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Utah Forest Insect and Disease Conditions Report 2013 & 2014

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Utah Forest Insect and Disease Conditions Report 2013 & 2014

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and
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FOREST HEALTH CONDITIONS SUMMARY

This report focuses only on the impacts of insects, diseases, and other disturbances on the various tree species in the state. Aerial detection surveys (ADS) conducted by the USDA Forest Service, Forest Health Protection offices are the means of collecting data that is used to describe 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. Thus, an estimate of the number of trees killed is also provided. Not all forested lands are surveyed, and not all the same acres are surveyed every year. The number of acres flown/surveyed in each county in 2013 and 2014 are provided in Table 1. Over ten million acres were flown each year and most was on National Forest Service (NFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), and National Park Service (NPS) lands, in addition to state, and private lands. Long-term insect trend data summarizes activity detected on all surveyed ownerships in Utah.

Forests throughout much of Utah are composed of dense stands that are relatively uniform in age, composition, and structure resulting in poor forest health conditions. Unhealthy forests are conducive to insect and disease issues. In other words, insect and disease issues are not the cause of poor forest health, but are the result. Several factors can contribute to the decline in forest health, including; lack of active management, poor grazing patterns, fire exclusion, and invasive weeds. Adequate precipitation and growing space is necessary to maintain tree vigor, thereby increasing tree resistance to insects and diseases. Drought conditions throughout the State continue to place more stress on forests that are already in poor health.

In 2013 and 2014, insect and disease-caused tree mortality generally increased from 2012. Mountain pine beetle in lodgepole pine has been declining over the past several years. However, tree mortality increased by nearly 40% in 2013, and then in 2014, it decreased by just over 79%. Mountain pine beetle-induced tree mortality in five-needle pines decreased in 2014 from 2013 by 30%.

Spruce beetle mortality has been significantly increasing, mainly in Summit, Wasatch, and Sevier Counties. In 2013, the number of trees killed statewide was 412,662, an increase of almost seven fold from 2012. In 2014, the number of spruce trees killed increased again by 25% (555,435 trees).

In 2013, subalpine fir mortality increased by 33% from 2012. When comparing 2013 to 2014 mortality increased again by 75%.

Douglas-fir beetle-caused tree mortality continued to increase statewide. Comparing mortality between 2012 and 2013, it increased by 67%. Mortality increased again in 2014 by 73%.
Fir engraver-caused tree mortality (primarily in white fir) decreased slightly from 2012 to 2013. However, it increased approximately 300% between 2013 and 2014. In 2013, 761 trees were killed while 34,303 trees were killed in 2014.

Western spruce budworm defoliation increased from 13,558 acres affected in 2012 to 38,702 acres affected in 2013. This was almost a three-fold increase. It increased again by 21% in 2014 affecting 47,038 acres.

Table 1. Total number of acres aerially surveyed in each county during 2013 & 2014

County	2013	2014
Beaver	184,272	252,259
Box Elder	188,154	228,663
Cache	466,574	547,918
Carbon	69,897	127,326
Daggett	252,966	309,928
Davis	78,417	58,187
Duchesne	845,668	1,122,766
Emery	310,624	348,969
Garfield	1,473,907	1,564,067
Grand	143,124	132,162
Iron	529,992	610,902
Juab	161,441	196,480
Kane	267,610	368,474
Millard	337,679	332,762
Morgan	214,656	254,033
Piute	298,557	375,570
Rich	110,356	155,775
Salt Lake	155,218	137,787
San Juan	688,514	762,697
Sanpete	556,340	678,758
Sevier	1,033,701	1,046,307
Summit	700,923	737,515
Tooele	0	232,374
Uintah	291,421	358,296
Utah	608,250	682,336
Wasatch	641,690	598,909
Washington	550,566	670,670
Wayne	238,367	282,719
Weber	217,771	258,407
Total	11,616,655	13,433,014

Table 2. Trees killed and acres affected by several agents in Utah counties as detected by ADS in 2013.

