United States
Department
Of Agriculture

Forest Service
State and Private
Forestry

Forest Health Protection
Intermountain Region
R4-OFO-PR 19-01
State of Nevada

Nevada
Division of Forestry
Department of
Conservation and
Natural Resources

Pinyon Sawfly Damage
Dayton, Nevada
(Photo: Gene Phillips)

2018
Forest Pest Conditions
In Nevada

Forest Health Specialists

Forest Health Protection
USDA Forest Service
Ogden Field Office
Forest Health Protection
4746 S 1900 E
Ogden, UT 84403
Phone: 801-476-9720
FAX: 801-479-1477

Robert Cruz, Group Leader
Email: rcruz@fs.fed.us

Darren Blackford, Entomologist
Email: dblackford@fs.fed.us

Danielle Malesky, Entomologist
Email: dmalesky@fs.fed.us

Elizabeth Hebertson,
Entomologist/Pathologist
Email: lghebertson@fs.fed.us

Laura Dunning, Program Assistant
Email: ldunning@fs.fed.us

Nevada Division of Forestry
Department of Conservation and Natural Resources
State Headquarters
2478 Fairview Dr.

Gene Phillips
Forest Health Specialist
Email: gphillips@forestry.nv.gov
Phone: 775-849-2500 Ext.241

Ryan Shane
Resource Program Manager
Email: rshane@forestry.nv.gov
Phone: 775-684-2507

Compiled by:
Gene Phillips, Forest Health Specialist, NDF DCNR
&
Danielle Malesky, USFS, Entomologist

With Contributions from:
Jeff Knight, Nevada State Entomologist

March, 2019

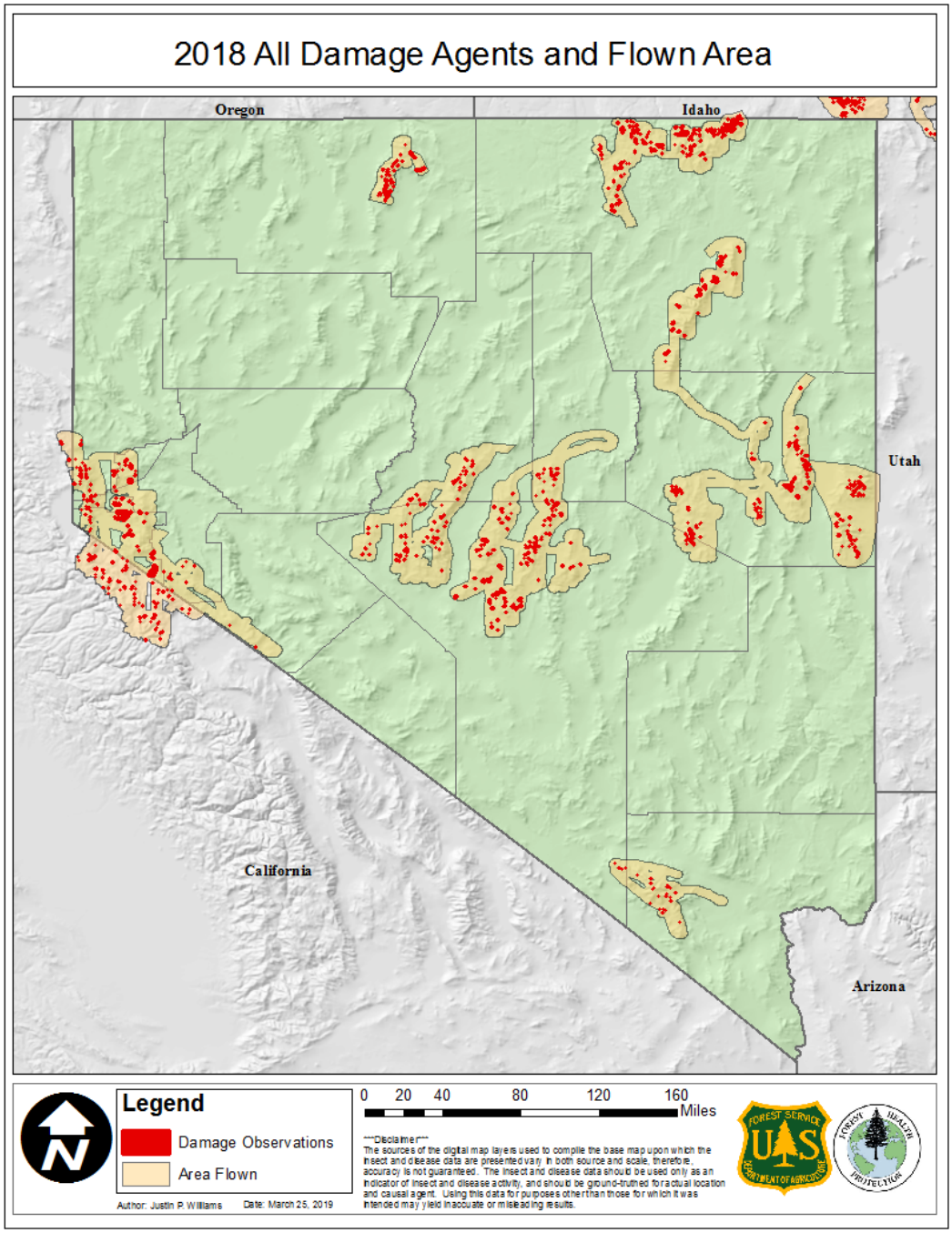


TABLE OF CONTENTS

INTRODUCTION AND SUMMARY

In an effort to simplify discussions of forest health conditions in Nevada, this report focuses on only insects, diseases, and weather factors that impacted various tree species in the State. Data collected through aerial detection surveys (ADS) conducted by the USDA Forest Service and Nevada Division of Forestry are primarily used to determine mortality trends in the State from year to year. Mortality trends are described in terms of acres affected; however, not all trees on these acres are dead. Not all forested lands are surveyed, and not all of the same acres are surveyed every year. Sometimes, tree mortality may be counted in the same area in consecutive years. This can lead to inflated estimates of actual tree mortality. Total acres tallied may also change between years due to increases or decreases in the total number of acres surveyed. Consequently, interpretation of ADS data should consider these sources of inconsistency. The ADS data encompasses most of the Humboldt-Toiyabe National Forest including portions of the Bridgeport and Carson Ranger Districts located in California. A smaller percentage of acreage was surveyed to obtain data for Great Basin National Park, other federal lands, State lands, and private lands (Table 1).

Table 1. Total number of acres surveyed in each of the ownership categories for the years 2011-2018.

Land Ownership/ Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
NF H-T (NV)	4,008,334	4,011,229	3,340095	4,429,990	4,916,969	5,329,221	5,239,810	4,778,157
NF H-T (CA)	582,933	582,933	685,252	595,007	625,488	570,641	575,908	590,747
BLM	1,937,082	1,892,996	1,013,172	1,483,353	1,597,815	2,742,127	3,168,492	2,474,465
Private (NV)	519,280	306,606	148,504	391,378	397,047	921,482	834,150	879,602
Private (CA within NF)	41,528	29,846	60,155	70,501	32,977	32,830	30,088	0
Great Basin NP	75,604	75,604	76,959	77,021	77,078	77,099	77,000	77,083
Other Federal*	33,228	33,228	6,466	5,124	3,719	80,120	114,275	96,863
NV State Lands	20,105	17,163	148,504	21,848	19,889	20,470	13,935	37,675
TOTAL	7,218,094	6,949,605	5,479,107	7,074,222	7,670,982	9,773,990	10,053,658	8,934,592

**Includes United States Fish and Wildlife Service, Department of Defense, Bureau of Indian Affairs, and other tribal lands*

Long term insect trend data summarizes activity detected on all surveyed ownerships in Nevada. However, the discussions of activity for individual insect and disease agents detected in 2018 are Nevada only and summarized on a county basis. The total number of acres in each county and the percentage of acres surveyed during 2018 are provided in Table 2.

Table 2. Number and percentages of acres surveyed in Nevada counties in 2018.

COUNTY	COUNTY ACRES	ACRES SURVEYED	PERCENT SURVEYED
Carson City	103,569	78,807	76.1
Churchill	3,215,911	0	0.0
Clark	5,176,177	415,152	8.0
Douglas	478,351	398,139	83.2
Elko	10,979,963	1,415,976	12.9
Esmeralda	2,294,165	0	0.0
Eureka	2,663,738	337,061	12.7
Humboldt	6,219,557	203,206	3.3
Lander	3,534,543	468,248	13.2
Lincoln	6,782,623	910	0.0
Lyon	1,310,315	354,641	27.1
Mineral	2,462,989	211,928	8.6
Nye	11,686,348	2,174,821	18.6
Storey	167,774	89,697	53.5
Washoe	4,234,009	230,827	5.5
White Pine	5,676,727	1,997,012	35.2
Total	70,869,726	8,376,425	11.8

In 2016, FHP changed the quantification methodology from “trees per acre” to “percent of trees affected” for polygons with insect and disease damage. Small areas are still recorded as points. A five level classification system is used to describe damage levels. Damage is recorded as a point, polygon, or grid cell feature and one causal agent is assigned to each feature. Depending upon feature type, the intensity of the damage is recorded differently. For point data, trees affected are classified into one of 5 levels that correspond to the number of trees killed associated with each point. For a polygon or grid cell data, the percentage of trees affected within each polygon or grid cell is classified into one of 5 levels for each polygon or grid cell associated with all trees within the polygon or grid cell data as estimated by the observer.

Table 3. Five Level classification system used to describe damage levels in 2018.

Point Class	Trees Affected		Polygon or Grid Cell Class	Percent Trees Affected
1	1		1	1 to 3%
2	2 to 5		2	4 to 10%
3	6 to 15		3	11 to 20%
4	16 to 30		4	21 to 50%
5	>30		5	>50%

The winter of 2018-2019 in Nevada had above normal precipitation statewide with above normal snow pack and winter rains in the valleys. Drought conditions were absent from the majority of the state, with only some abnormally dry conditions being present in small strip in the north, and the eastern portion of the state (Figure 1). The Palmer Drought Stress Index shows Nevada being abnormally dry, however no drought conditions are reported as of the time of writing this report and looks to improve through the spring of 2019 (Figure 2).

Figure 1. US Drought Monitor Map for March, 2019.

