2013 New Mexico Forest Health Conditions Report

Energy Minerals and Natural Resources Department:

Forestry Division

Summary:

New Mexico continues to be in the throes of prolonged drought conditions despite a short but intense monsoon season and a week of unusually wet weather in September. This has exacerbated an already tenuous situation for the state's forests and woodlands resulting in increases in drought induced mortality and insect and disease activity. Areas that have already been experiencing increased tree mortality and defoliation have seen continued pressure and are at risk in the coming year if there is not substantial moisture over the winter months.

Each year New Mexico State Forestry, in cooperation with the U.S. Forest Service, conducts an insect and disease survey of the state's forests and much of the woodlands. The vast majority of this is conducted through aerial surveys and most of the information in this report is derived from those results. Additional information is added based on ground surveys, observations, and research that are ongoing. During the aerial survey in 2013 over 360,000 acres of forested lands on state and privately owned land had some degree of insect and disease activity that was detectable. This is an increase from the 2012 area of over 154,000 acres, or a 75 percent increase. Most of this increase is the result of bark beetles in pine species.

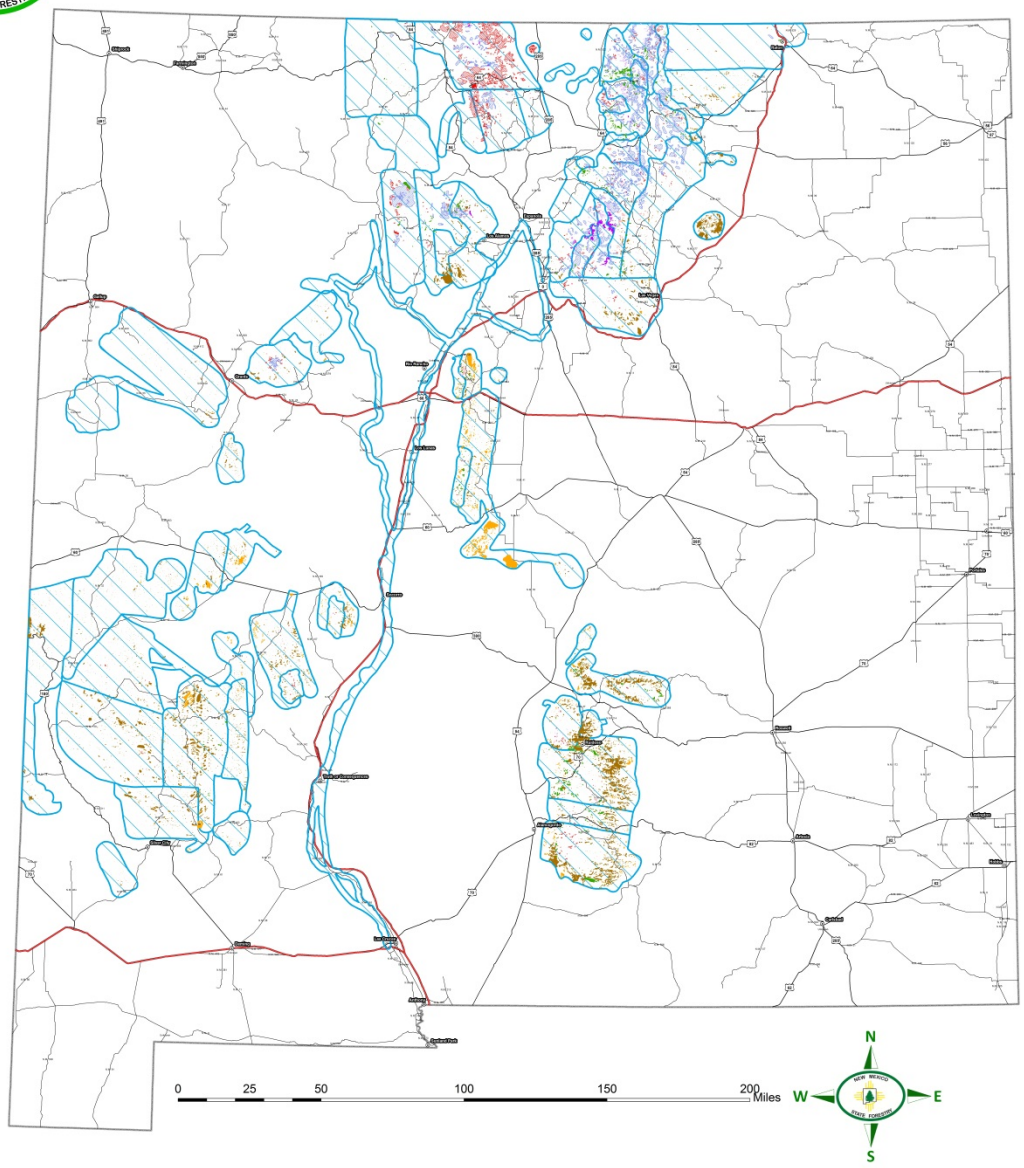
Over all ownerships, the area that was affected by insects and diseases increased by a very small amount (~744,000 in 2013 and ~743,000 in 2012). This is slightly misleading in that there were large increases by some damage agents and large decreases by others that offset each other. Federal and Tribal lands took the brunt of the area affected with almost 500,000 acres of impacted forests.

As the state's water woes continue there will be more trees killed by insects and disease as well as a continuation of previous year's fire activity which have seen several record breaking fires and longer fire seasons than have historically occurred. While insect and disease activity does play a role in the spread and intensity of wildland fires, it may not be as clear as some may believe. Current research and modeling has shown that fire spread and intensity do increase as bark beetle killed trees are subjected to fire, this effect goes away after the needles fall and both spread and intensity decrease to pre attack levels. The end result of insect activity in the state is a mixed bag with more dead trees but a long term reduction in the fire risk and a thinning of the states over crowded forest.

These issues underline the continued need for forest health work in the state and highlights needed attempts to reduce the overcrowded nature of the state's forests and woodlands. Unfortunately, in some areas of the state, the insect population has reached a critical mass and there is very little that land managers can do to eliminate the presence of the insect. This is especially evident in the Ruidoso and northern Sacramento Mountain region which has had an increasing bark beetle issue on the last five years and is experiencing a large die off of ponderosa pines and Douglas-fir trees. This will continue until the beetles run out of food or the climate abates and there is significant moisture for extended portions of time.