2013	Mountain Pine Beetle[1]		Douglas-fir Beetle		Spruce Beetle		Piñon Engraver		Fir Engraver Beetle		Subalpine Fir Mortality Complex	
COUNTY	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres
Beaver	0	0	125	62	10	5	40	20	40	7	0	0
Box Elder	0	0	16	8	0	0	0	0	5	2	191	60
Cache	34	9	441	220	10	5	0	0	0	0	903	368
Carbon	0	0	20	10	0	0	0	0	0	0	221	69
Daggett	9,465	3,197	140	70	0	0	0	0	0	0	10	5
Davis	0	0	0	0	0	0	0	0	5	2	63	26
Duchesne	29,297	7,909	291	137	32,509	7,778	335	167	0	0	110	55
Emery	0	0	138	69	0	0	10	5	0	0	156	72
Garfield	0	0	1,179	646	20	10	121	62	20	10	157	78
Grand	0	0	960	304	101	50	41	21	0	0	90	45
Iron	0	0	87	45	0	0	400	340	5	3	69	35
Juab	0	0	95	47	170	120	0	0	0	0	20	10
Kane	0	0	102	51	0	0	5	3	0	0	0	0
Millard	0	0	286	143	0	0	0	0	0	0	10	5
Morgan	0	0	235	96	0	0	0	0	0	0	192	96
Piute	0	0	290	145	1,059	176	52	27	0	0	62	31
Rich	166	76	60	30	0	0	0	0	0	0	25	12
Salt Lake	0	0	5	3	26	10	0	0	367	184	1,353	712
San Juan	0	0	1,446	714	246	148	820	328	15	7	460	271
Sanpete	0	0	1,641	746	5	3	85	42	0	0	1,875	943
Sevier	0	0	1,268	693	128,972	11,543	442	244	0	0	75	37
Summit	111,994	14,053	765	369	131,666	19,880	0	0	5	3	4,560	1,978
Tooele	0	0	0	0	0	0	0	0	0	0	0	0
Uintah	7,501	3,688	280	137	0	0	0	0	0	0	230	165
Utah	0	0	1,423	653	328	185	220	104	153	76	1,141	511
Wasatch	298	133	880	369	117,515	13,383	10	5	25	13	2,078	1,062
Washington	0	0	28	14	0	0	28	15	121	61	0	0
Wayne	0	0	431	215	15	8	0	0	0	0	0	0
Weber	0	0	135	67	10	5	0	0	0	0	110	55
Total	158,755	29,065	12,767	6,063	412,662	53,309	2,609	1,383	761	368	14,161	6,701

[1]Although mountain pine beetle has killed ponderosa and limber pine throughout Utah, the data is for lodgepole pine only.

Table 3. Trees killed and acres affected by several agents in Utah counties as detected by ADS in 2014.

2014	Mountain Pine Beetle[1]		Douglas-fir Beetle		Spruce Beetle		Piñon Engraver		Fir Engraver Beetle		Subalpine Fir Mortality Complex	
COUNTY	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees	Acres
Beaver	0	0	498	250	211	106	191	80	412	244	192	96
Box Elder	8	3	18	11	15	8	44	23	0	0	1,294	416
Cache	1,952	656	374	188	166	83	2	1	10	5	2,716	1,670
Carbon	0	0	68	35	0	0	0	0	15	8	2,193	1,090
Daggett	3,474	697	118	59	0	0	25	13	0	0	316	158
Davis	0	0	0	0	0	0	0	0	453	156	319	129
Duchesne	15,597	4,588	599	295	168,419	28,589	26	13	0	0	251	146
Emery	0	0	297	148	15	8	22	14	0	0	968	489
Garfield	0	0	2,914	1,671	41	23	134	70	271	141	223	110
Grand	0	0	413	342	5	3	5	3	8	4	38	19
Iron	0	0	69	35	0	0	146	76	136	116	173	87
Juab	0	0	672	337	10	5	12	9	462	222	50	25
Kane	0	0	339	168	0	0	3	2	287	160	0	0
Millard	0	0	725	387	25	13	32	16	5,945	1,652	160	98
Morgan	5	1	311	209	0	0	0	0	4,450	1,288	4,241	1,460
Piute	0	0	720	360	9,125	831	147	90	180	90	186	93
Rich	10,201	1,582	106	55	21	11	0	0	0	0	4,209	1,025
Salt Lake	0	0	20	10	57	29	0	0	4,207	1,108	2,190	865
San Juan	0	0	2,132	986	20	10	30	17	341	130	489	307
Sanpete	0	0	3,612	2,320	10	5	54	31	388	307	7,352	3,609
Sevier	0	0	1,569	857	95,608	7,188	297	172	2,277	651	551	283
Summit	1,168	539	242	121	256,305	44,715	0	0	1,879	476	8,301	3,243
Tooele	0	0	795	378	0	0	120	60	40	20	55	21
Uintah	90	23	298	149	0	0	0	0	0	0	284	176
Utah	0	0	3,492	1,350	50	25	30	15	10,690	2,993	2,584	1,150
Wasatch	20	5	1,064	542	25,297	6,465	0	0	1,276	467	16,309	6,063
Washington	0	0	5	3	0	0	79	46	136	70	0	0
Wayne	0	0	457	230	30	15	0	0	60	30	12	6
Weber	10	3	133	67	5	3	0	0	380	185	930	379
Total	32,525	8,097	22,060	11,563	555,435	88,135	1,399	751	34,303	10,523	56,586	23,211

