

New Mexico Forest Health Conditions Report, 2014



Piñon mortality, Sandia Mountains

**Energy, Minerals, and Natural Resources Department
Forestry Division**



1. Summary

New Mexico State Forestry Division cooperates with United States Department of Agriculture (USDA), Forest Service, Forest Health Protection, NM Zone to conduct annual insect and pathogen surveys of the state's forests and woodlands. The vast majority of data is collected by aerial detection survey¹ (ADS). Additional information is gathered through interactions with landowners in the private sector, ground truthing, and ongoing research.

A variety of tree-killing and defoliating forest insects and tree host mortality were identified and mapped by ADS during the 2014 flight season. The surveys encompassed ~11.2 million of forests and woodlands, including ~2.8 million acres of state and private lands. Across the entire state, ~552,000 of the acres surveyed were damaged² by insect agents. This is a considerable decrease (-27%) from the ~756,000 acres of damage mapped in 2013 (**table 1**). Of this damage, 27% (~149,000 acres) occurred on state and private land. This is a substantial decrease (-38%) from the ~240,000 state and private acres mapped in 2013 (**table 2**).

Much of the difference between 2013 and 2014 was likely due to slightly improved drought conditions, which contributed to a reduction in bark beetle and defoliator activity in pine and aspen, respectively. Despite these encouraging trends, widespread and severe insect activity continues in portions of the state, notably:

- i) aspen defoliation on the Chama District (Carson National Forest (NF));
- ii) spruce defoliation on the Chama and Cimarron Districts (Carson and Santa Fe NF);
- iii) mixed conifer mortality on the Cimarron and Las Vegas Districts (Carson and Santa Fe NF);
- iv) piñon mortality on the Bernalillo District (Cibola NF);
- v) ponderosa pine mortality on the Socorro and Capitan Districts (Gila and Lincoln NF).



Over-dense pine, Manzano Mountains State Park

These issues emphasize the continued need for management to reduce the density of much of the state's forests and woodlands. Insect infestations are difficult or impossible to control after populations have reached critical levels. Such is the case for bark beetles in the southern half of the state and defoliators in the northern half of the state. Damage will continue until the responsible agents run out of host or the drought abates. As a whole, New Mexico needs moisture of a quality that is both significant in amount and extended in duration.

The following report describes what forest health specialists and aerial surveyors documented across New Mexico in 2014. Observational data is primarily from the latter half of the year because New Mexico State Forestry Division's Forest Health Specialist position was vacant until late June. ADS data and associated maps (**appendix 1**) were not impacted by the vacancy.



ADS, Sangre de Cristo Mountains

¹ USDA Forest Service, Forest Health Protection and New Mexico State Forestry Division strive to maintain an accurate ADS dataset, but due to the conditions under which the data are collected, we shall not be held responsible for missing or inaccurate data. ADS are not intended to replace more specific forest health information. An accuracy assessment has not been done for this dataset; however, ground checks were completed in accordance with local and national guidelines. Maps and data may be updated without notice.

² Much like a fire, not all of the trees in a damaged area are defoliated or killed. Also, areas may be mapped with more than one damage agent. The acres reported in the Summary section represent the total "footprint" of damaged acres, with no multiple counting of acres.

2. Observed Forest Health Conditions

2.1. Technical assistance

State Forestry Division interacted with various landowners in the private sector between July and December, 2014 (**Table 3**). Overall, 53 landowners received technical assistance. 80% of these interactions were about mortality (tree death) and crown dieback (branch death) of pine, with piñon being the species of greatest concern. Of these interactions, 17 required direct site visits, all of which occurred in the greater East Mountain (Sandia), Albuquerque, and Santa Fe areas. The majority of secondary issues were requests for information about preventative pesticides and treatment options for dead/dying piñon.

2.2. Mortality agents

Mortality agents cause tree death. The effects of severe and widespread outbreaks have sizeable impacts on the ecology of entire forested regions. The primary cause of tree mortality in New Mexico is the activity of native bark beetles. Bark beetles outbreaks have a strong relationship with environmental factors that reduce tree defenses, notably prolonged drought. Bark beetles always have caused, and always will cause damage to New Mexican trees as part of their life cycle. While the large scale of recent bark beetle outbreaks is alarming, they fall within the range of previous outbreaks observed in the 1950's.

Absent from the following mortality agents is the mountain pine beetle (*Dendroctonus ponderosae*), which has caused landscape-scale pine mortality in the Rocky Mountains. Populations in New Mexico remain low due, presumably, to warmer pine habitat.



