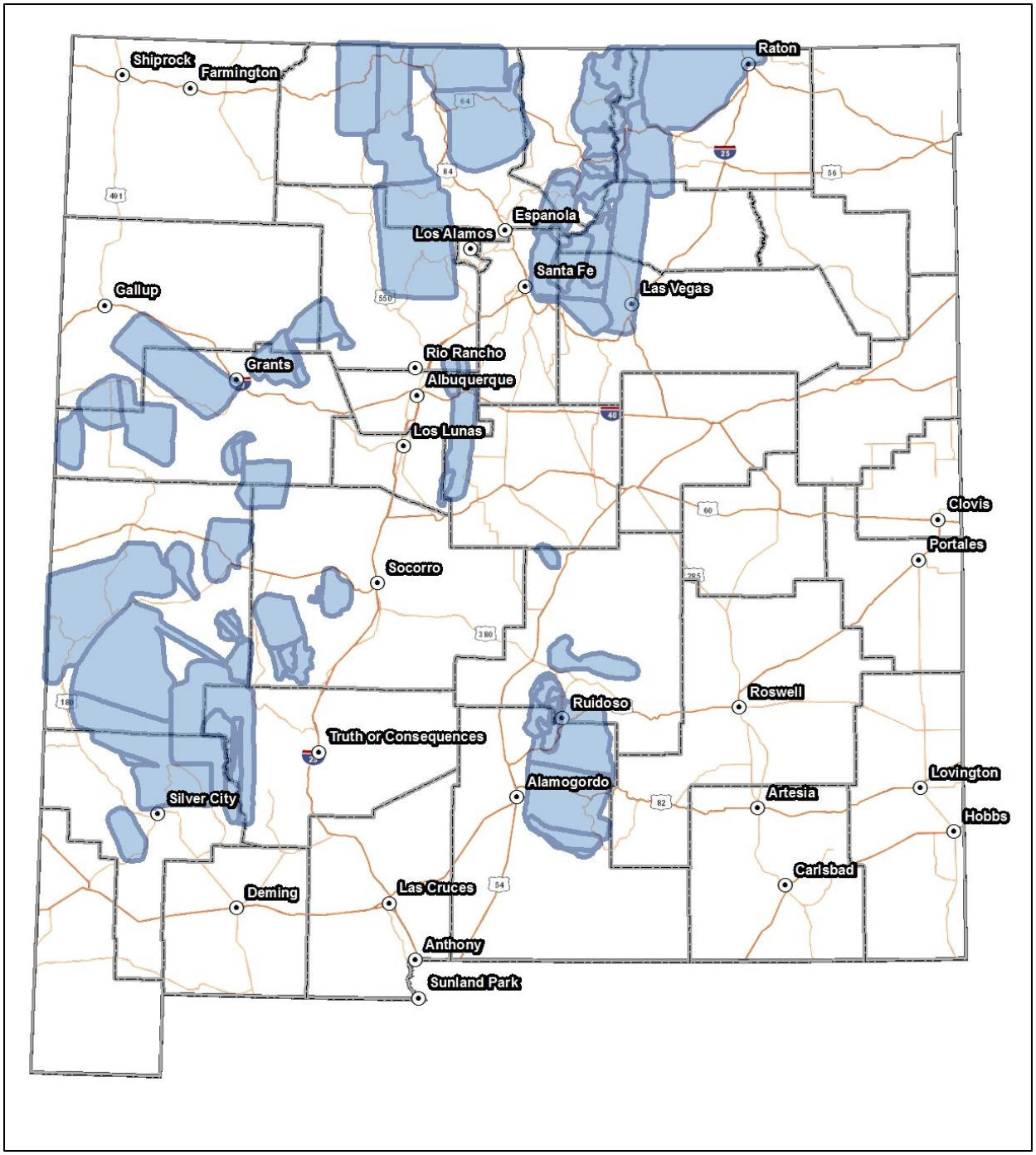
New Mexico's Insect and Disease Issues 2011:
State and Private Lands

New Mexico's forested ecosystems had a stressful year in 2011. Severe drought throughout much of the state resulted in record setting wildfires, increasing moisture stress, and a predisposition to insects and pathogen attack. But drought was not the only story. The year started off with an uncommon cold spell that saw the state plunged into a deep freeze that took a toll on many forest and urban trees, in particular alligator junipers. Much of the weather pattern that influenced New Mexico's weather can be tied to the El Nino/La Niña climate cycle. La Niña events are associated with dry, droughty weather throughout the state. La Niña conditions were present from June 2010 through May of 2011 which set the state up for a very dry 2010-2011 winter and spring.