Figure 1. Surveyed areas for the 2013/2014 Aerial Insect and Disease Detection Survey

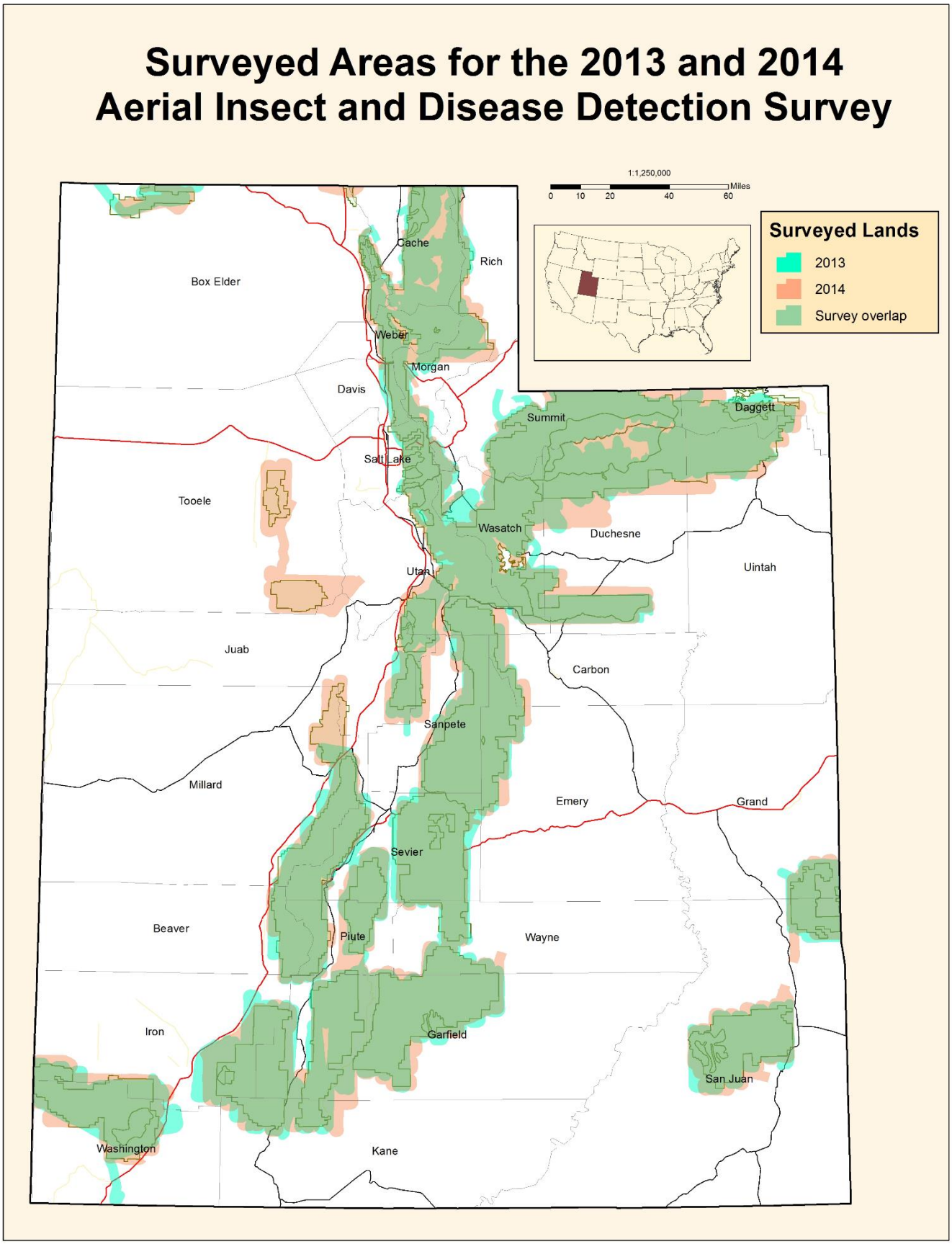

Table 4. The number of acres impacted by defoliators and other agents in Utah counties in 2013.

2013	Western Spruce Budworm	Unknown Aspen Defoliation	Aspen Decline
County	**Acres**	**Acres**	**Acres**
Beaver	13,712	0	0
Box Elder	0	0	0
Cache	159	0	558
Carbon	0	0	155
Daggett	0	0	0
Davis	0	0	40
Duchesne	0	0	172
Emery	0	247	163
Garfield	3,493	0	4,380
Grand	0	365	1,983
Iron	4,747	121	1,730
Juab	0	245	0
Kane	387	0	25
Millard	0	0	72
Morgan	0	0	0
Piute	9,434	0	268
Rich	0	0	99
Salt Lake	0	0	0
San Juan	314	156	1,009
Sanpete	38	58	498
Sevier	3,913	0	1,948
Summit	0	0	374
Tooele	0	0	0
Uintah	192	0	209
Utah	0	21	1,178
Wasatch	0	11	1,009
Washington	0	0	0
Wayne	2,313	0	178
Weber	0	0	139
Total	38,702	1,223	16,187

Table 5. The number of acres impacted by defoliators and other agents in Utah counties in 2014.

2014	Western Spruce Budworm	Unknown Aspen Defoliation	Aspen Decline
County	**Acres**	**Acres**	**Acres**
Beaver	11,207	10	0
Box Elder	0	32	0
Cache	0	0	29
Carbon	0	150	498
Daggett	353	0	5
Davis	0	0	0
Duchesne	72	0	534
Emery	18	253	159
Garfield	3,225	502	2,434
Grand	641	429	2,580
Iron	3,055	669	2,335
Juab	0	0	0
Kane	0	0	701
Millard	374	0	114
Morgan	0	20	10
Piute	10,149	153	198
Rich	0	0	61
Salt Lake	0	2	14
San Juan	170	594	1,842