Pine engraver gallery, ponderosa pine

2.2.1. ponderosa pine bark beetles

Dendroctonus and *Ips* bark beetles attack New Mexico's ponderosa pine. The important species in these two genera are: pine engraver (*I. pini*); western pine beetle (*D. brevicomis*); roundheaded pine beetle (*D. adjunctus*); and red turpentine beetle (*D. valens*). Each species exhibit different behaviors and preferences, but tree mortality is the end result of them all. Pine engraver and western pine beetle caused a combined total of ~70,000 acres of statewide damage, which is a 68% decrease from last year. Despite this dramatic decrease, southern portions of the state continue to suffer from the severe impacts of ponderosa bark beetles.

2.2.2. pinyon ips (*I. confusus*)

Piñon is the preferred host of this bark beetle, which killed millions of piñon in the early and mid-2000's. Pinyon ips populations in New Mexico have been on the rise since 2010. The state experienced a dramatic spike in 2013 with ~69,000 acres of damage. This year, ~46,000 acres of damage were mapped, which is a 34% decrease from last year. Despite a reduction in statewide acres, the widespread and severe pinyon ips outbreak on the Manzano and Sandia Mountains continues to grow. The forecast for these regions is sustained or increased pinyon ips populations into the near future.

2.2.3. mixed conifer bark beetles

Fir engraver (*Scolytus ventralis*) and Douglas-fir beetle (*D. pseudotsugae*) attack New Mexico's white and douglas-fir, respectively. They caused a combined total of ~74,000 acres of statewide damage, which is a 22% increase from last year. This corresponds with the steady upward trend in mixed conifer mortality observed since 2011.

2.2.4. spruce/fir bark beetles

Spruce beetle (*D. rufipennis*) and western balsam bark beetle (*Dryocoetes confusus*) attack New Mexico's spruce and subalpine fir, respectively. Spruce beetle continues to spread southward from Colorado, where it has caused extensive spruce mortality. ADS mapped ~16,000 acres of statewide spruce beetle damage, which is a 55% increase from last year. Given the heavy spruce beetle activity in southern Colorado, the threat for massive spruce mortality is high in the northern half of the state. Western balsam bark beetle is less of a threat.

2.3. Defoliation agents

Defoliation agents cause highly visible damage but do not often kill large trees outright. The direct effects of defoliation are reduced vigor and photosynthetic capacity. Successive years of severe defoliation can cause crown dieback and, ultimately, tree mortality. In general, defoliation weakens trees and predisposes them to the attack of more threatening damage agents.

2.3.1. western spruce budworm (*Choristoneura occidentalis*)

Spruce, Douglas-fir, and true fir are the preferred hosts of this moth larva. Infestations can be widespread and severe, resulting in entire landscapes of damaged host. The mountains of northern New Mexico are currently experiencing a multi-year spruce budworm outbreak. Budworm activity peaked in 2011 at ~500,000 acres and has now leveled off at ~300,000 acres. Populations are expected to sustain or increase into the future.

2.3.2. pinyon needle scale (*Matsucoccus acalyptus*)

Piñon is the preferred host of this scale insect. New Mexico experienced a 25% increase in acres damaged by pinyon needle scale, which corresponds with the steady upward trend observed since 2012. While the acreage affected was not large in comparison to other defoliating agents, the trend is noteworthy because it may indicate the possibility for greater forest health issues in the coming years.

2.3.3. Douglas-fir tussock moth (*Orgyia pseudotsugae*)

Douglas-fir, white fir, and spruce are the preferred hosts for this moth larva. Defoliation is often complete in both overstory and understory trees, and severe outbreaks can cause mortality in less than two years. While the overall area was low (~1,900 acres) New Mexico experienced a 419% increase in tussock moth damage since last year. Populations are currently being monitored on the Magdalena and Sandia Mountains and the Santa Fe and Lincoln NF.

2.3.4. pine sawflies (*Neodiprion & Zadiprion* spp.)

Piñon and ponderosa pine are the preferred hosts of this non-stinging wasp. When present in sufficient numbers, sawflies create extensive defoliation pressure for host pine. New Mexico has experienced a decreasing trend in sawfly activity since 2012. Prior year outbreaks on the Gallinas and the Zuni Mountains have subsided.