During the months from July to September, staff from, the New Mexico Energy, Minerals, and Natural Resource Department, Forestry Division (NMSF) and the U.S. Forest Service's Forest Health Protection group (FHP)flew a total of 10.1 million acres of surveys, with the Forest Health Specialist from NMSF surveying 4.8 million acres. This survey included 2.5 million acres of State of New Mexico and privately owned lands. Of the State and private lands surveyed, insects and diseases had a footprint of 153,920 acres (roughly 240 square miles). The footprint of land represents the area of land that contains some degree of observable insect or disease activity from the air. It does not mean that all of the trees in that area are affected or dead, much like a wildfire has a mosaic of burn severity. Values of intensity range from one tree per acre up to one hundred percent of the trees being affected. While these aerial surveys are efficient, cost effective and reasonably accurate, they do have limitations. For smaller scale events, mistletoe, and issues in the understory, aerial surveys are not the ideal tool or method. This year the aerial survey detected a variety of bark beetles, aspen and cottonwood declines, and defoliation agents on spruce, firs, aspen, cottonwoods, piñon, and oaks. Several other events were also noted.

The Las Conchas fire seen from above Bernalillo on 7/7/11.

The following is a synopsis of what was detected though the aerial surveys, ground checking, and ground surveys on State and private lands.



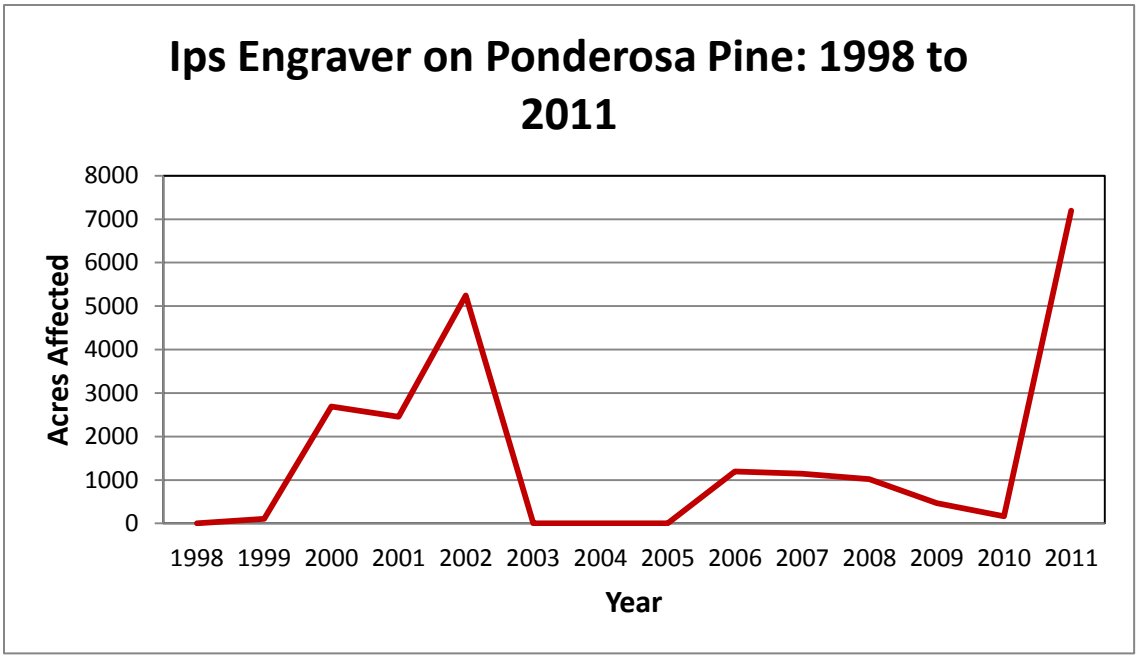
Areas covered by the 2011 aerial insect and disease detection survey.

Ponderosa pine (*Pinus ponderosa*):

Bark beetles, *Ips*, *Dendroctonus,* and other species, feed on the inner bark of trees resulting in girdling the tree. They also introduce fungi that spread into the heart of the trunk and cuts off the water flow from roots to needles. Once a tree is attacked by bark beetles there is nothing that can be done to save the tree. On occasion, especially in moist years, the tree may be able to defend itself, but this is not common with a mass attack. Preventative treatments may be possible but can be costly and time consuming, limiting their landscape level effectiveness.