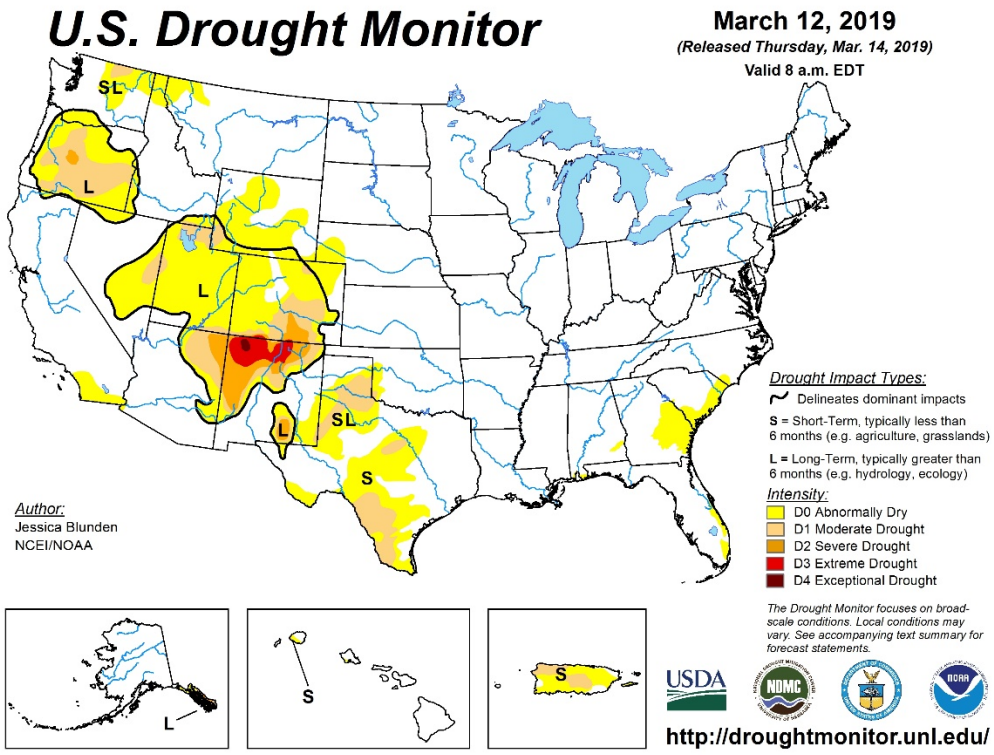
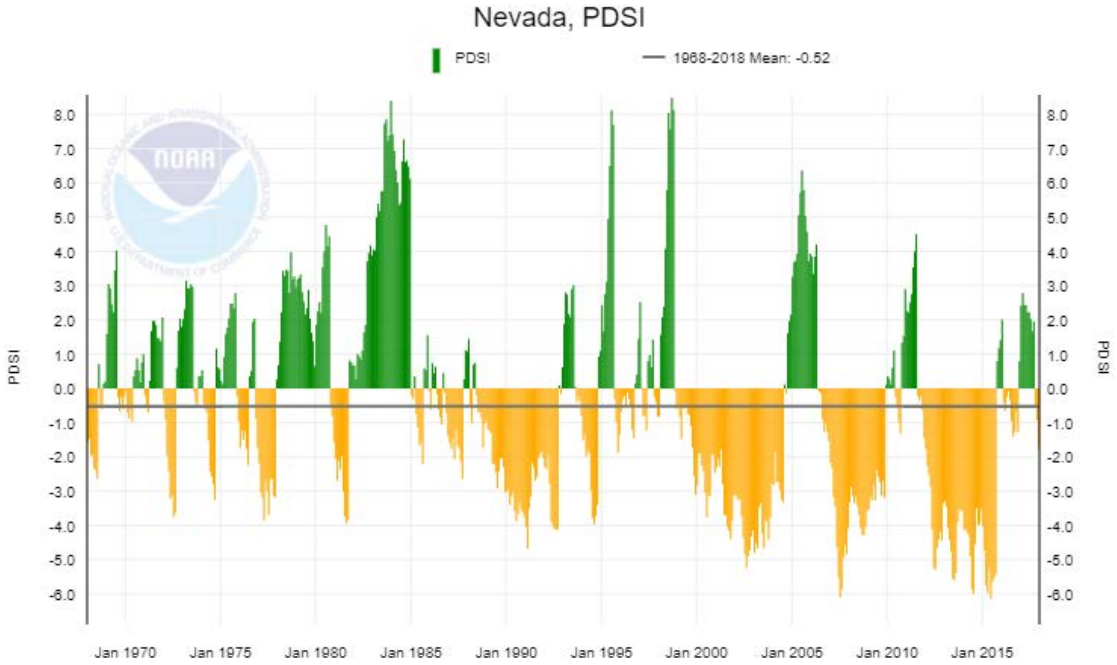


Figure 2. National Oceanic and Atmospheric Administration (NOAA) Nevada Palmer Drought Severity Index – January, Precipitation from 1968-2018 (National Climate Data Center).



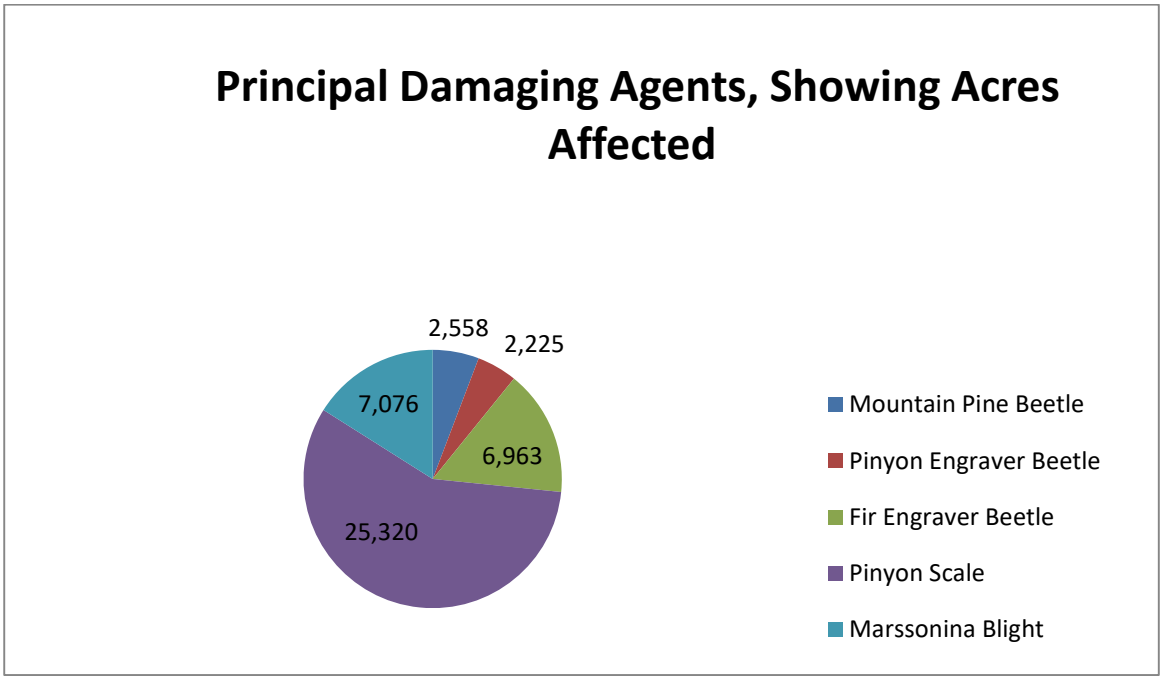
In 2018, the amount of insect and disease caused mortality increased with damage being recorded on 54,595 acres. This increase may be attributed to several factors, including but not limited to, the natural population trends of insects over the course of time given the increase in predatory and secondary insect post outbreaks.

The majority of the tree mortality noted in 2018 is attributed to pinyon needle scale activity. Additional acres affected were largely dominated by pinyon engraver, mountain pine beetle and fir engraver beetle, marssonina blight, followed by root disease, and bark beetle complexes, white satin moth, and western spruce budworm. It should be noted that some bark beetle-killed trees are not typically symptomatic (faded foliage) until one year following the year of attack. Therefore, the numbers of acres affected and trees killed by bark beetles, as recorded during ADS flights, are typically a reflection of the previous year's or earlier attacks. Levels of defoliation, however, may reflect either the activity of an insect or disease during the current year or activity since bud break. Marssonina blight continues to be a problem in Aspen stands, with approximately 7,076 acres of damage recorded, including tree stress and morality statewide.

In 2018, Nevada tree mortality (number of trees killed) caused by most insects and diseases increased for the first time since 2014. Mountain pine beetle in lodgepole, whitebark, white, and limber pine increased slightly to 2,558 acres. Fir engraver beetle mortality, increased to 6,963 acres, which is up from 2,083 acres in 2017.

In 2018, acres affected by defoliators increased. Pinyon needle scale increased in 2018 with 25,320 acres damaged, up from a total of 1,511 acres in 2017. Forest tent caterpillar, and Douglas-fir tussock moth were not detected in 2018 with no damaged acres recorded. White satin moth infestations increased mainly in Washoe and Humboldt County. White satin moth were also recorded in Carson City, Douglas, and Elko Counties. A total of 1,929 acres was recorded with 330 acres containing heavy defoliation in Lake Tahoe Nevada State Park.

Figure 3. Graphic representation of the acres affected in Nevada by the main mortality and defoliation agents aerially mapped in 2018.



For additional information on forest insect and disease conditions and maps see:

http://foresthealth.fs.usda.gov/portal
and
http://forestry.nv.gov/forestry-resources/forest-health/

NOXIOUS WEEDS

Noxious weed species are widespread throughout Nevada. They can invade and jeopardize the sustainability of forestlands and impair their ecological functions, prevent regeneration and create hazardous fuel loads that change the fire ecology on the sites. Nevada Department of Agriculture (NDOA) monitors and oversees Nevada's weed laws. Their main website for weed status, information, contacts, is: http://agri.nv.gov/PLANT_NoxWeeds_index.htm

Table 4. Below is NDOA's listing of Noxious Weeds in Nevada by Category A, B or C.

Common Name	Scientific Name	Common Name	Scientific Name
Category A Weeds:		**Category B Weeds:**	
African Rue	Peganum harmala	Carolina Horse-nettle	Solanum carolinense
Austrian fieldcress	Rorippa austriaca	Diffuse Knapweed	Centaurea diffusa
Austrian peaweed	Sphaerophysa salsula / Swainsona salsula	Leafy spurge	Euphorbia esula
Black henbane	Hyoscyamus niger	Medusahead	Taeniatherum caput-medusae
Camelthorn	Alhagi camelorum	Musk Thistle	Carduus nutans
Common crupina	Crupina vulgaris	Russian Knapweed	Acroptilon repens
Dalmation Toadflax	Linaria dalmatica	Sahara Mustard	Brassica tournefortii
Dyer's woad	Isatis tinctoria	Scotch Thistle	Onopordum acanthium
Eurasian water-milfoil	Myriophyllum spicatum	White Horse-nettle	Solanum elaeagnifolium
Giant Reed	Arundo donax	**Category C Weeds:**	
Giant Salvinia	Salvinia molesta	Canada Thistle	Cirsium arvense
Goats rue	Galega officinalis	Hoary cress	Cardaria draba
Green Fountain grass	Pennisetum setaceum	Johnson grass	Sorghum halepense
Houndstongue	Cynoglossum officinale	Perennial pepperweed	Lepidium latifolium
Hydrilla	Hydrilla verticillata	Poison Hemlock	Conium maculatum
Iberian Starthistle	Centaurea iberica	Puncture vine	Tribulus terrestris
Klamath weed	Hypericum perforatum	Salt cedar (tamarisk)	Tamarix spp
Malta Star thistle	Centaurea melitensis	Water Hemlock	Cicuta maculata
Mayweed chamomile	Anthemis cotula		
Mediterranean sage	Salvia aethiopis		
Purple loosestrife	Lythrum salicaria, L.virgatum and their cultivars		
Purple Star thistle	Centaurea calcitrapa		
Rush skeletonweed	Chondrilla juncea		
Sow Thistle	Sonchus arvensis		
Spotted Knapweed	Centaurea masculosa		
Squarrose knapweed	Centaurea virgata		
Sulfur cinquefoil	Potentilla recta		
Syrian Bean Caper	Zygophyllum fabago		
Yellow Starthistle	Centaurea solstiltialis		
Yellow Toadflax	Linaria vulgaris		

INSECTS: NATIVE DEFOLIATORS

DOUGLAS-FIR TUSSOCK MOTH

Orgyia pseudotsugata

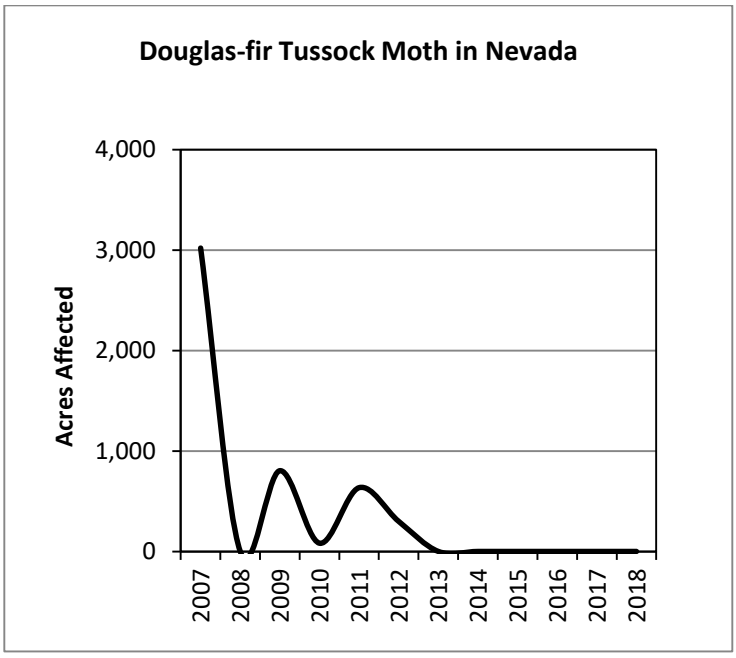
Hosts: All true firs and spruce

The Douglas-fir tussock moth (DFTM) is a native insect capable of causing significant defoliation of subalpine fir in Nevada. Heavy defoliation causes reduced growth, stress, and tree mortality. Heavy defoliation can cause top kill and mortality of advanced regeneration during a single season. Outbreaks are cyclic, usually appearing quickly followed by an abrupt decline within a one to four-year period.