Sanpete	7,198	400	1,806
Sevier	7,508	32	3,470
Summit	0	153	549
Tooele	0	0	22
Uintah	224	0	721
Utah	655	45	1,270
Wasatch	187	10	318
Washington	0	289	486
Wayne	2,002	0	152
Weber	0	0	0
Total	47,038	3,741	20,310

INSECT STATUS

Native Defoliators

Figure 2. Douglas-fir tussock moth larvae (Photo: D. McComb, Bugwood.org).

Douglas-fir Tussock Moth
Orgyia pseudotsugata McDunnough

Hosts: all true firs, Douglas–fir, and spruce

The Douglas-fir tussock moth (DFTM) is an important native insect capable of causing extensive defoliation. Caterpillars feed on the needles of trees which can lead to topkill and after several seasons of defoliation, tree mortality. Outbreaks are cyclical due to natural controls, such as parasitic wasps, a virus, and weather conditions. The hairs on caterpillars can cause allergic reactions in some individuals.

No DFTM defoliation was detected in Utah in 2013 and 2014.

Western Spruce Budworm
Choristoneura freemani Freeman

Hosts: Douglas-fir, subalpine fir, white fir, blue spruce, and Engelmann spruce

Western spruce budworm (WSBW) is the most widely distributed and destructive defoliator of coniferous forests in western North America. Trees may be extensively defoliated during outbreaks, resulting in stress that can directly kill the tree or make it susceptible to diseases and secondary insect pests, such as the Douglas-fir beetle.

