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"STEWARDSHIP IN FORESTRY"

MEMORANDUM

SUBJECT: 2007 Aerial Survey for Bear Damage in Northwest Oregon

TO: Survey Cooperators

FROM: Rob Flowers & Mike McWilliams

DATE: July 31, 2007

Maps are generated each year showing the approximate location, size and intensity of areas with tree damage and mortality detected during aerial surveys of Northwest Oregon. The following summary describes the major damage agents observed in 2007 and provides relative comparisons to results from 2006. Maps of this special survey are available in printed format on request or online as part of statewide survey maps.

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

Survey Rationale

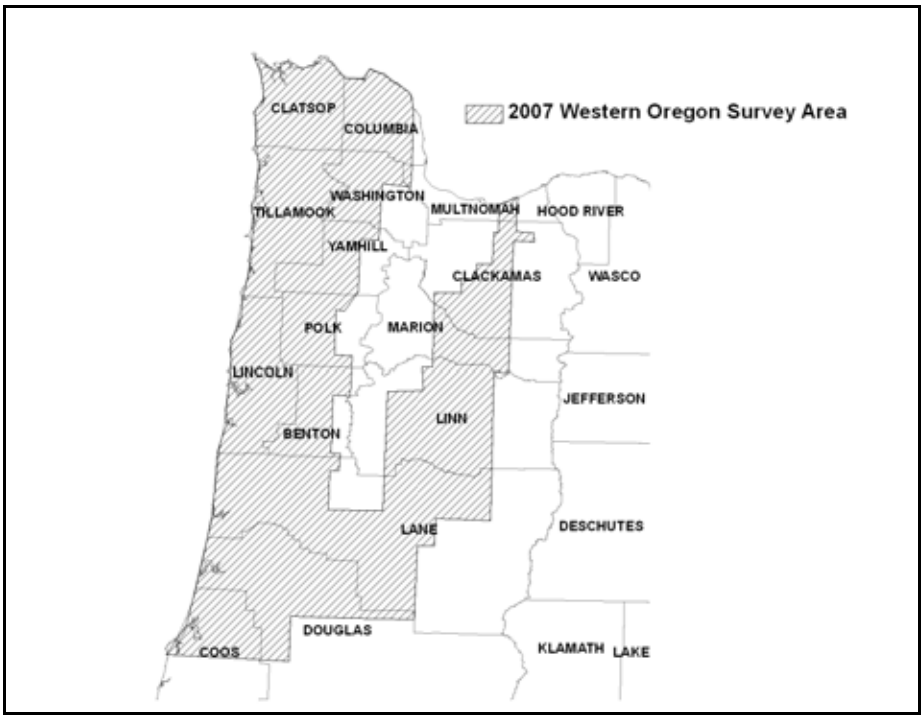
Each year, conifers in western Oregon are affected by a number of agents that cause substantial damage and mortality. These include animals, insects, diseases and environmental events. Forest landowners with an interest in the locations and causes of tree damage and mortality, particularly that resulting from bear have sponsored an annual aerial survey since 1993. While the average number of trees per acre suffering bark peeling/girdling annually over the survey area is relatively low, damage tends to be highly variable and can result in significant losses given its clumped distribution and tendency to occur in the same areas for consecutive years.

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.

Survey Description

The aerial survey is usually flown in early summer, as this is the optimal time to detect damage signatures associated with black bear feeding that has occurred the previous year. Damage from a number of other agents, including Douglas-fir beetle, fir engraver, Port Orford cedar root disease, and storm events are also recorded during the survey. Approximately 7.7 million acres were flown in 2007 (Figure 1). The ownership of forest lands within the survey area includes Bureau of Land Management, U.S. Forest Service, State of Oregon and Private.

Figure 1: The coverage area for the aerial survey of bear damage in Northwest Oregon in 2007. Approximately 7.7 million acres were flown, which includes portions of 15 counties.