Figure 4. Douglas-fir tussock moth larvae. (Photo from http://www.bugwood.org/)

No DFTM defoliation was detected during aerial surveys in 2018, and no moths were trapped in 2018.

Figure 5. Acres with Douglas-fir tussock moth defoliation in Nevada from 2007-2018.



PINYON SAWFLY

Neodiprion edulicolus

Host: pinyon pine

The pinyon sawfly is a native insect capable of causing significant defoliation, but usually goes undetected because it occurs in small numbers and causes little damage. However, heavy defoliation causes reduced growth, stress, and tree mortality. Thin crowns add a ghostly, transparent appearance to the forest canopy. In some locations, sawfly outbreaks are occurring in conjunction with pinyon needle scale (Matsucoccus acalyptus) defoliation.

Figure 6. Sawfly damage near Dayton, Nevada.

In 2018, very little sawfly damage was detected in the aerial detection survey. Only 8 acres were recorded in the Monitor Range in an isolated outbreak. Some local damage was noted in the Carson City, Ely, Baker and Dayton, Nevada areas, but were mainly damaging landscape yard trees. Defoliator activity is cyclical in nature and will likely pick back up in the future.

PINYON NEEDLE SCALE

Matsucoccus acalyptus

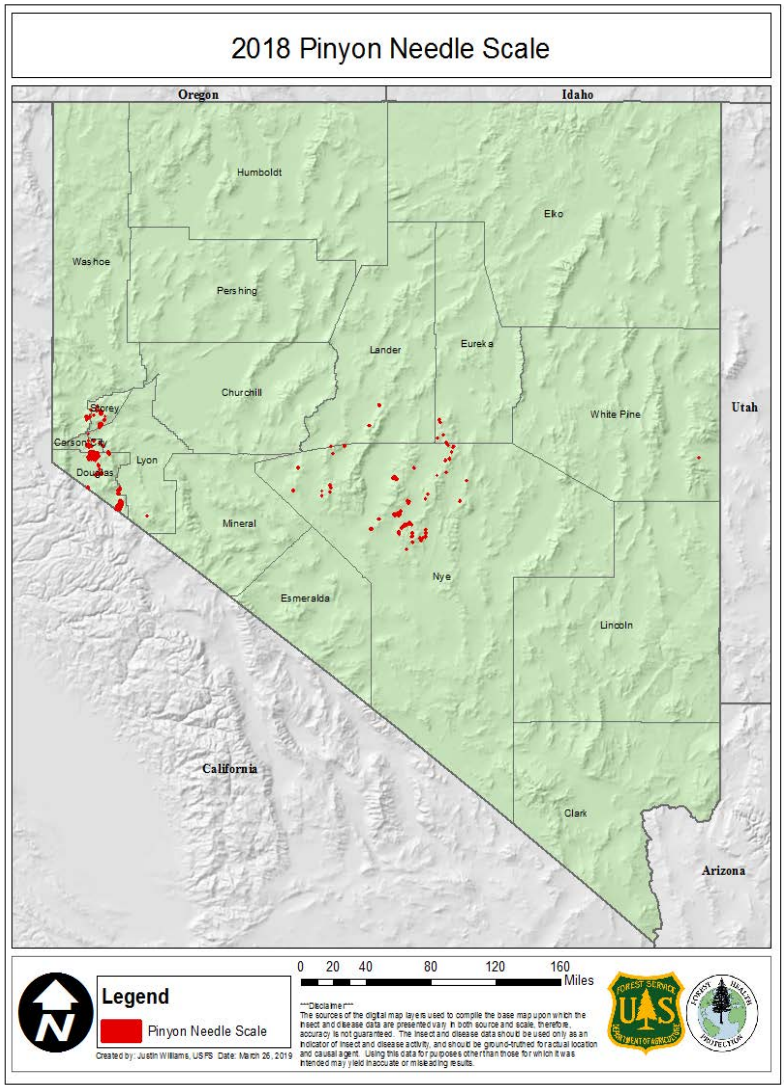
Host: pinyon pine

The pinyon needle scale (PNS) is a sap-sucking insect that feeds on two-year-old needles. Foliage of infested trees turns yellow then brown. Heavy defoliation causes reduced growth, stress, and tree mortality. Past outbreaks have been recorded as far back as 1959 throughout Nevada, causing localized defoliation and mortality of some trees. Historic outbreaks have been noted between 1963-2011 in Nevada and southwest Utah, affecting several hundred thousand acres. In 2018, damage throughout Nevada increased, and this may be an indicator of a larger outbreak in the next few years. In 2018, approximately 25,316 acres of damage was recorded as compared 1,511 acres in 2017. Much of the mapped area was also affected by a combination of secondary insects such as twig beetles (Pityophthorus spp., Pityogenes spp.). From the air, the damage caused by these other insects is similar in appearance to that of PNS infestation, and some areas will be dominated by one or a mixture of these insects. Consequently, differentiating damage attributed to these various causal agents can be extremely difficult, and therefore are all mapped as PNS.

Table 5. The following is a list of the counties, acres and specific locations where PNS was detected.

County	Acres	Specific Area and Description
Carson City	1,887	Low elevations on the west side of the Pine Nut range on the far the north end.
Douglas	12,401	Lower and mid elevations of the Pine Nut Range. Damage was readily evident in the Sunrise Pass area.
Eureka	139	Within 2 miles of Eureka, Nevada.
Lander	188	Throughout the county south of State Highway 50.
Lyon	342	Foothills of the Pine Nut Range.
Nye	7,162	All elevations in the Monitor and Toiyabe Ranges which was a large increase from 2017 when only 105 acres were recorded.
Storey	2,869	Throughout the Virginia Range.
Washoe	357	Lower elevation of the Virginia Range, adjacent to sub-divisions.
White Pine	71	Throughout all elevations of the Egan, duck Creek and Snake Ranges.

Figure 7. Pinyon needle scale damage in Nevada 2018.



FOREST TENT CATERPILLAR

Malacosoma disstria

Hosts: aspen, birch, oak, some maples, and other deciduous species

The forest tent caterpillar (FTC) is a native defoliator of aspen. Overwintering takes place as a fully developed embryo inside the egg shell. When they hatch in the spring, the larvae tend to migrate high in the tree where they feed on expanding flower and leaf buds. After bud break, larvae feed on the foliage, being most gregarious in their early life stages. The adult is a tan moth about 4 cm long with two dark brown, oblique stripes on each forewing. The caterpillar (the most often seen life stage) is mostly dark blue with wavy reddish brown lines and distinct white, keyhole-shaped markings down the back. Larvae feed in groups without making any webbing. (Western Tent Caterpillar makes the large webs found on chokecherry and are reddish brown caterpillars). Flight and mating activities begin late afternoon through most of the night. There is one generation each year. Parasites tend to keep the outbreaks of this insect cyclic and in check over time. In 2018, no FTC defoliation was observed during on the ground or aerial surveys.

WESTERN SPRUCE BUDWORM

Choristoneura occidentalis

Hosts: Douglas-fir, all true firs, spruce, and pines on occasion

The western spruce budworm is a native defoliator of true firs, Douglas-fir and spruce. Look for larvae in silken nests of webbed, chewed needles from June through August. Larvae are seen in spring and early summer and fist mine buds and old needles then consume new foliage as it appears. Mature larvae have brown heads and bodies with prominent ivory-colored spots. They can be an inch long when fully grown. Adults are mottled-rust brown and have a wingspan of approximately seven-eighths of an inch. Female moths lay eggs on needles in a shingle-like pattern usually in August. Larvae hatch and immediately seek a sheltered location to overwinter.

Table 6. The following is a list of the counties, acres and specific locations where western spruce budworm was detected.

County	Acres	Specific Area and Description
White Pine	21	Damage was observed within Great Basin National Park. This is a slight increase from the 154 acres recorded in 2017. All the defoliation was found mid-slope on the northeast flank of Wheeler Peak. Damage was mainly observed on Douglas-fir and some small pockets of Engelmann spruce.

INSECTS: NATIVE BARK BEETLES

FIR ENGRAVER BEETLE

Scolytus ventralis

Hosts: true firs

In 2018, mortality and damage increased to 6,939 acres, up from 2,083 acres in 2017. This is an increase of more than 300% in acres detected in 2017. However, even though this percentage increase sounds high it is still a relatively small number of acres statewide. White Pine County had the largest increases of FEB in stands heavily dominated by true firs. The majority of the damage was recorded in the Schell and White Pine Ranges and the Mt. Moriah Wilderness.

Figure 8. Fir Engraver Mortality in Nevada in 2018

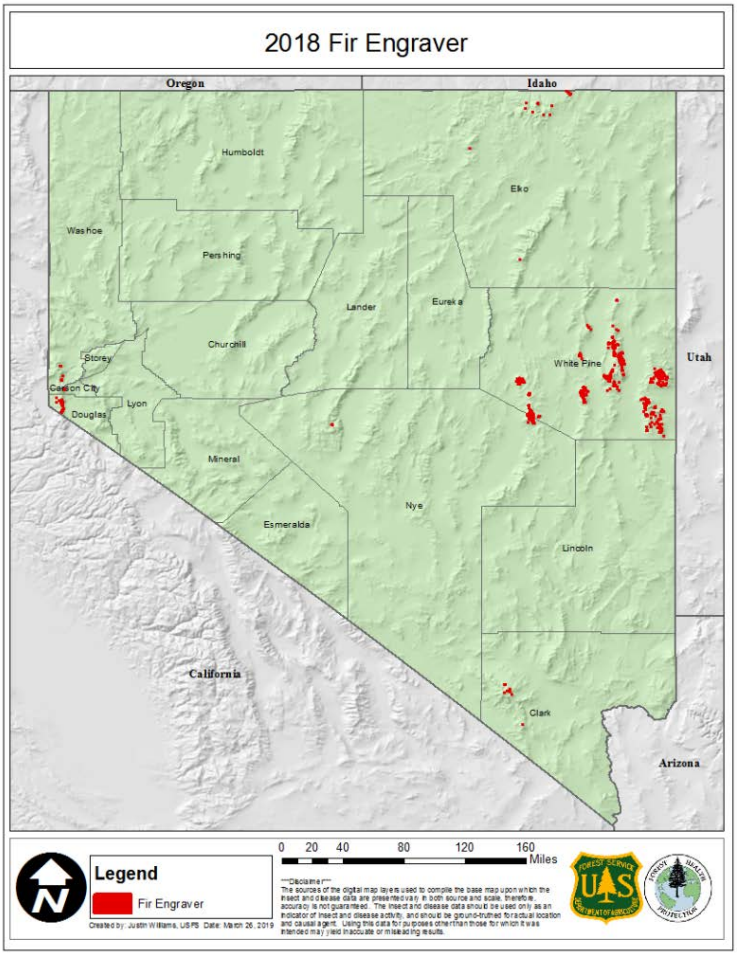
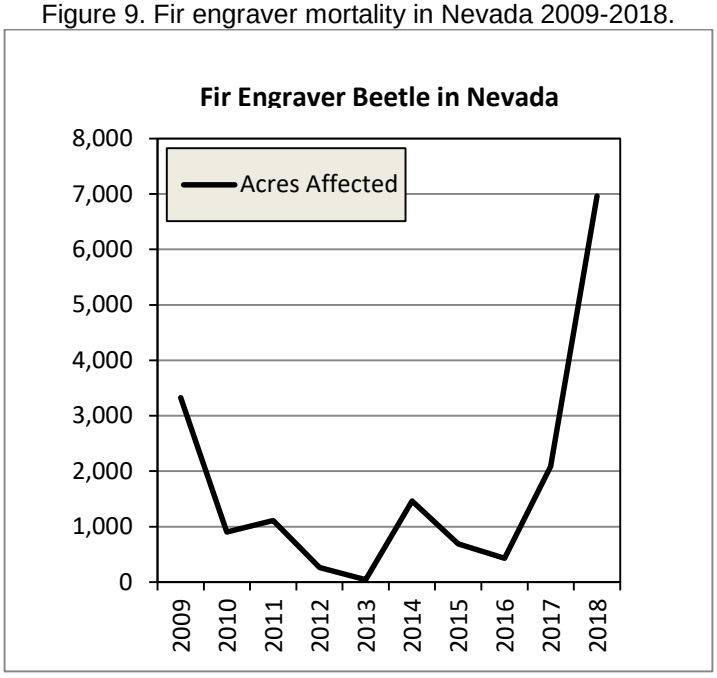


Table 7. The following is a list of the counties, acres and specific locations where fir engraver beetle was detected.