Over the last few years, defoliation of subalpine fir, Douglas-fir, and Engelmann spruce has increased significantly in the high plateaus of Beaver, Piute, Iron, Garfield, Wayne, Sevier, and Sanpete counties. From 2012 to 2013, statewide defoliation by western spruce budworm increased almost three-fold. The largest increase was in Beaver County, from 1,767 acres to 13,712 acres; and Piute County, 2,668 acres to 9,434 acres. More specifically in 2013, the largest defoliation occurred in and around the Dixie and Fishlake National Forests, and neighboring State Trust Lands and private lands. In 2014, statewide defoliation increased another 21%. The largest increase was in Sanpete County, from 38 acres to 7,198 acres; and Sevier County, 3,913 acres to 7,508 acres.

Western Tent Caterpillar
Malacosoma californicum Packard

Hosts: aspen, willow, cherry, cottonwood, mountain mahogany, oak, alder, and birch

The first noticeable thing about western tent caterpillar (WTC) is white silken tents formed in branch crotches. Aspen is the preferred host, but WTC may attack a wide range of deciduous trees and shrubs. Outbreaks, usually last two to three years in the western states. Repeated

defoliation and other stress factors may reduce growth rates of infested trees, kill trees, or predispose them to other diseases or insect pests. Larvae are dark brown with bluish heads, reddish-brown stripes, and distinct white, keyhole-shaped markings down their backs. Western tent caterpillars are often confused with fall webworms, which are rather hairy and reddish–brown in color. The fall webworm makes large diffuse webs that encase entire branches, often found on chokecherry and other deciduous trees and shrubs.

There was no western tent caterpillar defoliation aerially mapped in 2013. However, tent caterpillars continued to cause heavy cottonwood defoliation throughout its range in southern Utah, especially in Capital Reef and Zion National Parks.

In 2014, both forest (*Malacosoma disstria*) and western (*M.californicum*) tent caterpillars were observed. Most of the defoliation occurred on shrubs and sapling-sized aspen and cottonwood trees, with feeding so extensive as to be aerially visible in several counties (Box Elder, Cache, Weber, Salt Lake, and Iron).

Western False Hemlock Looper
Nepytia freemani Munroe

Hosts: Douglas-fir, white fir, subalpine fir, and Engelmann spruce

Young inch worm larvae begin to feed on new foliage in the upper crowns of trees during late May, progressing to the older foliage when new foliage is depleted. Eggs are often laid on defoliated twigs and the resulting larvae may feed on the new needles causing twig mortality. In late summer the ground beneath heavily defoliated trees may be carpeted with partially eaten needles and frass. During outbreaks, trees may be entirely defoliated in one season.

This looper defoliated 156 acres of white fir in Big Cottonwood Canyon (one mile north of Ferguson Canyon) and in Little Cottonwood Canyon in 2013 but, was not observed in 2014.

Needle Insects

Piñon Needle Scale
Matsucoccus acalyptus Herbert

Hosts: Colorado and singleleaf piñon pine

The piñon needle scale is a native sap-sucking insect that feeds on older needles of infested trees. Damage results in tip killing, branch flagging, stunted tree growth, and needle injury. Thin crowns cause a ghostly "see-through" appearance, with trees retaining only current year's needles. Insects in the first larval stage are hard to see on the needles but insects in the second larval stage resemble tiny black beans. Small trees may be killed outright and large trees may be seriously weakened after repeated infestations, rendering them susceptible to piñon engraver beetle. Most piñon seem to recover in a few years from light to moderate defoliation.

A small amount of damage by piñon needle scale was reported in the La Sal Mountains in southeastern Utah in 2013 but none in 2014.

Black Pineleaf Scale
Nuculaspis californica Coleman

Hosts: *Pinus spp.* especially Scotch/Scots and Austrian pines

Figure 3.Black pineleaf scale on Austrian pine (Photo: C. Keyes; UT, DNR, FFSL).

