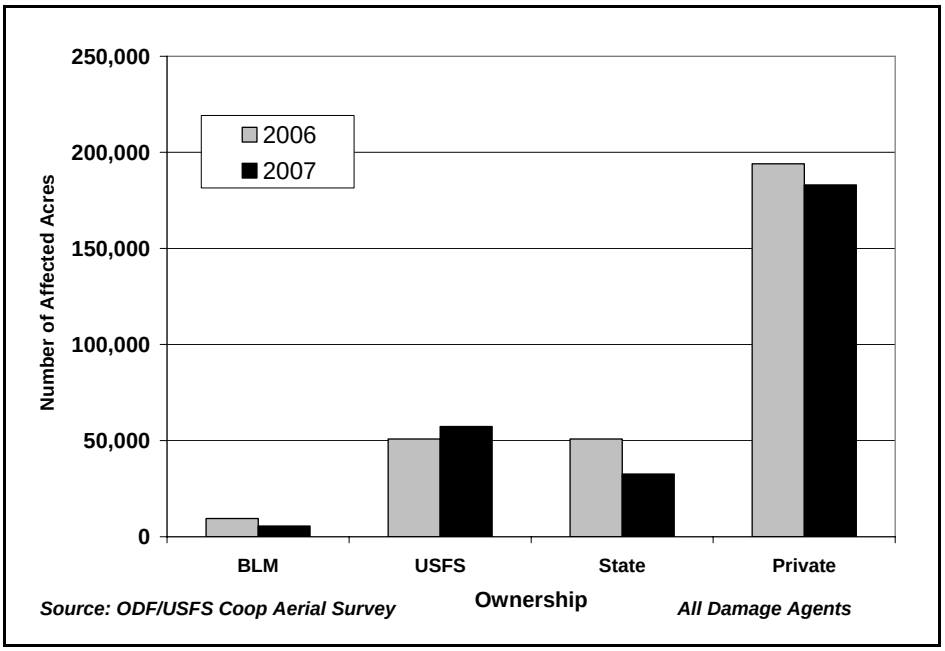
Figure 1: The annual statewide aerial survey covers all forest lands (>28 million acres). Damage estimates are summarized by ODF area and protection districts.

Survey Results: Northwest Oregon Area

The following survey data are summarized by ownership, protection district and agent category. Agents are grouped by needle casts, bark beetles, those damaging young conifers, and storm damage. Estimates are described by *either the total number of affected acres or the number of dying/damaged trees in those areas*. In uneven-aged stands, the affected acreage provides a better damage estimate, while in young stands the number of trees killed may provide a better indication of damage. Volume of affected timber and other measures are available and can be provided on request.

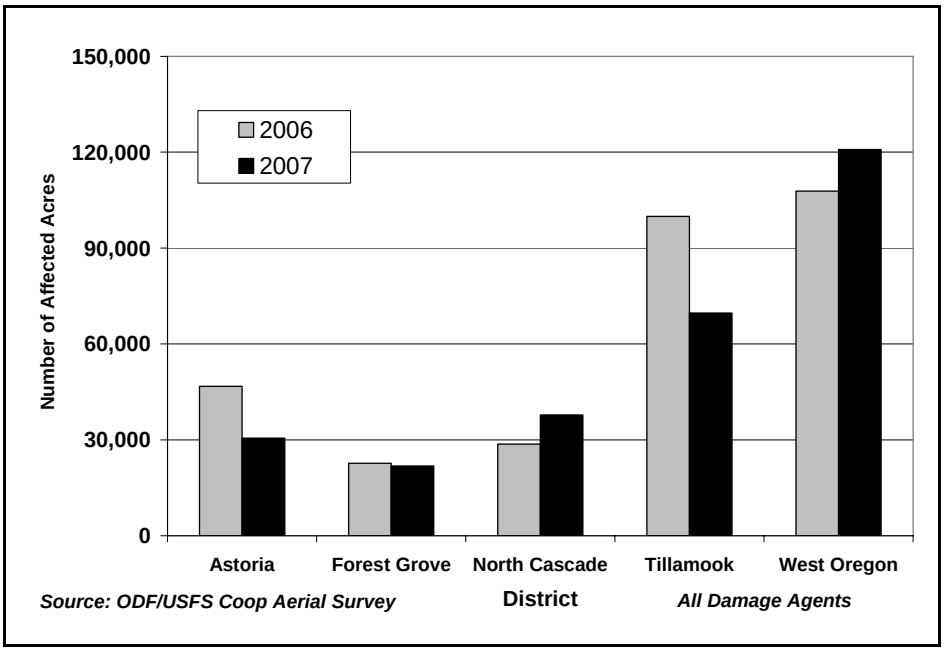
In 2007, detected damage to forest lands in Northwest Oregon decreased by 10% overall (Figure 2). Decreased damage relative to the previous year occurred on Bureau of Land Management (BLM), State of Oregon (State) and Private ownerships. Increased levels were observed on U.S. Forest Service (USFS) lands.