The survey aircraft flies a grid pattern at an altitude of 1,000-1,500 ft above the ground, with flight lines located 3 miles apart. Each of two aerial observers maps a 1.5 mile area on one side of the aircraft. A digital sketch-mapping system is used, which consists of a touch-screen computer linked to a GPS receiver. The computer displays topographic maps, satellite imagery and aircraft position, allowing observers to quickly locate and record affected areas in the form of polygon figures. The polygons mapped designate approximate damage boundaries and are coded with the agent and the number of trees affected. Ground surveys conducted in 2000 examined the correlation between the number of dying trees recorded within polygons and the occurrence of bear damage (Table 1).

Table 1. Relationship between the number of dying/damaged trees located within a polygon and the likelihood of bear damage (ODF 2001). Remaining causes of tree damage include root diseases, insects, other animals & environmental factors.

NUMBER OF DYING TREES WITHIN POLYGON	% OF POLYGONS WITH BEAR DAMAGE
≤ 5	26
6-10	50
11-20	67
>20	88

In areas where damage is severe, the number of affected trees per acre is estimated (1A=1 tree per acre). A key is provided on each map that details major damage agents and their primary hosts.

Survey Results

Damage to Young Stands

Results are summarized by ownership and county for: 1) the number of polygons (damage areas) mapped, and 2) the approximate number of dying trees mapped within those areas. As bear damage is often scattered within the polygon, the cumulative number of trees affected provides a better damage estimate than the total acreage over which it occurs. Survey results are compared to those obtained in 2006.

In 2007, bear damage to young conifers appeared to decline across all ownerships. The total number of polygons (damage areas) mapped decreased by 12% (Figure 2), while the total number of dying trees observed decreased by 92% (Figure 3). Damage occurred in many of the same areas as seen in previous years, but the intensity was reduced. State lands showed the greatest relative decrease followed by federal ownerships and private lands. Comparisons among the 15 counties in the survey area were more variable. The number of polygons mapped decreased in 10 counties by an average of 30%, while 5 counties showed an average increase of 10% (Figure 4). The number of dying trees decreased in 13 counties, by an average of 142%, while an average increase of 18% was observed in the 2 counties with more damage (Figure 5).

Figure 2: Number of polygons (damage areas) mapped in young conifer stands during 2006 & 2007 by ownership.