The black pineleaf scale attacks several pine species and on rare occasions Douglas-fir and white fir. The insect generally overwinters as a partially developed scale. Eggs and immature nymphs (crawlers) appear in June or July, depending upon temperature. If there is a second generation, egg hatch and crawlers may appear again in late summer. Sap loss due to scale insect infestations may cause yellowing or wilting of needles, stunting of the needles, needle mortality, and defoliation. Defoliation often leaves the tree with just the new growth at the tips of the branches. Infested needles sometimes look dull and light green to yellow-gray in color. Heavy infestations over several years may lead to death of all, or portions of the tree. Black pineleaf scale outbreaks have been associated with stressful growing conditions of the host tree; caused by drought, soil compaction, root injury, overwatering, and other factors that affect plant health. Additional stress, associated with scale infestation, may result in other insects and/or diseases attacking the tree.

Since about 2008, black pineleaf scale populations increased throughout urban and rural areas and peaked in 2010/2011. Fortunately, black pine leaf scale appears to be in decline since 2012. However, many trees are still infested thoughout the state.

Native Bark Beetles

Fir Engraver Beetle
Scolytus ventralis LeConte

Hosts: true firs

Fir engraver beetle (FEB) is a major pest of true firs throughout the West. It attacks trees of any size. Tree stress due to drought, disease, and defoliation may incite outbreaks that cause severe tree mortality. This insect is often associated with other forest pests such as Douglas-fir tussock moth, spruce budworm, bark beetles, woodborers, and annosus root disease.

Mortality due to FEB decreased to 368 acres in 2013 from 1,642 acres in 2012. In 2013, FEB–caused tree mortality was mapped throughout host trees in 11 Utah counties. Salt Lake County had the most acres affected by FEB (184 acres). Mortality occurred in small pockets of 5-14 trees in Little Cottonwood Canyon. One pocket was also mapped south of Centerville Canyon. A little farther south, mortality was mapped south of Maple Canyon and Little Diamond Creek. Additional mortality was mapped in the vicinity of Dry Mountain, Rock Canyon, and Dry Lake Reservoir.

In 2014, mortality increased again to over 10,000 acres. It occurred on both private and National Forest lands. The following counties each had over 1,000 acres of mortality- Utah (2,993), Millard (1,652), Morgan (1,288), and Salt Lake (1,108). In Utah County, the largest concentrations of activity occurred northeast of Spanish Fork Peak, in the Pumphouse Ridge area, and on Powerhouse Mountain east of Springville. In Morgan county mortality was observed on the mountain ridges east of Kaysville/Layton and west of East Canyon. In Salt Lake county activity was found in Big and Little Cottonwood Canyons, and in Lambs and Parley Canyons. In Millard county significant white fir mortality (over 7,800 trees) caused by FEB was mapped on and accounted for 92% of the total white fir mortality detected on the Fishlake National Forest. Large infestations approximately 500 acres in size occurred in the central portion of the Pahvant Plateau near Bear Canyon, White Pine Creek, and Hans Ridge. Other large infestations (50 to 75 trees) were detected in the upper reaches of Mill Canyon, Newts Canyon, and Strawberry Canyon just to the east of the main ridgeline and in the vicinities of Spring Branch Canyon and Upper Ebbs Spring.

Mountain Pine Beetle
Dendroctonus ponderosae Hopkins

Hosts: lodgepole, limber, bristlecone, 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 small diameter trees (4" diameter at breast height). Extensive mortality may alter large forest landscapes by converting pine ecosystems to grass and shrub landscapes for a period of 10-20 years. This conversion affects wildlife species, water yields and fuels.

In 2013, MPB–caused tree mortality in lodgepole pine increased slightly, to about 29,000 acres. The ongoing outbreak occurring in northern Utah had killed most of its host type. This outbreak which began in 2003, but is now subsiding, increased annually with most of the mortality on the Uinta–Wasatch–Cache and Ashley National Forests. There was about 15,000 acres of mortality occurring in Daggett, Duchesne, and Uintah counties. Over 14,000 acres of mortality occurred in Summit County alone. This was an increase from 2012 numbers.

Beetle populations have collapsed along the Mirror Lake Highway. Current activity was mapped on the east side of the Evanston and Mountain View Ranger Districts. In stands with heavy MPB mortality, pine engraver and twig beetles are infesting smaller trees, which are not suitable hosts for MPB.

In Daggett County there was extensive mortality in lodgepole pine south and west of Flaming Gorge National Recreation Area. Mortality pockets range from 1-20 tree/acre pockets. Mortality is continuing to spread in areas around Spirit Lake and to the north of Weyman Lake.