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



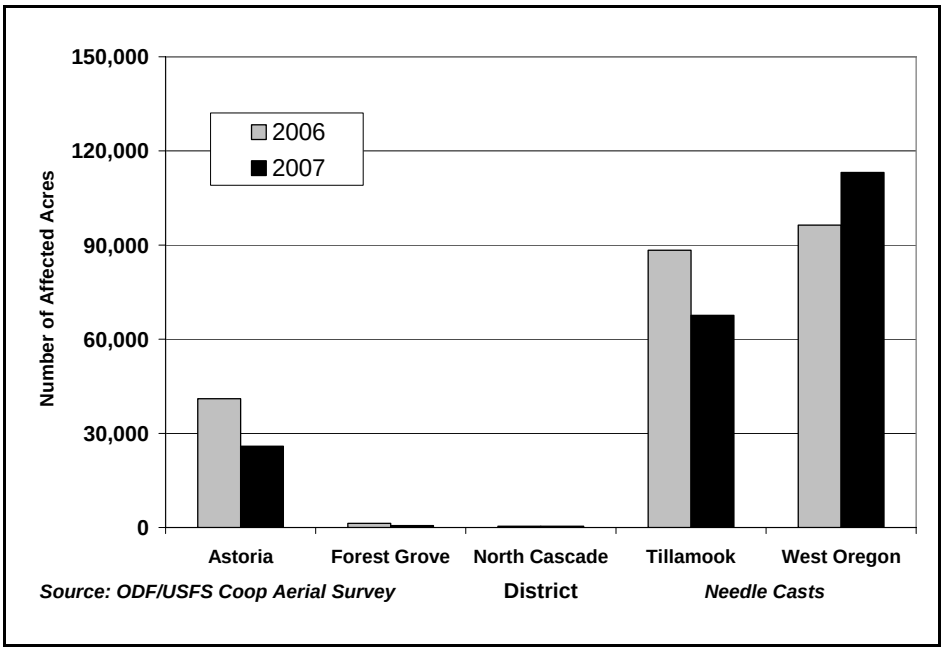
Damage trends by protection districts were more variable between years (Figure 3). Less overall damage was detected in the Astoria and Tillamook districts, while increased damage was observed in the North Cascade and West Oregon districts. Forest Grove showed similar levels between years. In coastal areas, Swiss needle cast and storm damage were the major damaging agents, while bark beetles and damage to young conifers (due to bear & other agents) were more important further inland.

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



In recent years, needle cast has been the greatest damaging agent along coastal areas in Northwest Oregon. Virtually all of the damage is due to Swiss needle cast of Douglas-fir, caused by a native pathogen (*Phaeocryptopus gaeumannii*). Small pockets of Ponderosa pine needle cast (*Lophodermella spp.*) and larch needle cast (*Meria laricis*) were also observed further inland. Although detection was slightly lower in 2007, infection by Swiss needle cast remains widespread over the area of susceptible host. With the exception of the West Oregon district, which increased, detection was lower on all other districts (Figure 4). Infection severity is often localized as it is driven by moisture levels in spring, warm winter temperatures, and other factors. This, along with difficulty in obtaining proper survey timing due to weather conditions, generates a moderate degree of variability in detection year to year.

Figure 4: Area (acres) affected by needle casts in Northwest Oregon in 2006 & 2007. Swiss needle cast accounted for >99% of all detections.