2.4. Multiple agents

Several tree species in New Mexico are damaged by a set of mortality and defoliation agents that cannot be distinguished during ADS. Rather than introduce errors into the dataset, damaged acres are mapped by tree host instead of damage agent. These sets of agents have no overlap with the agents that are mapped individually for other hosts.



Heavy aspen mortality, multiple damage agents

2.4.1. aspen

Aspen is biologically and economically important to New Mexico because it is the principal upland deciduous tree species and provides high amounts of habitat and esthetics. Furthermore, populations directly impact local economies that depend on fall tourism. Therefore, threats to aspen health consistently receive high-profile attention. Of the broad set of insects that defoliate aspen, the western tent caterpillar (*Malacosoma californicum*) and large aspen tortrix (*Choristoneura conflictana*) are the most important. There was a large (-51%) statewide decrease in aspen defoliation in 2014. Aspen mortality also experienced a similar, though less steep, reduction (-22%) in the mapped area. Hopefully these trends will continue into the future.

2.5. *Emerging issues*

2.5.1. emerald ash borer (EAB; *Agilus planipennis*)

EAB is a buprestid beetle of Asian origin. All native ash species in the United States are susceptible to attack, and attack leads to certain mortality. EAB was discovered in Boulder, CO in 2013. This discovery occurred hundreds of miles from the nearest known infestation in the Midwest. Long distance firewood transport makes EAB extremely difficult to contain. New Mexico currently has no known occurrences, but the Colorado introduction shows that infestation is only one truckload of firewood away from *any* location. Most of the ash in New Mexico is planted in urban areas; however, southwestern New Mexico has a component of native ash in riparian zones. This exotic and highly invasive beetle has the potential to be the most destructive tree-killing force in the USA since the chestnut blight of the early 20th century.



Native velvet ash, Mimbres River

3. Conclusions

Forest health in the state of New Mexico is closely tied to climatic trends and large-scale weather cycles. These include El Nino/La Nina, the Pacific decadal oscillation, and others. These cycles impact New Mexico's weather by controlling the location of high and low pressure centers, which, in turn, dictate precipitation across the state. A dry 2014 winter predisposed New Mexico's trees to spring and early-summer mortality and defoliation. While a wet summer monsoon helped to mitigate potential damage for the rest of the year, the risk of future forest health problems in New Mexico is still high. Widespread and severe damage to our forests and woodlands will continue along with long-term drought.



Much-needed snow, Jemez Mountains



Boletus ruficeps, a newly classified southwestern porcini

Written by Tom Zegler, Forest Health Specialist, New Mexico State Forestry

Phone: 505-476-3351

Email: tomj.zegler@state.nm.us

Maps prepared by Todd Howell, GIS Coordinator, New Mexico State Forestry

Photographs taken by Tom Zegler

Special thanks to the staff of USDA Forest Service, Forest Health Protection, New Mexico Zone for collecting 2014 statewide aerial survey data.



Table 1. Aerial survey results for insect and pathogen activity on all jurisdictional lands in New Mexico, 2014.

Class	Name	2014 acres	2013 acres	% Δ^1
Mortality				
<i>By Agent</i>				
	pine engraver	55,060	173,430	-68
	pinyon ips	45,970	69,300	-34
	fir engraver	39,390	14,840	165
	Douglas-fir beetle	34,480	45,470	-24
	spruce beetle	15,650	10,070	55
	western pine beetle	15,340	43,480	-65
	western balsam bark beetle	8,250	10,320	-20
	cedar bark beetles	930	6,020	-85
<i>By Host²</i>				
	aspen	2,590	3,760	-31
	southwestern white pine	380	2,270	-83
	cottonwood	100	230	-57
	saltcedar	80	0	-
	mortality summary	218,220	379,190	-42
Defoliation				
<i>By Agent</i>				
	western spruce budworm	302,560	297,650	2
	pinyon needle scale	4,480	3,570	25
	Douglas-fir tussock moth	1,920	370	419
	pine sawfly	990	2,070	-52
	unknown (multiple)	580	1,080	-46
	tamarisk leaf beetle	450	9,830	-95
<i>By Host²</i>				
	aspen	60,780	123,860	-51
	ponderosa	2,680	0	-
	cottonwood	150	150	0
	defoliation summary	374,590	438,580	-15
Other				
	dieback	950	3,850	-75
	discoloration	430	2,000	-79
	branch flagging	60	70	-14
	other summary	1,440	5,920	-76
	grand summary	594,250	823,690	-28
	total area mapped ³	551,730	756,440	-27

¹ (2014 acres – 2013 acres) / 2013 acres * 100.