County	Acres	Specific Area and Description
Carson City	12	Mortality was observed on 12 acres, all within the Carson Range.
Clark	2	Two to three year old damage has resulted in dead standing trees with no needles present. Damage was located in Lee and Kyle Canyon which is north and east of Mount Charleston.
Douglas	188	Located mainly in the Carson Range.
Elko	107	Located in the Jarbridge, and Ruby Mountains.
Nye	480	Located mainly in the Grant, Hot Creek and Monitor Ranges.
Washoe	49	Compared to 346 acres in 2017. Damage is located all along the Sierra Front Range, with pockets of 5 acres or less within the Mt. Rose Wilderness Area.
White Pine	6,101	Mapped activity is found in pockets and across entire stands. These range in size from 10 acres to 100 acres. Stands that show continuous damage when observed do not have every true fir dying, however damage is scattered across the entire area where damage is recorded in a polygon. This was recorded mainly in the White Pine, Schell Creek, Egan, and Snake Ranges.

Figure 9. Fir engraver mortality in Nevada 2009-2018.



JEFFREY PINE BEETLE

Dendroctonus jeffreyi

Host: Jeffrey pine

The Jeffrey pine beetle is the most destructive bark beetle of Jeffrey pine. Endemic populations usually attack scattered, slower growing, mature and over-mature trees and trees struck by lightning. In Nevada, Jeffrey pine is only found naturally along the Sierra Nevada Mountains. Mortality

decreased in 2018 to 6 acres as compared to 146 acres observed in 2017. The area northwest of Incline Village, north of Crystal Bay still has pockets of 1 acre but has substantially decreased the last two years. Jeffrey pine is also being killed by Ips pini in combination with roundhead and flathead woodborers. California flathead woodborer is also found as the main mortality agent on Jeffrey pine along the eastern front of the Carson Range in western Nevada.

Figure 10. Jeffrey pine beetle-caused tree mortality in Alpine county in California along Highway 88. *(Photo: Sheri Smith)*

Figure 11. Jeffrey Pine Beetle mortality in 2018 in western Nevada.

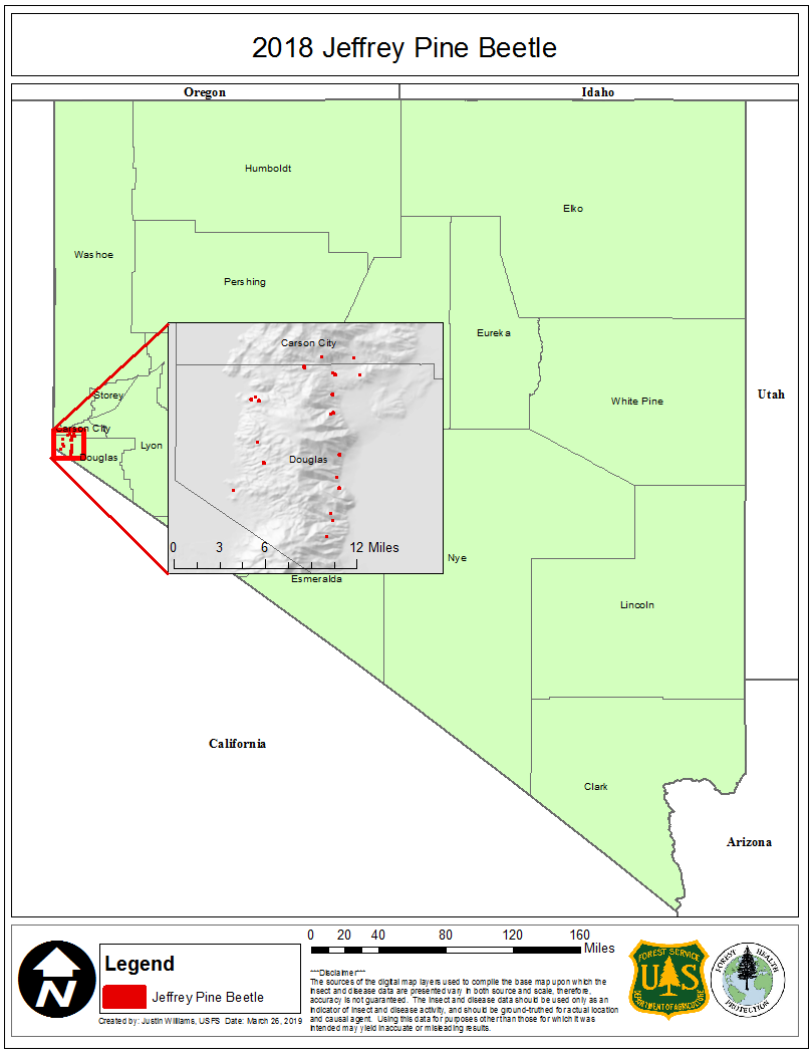


Table 8. List of Jeffrey Pine Beetle outbreak locations and acreages detected.

County	Acres	Specific Area and Description
Carson City	2	Mainly located in the headwaters of Clear Creek, and north or Spooner Summit north of state Highway 50.
Douglas	4	Within the Carson Range within the county.

MOUNTAIN PINE BEETLE

Dendroctonus ponderosae

Hosts: whitebark, limber, lodgepole, sugar, and ponderosa pine

Mountain pine beetle (MPB) can kill thousands of trees per year during outbreak conditions and millions of trees during extended epidemics in western forests. At endemic levels, MPB favors weakened, less vigorous trees with adequate phloem thickness to complete its life cycle. During epidemics, beetles may attack smaller diameter trees down to 4 inches diameter at breast height. Extensive mortality may alter large forest landscapes by converting pine forest ecosystems to grass and shrub landscapes for a period of 10-20 years. This conversion affects wildlife habitat, water yields and fuel loading.

In 2018, MPB-caused tree mortality in Nevada in all tree species listed increased slightly from 2017 levels. Mortality increased by only 9% with a total of 2,558 acres mapped as compared to 2,327 acres mapped in 2017. Most of the 2018 Nevada mortality occurred in Clark, Douglas, Elko, Nye, Washoe, and White Pine counties.

Figure 12. Whitebark, limber, western white, and lodgepole pine acres affected by mountain pine beetle in Nevada from 2008-2018.

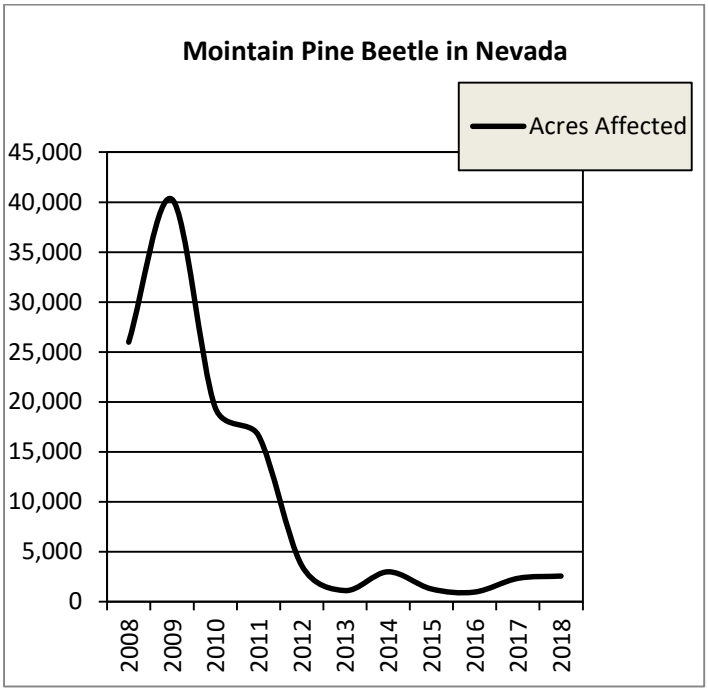


Figure 13. Mountain pine beetle caused tree mortality in 2018.

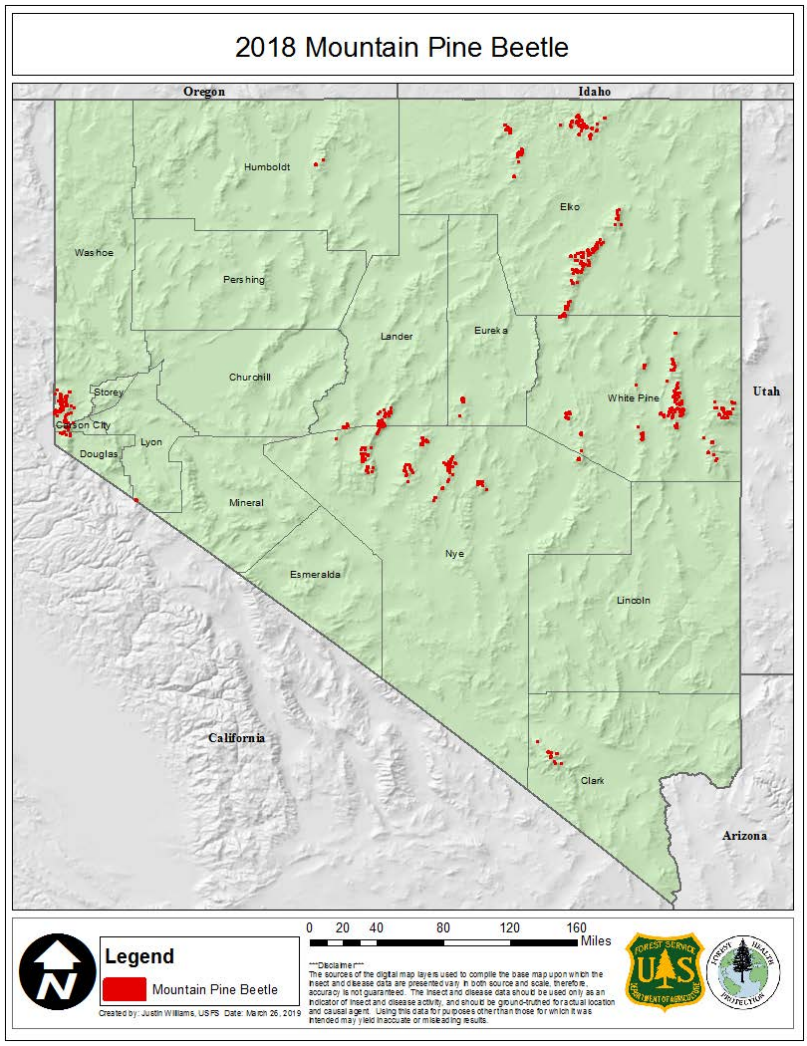


Table 9. List of Mountain Pine Beetle outbreak locations and acreages detected.

County	Acres	Specific Area and Description
Clark	50	Killed whitebark and limber pine trees, all within the Spring Mountain National Recreation Area.
Douglas	17	MPB killed lodgepole, limber, and western white pine, all within the Carson Range south of Highway 50.
Elko	168	MPB killed whitebark and limber pine trees. The majority of this mortality occurred in the Ruby and Jarbidge Mountain Ranges.
Nye	547	MPB killed limber and whitebark pine trees. Damage was located in the Hot Creek, Monitor, and Toiyabe Mountain Ranges.
Washoe	647	MPB killed western white, whitebark, and limber pine trees in 2017. The 2018 survey also mapped 3 acres of MPB killed lodgepole pine in small group kills. This damage was surveyed throughout the higher elevations of the Carson Range, mostly northwest of Mount Rose. An additional 46 acres of mortality was recorded in ponderosa pine at lower elevations along the entire sierra front.
White Pine	6,928	MPB killed limber and whitebark pine trees. New damage was observed in the limber pine in the Wheeler Peak area in Great Basin National Park. An additional 3 acres of MPB killed bristlecone pine trees was recorded in

		the Snake, and Schell Creek Ranges. This is significant since MPB killed trees for this species has not been recorded for several years, and any mortality is considered significant for this tree species.

The Nevada Division of Forestry continues its trapping program Clark, Elko, and Washoe County.

Below is the trapping data from Mt. Rose for Mountain Pine Beetle in 2018.

Table 10. Trap catch counts by date and species.

