

# FY 2015 WESTERN BARK BEETLE MITIGATION ACCOMPLISHMENT REPORT

November, 2015



USDA Forest Service

## **EXECUTIVE SUMMARY**

The Forest Service is aggressively implementing projects to mitigate the effects of the bark beetle in Regions 1-6 under the 2011 Western Bark Beetle Strategy (WBBS). The strategy is being achieved through three well-defined goals: human safety, forest recovery, and long-term forest resiliency. This report presents bark beetle mitigation accomplishments during FY 2015.

During the year, the Forest Service exceeded its bark beetle mitigation goals. Mitigation efforts resulted in a total of 292,092 treated unified acres across the three goals. A total of 11,210 acres were treated to improve human safety (safety goal), 28,092 acres were reforested (recovery goal), and 252,787 acres were treated to improve resiliency (resiliency goal). In addition, 98 miles of roads and trails had hazard trees removed to improve human safety. The treatments resulted in 100.6 million board feet of timber sold and 63,840 green tons of biomass produced.

A total of 27 research publications and tools were developed to increase the effectiveness of forest management practices towards bark beetle mitigation.

The Forest Service spent \$ 101.5 million supporting safety, recovery and resiliency activities during the year.

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## **BACKGROUND**

For the period of 2000-2010, over 43 million acres in the west had trees infested with bark beetles, of which nearly 32 million acres were National Forest System lands. However, the mortality figures have continued to decline since 2010 as a result of the depletion of susceptible host trees and active management.

In July 2011, the Forest Service released a science-based strategy in response to the bark beetle infestation across forests of the interior west to ensure these forests provide healthy watersheds, stimulate local economies, are resilient to a changing climate and are ecologically restored over time. The strategy covers a five-year period: FY2011 to FY2016. The strategy is being achieved through well-defined goals, objectives, and action items, to address each of the three aspects of the bark beetle situation: human safety, forest recovery, and long-term forest resiliency across Regions 1 - 6.

This annual report is intended to be a brief synopsis of the western bark beetle mitigation accomplishments for FY2015.

## **ACCOMPLISHMENTS**

The top priority goal of the Forest Service in responding to the western bark beetle epidemic is to ensure that people and community infrastructure are protected from the hazards of falling bark beetle-killed trees and elevated wildfire hazard (safety goal). Work performed included the removal of standing hazardous trees as well as dead and down trees near roads, along trails, and in campgrounds that support the most user traffic. After the priority of safety, forested areas with severe mortality were reforested (recovery goal) with the appropriate diverse species. The overall goal was to regenerate healthy forest ecosystems in beetle-impacted areas. Some of this recovery work occurred in areas that had been treated for safety issues. Other recovery work occurred in areas that did not have public safety concerns, but still needed attention to restore ecosystem function. Forests were thinned to reduce the number of trees per acre in order to create more diverse stand structures as well as minimize future extensive epidemic bark beetle attack (resiliency goal). Generally, thinning reduces the relative competition for moisture, nutrients, and sunlight between trees, enabling trees to withstand stress, thus reducing susceptibility to future attack.

### **Acres treated**

In this report unified accomplishments are reported. Unified accomplishments are a combination of core, integrated, partnership, and unspecified accomplishments. Core accomplishments are achieved through direct expenditure of Forest Service funds that are associated with the same resource as the specific budget line item (BLI). Integrated accomplishments are those that were achieved using funds from a BLI that is not associated with the resource program tied to that particular accomplishment measure.

Partnership accomplishments are achieved through partnership funds or reimbursable agreements, volunteer agreements, or in-kind contributions. When the system of record does not have a BLI or valid BLI, these accomplishments are known as unspecified accomplishments.

Table 1 shows the unified accomplishments. A total of 11,210 acres were treated to improve human safety (safety goal), 28,092 acres were reforested (recovery goal), and 252,787 acres were treated to improve resiliency (resiliency goal). The number of treated acres for the resiliency goal includes State and Private Forestry (S&PF) funded suppression and prevention projects on federal lands (12,633 acres). The total number of unified accomplishments across all three goals was 292,092 acres. The FY15 treated acres were slightly less than the planned treated acres (293,243).