The following summaries describe what was observed in the state over the survey season and throughout the year.

2013 Forest Insect and Disease Activity



Mortality

- Aspen Decline
- WBBB
- Douglas-fir Beetle
- Ponderosa Mortality
- Fir Engraver
- Piñon Ips
- Spruce beetle

Survey Extent

- Survey Extent

Defoliation

- Western Spruce Budworm
- Aspen Defoliation - heavy
- Aspen Defoliation - light
- Unknown Pinon Defoliation - light
- Unknown Pinon Defoliation - heavy
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- Oak Defoliation - light
- Cottonwood def - heavy

STATE

	NS	1	2	3	4	5	Grand Total	2012 Totals	AC CHANGE	% Change
western pine beetle	274	1,046	8,365	5,940	1,073	223	16,921	1,959	14,962	764%
Douglas-fir beetle	47	109	3,107	2,531	1,435	117	7,346	1,222	6,124	501%
spruce beetle	3		72	112	2		190	89	101	113%
western balsam bark beetle	8	240	2,008	500	94		2,849	1,950	899	46%
pinyon ips	184	176	7,582	15,041	20,810	1,973	45,765	3,611	42,155	1168%
ips	79	213	21,012	27,892	11,681	2,100	62,977	5,805	57,172	985%
<Phloeosinus spp.>	1		267	300			568	1	567	113335%
fir engraver	26	576	3,179	1,811	717	81	6,390	1,695	4,695	277%
defoliators	67						67	6	61	943%
sawflies	453						453	2,914	2,461	-84%
western spruce budworm	136,407						136,407	135,075	1,332	1%
Douglas-fir tussock moth	132						132	24	109	460%
pinyon needle scale	1,782						1,782	411	1,371	333%
boring insects	31						31	411	380	-92%
decline	1,913						1,913	946	967	102%
Dothistroma needle blight	4,107						4,107	946	3,161	334%
drought	1,406						1,406	578	827	143%
hail	859						859	578	280	48%
road salt	1				41		42	574	533	-93%
aspen defoliation	69,087						69,087	42,826	26,261	61%
unknown	1,239		168	46			1,453	5,004	3,551	-71%
dieback	0						0	24	24	-99%
	218,107	**2,359**	**45,761**	**54,173**	**35,852**	**4,494**	**360,745**	**206,650**	**154,095**	**75%**

ALL

	NS	1	2	3	4	5	Grand Total	2012 Totals	AC CHANGE	% Change
western pine beetle	906	2,969	23,542	13,129	2,210	290	43,045	49,920	6,875	-14%
Douglas-fir beetle	221	784	16,049	13,553	4,758	303	35,668	18,385	17,283	94%
spruce beetle	8	47	3,935	4,544	1,367	171	10,072	2,317	7,755	335%
western balsam bark beetle	20	697	4,922	3,354	714	18	9,724	8,128	1,595	20%
pinyon ips	417	199	11,614	24,956	22,758	2,198	62,141	15,495	46,646	301%
ips	840	2,288	55,152	73,768	26,351	4,567	162,965	62,813	100,152	159%
<Phloeosinus spp.>	14		343	826	32	42	1,256	340	916	269%
fir engraver	79	1,076	4,653	4,628	1,052	227	11,715	14,711	2,996	-20%
defoliators	147						147	48	99	204%
sawflies	2,066						2,066	5,314	3,248	-61%
western spruce budworm	261,932						261,932	397,753	135,821	-34%
Douglas-fir tussock moth	371						371	128	243	189%
pinyon needle scale	3,574						3,574	3,942	368	-9%
boring insects	31						31	3,942	3,911	-99%
decline	3,440						3,440	3,185	255	8%
Dothistroma needle blight	4,107						4,107	3,185	922	29%
white pine blister rust	26						26	30	4	-14%
drought	2,901						2,901	1,346	1,555	115%
hail	859						859	1,346	487	-36%
road salt	1				41		42	5,397	5,355	-99%
aspen defoliation	123,849						123,849	135,585	11,737	-9%
unknown	3,573		386	46			4,004	9,991	5,987	-60%
dieback	880						880	100	780	780%
	410,263	**8,058**	**120,595**	**138,803**	**59,283**	**7,815**	**744,817**	**743,404**	**1,413**	**0%**

Observed Conditions:

Insect and disease damage is broken into two different classifications: defoliation and mortality. This is based the end result of the insect or disease attacking a tree.

Defoliation:

Western Spruce Budworm (*Christoneura occidentalis*):

Western spruce budworm is a species that attacks spruce, Douglas-fir, and true fir trees, defoliating them and reducing their vigor substantially. After several years of attacks and defoliation the trees may not be able to recover and they may die or parts of them may die back. The result of infestations can be large and significant resulting in many dead trees and a forest full of grey, decaying trees. The mountains of northern New Mexico have been experiencing a long and substantial outbreak of spruce budworm for many years now. Despite early efforts at control the population increased and in 2013 over 136,000 acre of state and private lands were impacted. This is consistent with the previous year's amounts but the area actually decreased by over 135,000 acres on federal lands.

Impacted trees are recognizable by the reddish hue that the tree will take on as the fed on foliage dies off and dries out. Often times the tree will have a thin crown and reduced number of needles that inhibit its ability to photosynthesize, causing the reduction in tree health and vigor.

Pine Sawflies:

Area affected by pine sawflies actually decreased in 2013. Infestation levels dropped from almost 3,000 acres to just over 450 acres. Pine sawflies are actually a small wasp but in large populations they can present extensive defoliation pressure on the trees that they inhabit. Long term defoliation weakens trees and can exacerbate existing tree health issues or predispose the trees to attack from other damaging insects and diseases.

Aspen Defoliation:

Aspen is an important ecological and economical species in northern New Mexico, being one of the predominant hardwood species and fall color attractions for many of the communities. Defoliation of this species can have detrimental impacts on the environment and cause hardships for the people that rely on the influx of tourists. The extent of the defoliation and the population of the primary defoliator, the western tent caterpillar (*Malcosoma californicum*), became evident when the scenic railroad between Chama, NM and Antonito, CO required assistance because there were so many larvae on the tracks that it became very slick and the locomotive could not gain traction.