Date	D. adjunctus	D. ponderosae	D. valens	Ips pini
6/11/2018	64	0	0	0
7/3/2018	16	400+	8	22
7/16/2018	8	400+	0	0
7/30/2018	13	300+	4	0
8/14/2018	8	300+	1	0
9/5/2018	4	400+	1	0
9/18/2018	100	100	0	0

WESTERN PINE BEETLE (WPB) IN PONDEROSA PINE

In 2018, ponderosa pine mortality was attributed to western pine beetle in only one county within the state of Nevada. See Figure 14 for trapping data.

Clark County – In 2018, there were WPB-killed ponderosa pine trees mapped on 10 acres in Clark County. This is a substantial decrease in WPB damage and activity. Damage decreased from 196 acres in 2017 to 10 acres in 2018. The majority of the WPB damage is along the Kyle Canyon corridor along Highway 157 where salt damage is occurring from winter time road salting thus stressing the ponderosa pine within the road right-of-way. Additional damage was observed between the Kyle and Lee Canyons, scattered in pockets of 1 acre or less. Below is a graph showing the results from trapping in Kyle Canyon for various bark beetles. Monitoring will be installed for the 2018 field season to monitor any changes in beetle populations.

Figure 14. Kyle Canyon trap catches summer of 2018 showing the dominance of D. brevicomis in mid-summer through early fall. This data is mainly to track secondary beetles which can indicate increased bark beetle activity.

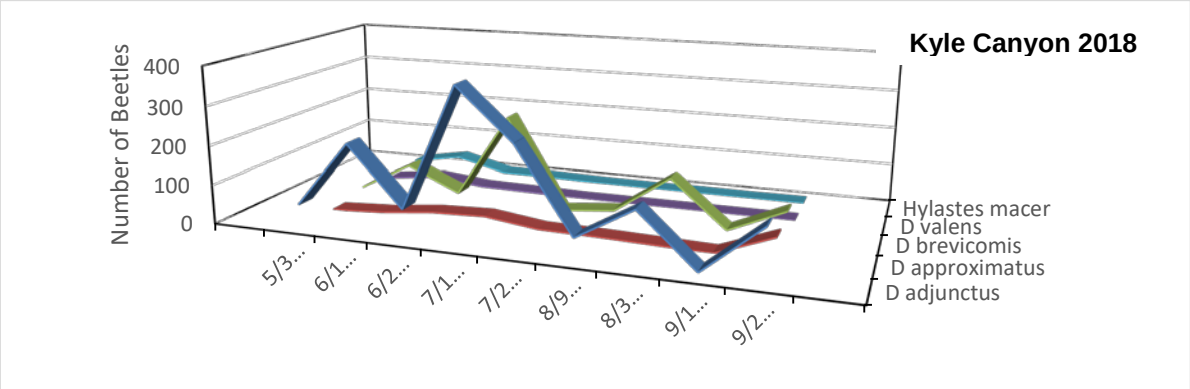
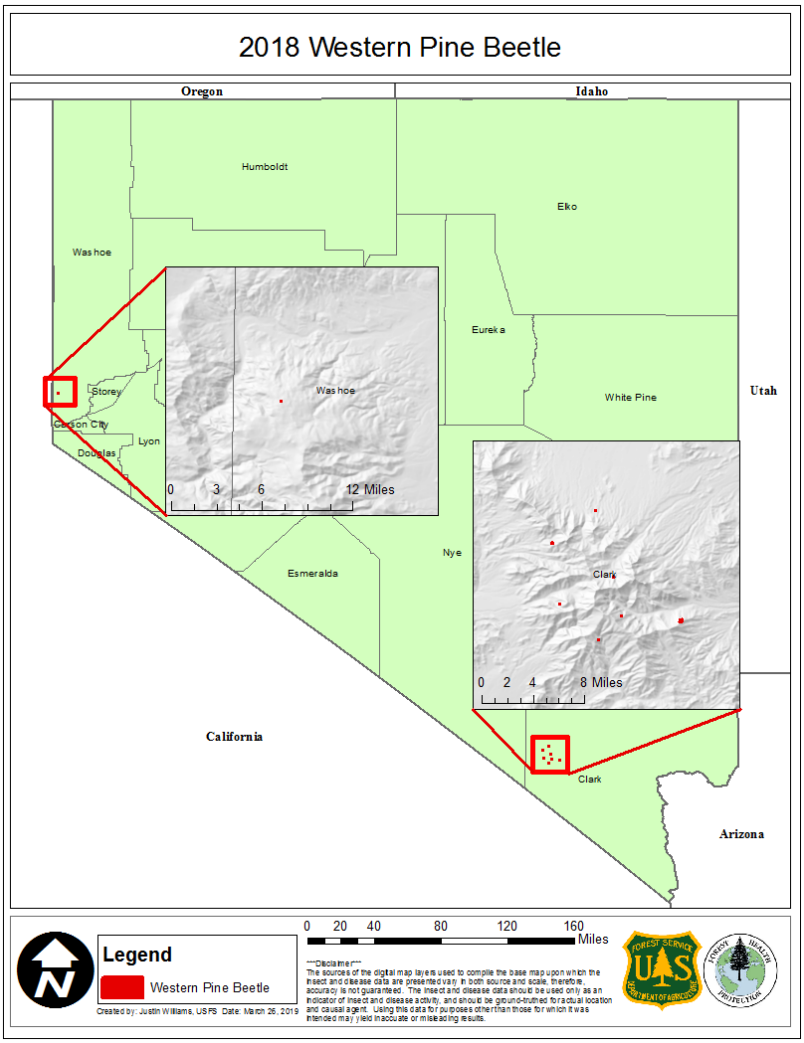


Figure 15. 2018 Western Pine Beetle Damage in Nevada.

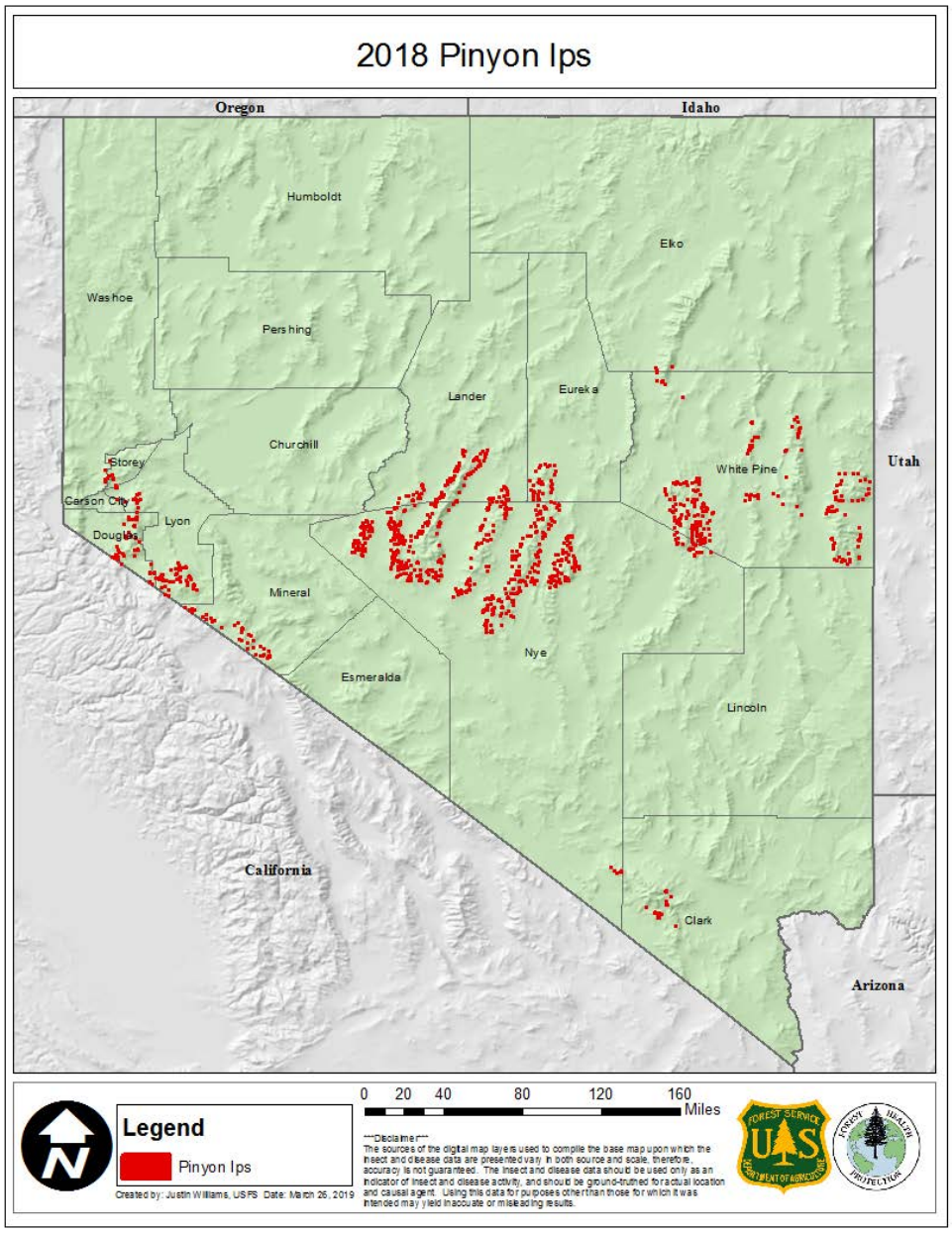


PINYON ENGRAVER BEETLE / PINYON IPS

Ips confusus
Host: single leaf pinyon

The pinyon engraver beetle (PEB) is a pest in pinyon-juniper ecosystems often affecting both woodlands and valuable home landscape trees. The insect produces multiple generations each year and consequently populations can build and spread rapidly.

Figure 16. Tree mortality caused by the pinyon engraver beetle in 2018 in Nevada.



In 2018, recorded mortality decreased to 2,116 acres mapped as compared to 2,314 acres in 2017. This is a slight decrease statewide (Figure 16). In 2018, ten counties recorded mortality from pinyon Ips. Nye and Clark counties had the greatest number acres recorded in aerial surveys which represents 82% of the state total.

Figure 17. Pinyon pine acres affected by pinyon engraver in Nevada and from 2008-2018.

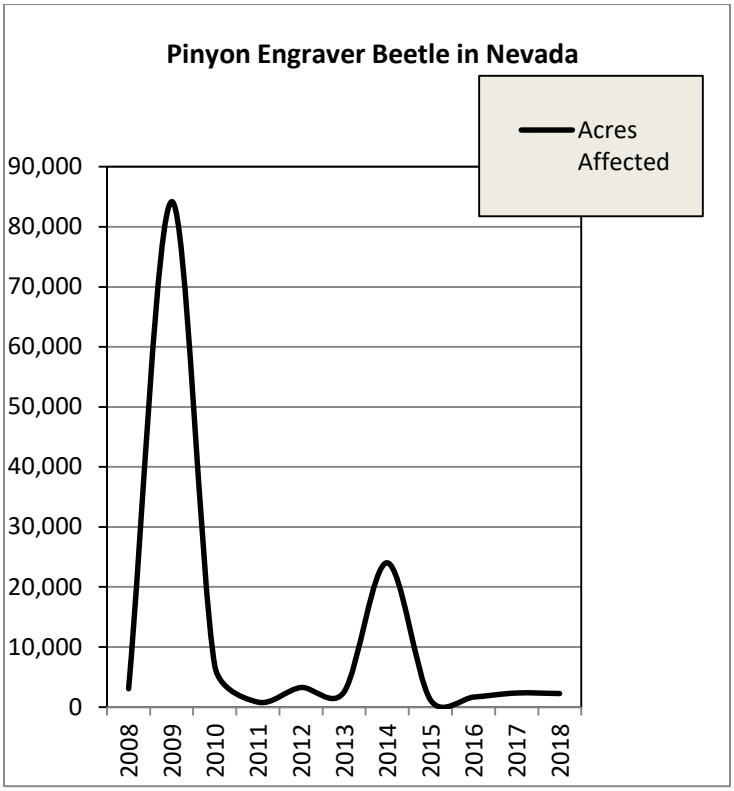


Table 11. List of Pinyon ips outbreak locations and acreages detected.