On the Vernal Ranger District tree mortality had increased to 9,933 trees. There continues to be mortality pockets mapped along Whiterocks Canyon and north of Mosby Mountain, with scattered 5–20 tree pockets along the northern border of the District.

In 2014, MPB–caused tree mortality in lodgepole pine declined rapidly to about 8,100 acres. Most of the preferred, susceptible host trees have been killed where the outbreak has been

occurring for many years. Mortality was still high in Duchesne County with 4,600 acres affected and in Rich County mortality increased significantly to approximately 1,600 acres. Areas with mortality were along the Sinks Road working south to Hells Hollow, near Slideout Canyon and, along Log Cabin Ridge.

MPB-caused tree mortality in Ponderosa Pine increased three-fold on the Fishlake National Forest. Much of this mortality was mapped in stands burned in the Twitchell Fire.

Douglas-fir Beetle
Dendroctonus pseudotsugae Hopkins

Host: Douglas-fir

Douglas-fir beetle (DFB) typically kills single and small groups of trees, but during outbreak conditions, pockets of 100 or more tree mortality centers are not uncommon. At endemic (low) levels, DFB favors stressed and damaged trees such as; broken or windfallen, wounded or fire–injured trees, and trees with root disease or defoliation. Beetle populations can build rapidly in newly-fallen trees and spread to adjacent healthy standing trees.

In 2013, the acreage affected by DFB almost doubled from that of 2012 to over 6,000 acres. Most counties in Utah had some DFB mortality. The majority of mortality occurred in San Juan, Sanpete, Sevier, Garfield, and Utah counties.

More specifically, in San Juan county DFB mortality increased significantly. Numerous pockets (20-100 trees) were detected on the western slopes of the La Sal Mountains. The greatest concentration of mortality occurred near Grandview Peak on the north end of the range and was associated with areas burned during the Pinhook Valley Fire. Other areas of mortality were in Pole and Cottonwood Canyons below South Mountain. Pockets of 4 to 20 trees were mapped near Shay Mountain, on the north side of North Peak, and on Dry Mesa.

In Sanpete county DFB mortality increased from 165 acres to 746 acres. This mortality occurred across the western Wasatch Plateau. The largest concentrations of dead trees on the northern end of the Sanpete Ranger District were mapped in South San Pitch Canyon, Dry Creek, and along Oak Creek Ridge. Further south the highest concentrations of DF mortality occurred in Canal Canyon, in Spring City Canyon, and in stands located between Sixmile Canyon and Manti Canyon.

In Sevier County, pockets of mortality were detected north of Monroe Mountain and on the northern end of the Sevier Plateau. A large concentration of mortality occurred along the eastern side of Fishlake Hightop just west of Fishlake.

In Cache County, mortality increased slightly with scattered pockets of 4–20 trees mapped across the Bear River Range. Some mortality was mapped in Logan Canyon near Right Hand Fork, and in Green Canyon.

In 2014, the acreage almost doubled again to 11,600 acres. Most counties had some DFB mortality. The majority of mortality occurred in San Juan, Garfield, Sanpete, Utah, Wasatch, and Sevier counties.
More specifically; In San Juan County-DFB mortality increased 38% mostly along the western slopes of the La Sal Mountains. The greatest concentration occurred between South Mountain

and Cottonwood Canyon. Other pockets were concentrated near Boren Mesa and Willow Basin. Previous concentrations in the vicinity of Shay Mountain, on the northern side of North Peak, and on Dry Mesa (30 and 75 tree pockets mapped) continued, and in some cases grew in amount of affected trees and number of pockets.

In Garfield County-DFB mortality increased from 646 acres in 2013 to 1671 acres in 2014. Large concentrations of heavy mortality (20 to 100 tree pockets) occurred in most major drainages running off of Barney Top and the Table Cliff Plateau. A cluster of several 20 tree pockets occurred southwest of Posey Lake, and Barker Reservoir. Other large clusters occurred near the Jubilee Historic Guard Station and McGath Lake. Mortality pockets of 50 to 150 trees occurred near Roger's Peak and the lower portion of Boulder Creek, respectively.