Ips beetles in ponderosa pine:

Commonly referred to as engraver beetles, this group of *Ips* species were the most common bark beetle on the state and private ponderosa forests of New Mexico. Approximately 7,260 acres of ponderosa pine experienced some level of mortality since the 2010 survey (which amounted to 120 acres). The *Ips* population is often linked closely to environmental conditions and the harsh drought that the state experienced in 2011 contributed to the increase in the beetle population. An increase in bark beetle population is a concern because it increases the number of adults that can infest new trees in the following year. This is often ameliorated by increased moisture to increase tree resistance; however, without a change in the weather patterns, the following year could see an even greater increase and more dead trees.



Dendroctonus Species:

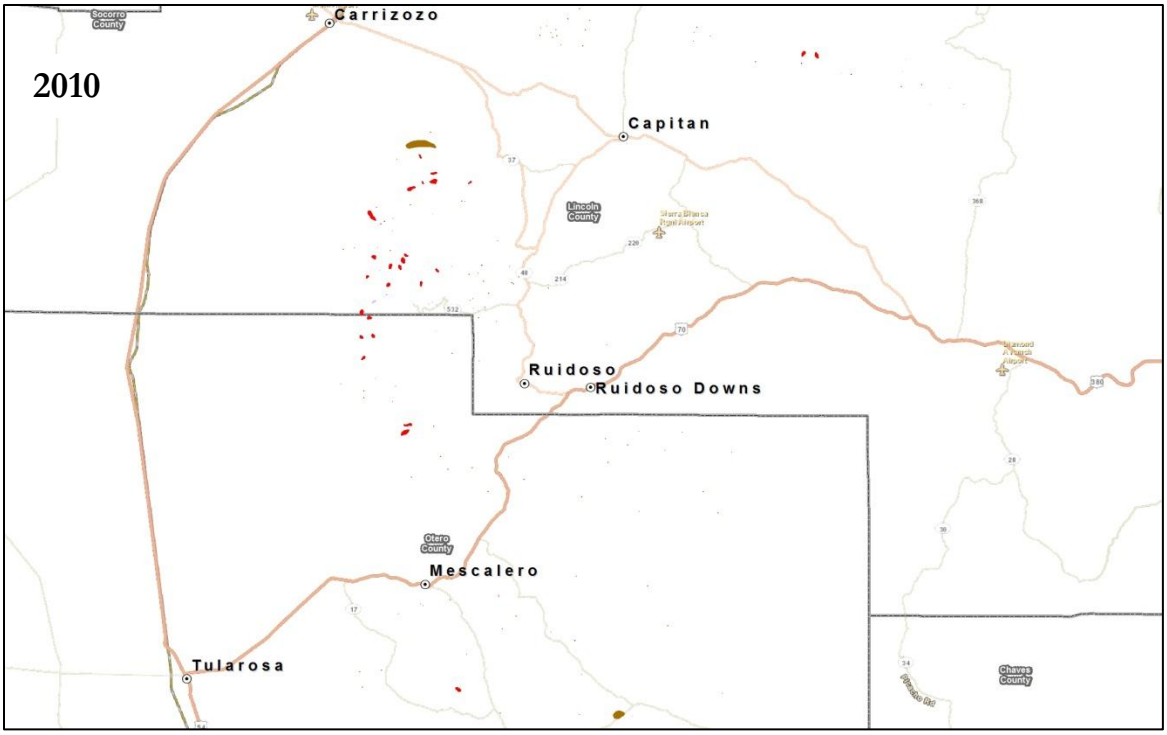
Western pine beetle (*Dendroctonus brevicomis*) and roundheaded pine beetle (*Dendroctonus adjunctus*) were both observed in various areas of the state during ground and aerial surveys. Much of the impact from this group of bark beetles was felt on federal lands, but state and private were not spared.

Approximately 1,110 acres of state or private lands had evidence of *Dendroctonus* impacts on ponderosa pines. Areas of Catron and Mora counties had the majority of mortality.