From aerial survey data, there was a large (61%) increase in the area that was defoliated. This translates to an increase of approximately 26,000 acres on state and private lands (~69,000 ac. from ~43,000 ac.). Baring an extreme event during the winter it can be expected that the population will remain high or increase in the coming years and further defoliation will continue. This can be an issue as multiple years of defoliation weakens trees/clones and trees/clones can experience mortality.

Piñon Needle Scale:

This small insect can have long term impacts if it attacks the same trees for several years in a row. Repeated defoliation can cause weakened trees and a predisposition to bark beetle attacks. Non-federal lands had a threefold increase in the acreage of defoliation from about 400 acres to over 1700 acres. While not a large area, this represents that there is an increasing population and can indicate that there may be more issues in coming years, an important thing to keep in mind as land owners and land managers consider planning for the future.

Dothistroma needle blight:

This is a foliar disease that infects ponderosa pine needles. It is generally not common in the state but the higher than average temperatures have allowed the species to increase its foot hold. It was seen mostly in the area to the west of Raton and surveyors mapped about 4,100 acres of impact. This species causes premature needle drop as the tree attempts to defend itself. The loss of photosynthetic area decreases the trees vigor and can predispose it to bark beetle attacks or other mortality agents to move in.

Mortality Agents:

While the defoliation agents may have visible impacts, they are usually not as long term as the mortality agents. Mortality agents result in tree death and this can have a sizeable impact on the landscape in specific watersheds and regions. Throughout the state the primary cause of tree mortality is bark beetle attacks. Certain areas have been experiencing more than others (Ruidoso, Las Vegas area) while others have been spared the widespread damage. Much of the cause is environmental and the areas that have been experiencing the brunt of the drought have had an increase in the area affected. With that in mind there is no area in the state that is immune from the effects of the small rice sized insects.

Pine Bark Beetles:

There are two primary types of bark beetles that are affecting New Mexico's pine trees: *Dendroctonus* and *Ips*. There are many different species that fall into these two genera including the western pine beetle, round headed pine beetle, red turpentine beetle and the pine engraver. Each species has a different behavior and preferences but the end result is often times the same, a dead tree.

The last year was a rough one for the trees with the areas affected by the different beetles increasing several fold in many cases. The area of ips increased almost ten times from the previous year and affected almost 63,000 acres of state and private lands. The western pine beetle went up to ~17,000 acres from a previous total of around 2,000 acres in 2012. In some areas of the state there is a very substantial and obvious impact. The current conditions in the Ruidoso area are reminiscent, on a slightly smaller scale, of the mountain pine beetle outbreak in the central and northern Rockies which experienced landscape scale mortality. This expected to be the continuing trend until there is ample moisture or the beetled have consumed much of the available food supply. This kind of mortality is not unknown in the area with previous outbreaks occurring, notably in the 1950's which had conditions similar to todays.

Piñon Ips:

The piñon engraver is making an impact once again in the northern portion of the state. This is the same species that killed millions of piñon trees in the early and mid-2000's and created much concern amongst land managers who were very concerned over the fate of the tree species. There was a 11fold increase in the acreage (3,611 in 2012 to 45,765 in 2013) of piñon ips, primarily

from the southern portion of the Manzano Mountains, through the Sandias, and continuing into the foothills of the Sangre de Christos. This is a special tree to New Mexicans and there has been an increasing level of concern over the fate of land owner's trees. Much like the other pine bark beetles, the increase in population is largely due to the prolonged and severe drought that the state has experienced for more than three years at this point. With little snowfall in the early part of the current winter season and the increased beetle population, there will be more mortality in the coming year and beyond.

Other Bark Beetles:

Pines trees are not the only tree species that is affected by bark beetles in the state. The Douglas-fir beetle increase fivefold to over 7,000 acres. While not as prevalent as in other states, this mid elevation tree is an important part of the ecosystem. They are often larger than the other mixed conifer species and provide important habitat for many forest species.

Moving higher in elevation, the mixed conifer trees (spruce and fir) had pressure from several different bark beetles, all of which increased their presence over the year. The Spruce beetle, which is becoming more of an issue in southern Colorado, increased its impact 100 percent, but is largely still in isolated areas and sport throughout the northern forests. Given current trends this will increase in the future and become more of a landscape issue with more pockets throughout the forest. The western balsam bark beetle is a high elevation species that attacks sub-alpine firs. It increased in area less than other, only going up by about 50 percent (2,800 acres in 2013) these trees are easier to spot as they turn a bright red once dead. The other mixed conifer species observed was the fir engraver which went to 6,390 acres in 2013, up from 17,000 in 2012.

All of these species combine to have a widespread impact on the landscape and there is not really any part of the state that has not experienced some degree of tree mortality in recent years.

Emerging Issues:

Juniper: This often considered un-killable tree genus experienced a substantial amount of damage over the past year. The extended drought coupled with some small bark beetles and wood borers caused expensive areas of juniper dieback and mortality. The drought became so severe that hundreds of acres (the actual area is not known as it was outside of the survey area) experienced mortality from a lack of water. Other areas had an increase in the juniper twig pruner (*Styloxus bicolor*) that caused the trees to look dead but only killed the ends of the branches. This follows the dieback of many alligator junipers that froze during the 2011 extreme cold event, however, many of these have resprouted and are coming back slowly.

Hail damage: Besides the drought, the state experienced several other extreme events including heavy thunder storms and severe flooding. With the large storms came large sized hail and as the stones fell they ripped small branches off of many trees giving the look of defoliation. Over 850 acres of hail damage was recorded and confirmed through ground checks.

Road salt: The widespread use of salts on roadways has been increasing throughout the western states in recent years. This becomes an issue when there is not enough moisture, rain or snow, to dilute the salts and trees begin to take them up. This often results in strips of bead trees along road ways which can pose hazards to traffic after they die and begin to decay.

Tamarisk leaf beetle: This is a introduce bio-control agent that has made its way to the New Mexico from bordering states. It only attack salt cedars (tamarisk) and defoliates them. A special aerial survey was conducted and found the TLB from Cuba south to Socorro, and from the Gallinas area west to the Rio Puerco. The species continues to increase its presence and the damage that it does becomes very visible in the middle Rio Grande valley in mid-summer as the tamarisk trees turn a reddish orange and drop their foliage. They have been refoliating about a month following the defoliation and by September they have green foliage once again. It will take an estimated three to ten years of repeated defoliation before there is observable mortality form the beetle. This give land managers time to plan for the future reclamation and restoration of areas currently infested with the invasive tree.