In FY2015, Region 2 treated the most acres followed by Region 6, and Region 3 had the least treated acres (Figure 2).

The majority of the accomplishments (60%) were through fuels treatments, followed by acres treated for forest vegetation establishment and improvement (20%), and a small proportion was accomplished through timber sales activities (15%) (Figure 3).

Table 1. FY 2015 treated acres

Goal	Performance measure	Region					
		1	2	3	4	5	6
Safety	FP-FUELS-ALL (Acres of hazardous fuels treated)	431	3522	120	776	0	2723
	TMBR-SALES-TRT-AC (Acres of forestlands treated using timber sales)	195	1127	120	1,135	44	1018
Recovery	FOR-VEG-EST-IMP (Acres of vegetation established& improved)	2917	2602	0	4,679	208	15
	FP-FUELS-ALL (Acres of hazardous fuels treated)	0	2376	0	6,664	47	3088
	INVPLT-NXWD-FED-AC (Acres treated for noxious weeds and invasive plants)	460	0	0	3,164	0	0
	TMBR-SALES-TRT-AC (Acres of forestlands treated using timber sales)	0	803	0	88	0	985
Resiliency	FOR-VEG-EST-IMP	4488	12961	3,171	3,623	9,781	12708

	(Acres of vegetation established & improved)						
	FP-FUELS-ALL (Acres of hazardous fuels treated)	23153	51796	7,489	14,086	10,502	48248
	SP-NATIVE-FED-AC (Acres treated for native pests)	3015	7232	0	0	0	2386
	TMBR-SALES-TRT-AC (Acres of forestlands treated using timber sales)	4129	16044	1433	4,099	1,007	11436

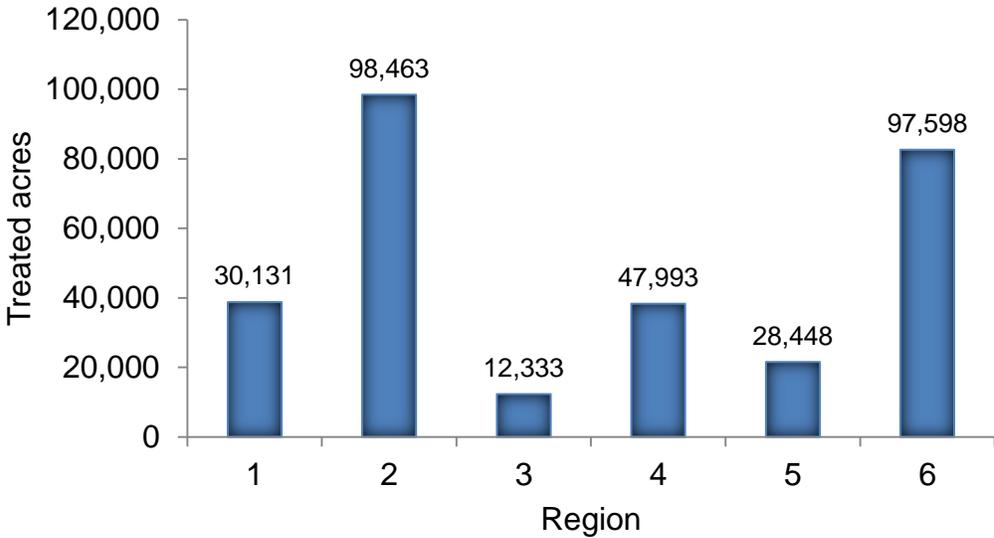


Figure 2. Unified accomplishments by region.