County	Acres	Specific Area and Description
Clark	263	Located on the northeast aspects at lower elevations on the Spring Mountains.
Douglas	14	Ips-killed pinyon pines on 183 acres in 2017, so this represents a decrease in mapped tree mortality. Damage is located in many scattered spots throughout the Pine Nut Mountain Range and north of Holbrook Junction.
Eureka	10	The majority of the mapped mortality was immediately south and east of the town of Eureka, Nevada.
Lander	111	Damage is found in scattered pockets in the northwest Shoshones, and northern Toquima Ranges.
Lyon	106	This is a slight increase from 2017 where 148 acres were mapped. Mortality was identified in southern ends of the Virginia Range and the Pine Nut Mountains.
Mineral	20	Mortality is primarily located in the Excelsior Mountains.
Nye	1,482	As compared to 607 acres mapped in 2017, this is an increase from the previous year. Damage was identified in scattered pockets in the Grant, Hot Creek, Monitor, Toquima, southern Toiyabe Mountain Ranges.
Storey	2	All of the mortality was located in the Virginia Highlands.
Washoe	2	Damage continued to be very light where pinyon Ips-killed pinyon pine trees were mapped on only 2 acres.
White Pine	106	This is a large decrease when compared to 2017 where 885 acres were mapped. Much of the mortality was associated with older pinyon needle scale in the eastern White Pine Range. Mortality was also observed in scattered pockets on the White Pine Range and in larger 1-2 acre pockets in the Egan, and Snake Mountain Ranges.

PITCH MASS BORER

Dioryctria spp.

Hosts: Singleleaf pinyon, ponderosa pine, Jeffrey pine

In the larval stage, Dioryctria spp. bore into the cambium of the trunk, branches, and shoots. This borer kills lateral branches and treetops of singleleaf pinyon and Jeffrey pine. With prolonged drought, this injury has weakened pinyon trees sufficiently to allow pinyon engraver beetle to successfully attack and kill pinyon pine trees. Pitch mass borer is found throughout the state of Nevada in most counties with singleleaf pinyon. The heaviest concentrations seem to occur in western Nevada where it also affects Jeffrey and ponderosa pine. Many young Jeffrey pines on the east slope of the Carson Range that came in after fires have been affected by this insect. In 2006, several entomologists, pathologists and foresters conducted a pinyon blister rust (Cronartium occidentale) search through the central portion of Nevada. They noted that pitch mass borer frequently uses rust cankers as an entry point (Figure 18). The rust and borer are found extensively across the state but are not mapped by ADS.

Figure 18. Pitch mass borer infesting pinyon pine infected with pinyon blister rust.

INSECTS: NON-NATIVE

WHITE SATIN MOTH

Leucoma salicis (L.)

Hosts: aspen, willows, cottonwoods, and other deciduous species

The white satin moth (WSM) is a non-native defoliator of aspen in the family of tussock moths (Lymantriidae). WSM is native to Europe and Asia. This is the same family gypsy moth and Douglas fir tussock moth are found in. It was introduced into North America in British Columbia in 1920. It is now being found throughout Northern Nevada. Overwintering takes place as a second-instar larvae which seek out hibernation sites on the trunk or branches of a host tree and molt after spinning silken coverings (hibernacula) which are hard to see because they are covered with bark, mosses and other

detritus. When they emerge in May they feed on the young new leaves. This feeding continues until late June to early July and the larvae go through five to 6 more instars until they are approximately 3.5 – 4.5 cm long. The caterpillar is mostly grayish brown with a dark head and back, but what stands out is the one row of large oblong white to pale-yellow patches down the middle of the back and two yellow lines sub-dorsally. The two lateral and sub-dorsal rows of orange tubercles have tufts of long brown hairs attached. These larvae spin cocoons in the leaves to pupate into shiny black, 1.5 to 2.2 cm long pupae with tufts of yellow hair. In July and August, the adult moths emerge. The white adult moth about 2 - 4 cm long have no markings on the wings; the bodies are black and covered with white silky hairs that only allow glimpses of black beneath. See Figure 18 photos below

Figure 19. Female White satin moth (top left); egg mass (top right); North Canyon (bottom left); 100% defoliation: caterpillars (bottom left); Nevada Lake Tahoe State Park, July, 2018 (Photos-Gene Phillips)

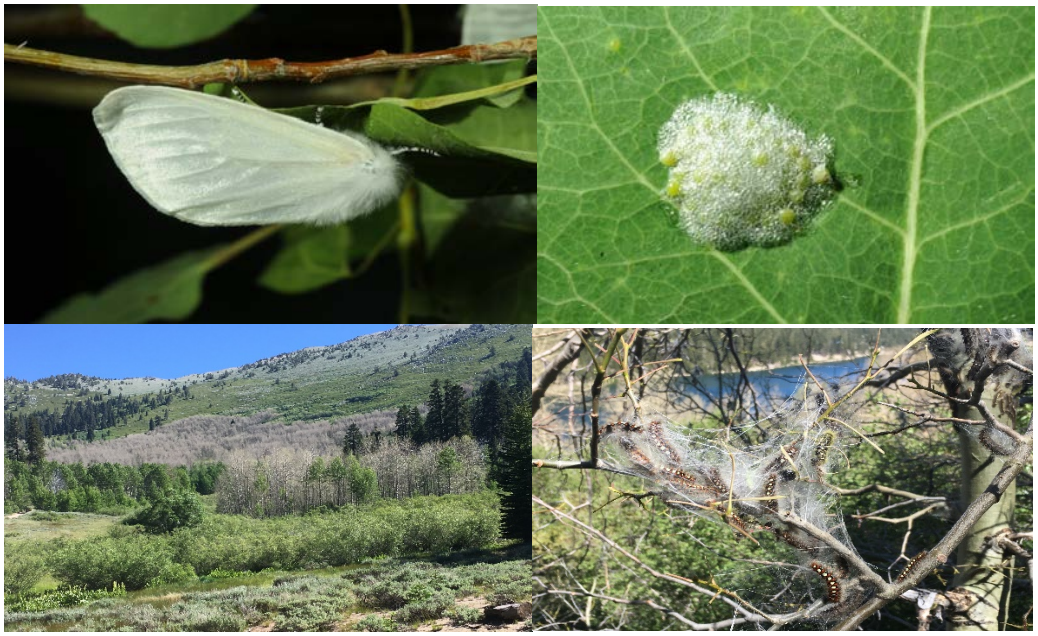
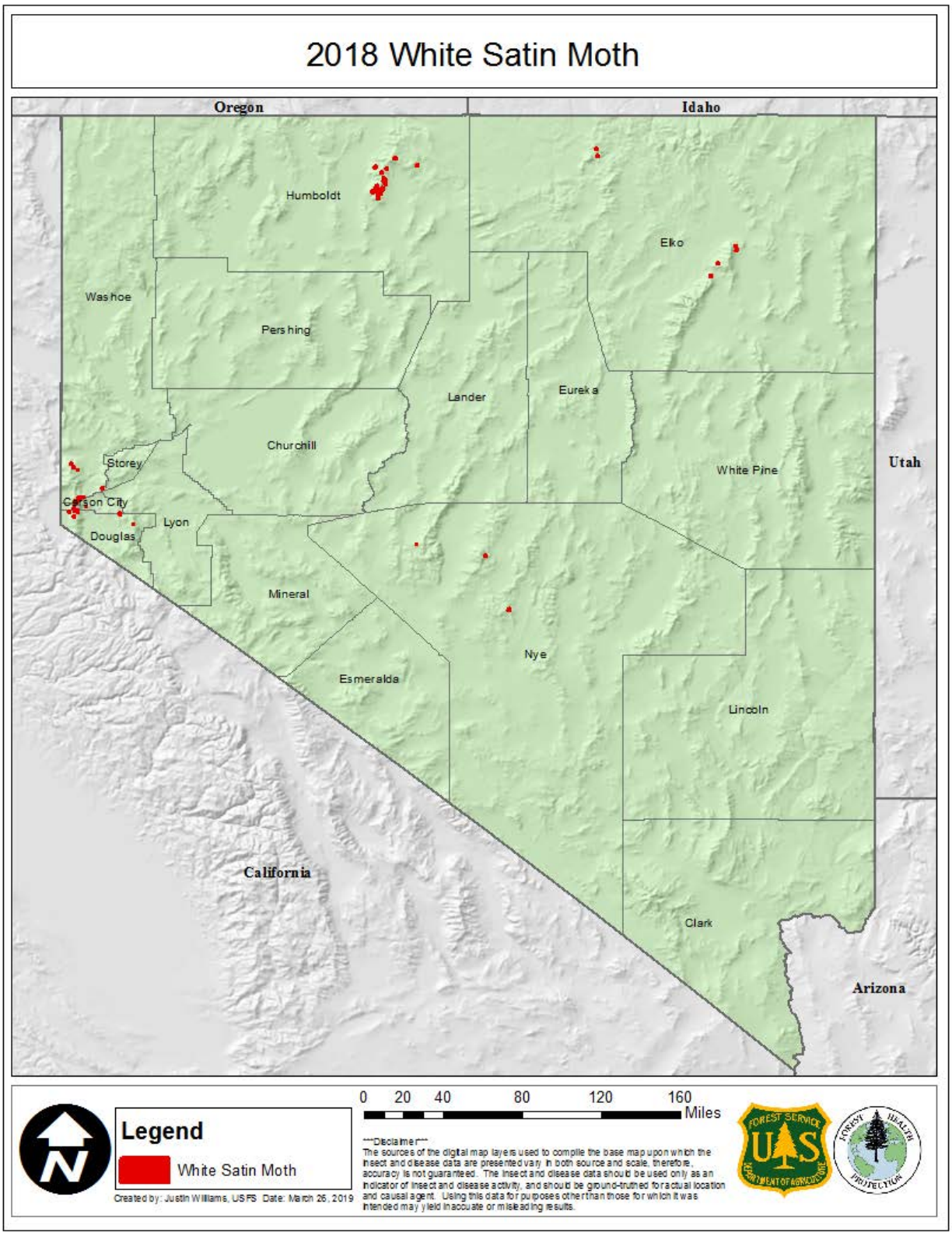


Figure 20. White Satin Moth Damage in Nevada in 2018.



In 2018, continued heavy to severe defoliation was observed throughout Nevada. A better understanding of the aerial signature has allowed for improved mapping of this pest. In 2018, a total of 1,930 acres were mapped as compared to 226 acres in 2017. In the Lake Tahoe Basin and the

Carson Range approximately 511 acres of heavy defoliation of greater than 75% was observed including within Nevada Lake Tahoe State Park. Severe defoliation was observed in North Canyon, Marlette and Hobart Lakes. This area is north of Spooner Summit and Highway 50. Damage was also recorded south of Highway 50 in Douglas County on adjacent Humboldt Toiyabe National Forest Land as well. This infestation has been present since 2011, however this was largest increase in population and severity of defoliation. Approximately 100 acres in the North Canyon Marlette lake area had 100% defoliation with some limited mortality. Statewide observations recorded defoliation in Carson City, Elko, Humboldt, and Nye Counties. Humboldt County had 1,282 acres of heavy defoliation recorded in the Santa Rosa Mountains. The southern third of the range had large polygons of more than 100 acres each in several different drainages. The NDF Forest Health Specialist has increased monitoring, and is coordinating statewide efforts for trapping, A Cooperative fact sheet on identification and management was also produced with the University of Nevada Cooperative Extension and Nevada Department of Agriculture. See the Nevada Division of Forestry fact sheet for further information.

EUROPEAN GYPSY MOTH

Lymantria dispar

Hosts: various deciduous species

In 2018, gypsy moth was surveyed by Nevada Department of Agriculture (NDOA). Trapping was conducted from May to October. In all 212 traps were placed in 17 counties; all traps were negative. The last identified adult male was discovered in an RV park in Winnemucca in 1999. No moths were trapped in 2018.

Figure 21. Adult gypsy moths; female above; male below, Photo: USDA APHIS PPQ archive, www.bugwood.org.

RED PALM WEEVIL

Rhynchophorus ferrugineus

Hosts: various palm tree species

Red palm weevil (Rhynchophorus ferrugineus), South American weevil (Rhynchophorus palmarum), and Silky cane weevil (Metamasius hemopterus) were surveyed for using a modified bucket trap baited with pheromone and fermenting fruit. In all, 120 traps were placed in Clark County. All traps were negative.

Exotic Wood Borers including: Scolytinae/Sirex Wood Wasp (Sirex noctillo), Asian Longhorn Beetle (Anoplophora glabripennis), and Emerald Ash Borer Beetle (Agrilus planipennis)

Hosts: various species

In 2018, the Nevada Department of Agriculture NDOA conducted funnel trapping for exotic wood borers using EDRR style trapping methods and sites (20 traps total) surveyed in 4 counties. All traps were negative. Emerald Ash Borer (*Agrilus planipennis*) trapping and data collection was performed in the Las Vegas and Reno areas. Trapping was conducted with traps located in 4 counties and all traps were negative.