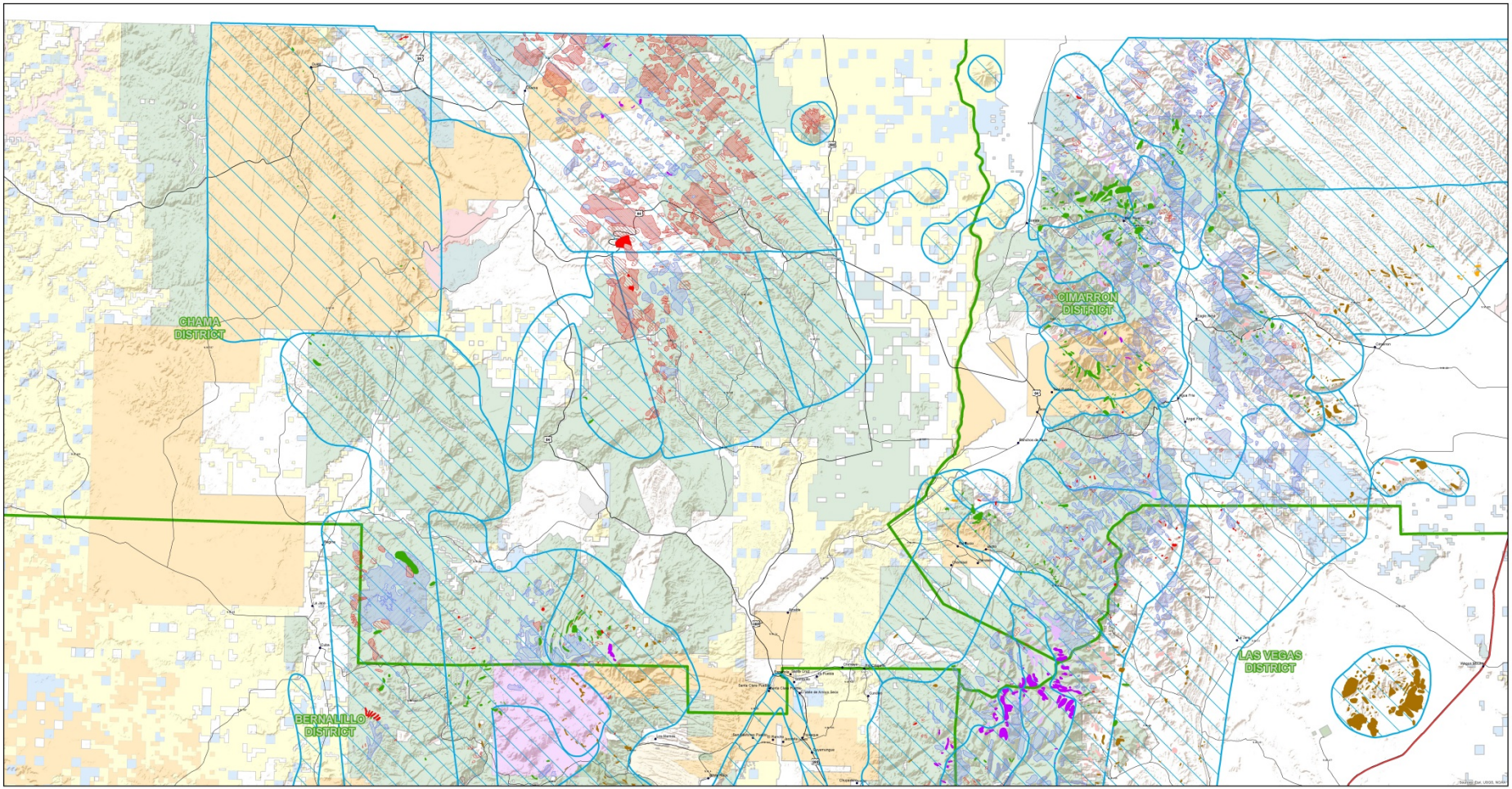
Emerald Ash Borer: While this has not been found in the state, it was found in Boulder, CO, traveling many hundreds of miles from the nearest known infestation. This demonstrates that there can be distant spread of damaging invasive species that can go undetected for several years. It is key

to be on the lookout for invasive species and to have plans on how to deal with them once they arrive.

Conclusion:

Forest health in the state of New Mexico is a complex issue. There are many different aspects that play into the overall health of the state's trees and much of this is closely tied to the current climatic trends and large scale climate and weather patterns and cycles including the El Nino/La Nina state, the Pacific decadal oscillation and many more. These cycles impact New Mexico's weather by dictating the location of key high and low pressure centers which in turn cause different rainfall patterns in the state. Without an alleviation of the current long term drought there will be continued increases in mortality and defoliation of the state's trees. It is important to remember that these are key resources for the state, helping to purify water and providing important habitat for animals and also for humans who cherish their forests and woodlands. Many people in the state have very close ties to the land and the trees are an important part of their livelihood.

2013 Forest Insect and Disease Activity: Chama District



Sum of ACRES	Severity						
Damage Agent	Defoliation/Points	Very Light (1-3%)	Light (4-10%)	Moderate (11-29%)	Severe (30 – 50%)	Very Severe (>50%)	Grand Total
<Phloeosinus spp.>	1						1
aspen defoliation	106,222						106,222
decline	1,612						1,612
defoliators	71						71
Douglas-fir beetle	51	83	2,154	1,253	501	13	4,055
drought	252						252
fir engraver	8		93	78	28		207
ips	2						2
pinyon ips	2						2
spruce beetle	5		587	1,067	284		1,943
unknown	642						642
western balsam bark beetle	1		327	857	11		1,195
western pine beetle	40	72	328	116	65	29	651
western spruce budworm	67,216						67,216
Grand Total	**176,124**	**155**	**3,490**	**3,371**	**888**	**42**	**184,070**