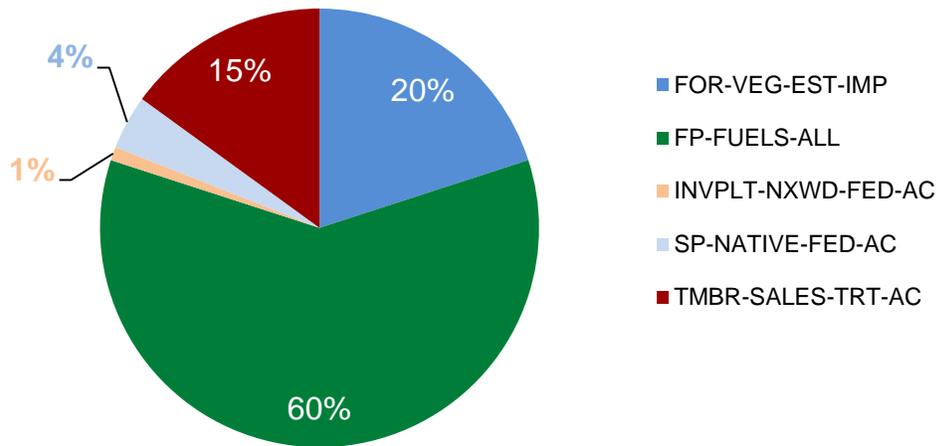


Figure 3. Unified accomplishments by performance measure.

### Timber volume sold

During the report period, a total of 100.6 million board feet (201,236 CCF) of timber were sold across all goals. Most of the timber sold was from areas treated for recovery (55%) followed by areas treated for resiliency (44%). Areas treated for safety comprised only 1% of the timber sold. R5 sold the most timber volume (Figure 4).

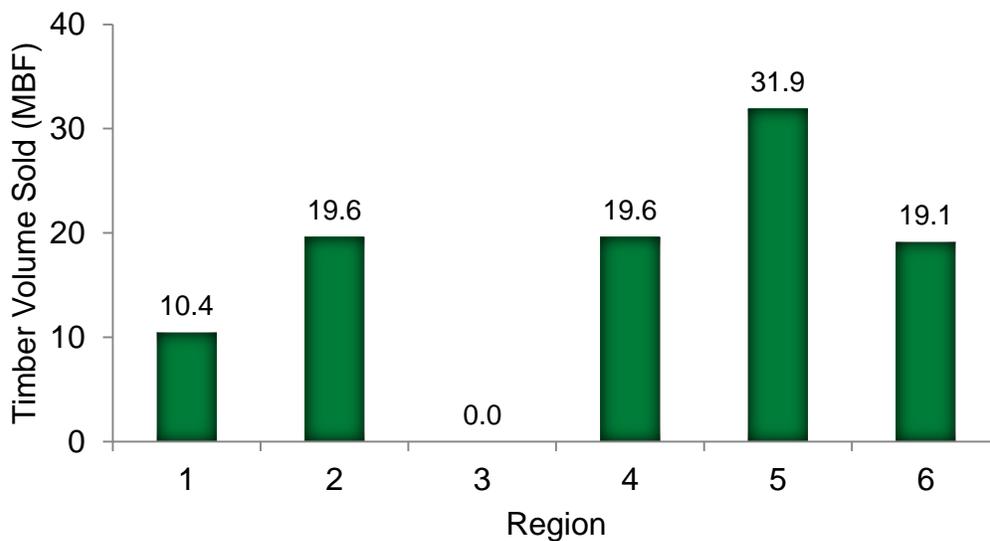


Figure 4. Timber volume sold by Region.

### Bio-energy production

During the report period, a total of 63,840 green tons of biomass were produced across all goals. As expected, the majority (99%) of the bio-energy came from areas treated for resiliency and recovery.

### **Road and trail maintenance**

During the report period, a total of 98 miles of roads and trails had hazard trees removed to improve safety.

### **Research Tools Developed and Applied to Management**

Forest Service researchers and their partners continued to study the biology, ecology, and management of the principal species of tree-killing bark beetles and the socioeconomic effects of bark beetle activity. More specifically, scientists examined: 1) the effects of forest thinning and other silvicultural methods on the occurrence and severity of bark beetle-caused tree mortality, 2) interactions between bark beetles and forest fires, 3) general physiological interactions between trees and their environment, 4) ecological, economic, and social consequences of bark beetle outbreaks, and 4) effects of climate change on beetle dynamics.