MEDITERRANEAN PINE ENGRAVER

Orthotomicus erosus

Hosts: Pinyon pine. Aleppo Pine

This is a new non-native species identified by the Nevada Department of Agriculture (NDA) entomologist, Jeff Knight, in the fall of 2015. This species was identified in pinyon pine west of Las Vegas, in the Blue Diamond area. The Mediterranean Pine Engraver is established though out the Las Vegas area, with reports in Overton, Nevada area as well to the south near the state line with California. Populations at this time appear to be scattered and generally very light. The beetle does not appear to be the cause of the reported problems on pines in the area. Several specimens were submitted for identification to the NDA. The NDA is developing information on this species and its possible effects and damage to conifer species in Nevada.

STEM AND BRANCH DISEASES

DWARF MISTLETOES

Arceuthobium spp.

Hosts: Douglas-fir, pines, true firs, and single-leaf pinyon

Dwarf mistletoes (DMT) are the single-most damaging agents of coniferous trees. These parasitic plants remain the most widespread and frequently observed disease within the state. Profusely

branched, dense masses of host branches called “witches brooms” are often observed. Dwarf mistletoe infests trees of all ages, and infection may exist in secondary growth and regeneration, as well as mature and over mature tree stands. Dwarf mistletoes spread fastest and are most problematic when an infected overstory exists over new regeneration. Severe dwarf mistletoe infestation can:

- Predispose trees to attack by insects and other diseases,
- Reduce incremental growth,
- Affect the forest canopy structure,
- Lower resistance to drought,
- Affect production of seed,

Conversely, dwarf mistletoes may be beneficial to wildlife habitat in some cases, depending on the type of wildlife habitat desired.

Pinyon engraver beetle-caused mortality was observed in some of the heavy dwarf mistletoe infected pinyon pine stands around the state of Nevada. Dwarf mistletoe continues to cause weakened lodgepole and ponderosa pine trees to succumb to bark beetle attacks as well.

Currently, fuel reduction activities are being undertaken in heavily DMT infested stands of pinyon pine in western Nevada. The treatments are intended to create a buffer between non-infected stands and infected stands to prevent the spread of this disease. This type of treatment can be effective, due to the primarily short range spread mechanism of dwarf mistletoes.

Ponderosa and Jeffrey pines are often found heavily infected with western dwarf mistletoe (*A. campylopodum*) and then are attacked by *Ips*, flathead borers, Jeffrey pine beetle, and western pine beetle as well as other agents, especially during prolonged drought periods. Additionally, true fir trees infected with dwarf mistletoe are commonly attacked by fir engraver beetle, or experience branch dieback due to *Cytospora* canker. Limber pine dwarf mistletoe (*A. cyanocarpum*) was found infecting whitebark and limber pines on the East Humboldt and Ruby Mountains predisposing them to attack by mountain pine beetle in those areas.

Figure 22. A. cyanocarpum infecting whitebark pine in Lamoille Canyon in the Ruby Mountains and on limber pine at Angel Lake in the East Humboldts. These trees were subsequently killed by mountain pine beetle.

PINYON BLISTER RUST

Cronartium occidentale

Host: singleleaf pinyon pine

An informal survey of central Nevada by various Forest Service pathologists and entomologists as well as BLM and Nevada State Foresters revealed that the disease is common throughout the state. It attacks and kills small trees (Figure 23) and causes branch flagging on larger more trees. Many of the rust infections were attacked by pitch mass borer. This disease is mainly found in a band between 6000 and 7000 feet of elevation near drainages that are suitable for the alternate host (*Ribes* spp.).

Figure 23. Single leaf pinyon pine infected with pinyon blister rust near its base.

WHITE PINE BLISTER RUST

Cronartium ribicola

Hosts: limber, bristlecone, whitebark, sugar, and western white pine

White pine blister rust (WPBR) has been observed in western Nevada on the east side of the Sierra Nevada Mountains in sugar, whitebark and western white pines. The rust has expanded its range in Nevada in recent years, with populations of rust now confirmed in the Jarbidge Mountains. Continued WPBR infections have been identified in the Lake Tahoe Basin and most recently near Incline Village, Nevada near Crystal Bay. The NDF has purchased blister rust resistant seed from the Sugar Pine Foundation in order to grow blister rust resistant sugar pine. These seedlings can be used in reforestation efforts where natural regeneration is not occurring. This seedling growing effort has just begun so no results available at this time.

At this point in time the only confirmed population of white pine blister rust in eastern Nevada is in the Jarbidge Mountains. There is concern that WPBR could become established in sensitive populations of Great Basin bristlecone pine. In 2010, researchers initiated an effort to collect seed from Great Basin bristlecone to include this species into breeding efforts aimed at detecting resistance to WPBR

in 5 needle pines. Additionally, seed from bristlecone in Great Basin National Park was collected in 2011. Seed collection began in 2014, along with disease resistance testing. Resistance trails that a quantitative is currently ongoing. Preliminary results are promising and suggests heritable genetic resistance exists in limber pine within the park. Research will be ongoing through 2022 and will provide deliverables about frequency and variation of resistance, seed collections form both species, identify rust resistant trees for future seed collection, and refinement of the resistance screening technology.

Figure 24. White Pine Blister Rust in sugar Pine *(Photo: Jeff Haas)*

Aerial surveys in 2018 indicated scattered mortality throughout the Lake Tahoe Basin. Approximately 2 acres were observed showing decline or mortality, with the majority being observed in Carson, and Douglas Counties.

SUDDEN OAK DEATH

Phytophthora ramorum

Sudden Oak Death (SOD), an exotic forest disease caused by the pathogen *Phytophthora ramorum*, has been killing thousands of tanoak and oaks in the coastal areas of California, but has not been observed in Nevada. However, potentially infected nursery stock was released into all 50 states from a single California nursery, prompting NDOA officials to contract with the USFS to conduct surveys. Both forest areas and areas near nurseries were surveyed, but showed no SOD. SOD has been detected for all regions surveyed to date.

ROOT DISEASES

ANNOSUM ROOT DISEASE

Heterobasidion irregulare
Heterobasidion occidentale

Hosts: Lodgepole pine, Jeffrey pine, ponderosa pine (*H. irregulare*), spruce, true firs, and incense cedar (*H. occidentale*)

H. occidentale can be found throughout the state on true firs, but it frequently acts as butt decay or as a saprophyte on dead trees, stumps, roots, and cull logs or fallen stems. *H. irregulare* can be found in mature pine trees on the east side of the Sierras and the fungus can kill young ponderosa pine, especially in plantations on droughty soils. Symptomatic small trees can frequently be found around infected stumps with butt decay. The symptoms on larger trees include a thinning crown, decay in the root system and fruiting bodies that develop at the base of the tree or inside stumps.

ARMILLARIA ROOT DISEASE

Armillaria spp.

Hosts: All trees

Evidence of Armillaria root disease can be found throughout the state causing mortality in all species of trees. This disease also frequently functions as a weak pathogen or saprophyte. Fruiting bodies grow in clusters from the roots or at the base of the tree during moist conditions. There is a close association between root disease pockets and endemic level bark beetle populations.

Figure 25. Armillaria mushrooms, *photo: Gail Durham*

BLACK STAIN ROOT DISEASE

Figure 26. Black stain root disease. *Photo-Donald Owen*

Ophiostoma wageneri

Hosts: pinyon pine, ponderosa pine, Jeffrey pine and Douglas-fir

Black stain root disease is a disease of several hosts. It is found mainly in pinyon pine, but it can infest both Jeffery and ponderosa pine which has been found in small areas of the eastern Carson Range. It usually kills affected trees within a few years, and it can produce groups of mortality that are several acres in size. Pockets of infected trees are preferred host for low-level populations of pinyon engraver beetles. No new pockets of black stain root disease were observed by aerial survey in 2018.

CYTOSPORA CANKER

Cytospora spp.

Host: aspen

Cytospora canker is one of the most common diseases affecting aspen in ornamental situations and often attacks stressed trees through wounds. This fungus girdles branches by killing the cambium. Large, vigorous trees can withstand the disease and are rarely killed. Activity from this pathogen is most likely a symptom of several years of water stress or defoliation from other insects or diseases. From the air, decline due to Cytospora canker can look similar to decline by forest tent caterpillar defoliation. Heavily infected stands have been noted in the Independence Mountains and Schell Creek Range within Elko County. This has been observed mainly in mature to over-mature stands of Aspen that are approximately 100 years old, and are found at the mid-elevation range around 6,000 feet.

LEAF AND NEEDLE DISEASES

Figure 27. Symptoms of aspen leaf spot disease.

ASPEN LEAF SPOT

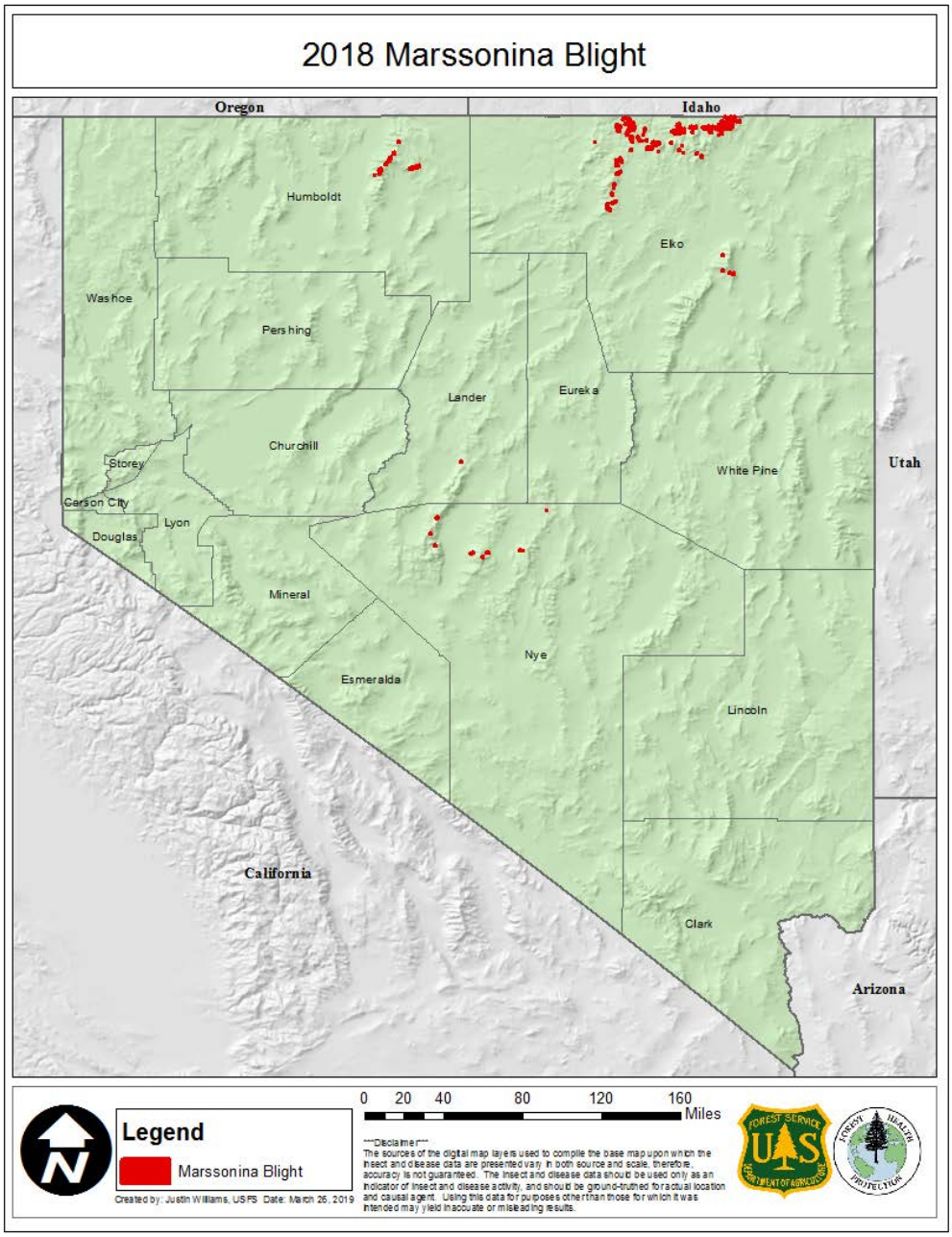
Marssonina populi

Host: Aspen

Blight and leaf spot caused by this disease have been seen in the past throughout the host type. In late June through early July, Nevada received heavy amounts of precipitation which caused a significant amount of blight and leaf spot by late summer.