0 5 10 20 Miles

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NM Land Ownership

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- Ponderosa Mortality
- Fir Engraver
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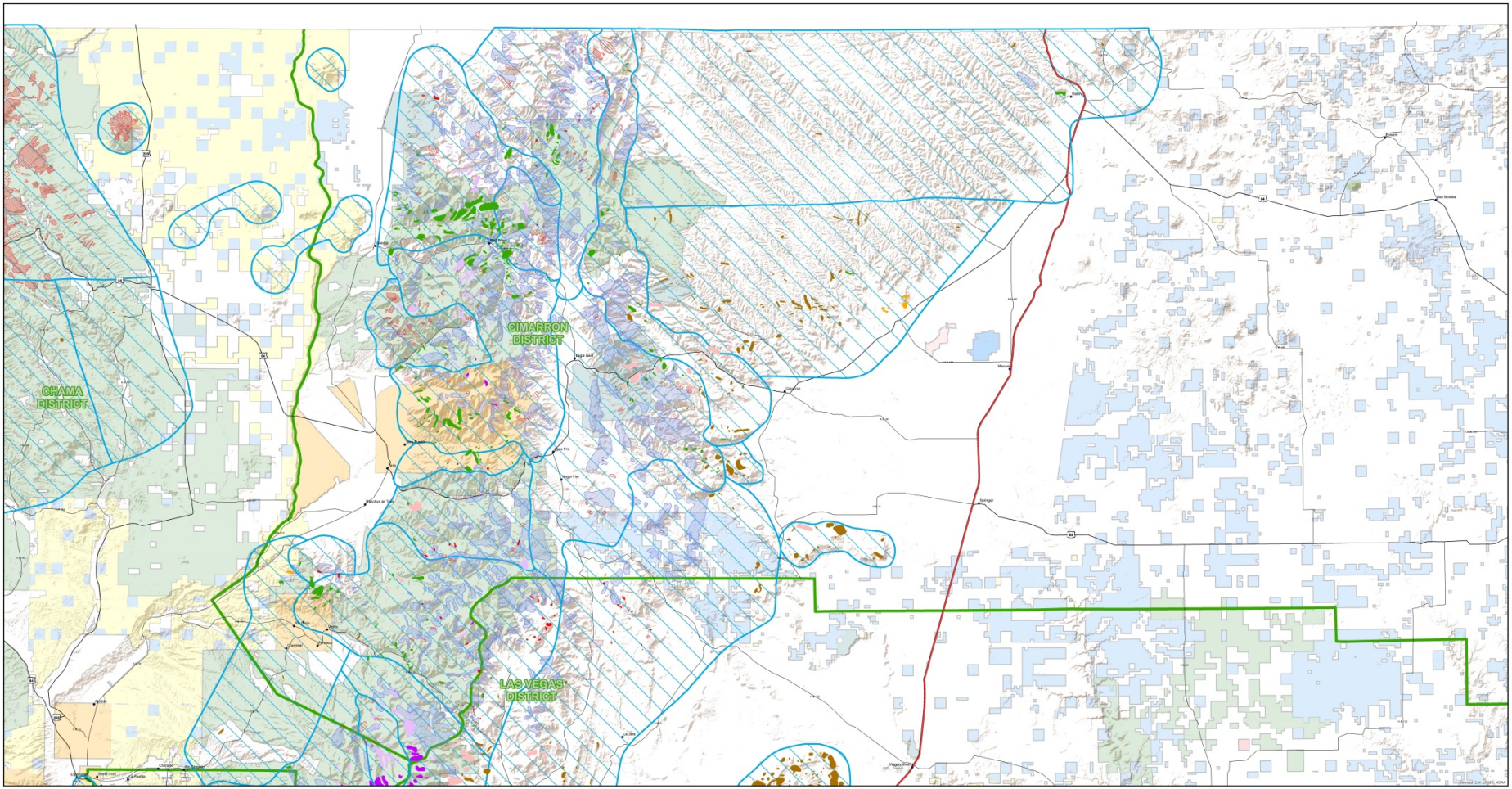

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<Phloeosinus spp.>	0			63			64
aspen defoliation	7,832						7,832
boring insects	31						31
decline	499						499
dieback	0						0
Dothistroma needle blight	4,107						4,107
Douglas-fir beetle	63	460	6,600	3,475	1,468	275	12,340
drought	24						24
fir engraver	23	738	1,644	1,001	425	67	3,897
ips	9		1,448	488	4		1,949
pinyon ips	17	54	143	199	7		420
road salt	1				41		42
spruce beetle	2		434	305	72		813
unknown	363						363
western balsam bark beetle	15	638	3,720	1,825	538	18	6,753
western pine beetle	62	195	2,320	940	212		3,730
western spruce budworm	142,479						142,479
Grand Total	**155,528**	**2,085**	**16,307**	**8,297**	**2,767**	**359**	**185,343**