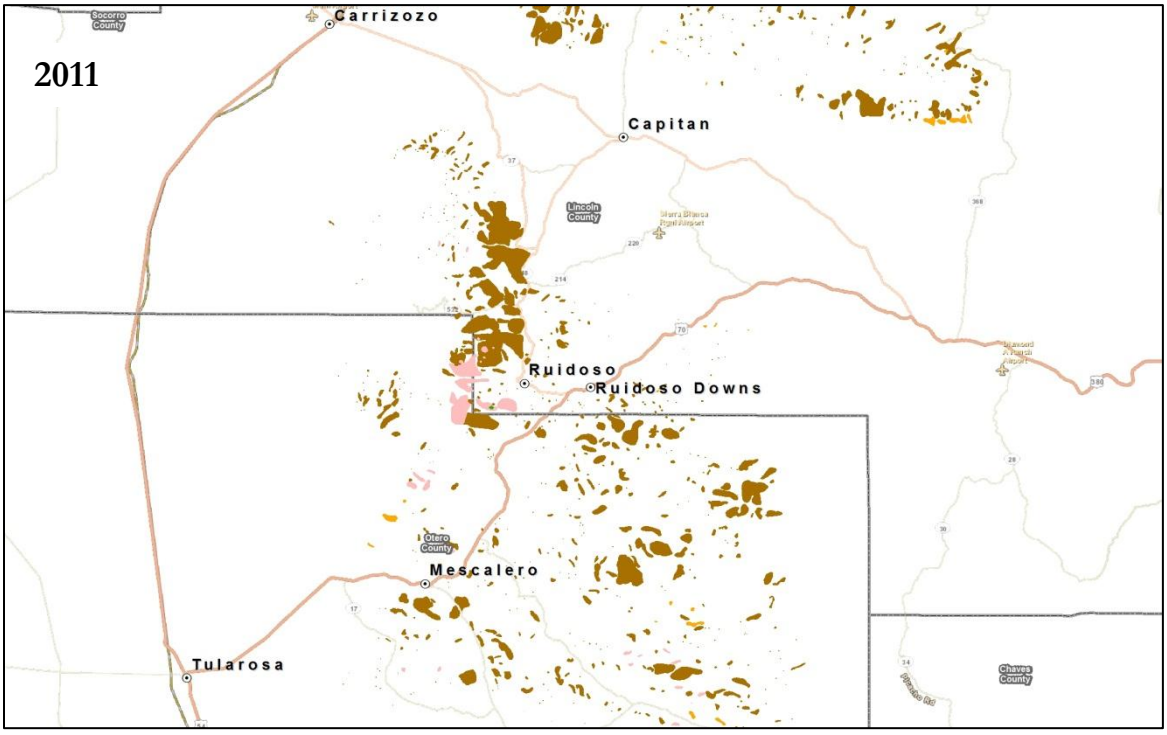
A pocket of mortality caused by bark beetles in the Sacramento Mountains.

A roundheaded pine beetle recovered from a tree near Ruidoso.

A ponderosa pine trunk covered with pitch tubes from roundheaded pine beetles.



2010 aerial detection survey results for the greater Ruidoso area. The majority of the damage is aspen decline (red) with a trace of bark beetle damage (brown).



2011 aerial detection survey results for the greater Ruidoso area. There was a dramatic increase in the area that was impacted by bark beetles (brown, pink and yellow) over the 2010 results.

Defoliators:

There were spotty areas of ponderosa defoliation resulting from tiger moths and sawflies throughout the mountains of the state. These were primarily on younger trees but some were seen on older mature trees.

Tiger moth larvae feeding and in and around their tent in the spring of 2011.

Abiotic factors:

Several areas around natural gas wells located in the forest had pockets of mortality which were suspected to be a result of brackish water from the wells. These pockets were limited in size and in downslope drainages adjacent to gas wells. Further investigation is ongoing and will be monitored in the future.

Piñon pine (*Pinus edulis*)

Piñon *Ips* (*Ips confusus*):

While not all of the piñon woodlands in the state were surveyed those that were showed an increase in the occurrence of piñon bark beetles over the 2010 level. While only ten acres were mapped during the 2010 survey the acreage increased to 370 acres in 2011. This is still far below the millions of trees that were killed in the early 2000's. This increase does show that there is a potential for more population expansion in the coming year depending on the weather during the 2011-12 winter and early spring. Landowners and managers should be aware of the possibility of an increasing population and plan accordingly.

Piñon defoliation:

Several different agents will defoliate piñon trees including piñon needle cast, piñon needle rust, and piñon needle scale. Piñon defoliation decreased from 2010 levels of 1,090 acres to only 40 acres. Several factors could explain this decrease including the dry weather which can reduce fungal pathogens and natural cycles in the populations.