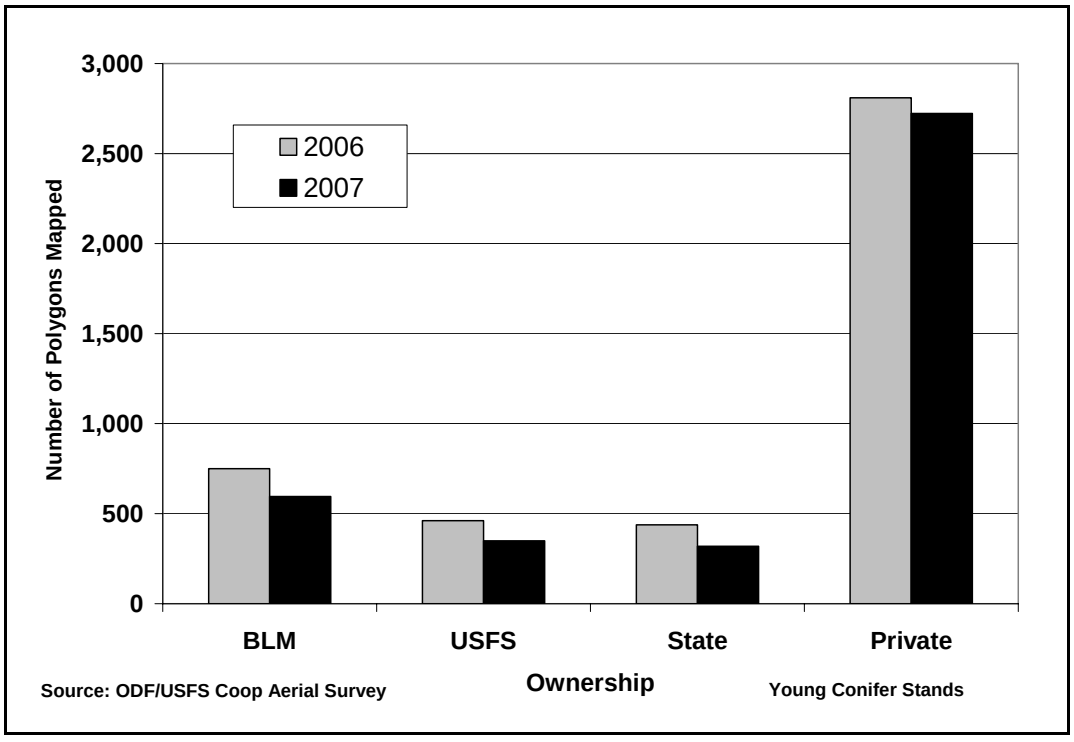


Figure 3: Approximate number of dying trees mapped in young conifer stands during 2006 & 2007 by ownership.

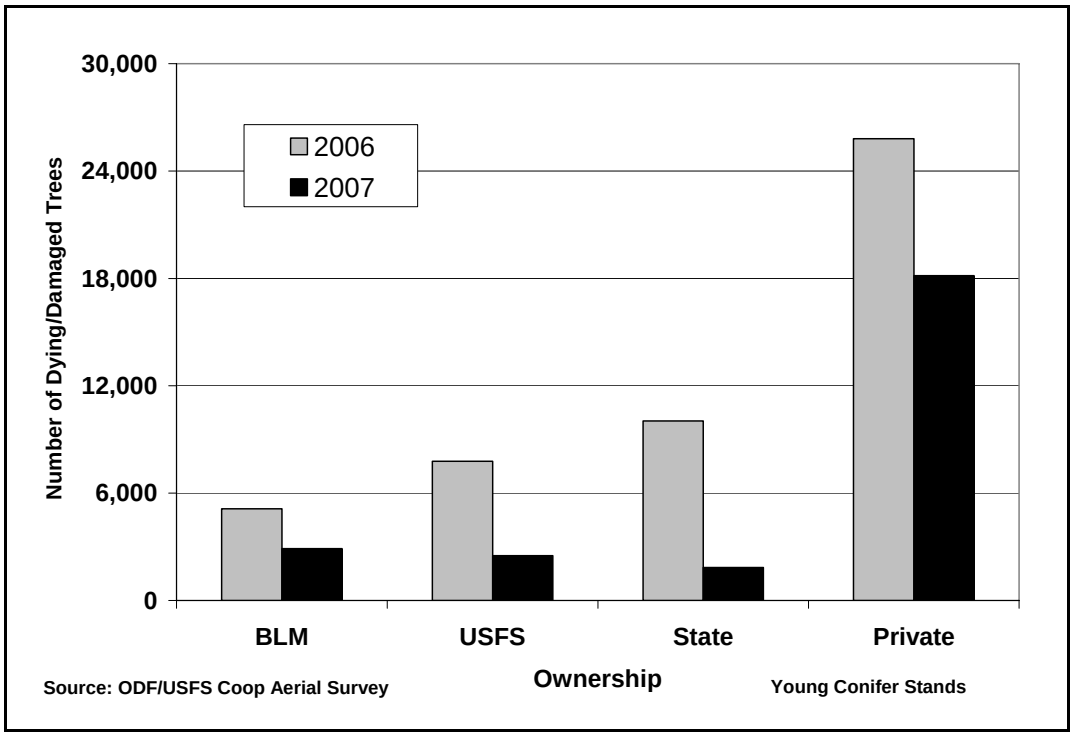


Figure 4: Number of polygons (damage areas) mapped in young conifer stands during 2006 & 2007 by county.