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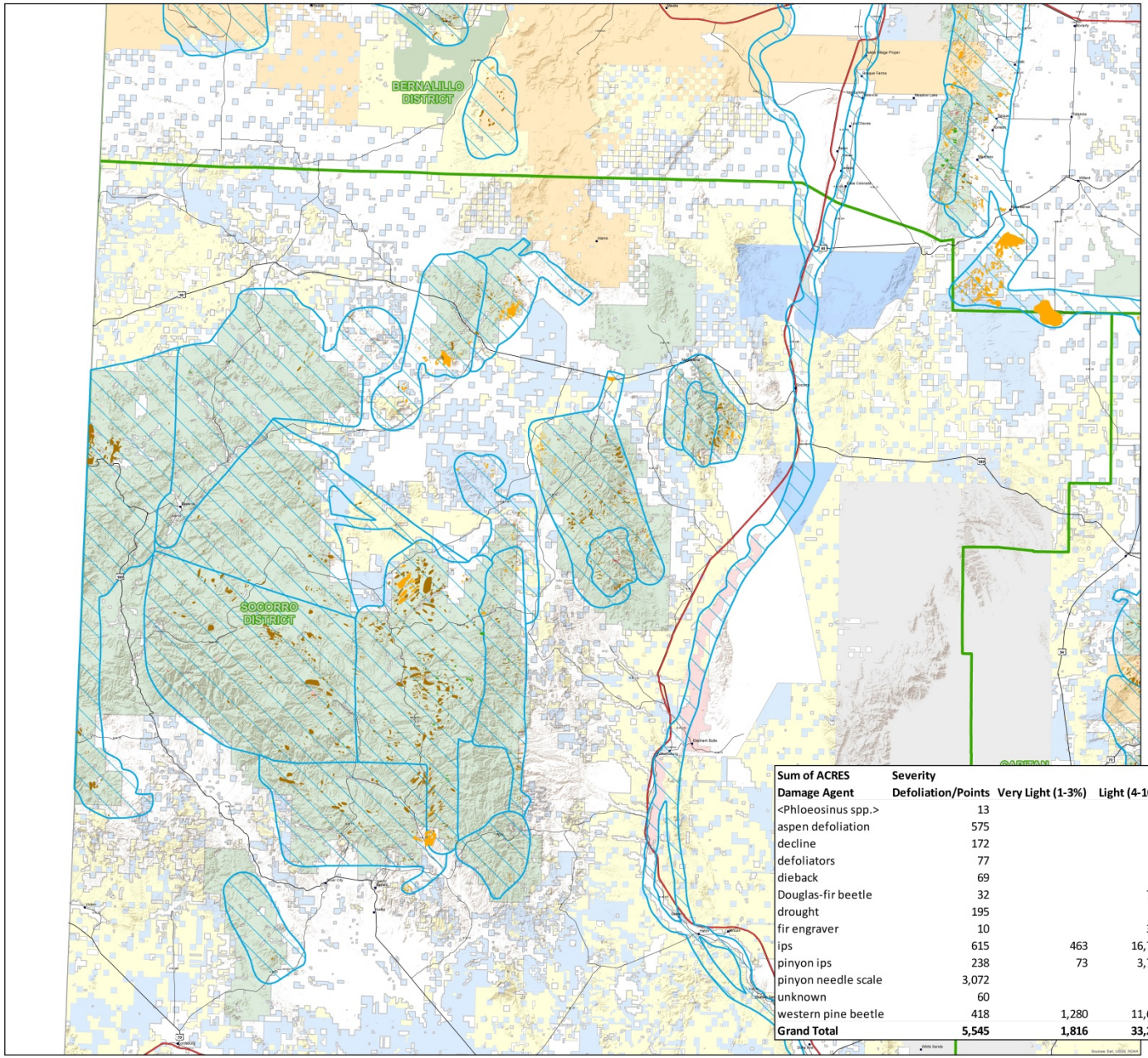
2013 Forest Insect and Disease Activity: Socorro District



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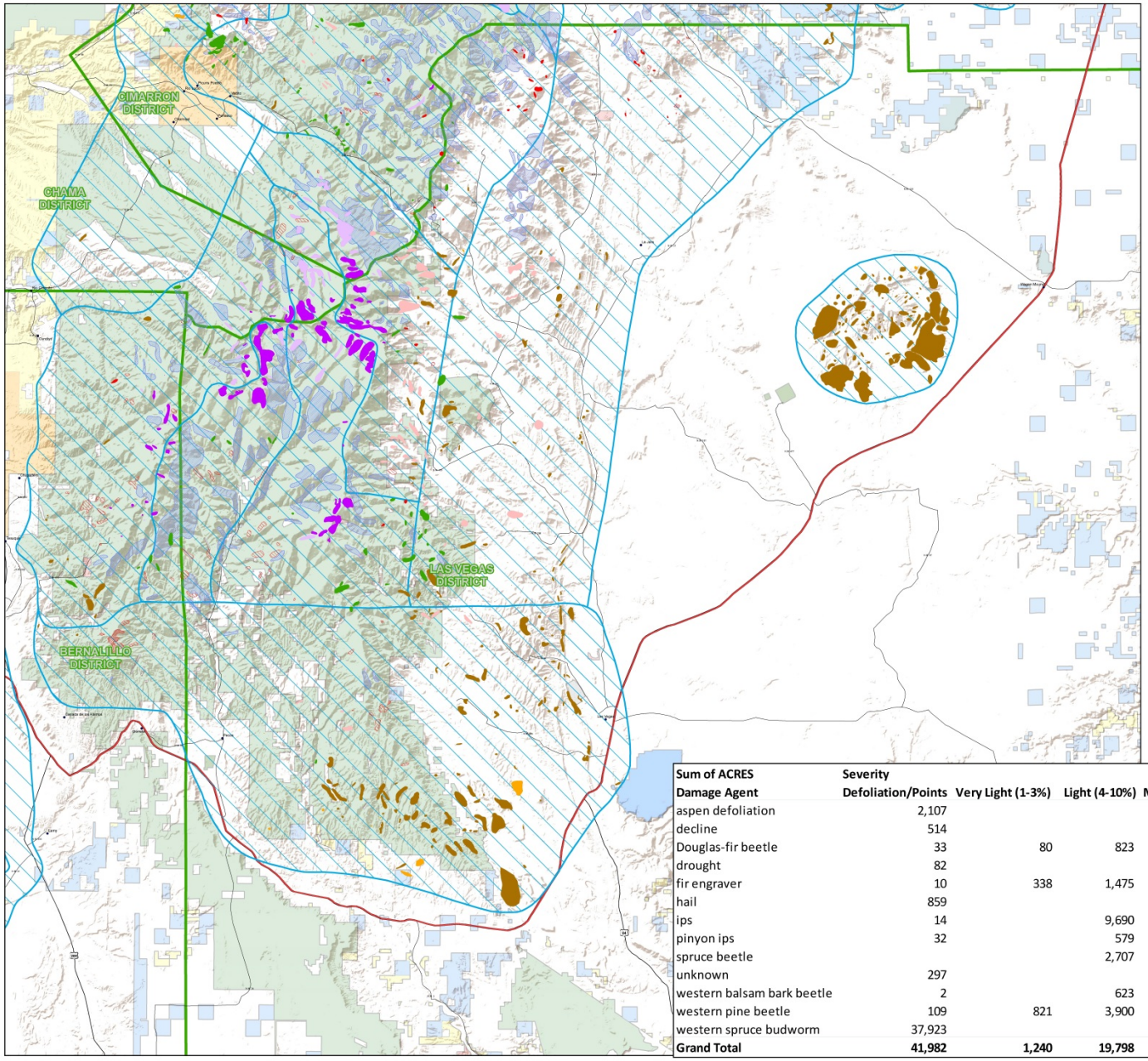
decline	172						172
defoliators	77						77
dieback	69						69
Douglas-fir beetle	32		790	267	52		1,141
drought	195						195
fir engraver	10		358	507	48		924
ips	615	463	16,738	18,420	1,588	136	37,960
pinyon ips	238	73	3,759	11,174	7,424	104	22,771
pinyon needle scale	3,072						3,072
unknown	60						60
western pine beetle	418	1,280	11,606	4,694	364	17	18,380
Grand Total	**5,545**	**1,816**	**33,282**	**35,267**	**9,477**	**256**	**85,643**