Approximately 7,076 acres of damage was recorded in 2018, which is approximately a 230% increase when compared to 3,083 acres of recorded damage in 2017. These acres were surveyed as Marssonina blight, with very little Aspen defoliation. Elko County had 5,514 acres surveyed mainly in the Jarbidge and Ruby Mountains. Humboldt County had 1,390 acres of damage recorded in the Santa Rosa Mountains in stands just east of Orovada, Nevada. Lander, and Nye County had 6 acres, 166 acres surveyed respectively. The majority of the damage included heavy blight and leaf spot causing noticeable leaf discoloration and dieback. Fall color was impacted with trees losing their leaves early or not showing much fall color at all. Since these leaf diseases are cyclical and weather dependent it is not anticipated to be a long term problem.

Figure 28. Marssonina Blight in Nevada 2018



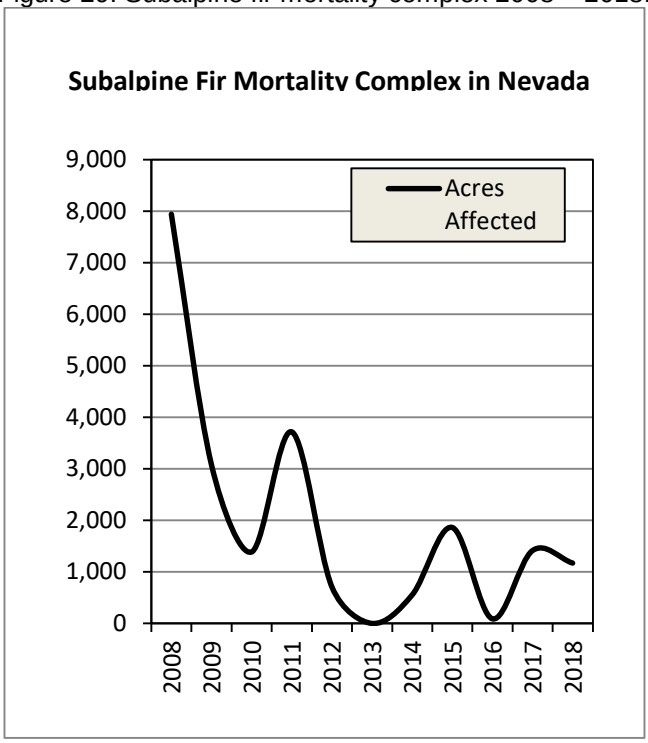
DECLINES AND COMPLEXES

SUBALPINE FIR MORTALITY COMPLEX

Host: Subalpine fir

The western balsam bark beetle (WBBB) is the most significant mortality agent in a complex of forest insects and disease causing subalpine fir mortality. Endemic populations will occur in storm-damaged trees, slash, or trees of poor vigor. WBBB infestations may build to epidemic levels, where mortality can occur in groups of 100 to 10,000 trees. Annosum root disease, woodborers and several species of smaller bark beetles are also involved in this complex. Environmental stress due to drought or overcrowding may also have a role in the death of trees in this category.

Figure 29. Subalpine fir mortality complex 2008 – 2018.



In 2018, mortality attributed to subalpine fir mortality complex increased from very small pockets of 2 acres up to pockets that exceeded 50 acres. All damaged mapped in the 2017 Aerial Detection Survey is located in Elko County.

Elko County – Small to larger sized continuous areas were identified with some areas exceeding 50 acres. All recorded damage was located in the Jarbridge Mountains and totaled approximately 1,147 acres.

ASPEN DECLINE OR DIEBACK

Host: Aspen

A decrease in the amount of aspen forest acreage has been reported throughout the western U.S. for many years. The primary factors involved are succession of aspen forest to other vegetation types due to fire exclusion, and damage to young aspen sprouts by grazing animals. This phenomenon has been labeled “aspen decline” by some authors. This type of “decline” should be distinguished from the aspen dieback that has been detected in aerial survey that is caused by several agents including drought stress, insects, diseases and other stresses. This dieback can impact aspen clones that have been impacted by fire exclusion and grazing pressure causing them to decline and die.

In 2004, Intermountain Region FHP examined what had been mapped as insect defoliator damage or Cytospora canker in several areas in north-central Nevada and discovered that a number of insect and disease agents were involved. Research across North America has revealed mostly canker diseases and insect borers are causing the decline in which drought stress is the largest contributing factor to decline and dieback. In 2018, surveyors mapped 6,564 acres which is approximately a 110% increase as compared to 2017 where 3,083 acres of damage was recorded.

Table 12. List of Aspen Decline or Dieback locations and acreages detected.

County	Acres	Specific Area and Description
Douglas	27	Observed mainly in the Carson Range
Elko	2,977	Located mainly in the Jarbidge and Ruby Mountains.
Eureka	353	Damage recorded in the Monitor and Hot Creek Ranges.
Humboldt	2,005	All of the damage being recorded in the Santa Rosa Range.
Lander	178	Very isolated pockets of damage were observed.
Nye	911	Dieback is found in continuous pockets in the southern Monitor, Toiyabe, and Hot Creek Ranges.
Washoe	89	Located mainly in the Mt. rose Wilderness, north of Highway 431.
White Pine	12	This was a substantial decrease from 2017, where 353 acres of damage was recorded. All damage recorded was in the Schell Creek Range.

ABIOTIC DAMAGE

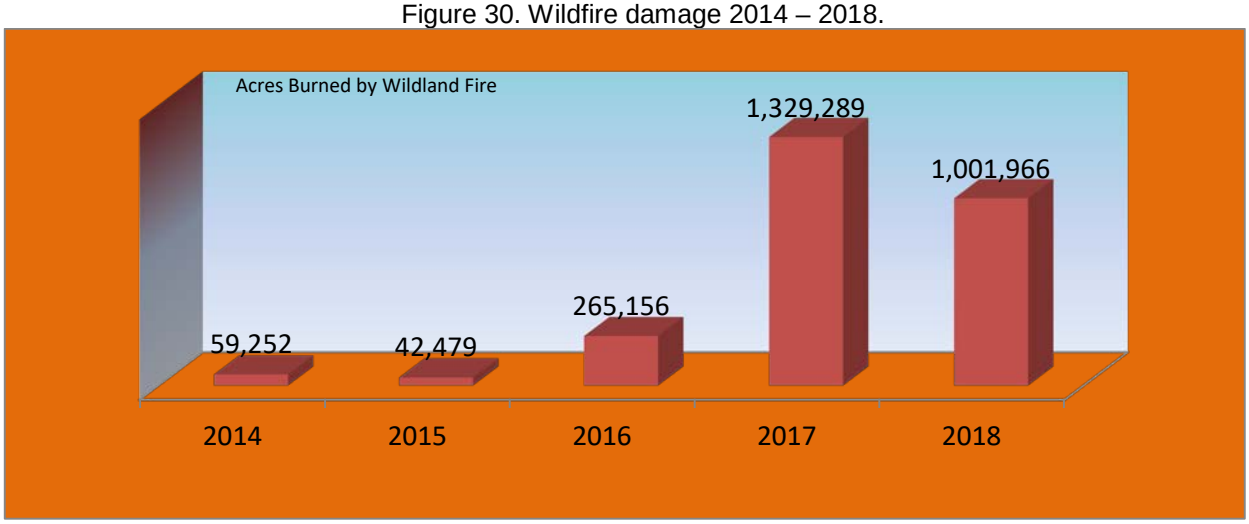
WIND DAMAGE AND BLOWDOWN

Areas of concentrated, high velocity winds can cause trees to blow over. Blowdown occurs in groups or as scattered trees within the landscape. Depending on the tree species, patches of blowdown in coniferous forests can provide a food source for various bark beetles, enabling populations to build to epidemic levels. These epidemic populations may then attack and kill standing, live trees adjacent to the blowdown. No significant blowdown was mapped in Nevada in 2018.

WILDFIRE DAMAGE

The year 2018 saw a second consecutive year of large acreages burned. Approximately 1,001,966 acres were burned in 2018 as compared to 1,329,289 acres in 2017. The majority of the fires occurred in sagebrush ecosystems, however approximately 35% burned pinyon and juniper woodlands, mixed conifer forest, aspen stands, and riparian areas. The three largest fires were the Martin, South Sugarloaf, and Roosevelt fires in Humboldt and Elko counties. In these large fires higher elevation stands of Aspen, mixed conifers saw heavy damage. Some high elevation white bark pine and alpine fir burned as well destroying important wildlife habitat as well the ecologically important tree species. The majority of this damage occurred on lands managed by the USFS Humboldt Toiyabe National Forest.

Figure 30. Wildfire damage 2014 – 2018.



UNKNOWN AND FROST DAMAGE

Hosts: aspen, willows, cottonwoods, and other deciduous species

Approximately 231 acres of frost damaged aspen was aerially mapped throughout northern Nevada in 2018. The majority of the unknown damage was mapped throughout Elko County. These areas are located in very inaccessible terrain so damage was not verified and is listed as unknown.

APPENDIX A

Noxious weeds are a continuing problem for all Western states. They have the ability to colonize disturbed habitats, aggressively displacing native plant species and altering ecosystems. Several state and federal agencies have the responsibility for monitoring and controlling noxious weeds. Our intention by including this information is to increase awareness of these potential problems. Table 3 at the beginning of this document is the list of plants declared noxious weeds by the State of Nevada for specific counties. The NDOA in coordination with the Nevada Department of Conservation and Natural Resources' Natural Heritage Database tracks weed populations throughout the state. For up-to-date information on Nevada Noxious Weeds and the three-tier State List go to:

http://www.agri.nv.gov/PLANT_NoxWeeds_index.htm

http://www.invasivespecies.gov
This website is the gateway to federal and state efforts concerning invasive species. There are links to numerous invasive species databases. This website should be one of your first stops.

http://www.agri.nv.gov/PLANT_NoxWeeds_index.htm
This website contains any information you need about noxious weed prevention, control and management for all land managers in the state of Nevada.

http://www.cdfa.ca.gov/phpps/ipc/encyclowedia/encyclowedia_hp.htm
California Department of Food and Agriculture has a very comprehensive website. Information includes: identification, biology, and management. Pictures of the plants in various stages are just a click away.

http://www.nwcb.wa.gov/index.htm
State of Washington's noxious weed control board website has information on black henbane, buffalo bur, camel thorn, Canada thistle, Dalmatian toadflax, dyer's woad, goatsrue, houndstongue, johnsongrass, jointed goatgrass, diffuse, Russian and spotted knapweed, leafy spurge, Mediterranean sage, musk thistle, perennial pepperweed, purple loosestrife, puncturevine, rush skeletonweed, silverleaf nightshade, scotch thistle, St. Johnswort, yellow nutsedge, purple and yellow starthistle, and velvetleaf. Topics include description, economic importance, geographic distribution, habitat, history, growth and development, reproduction, response to herbicides, response to cultural controls, and biocontrol potentials.

http://www.ipm.ucdavis.edu/PMG/selectnewpest.landscape.html#WEED
University of California pest management website has information on Bermuda grass, field bindweed, Russian thistle, yellow starthistle, and others. Topics include identification, biology, and management through cultural and chemical control options.

http://www.ext.colostate.edu/pubs/natres/pubnatr.html
Colorado State University Cooperative Extension website in the Range section has fact sheets on musk thistle, leafy spurge, Canada thistle, diffuse, Russian, and spotted knapweeds. Information includes description, phenology, and management options such as cultural, chemical, mechanical, and biological.

http://www.weedcenter.org
An interagency website housed at the Montana State University. The Center for Invasive Plant Management (CIPM) promotes the ecological management of invasive plants in the West through education, by facilitating collaboration among researchers, educators, and land managers, and by funding research projects and weed management areas. The center serves as an information clearinghouse, providing examples of ecological management, and delivering implementation tools

and products to land managers. The center operates in partnership with federal, state, counties, private industry, universities, foundations, and landowners.

http://invader.dbs.umt.edu
The University of Montana's Invaders Database has a search engine that links the user to informational websites on most of the invasive weeds. You can search the database for the list of Noxious Weeds by state and most identified plants have additional information and links to more information.