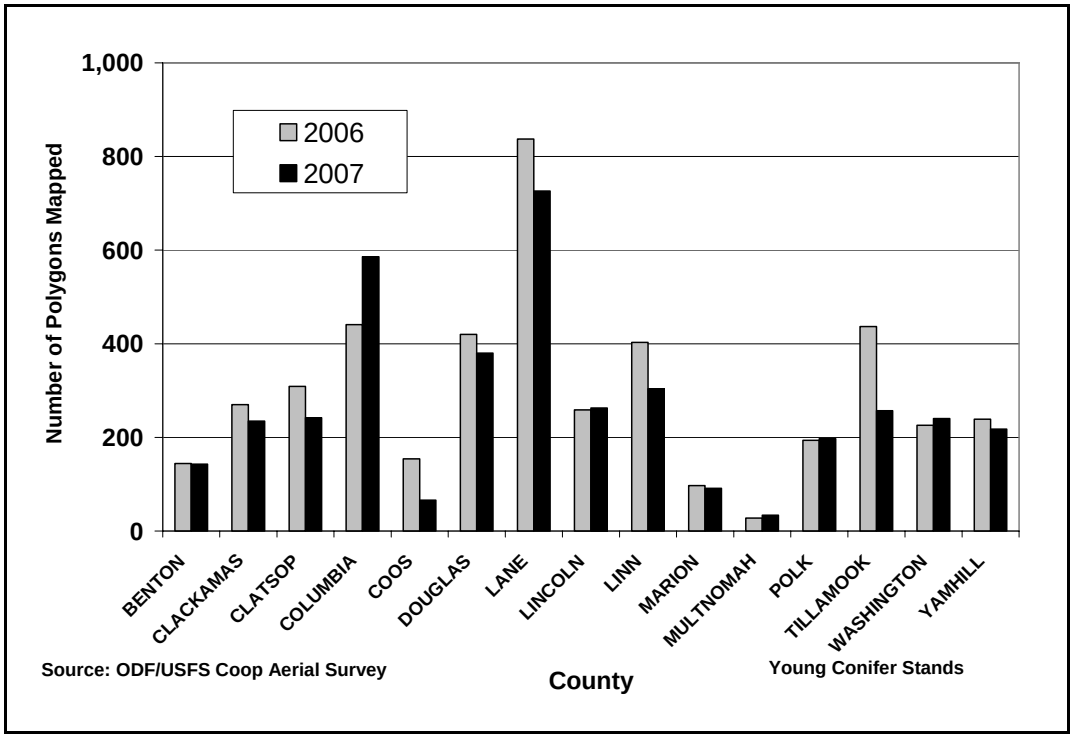
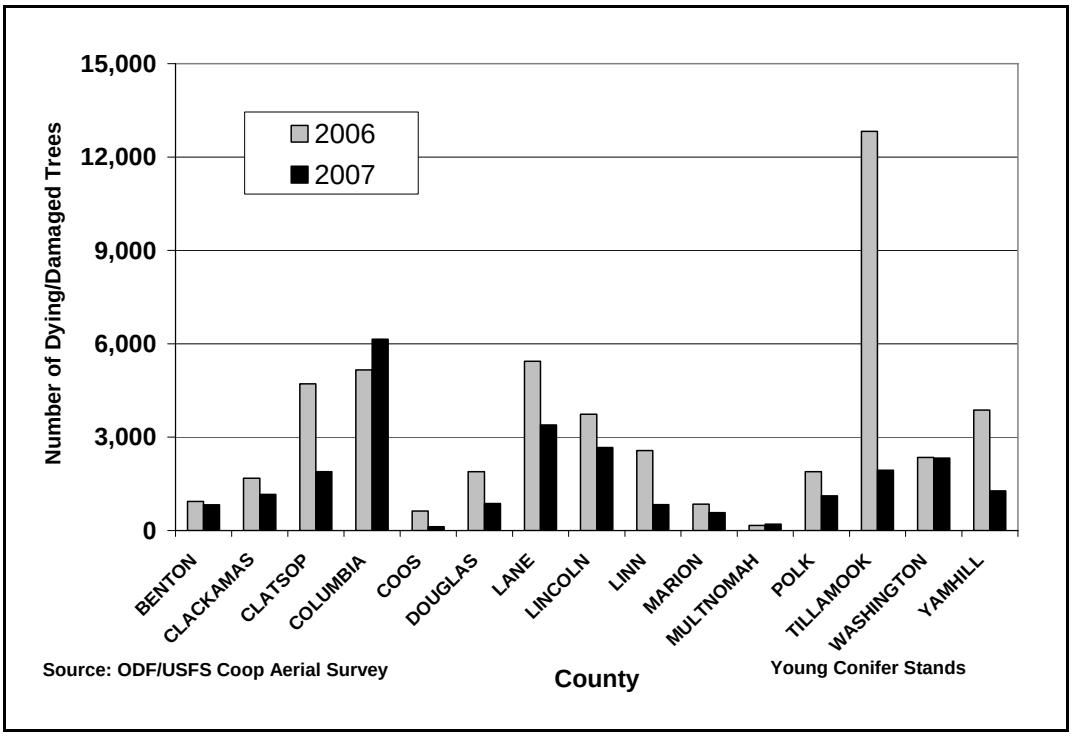


Figure 5: Approximate number of dying trees mapped in young conifer stands during 2006 & 2007 by County.