2013 Forest Insect and Disease Activity: Las Vegas District



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0 5 10 20 Miles

N W E S

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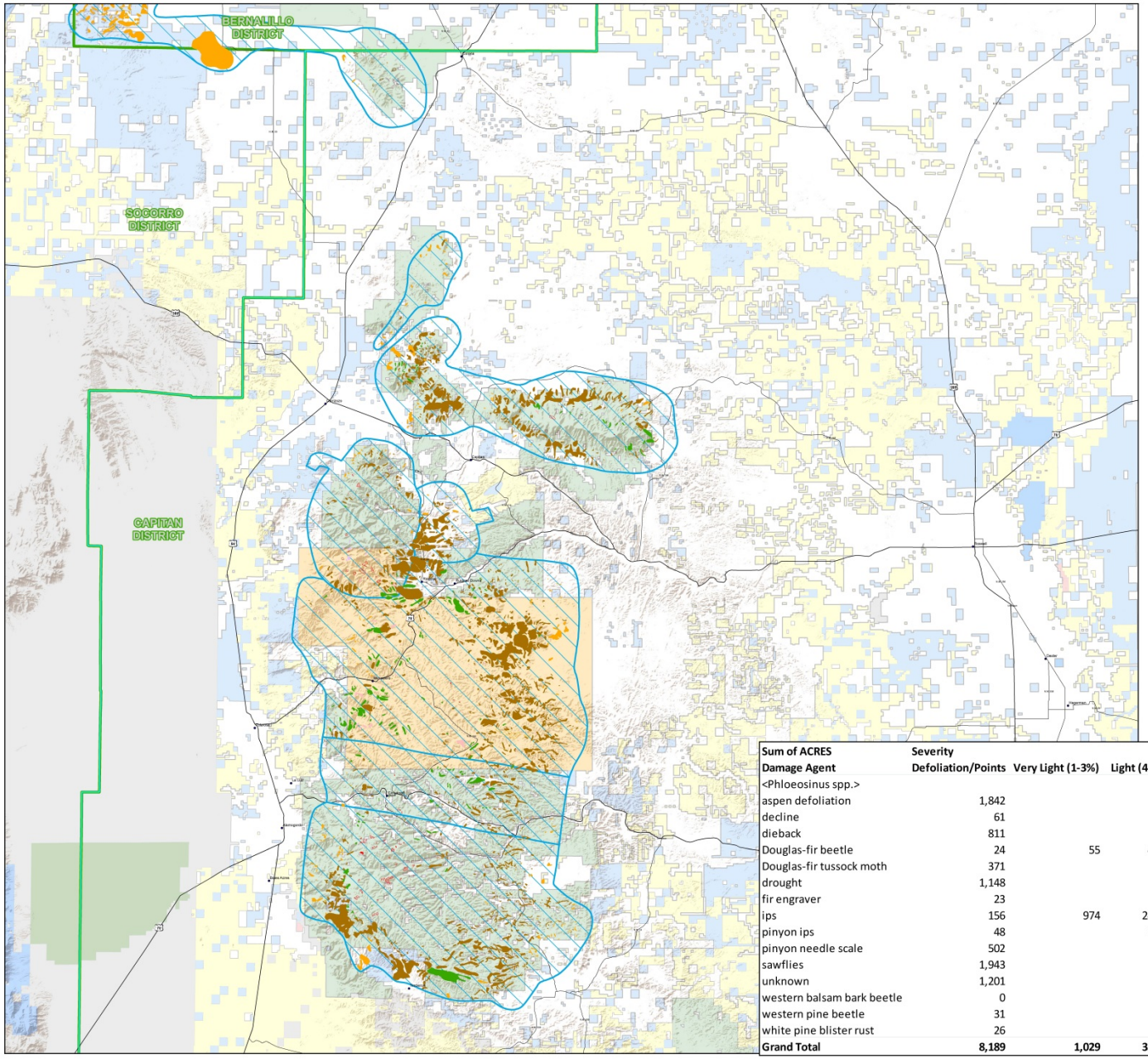
Sum of ACRES	Severity						
Damage Agent	Defoliation/Points	Very Light (1-3%)	Light (4-10%)	Moderate (11-29%)	Severe (30 – 50%)	Very Severe (>50%)	Grand Total
aspen defoliation	2,107						2,107
decline	514						514
Douglas-fir beetle	33	80	823	688	147		1,772
drought	82						82
fir engraver	10	338	1,475	1,293	453	160	3,731
hail	859						859
ips	14		9,690	2,663	270		12,638
pinyon ips	32		579		9		620
spruce beetle			2,707	2,855	963	171	6,697
unknown	297						297
western balsam bark beetle	2		623	548	138		1,311
western pine beetle	109	821	3,900	5,287	735	223	11,075
western spruce budworm	37,923						37,923
Grand Total	**41,982**	**1,240**	**19,798**	**13,334**	**2,716**	**554**	**79,625**

2013 Forest Insect and Disease Activity: Capitan District



Mortality
- Aspen Decline
- WBBB
- Douglas-fir Beetle
- Ponderosa Mortality
- Fir Engraver
- Piñon Ips
- Spruce beetle

Survey Extent
- Survey Extent
- NMSF_Districts

Defoliation
- Western Spruce Budworm
- Aspen Defoliation - heavy
- Aspen Defoliation - light
- Unknown Pinon Defoliation - light
- Unknown Pinon Defoliation - heavy
- Pinon Needle Scale - light
- DFTM - light
- Unknown defoliation - light
- Sawfly Defoliation - light
- Oak Defoliation - light
- Cottonwood def - heavy