Mixed Conifer Forest Type:

Douglas-fir beetle (*Dendroctonus pseudotsugae*):

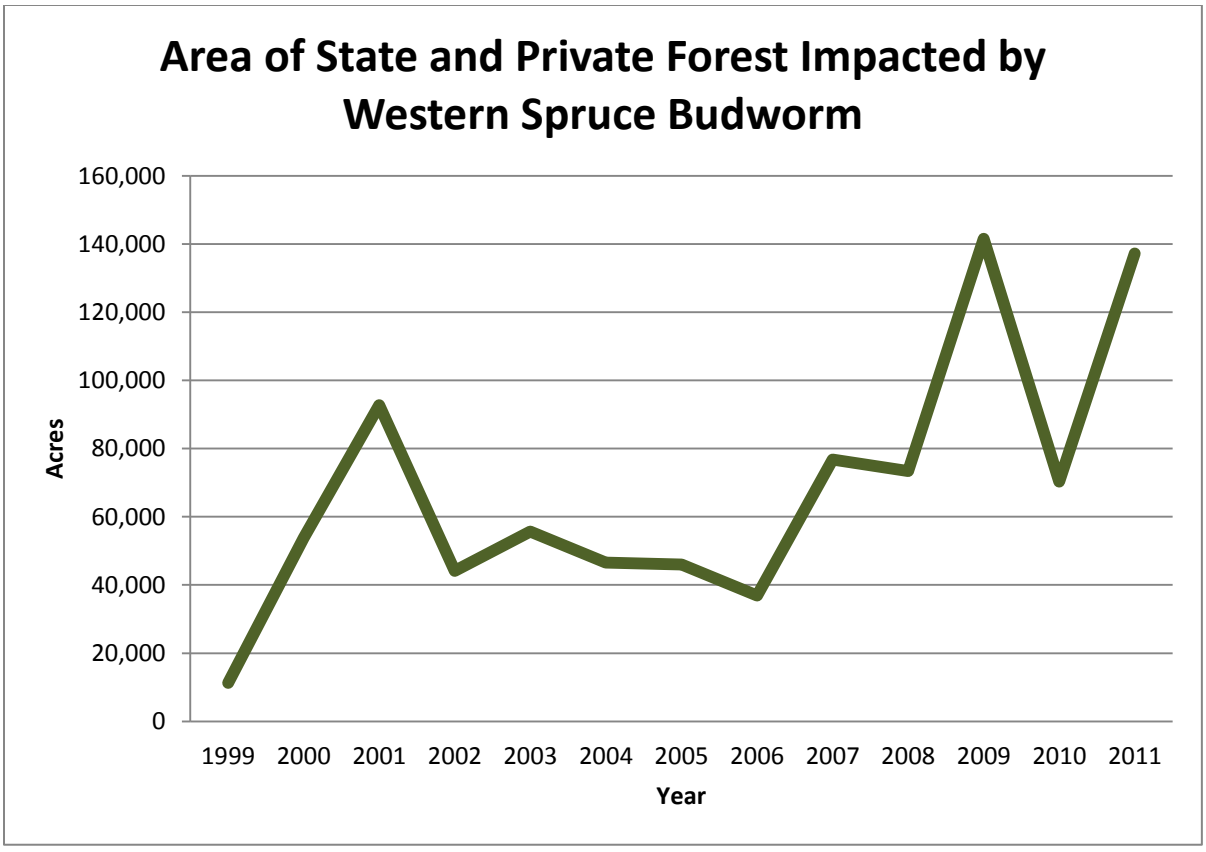
The only tree species that this beetle attacks is Douglas-fir, limiting its habitat to mid-elevations as well as the amount of damage that it can cause in the state. Despite this, there was an increase in the acreage mapped in the 2011 survey with and increase to 250 acres (up 230 acres from 2010).

True Firs (*Abies sp.*):

These higher elevation conifers are hosts to a couple of different bark beetles, the western balsam bark beetle (*Dryocetes confuses*) and the fir engraver (*Scolytus ventralis*). These bark beetles are slower maturing at the higher elevations with shorter growing seasons. The result is a longer generation time, often two years, which means that we are more likely to see the effects of the droughty conditions one to two years following the dry spell. The fir engraver increased the area impacted to 390 acres (up from 50 in 2010), mostly in Mora and Lincoln Counties. While the western balsam bark beetle actually impacted fewer acres, dropping from 1,130 to 720, almost entirely in Taos County.