It is beyond the scope of this summary to attempt to explain the underlying causes of current patterns, which have displayed great fluctuations in recent years. Similar levels of bear damage have been observed over the survey area during most years, but dramatic increases have appeared in 2003 and 2006. We can only speculate as to the relative contributions of the agents responsible (bear, root disease, etc.) for such rapid change, as comprehensive ground surveys are not done annually. Additional research into the factors that contribute to bear damage in Oregon is needed to gain a better understanding of these patterns and to assist in refining animal management efforts in these areas. Ground surveys of bear damage in Southwest Oregon are currently underway and may assist in this regard.

Damage to Older Stands

Beginning in 1996, observers also recorded damage observed in older stands. Two bark beetles, Douglas-fir beetle (*Dendroctonus pseudotsugae*) and fir engraver (*Scolytus ventralis*), commonly affect larger diameter Douglas-fir and true fir in the survey area. Port Orford cedar mortality from root disease (*Phytophthora lateralis*) and wind damage/blowdown from storm events are also common. In 2007, overall declines were observed in the number of trees affected by bark beetles as well as damage from Port Orford cedar root disease (Figure 6). Bark beetle damage has been highest in Douglas and Lane Counties in recent years, while damage to Port Orford cedar occurs primarily in Coos County. Dramatic increases in storm damage due to wind, flooding, and frozen precipitation (during the winter of 2006) were observed this year, with the highest levels in Clatsop, Columbia and Washington Counties (Figure 7). Douglas-fir beetle outbreaks often occur following significant wind/blowdown events, and are expected to increase over the next 1-2 years.

Figure 6: Approximate number of dying/damaged trees mapped in older conifer stands during 2006 & 2007. Major agents include: Douglas-fir beetle (DFB), fir engraver (FE), Port Orford cedar root disease (POC-RD), and storm damage (STORM).