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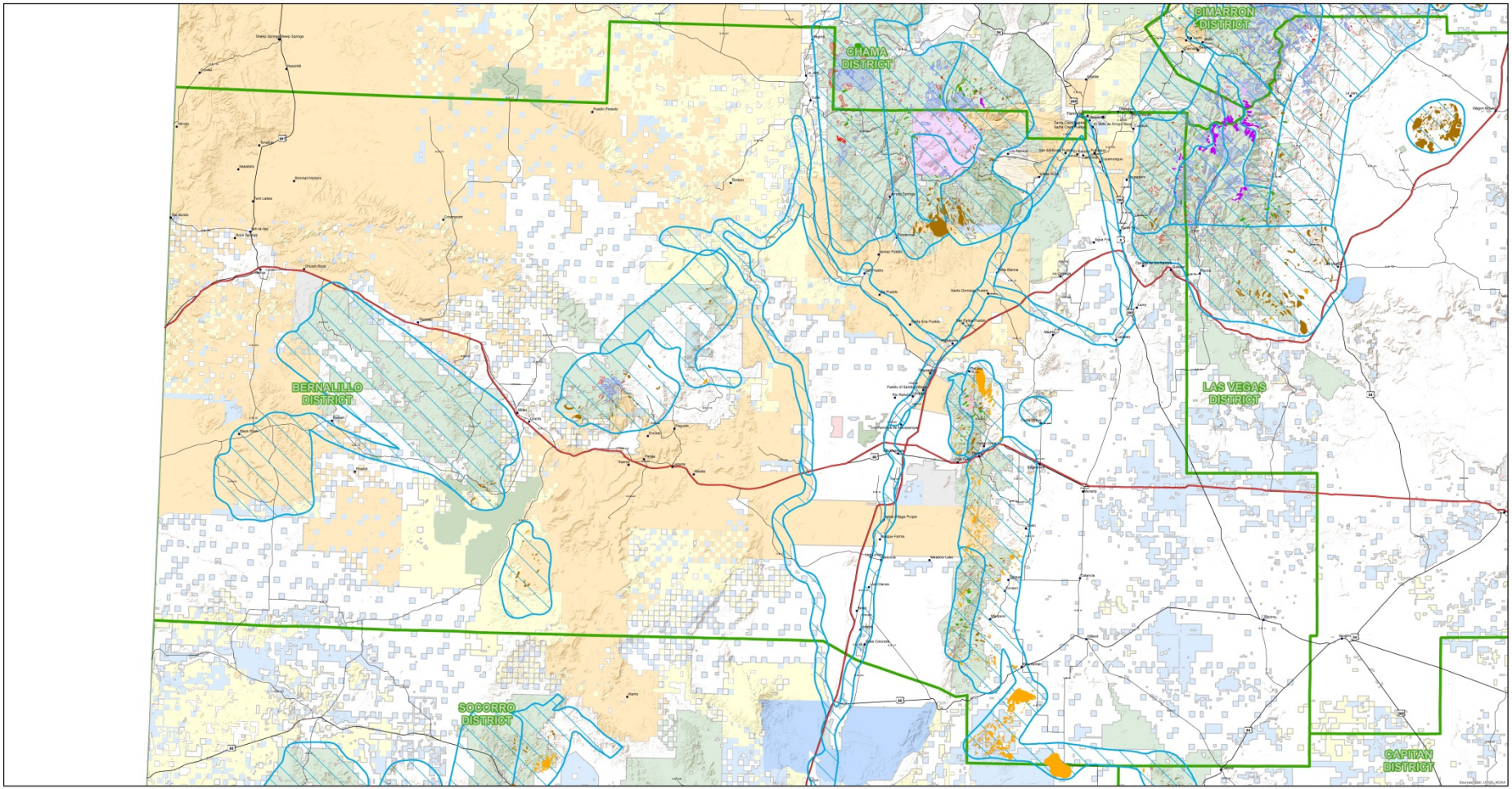
Sum of ACRES	Severity						
Damage Agent	Defoliation/Points	Very Light (1-3%)	Light (4-10%)	Moderate (11-29%)	Severe (30 – 50%)	Very Severe (>50%)	Grand Total
<Phloeosinus spp.>			70	496	32	42	639
aspen defoliation	1,842						1,842
decline	61						61
dieback	811						811
Douglas-fir beetle	24	55	4,490	6,261	2,186		13,015
Douglas-fir tussock moth	371						371
drought	1,148						1,148
fir engraver	23		376	937	97		1,434
ips	156	974	24,079	47,593	19,416	4,058	96,276
pinyon ips	48		1,858	4,201	1,371	108	7,585
pinyon needle scale	502						502
sawflies	1,943						1,943
unknown	1,201		386	46			1,632
western balsam bark beetle	0		150	54	12		216
western pine beetle	31		964	730	520		2,245
white pine blister rust	26						26
Grand Total	**8,189**	**1,029**	**32,372**	**60,317**	**23,633**	**4,208**	**129,748**

2013 Forest Insect and Disease Activity: BernalilloDistrict



Sum of ACRES	Severity						
Damage Agent	Defoliation/Points	Very Light (1-3%)	Light (4-10%)	Moderate (11-29%)	Severe (30 – 50%)	Very Severe (>50%)	Grand Total
<Phloeosinus spp.>	1		242	62			305
aspen defoliation	5,269						5,269
decline	582						582
Douglas-fir beetle	18	106	1,193	1,609	405	15	3,346
drought	1,201						1,201
fir engraver	5		706	811			1,522
ips	44	850	3,198	4,599	5,070	373	14,133
pinyon ips	80	73	5,276	9,382	13,947	1,986	30,744
sawflies	124						124
spruce beetle	1	47	206	318	48		620
unknown	1,009						1,009
western balsam bark beetle	3	58	102	71	15		249
western pine beetle	245	600	4,423	1,362	314	21	6,964
western spruce budworm	14,313						14,313
Grand Total	**22,894**	**1,733**	**15,346**	**18,214**	**19,799**	**2,395**	**80,382**

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Survey Extent

- Survey Extent

Defoliation

- Western Spruce Budworm
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- Oak Defoliation - light
- Cottonwood def - heavy

Written by Danny Norlander, Forest Health Specialist
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Forestry Division

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NMForestry.com

All Photographs by Danny Norlander unless noted