² Damage to a single tree species caused by a set of known agents that cannot be distinguished from the air.

³ Areas may be mapped with more than one damage agent. The total area mapped represents the “footprint” of damaged area, with no multiple counting of acres. Summary values reflect multiple counting.

Table 2. Aerial survey results for insect and pathogen activity on state and private lands in New Mexico, 2014.

Class	Name	2014 acres	2013 acres	% Δ^1	% all lands ²
Mortality					
<i>By Agent</i>					
	pine engraver	4,890	35,660	-86	9
	pinyon ips	21,750	36,480	-40	47
	fir engraver	15,360	4,920	212	39
	Douglas-fir beetle	7,510	3,650	106	22
	spruce beetle	1,460	30	4,767	9
	western pine beetle	3,170	13,270	-76	21
	western balsam bark beetle	1,020	2,070	-51	12
	cedar bark beetles	240	1,250	-81	26
<i>By Host³</i>					
	aspen	220	2,030	-89	8
	southwestern white pine	*	490	-99	<1
	cottonwood	80	110	-27	80
	saltcedar	70	0	-	88
	mortality summary	55,770	99,960	-44	26
Defoliation					
<i>By Agent</i>					
	western spruce budworm	80,690	108,280	-25	27
	pinyon needle scale	0	720	-100	0
	Douglas-fir tussock moth	140	120	17	7
	pine sawfly	990	80	1,138	100
	unknown (multiple)	80	310	-74	14
	tamarisk leaf beetle	60	2,960	-98	13
<i>By Host³</i>					
	aspen	20,590	40,180	-49	34
	ponderosa	2,100	0	-	78
	cottonwood	110	60	83	73
	defoliation summary	104,760	152,710	-31	28
Other					
	dieback	380	680	-44	40
	discoloration	330	4,170	-92	77
	branch flagging	0	30	-100	0
	other summary	710	4,880	-85	49
grand summary		161,240	257,550	-37	27
total area mapped ⁴		148,740	239,660	-38	27

¹ (2014 acres – 2013 acres) / 2013 acres * 100.

² State and private acres as a percentage of statewide acres in 2014 (**Table 1**).

³ Damage to a single tree species caused by a set of known agents that cannot be distinguished from the air.

⁴ Areas may be mapped with more than one damage agent. The total area mapped represents the “footprint” of damaged area, with no multiple counting of acres. Summary values reflect multiple counting.

* Activity detected, but on less than 5 acres.