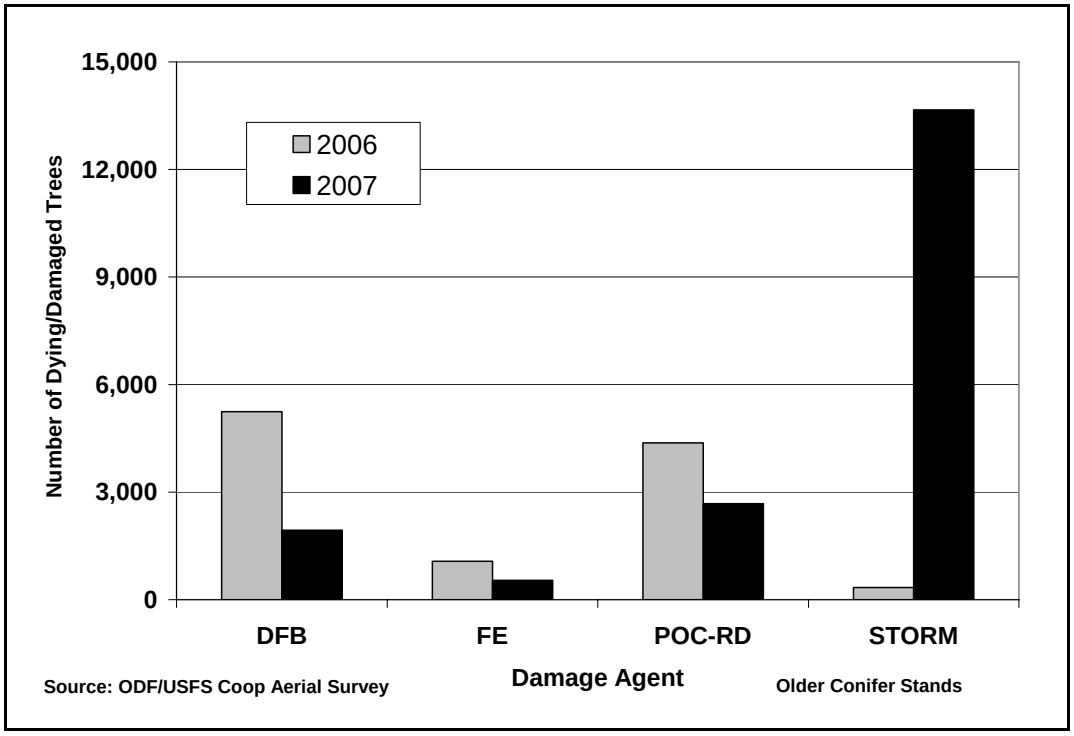
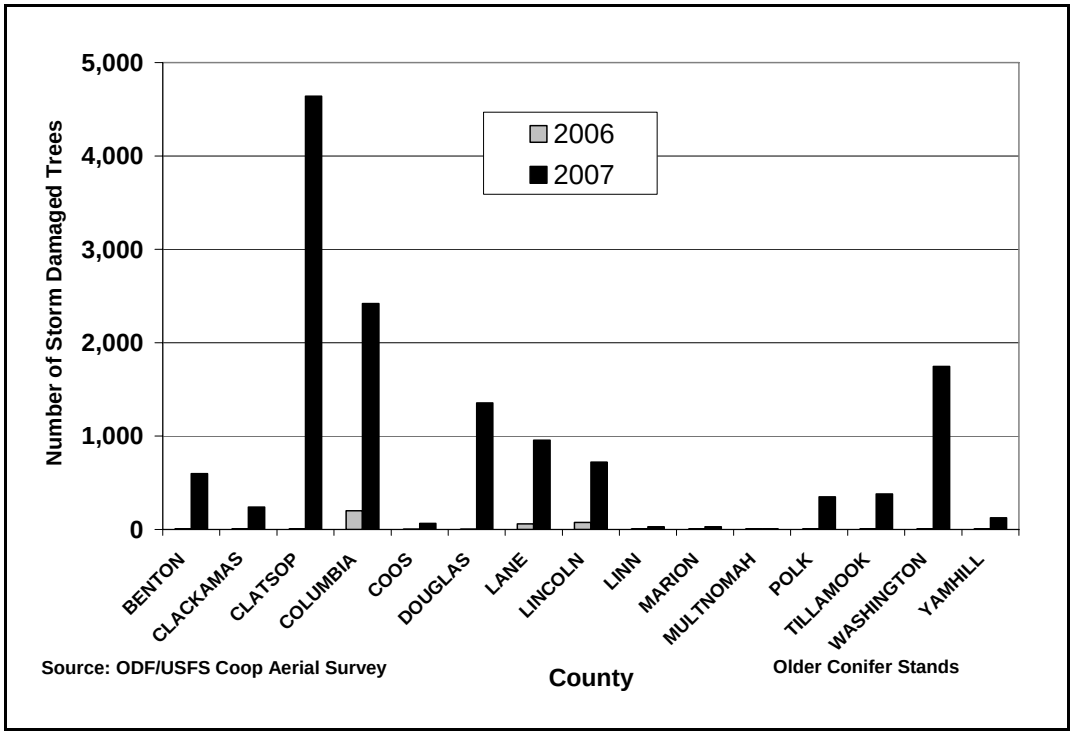


Figure 7: Comparison of the approximate number of trees affected by storm damage in older conifer stands during 2006 & 2007 by county (Does not include December 2007 storm damage).



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 damaging agents, but this is often confounded by weather 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

This aerial survey was conducted by the Oregon Department of Forestry, Forest Health and Air Operations units in cooperation with the USDA Forest Service. Thanks to our pilot Jim Baranek, as well as our federal cooperators Keith Sprengel, Ben Smith, Bob Schroeter and Julie Johnson. Funding for this survey was provided by the Oregon Forest Industries Council, ODF State Lands Program, and Bureau of Land Management.

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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