In FY 2015, researchers developed 27 new publications, 13 science delivery activities and several other tools aimed at improving bark beetle management in forests. Some highlights include:

- Researchers have been studying the interplay between tree stress and ethanol production and their findings reveal the key role that ethanol plays in tree stress physiology and disturbance ecology. Stress in trees is caused by disturbances such as fire, flood, disease, or insect infestations. A single stressor may not be enough to kill a tree, but a combination can be deadly. Tree tissues produce and accumulate ethanol in response to many stressors. Ethanol provides the stressed tissues with an emergency energy source when their normal source of energy from aerobic respiration is impaired by stressors. Many insects, including various bark and ambrosia beetles, can detect ethanol. If the stressed tree releases enough ethanol into the atmosphere, it serves as a signal, attracting the beetles and stimulating an attack.. Most recently, researchers and colleagues in Spain found that severely drought stressed pine attacked by bark beetles contained more ethanol than their unattacked neighbors. Knowing the connections among stress, ethanol production, and insect host-tree selection may eventually help foresters identify stressed trees that are vulnerable to insect attack and develop remedial measures to help the trees survive.  
<http://www.treesearch.fs.fed.us/pubs/48182>
- Researchers found that Irruptive bark beetles usually co-occur with their co-evolved tree hosts at very low (endemic) population densities. However, recent

droughts and higher temperatures have promoted widespread tree mortality with consequences for forest carbon, fire and ecosystem services. Researchers experimentally explored the direct link between tree symptoms of drought and spruce bark beetle attack success rate. The study combined precipitation removal with a novel method for assessing bark beetle attacks. Lower soil moisture promoted lower tree water potentials, relatively lower tree resin flow, and a higher proportion of successful bark beetle attacks. Although attack rates were low, their results also suggest that host attractiveness to beetles decreased at the highest level of water stress. This highlights the complex nature of interactions of trees with bark beetles. For example, the bark beetles show variability in the propensity to attack trees that may or may not be tied to environmental and tree cues. Factors related to the intrinsic beetle biology, combined with changes in tree physiology, highlight the difficulty of unraveling these interactions. In this commentary, we briefly review this complexity and offer suggestions for making further progress on this important problem particularly from the point of view of tree physiology.

<http://www.treesearch.fs.fed.us/pubs/47849>

- Researchers summarize a recently completed research project dealing with the measurement and characterization of the changes in crown fuel flammability caused by recent bark beetle attacks and consequently the implications of these changes on crown fire potential in these affected forest types. Recent outbreaks of mountain pine beetle (*Dendroctonus ponderosae* Hopkins) in lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) forests and spruce beetle (*Dendroctonus rufipennis* Kirby) in Engelmann spruce (*Picea engelmannii* Parry ex Engelm.) forests have affected vast areas across western and northern North America, which have subsequently produced forests containing relatively large amounts of dead or "bark beetle-altered" canopy fuel. Given that the transition to crowning represents an important threshold in terms of large fire growth and wildland firefighter safety and effectiveness, a better understanding of the potential role of bark beetle-altered foliage in altering crown fire initiation and spread is presented. <http://www.treesearch.fs.fed.us/pubs/49441>
- Large wildland fires in conifer forests typically involve some degree of crowning, with their initiation and propagation dependent upon several characteristics of the canopy fuels. Recent outbreaks of mountain pine beetle (*Dendroctonus ponderosae* Hopkins) in lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) forests and spruce beetle (*Dendroctonus rufipennis* Kirby) in Engelmann spruce (*Picea engelmannii* Parry ex Engelm.) forests have affected vast areas across western and northern North America, which have subsequently produced

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<http://www.treesearch.fs.fed.us/pubs/48587>

## **FUNDING**

There is not a dedicated budget line item exclusively for bark beetle management; however, the agency is committed to providing a stable level of funding from existing budget line items to support safety, recovery and resiliency activities. In FY 2015, the Forest Service spent \$101.5 million for bark beetle mitigation activities.

## **CONCLUSION**

The FY 2015 accomplishments exceeded the planned targets, highlighting the Forest Service's continued commitment to address the impacts of bark beetles to ensure national forests provide healthy watersheds, stimulate local economies, are resilient to a changing climate and are ecologically restored over time.

We are grateful for the commitment and great work being accomplished by our employees, contractors, and cooperators.