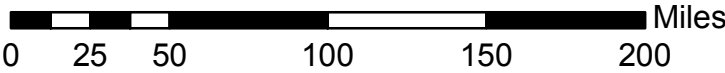
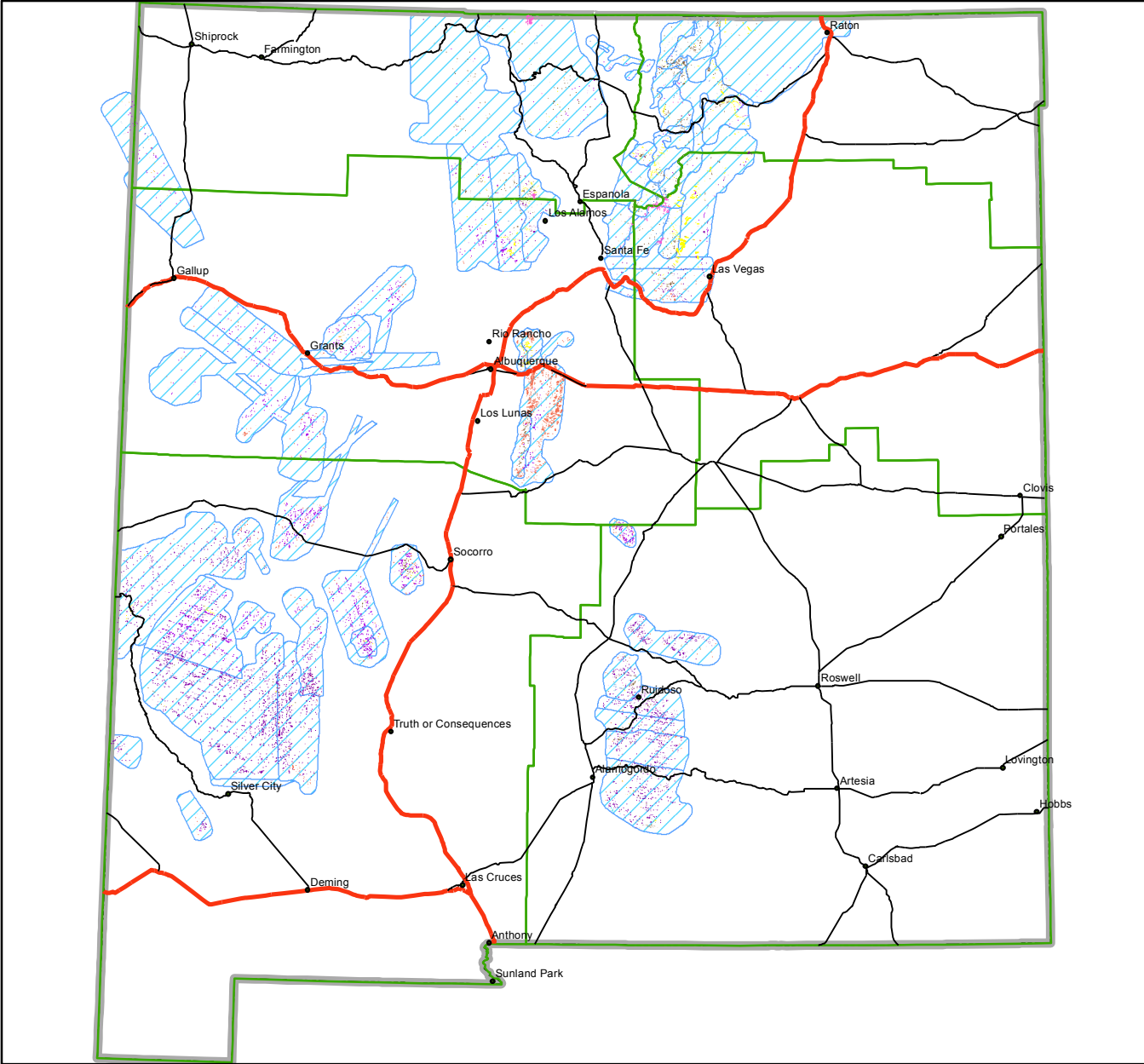
Table 3. Summary of technical assistance to the private sector, July – December, 2014.

Class	Primary issue	#	% ¹	Site visit	Confirmed ² insects & pathogens
Private landowner					
	mortality (piñon)	24	48	5	pinyon ips, pitch moth
	mortality (mixed pine)	7	14	2	pinyon ips, western bark beetle, red turpentine beetle
	crown dieback (mixed pine)	5	10	3	pinyon ips, pine engraver, pitch nodule moth
	crown dieback (piñon)	4	8	3	pinyon twig beetle, pinyon tip moth, pinyon dwarf mistletoe
	defoliation (aspen)	2	4	1	western tent caterpillar, aspen leaf beetle
	question (FHI)	2	4	0	–
	crown dieback (juniper)	1	2	1	cedar bark beetle, flatheaded juniper borer, juniper twig pruner
	request (identification)	1	2	0	cottonwood borer ³
	other ⁴	4	8	0	–
	landowner total	50		15	
Private business					
	crown dieback (ponderosa)	1	50	1	none; poor site
	question (wood transport)	1	50	0	–
	business total	2		1	
Nonprofit					
	request (identification)	1	100	1	pinyon ips, pine engraver
	grand total	53		17	

¹ Percent primary issue by class.² Identity confirmed by site visit collections/observations or, occasionally, picture analysis.³ Asian longhorn beetle look-alike.⁴ Questions about aspen debarking, insect venom, fire risk, and piñon nuts.

2014 Forest Insect and Disease Activity

- Mortality**
- Pine Engraver
 - Pinyon Ips
 - Fir Engraver
 - Douglas-Fir Beetle
 - Spruce Beetle
 - Western Pine Beetle
 - Western Balsam Bark Beetle
 - Cedar Bark Beetles
 - Aspen
 - NMSF Districts
 - NM Boundary
 - Survey Extent



2014 Forest Insect and Disease Activity

Defoliation

-  Western Spruce Budworm
-  Pinyon Needle Scale
-  Douglas-Fir Tussock Moth
-  Pine Sawfly
-  Unknown (Multiple)
-  Tamarisk Leaf Beetle
-  Aspen
-  Ponderosa Pine
-  NMSF Districts
-  NM Boundary
-  Survey Extent