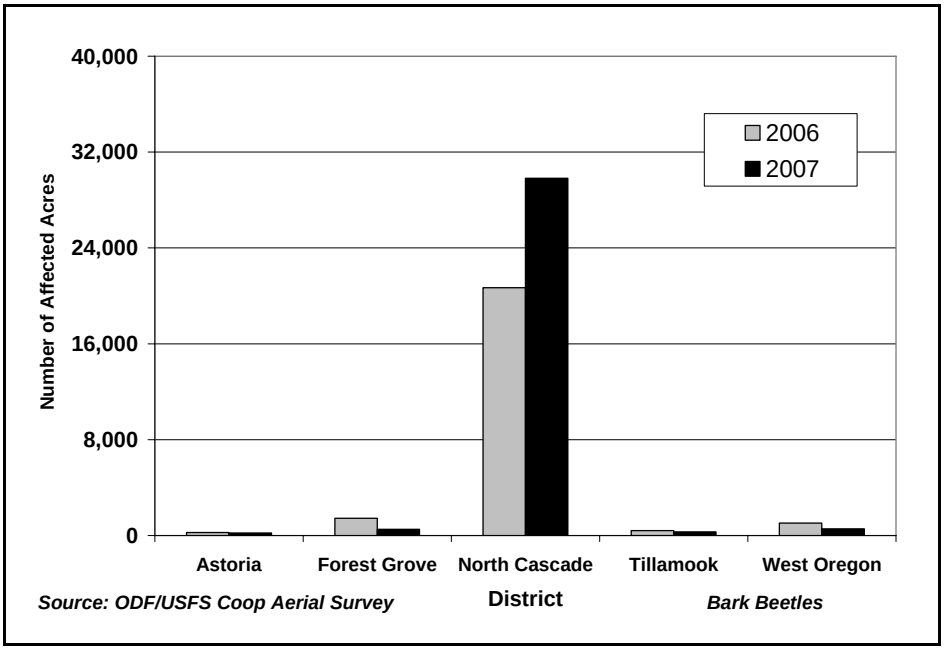


Bark beetles have the ability to rapidly increase their populations when favorable stand or weather conditions exist, and therefore tend to show high variability year to year. Overall, damage from bark beetles in Northwest Oregon has been relatively low in recent years due to above-average moisture levels. The major beetles affecting Western Oregon include Douglas-fir beetle (*Dendroctonus pseudotsugae*) and fir engraver (*Scolytus ventralis*), while areas east of the Cascade crest are being heavily impacted by an outbreak of mountain pine beetle (*D. ponderosae*). With the exception of increased levels in the North Cascade district, the majority of damage from bark beetles remained at endemic levels in 2007 (Figure 5).

High levels of mortality from Douglas fir beetle often appear 1-2 years following storm events in which there is significant blowdown of large trees. Given increased damage from winter storms over the last two years, populations are expected to rise in coming years, although their impact tends to be quite variable across the landscape. Fir engraver, which caused high levels of tree mortality from 2003-2004, has caused relatively low damage in most areas. In contrast, the mountain pine beetle outbreak

that began in 2001 is continuing to expand in lodgepole stands along east slopes of the Cascades and is causing significant damage in the North Cascade district. The outbreak is projected to continue for up to a decade or more, and is increasingly impacting Ponderosa, western white and whitebark pines in these areas as well.

Figure 5: Area (acres) affected by bark beetles in Northwest Oregon in 2006 & 2007. Mountain pine beetle accounted for >90% of all detections.

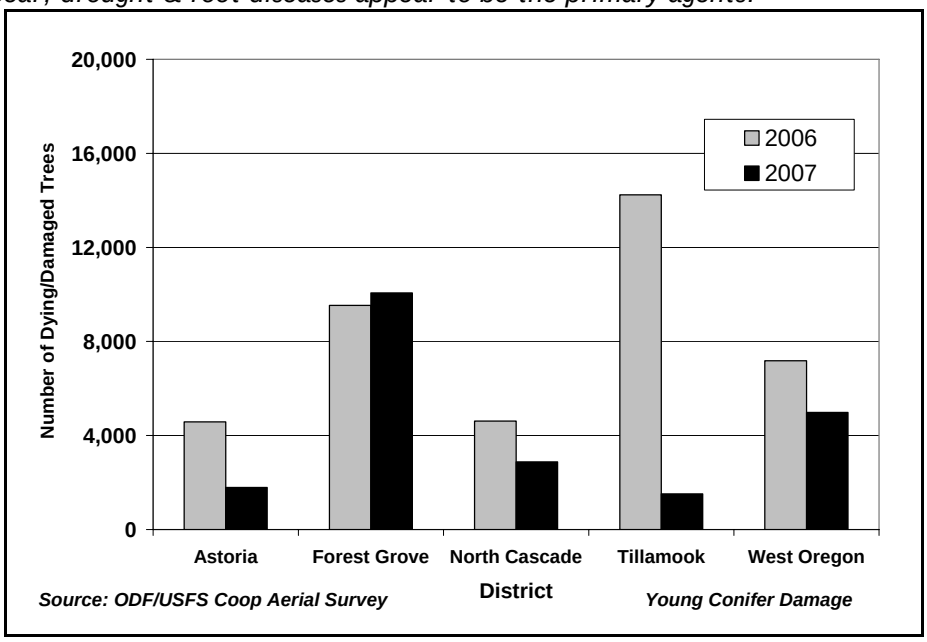


Each year, young conifers in western Oregon are damaged by a combination of agents including animals, insects and diseases. Approximately 70% of this damage usually occurs on state and private lands where the most active management is taking place. While aerial surveys attribute the majority of damage in these areas to bear, ODF ground surveys completed in 2001 estimated that bear damage occurred in only 42% of the polygons mapped and coded as bear. Root disease and drought are the other major damaging agents, and are often underestimated due to aerial survey limitations.