Spruce (*Picea sp.*):

New Mexico's state and private spruce populations showed just a trace of bark beetle impacts. However, there were other areas of concern. The long term western spruce budworm (*Choristoneura occidentalis*) epidemic continued to persist in the northern counties doubling the acreage from 2010 from 65,460 to 130,930 acres. This defoliator not only defoliates spruce but also true firs and Douglas-fir. It can predispose these species to attack by bark beetles and other forest health issues. The thinning of crowns and decreasing vigor are also able to mask other damage agents that may be at work. Ground surveys showed that there were several areas of *Armillaria* root rot which were killing trees but were not visible from during aerial surveys.



Juniper:

While many people are attempting to remove various juniper species from areas though out the state, natural events also contributed to juniper die off in 2011. Whether it was fire in the piñon-juniper woodlands or the extreme cold event that occurred early in the year, thousands of acres of these woodlands were affected. The cold snap alone caused the death or dieback of junipers on approximately 4,000 acres from Las Vegas to the Gila on various juniper species. In some cases the trees have started to come back through epicormic branching, showing just how resilient junipers can be.

A juniper trunk with a combination of borers and bark beetles (left) and the effects of a severe freeze in a drainage (above).

Various bark beetle and borers were observed on junipers though out the state, often killing a single stem or single tree. This background, endemic population is generally present in all tree species and helps to reduce over stocked areas of forests and woodlands by killing over stressed trees.

Hardwoods:

New Mexico is dominated by conifers, but there is the occasional stand of hardwoods. This includes aspen in the uplands, cottonwoods along rivers and streams, oaks in woodlands, and a smattering of other species.

Aspen:

Several years ago, aspen was often in the news due to "sudden aspen decline" (SAD). While researchers have attributed this decline to droughty conditions in the generally wetter aspen habitats, it appears to have been gradually decreasing throughout the species range over the last few years. This trend continues in New Mexico with a decrease from 4,400 acres to 1,290 acres (this may be

partially due to observational methodology changes in the last few years). The Forestry Division did undertake a study of aspen stands for long term monitoring of aspen health and plans to continue to do so in coming years. This will hopefully provide a better idea of what is going on in the states valuable aspen stands.

The western tent caterpillar (*Malacosoma californicum*) increased its area impacted, as most insects did during the year. The vast majority of the 30,190 acres (up from 20,380) of state and private land impacted by the defoliator were in Rio Arriba County. 2011 levels were roughly those that were seen in 2009.

Cottonwood:

Around 20 acres of cottonwood defoliation was observed from the air during 2011. While not attributed to a specific damage agent there are several possible defoliators including the western tent caterpillar, fall webworm, and the cottonwood leaf beetle. There was also an observed increase in the levels of the cottonwood blotch miner in the middle Rio Grande valley. Many cottonwoods also had evidence of bacterial slime flux and other heartwood rots that can weaken the stems and increase the risk of breakage.

Cottonwood blotch miners along the Rio Grande.

Urban Trees:

Urban forests come with their own host of issues and problems for tree health. These range from improper tree care and planting to mechanical damage to insects and diseases. In New Mexico, urban forests have been fortunate as invasive species which are killing and affecting millions of acres in the east and west coasts have not arrived in the state. This is an issue which is in need of constant monitoring to avoid potential issues.

The urban landscape is not without its issues though. The elm leaf beetle defoliated trees in various municipalities, sycamore scale and anthracnose decreased vigor, and the drought all took their toll throughout 2011.

Outlook:

2011 was a rough year to be a tree in New Mexico. Unfortunately 2012 is not looking to much better. A second year of La Niña conditions mean a dry winter and spring and predicted drought continuing through the year will stress forests even more. This could set the stage for increasing bark beetle and defoliator populations as they build off of the 2011 droughty conditions. The state can expect to see more dead and dying trees and the temporary increase in fire danger that accompanies this. Until the trees lose their needles or leaves the fire risk increases, but following

this drop the fire danger should decrease to be less than pre death levels due to the lack of fine fuel in the canopy.

So do not be surprised if we see more dead trees and more defoliation events. After all, this is nature's way of reducing competition and restarting the successional stage for the next cohort of plants (be it trees, shrubs, or grasses).

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All Photographs by Danny Norlander