With the exception of Forest Grove, that showed slightly higher levels of damage in 2007, the overall damage observed on young conifers decreased by an average of 90% (Figure 6). Although the number of trees per acre suffering bear damage annually over the survey area is relatively low, significant damage may still result in some areas given its clumped distribution and tendency to occur in consecutive years.

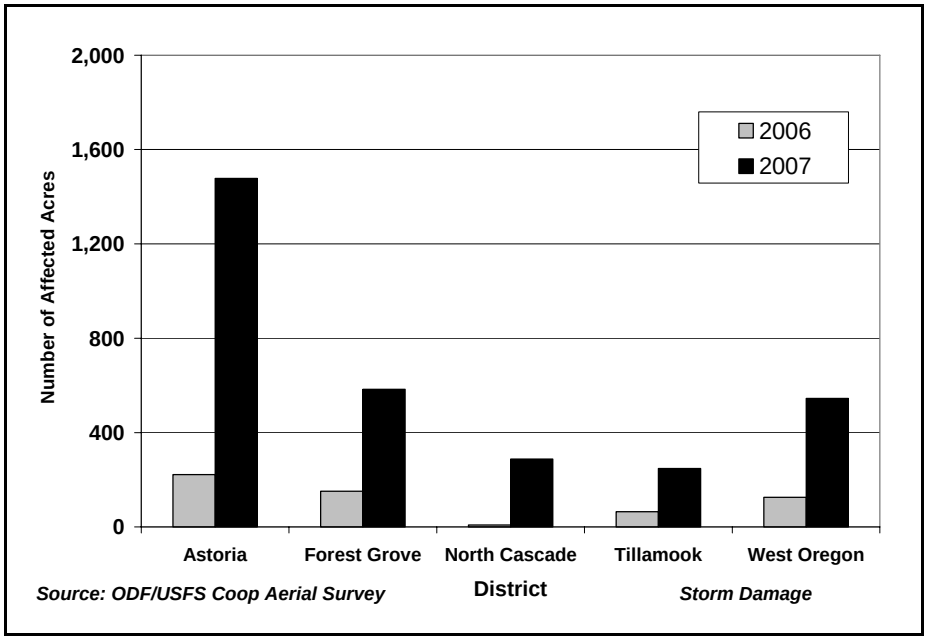
The 2007 results are similar to the average bear damage usually observed in these areas. The very high level of damage seen in 2006 was not consistent with long-term trends, and may be attributable to any number of factors. We can only speculate as to the relative contributions of the different agents or environmental conditions that have led to such large fluctuations in damage during recent years, as ground surveys of most areas are not done annually.

Figure 6: Approximate number of dying/damaged young conifers in Northwest Oregon in 2006 & 2007. Bear, drought & root diseases appear to be the primary agents.



Severe winter storms are a common occurrence in Northwest Oregon, with damage resulting from a combination of strong winds, flooding and frozen precipitation. Large, more contiguous areas represent the majority of recorded damage; however, more diffuse and scattered damage across the landscape is often not captured. In 2007, storm damage was widespread in the area, with the greatest levels observed in the Astoria district. As the statewide survey was completed in fall, estimates do not include the additional damage from the major storms that occurred in December 2007.

Figure 7: Area (acres) affected by storm damage in Northwest Oregon in 2006 & 2007. Does not include damage from storms in December 2007.



A number of other non-native insect and disease agents, often specific to certain areas, were also observed to cause moderate levels of damage in 2007. Decline of Sitka spruce due to spruce aphid has been reduced in recent years. Insect populations appear to have dropped significantly as the result of below-average winter temperatures in recent years. Port Orford cedar root disease is continuing to slowly expand from previously infected areas, and has caused high levels of mortality in many areas. In the Cascades, the sucking insect pest, balsam woolly adelgid, continues to cause decline and mortality in a number of true fir species. A newly detected invasive, the Asian gypsy moth, was also captured in 2006 near St. Helens. An eradication program was completed in spring 2007 and thus far no additional moths have been found. Among native insect pests, small areas of Pacific silver fir in the Cascades were killed by silver fir beetle this year, while scattered defoliation of red alder occurred due to feeding by western tent caterpillar and alder flea beetle.

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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