In Sanpete County-DFB mortality increased slightly from 746 acres in 2013 to 2,320 acres in 2014. This mortality is occurring in numerous small to large-sized pockets across the western Wasatch Plateau. Fairly contiguous pockets occur south of San Pitch Canyon. Further south, DFB-caused tree loss continues. Concentrated mortality was also noted around Barney Hollow and Smith's Reservoir.

Mortality doubled in Utah County and slightly increased in Wasatch County. Scattered small pockets (4-14 trees killed) of DFB occurred west of Birdseye, north of Payson Canyon, and on the west face of Mt Nebo. Pockets (4-14 trees killed) were detected north of Daniels Canyon, in an area centered on Center Canyon. Pockets of up to 50 trees were also detected south of Provo Canyon.

Spruce Beetle
Dendroctonus rufipennis Kirby

Hosts: Engelmann and rarely blue spruce

The spruce beetle (SB) is the most significant natural mortality agent of mature spruce. Endemic populations usually exist in weakened or windthrown trees, logging slash, and fresh stumps. Outbreaks typically occur when beetle populations build to high levels in concentrations of windthrown trees. Dispersing adults may infest standing live trees, initially preferring larger diameter trees.

In 2013, spruce tree mortality increased significantly to over 53,000 acres from 2012 when 18,968 acres were affected. The Uinta-Wasatch-Cache, Fishlake, and Ashley National Forests all have significant outbreaks. Sevier, Summit, Wasatch, and Duchesne counties had the most acres affected. Acres affected may be on National Forest, private or State Trust Lands.

More specifically; In Sevier County, spruce beetle continues to be the most damaging agent of spruce with beetles killing 129,000 trees on 11,543 acres. The largest outbreak areas were again observed on the Fishlake Hightop Plateau. Numerous pockets ranging from 20 to 1,000 acres occurred in the upper reaches of Tasha Creek, the Sevenmile Cirques, Lost Creek, and Na Gah Flat. There were also several pockets (20–100 trees) of mortality detected on the northern end of Boobe Hole Mountain. Small pockets occurred in the vicinity of Hilgard Mountain.

Out of Richfield, Englemann spruce trees killed increased five-fold and acres affected by spruce beetle increased by 67%, respectively in 2013. Most all of the mortality occurred on the northern end of the Sevier Plateau in the Monroe Mountain area.

In Wasatch and Summit counties, substantial pockets of mortality (over 249,000 trees) were detected around Murdock Basin, north and south along the Mirror Lake Highway corridor, and over to Smith & Morehouse Canyon. High levels of activity were visible north of Duchesne Ridge and east of Mill Hollow.

In Salt Lake county, spruce mortality remained at low levels with small pockets detected in Big Cottonwood Canyon, near South Fork, and Brighton. Some pockets were mapped in Wasatch Mountain State Park.

In Duchesne County, spruce beetle mortality increased significantly. There was an increasing number of pockets ranging from 5–500 trees mapped south of East Grandaddy Mountain. Also, activity is expanding east toward Rock Creek Canyon. Additional 20–100 tree pockets were detected south of Red Creek Mountain and near Tabby Mountain.

In 2014, the number of trees killed by the spruce beetle increased again by 34%, and the number of acres affected increased by 65%. Most mortality was noted in Piute, Sevier, Wasatch, Duchesne, and Summit counties. Acres affected may be on National Forest, private or State Trust Lands.

More specifically; In Piute and Sevier counties-The largest outbreak areas were again observed on the Fishlake Hightop Plateau. Numerous pockets ranging from 20 to 1,000 acres in size occurred from Na Gah Flat, north to the upper reaches of Tasha Creek, the Sevenmile Cirques and Lost Creek. Small pockets (1 to 20 trees) occurred on the southwestern slopes of Hilgard Mountain and the northwestern slopes of Thousand Lake Mountain near Neff's Reservoir. Spruce beetle continues to expand along the northern end of the Sevier Plateau with the majority of mortality occurring in stands on Monroe Mountain from Marysvale Peak to Monroe Creek.

Wasatch, Duchesne, and Summit counties-Small pockets (4-14 trees) of spruce beetle were detected between the upper portions of the Cottonwood Canyons, in close proximity to Brighton and Alta ski areas. In the Logan Ranger District, several small (4-14 trees) pockets occurred near Mill Hollow and scattered across the upper elevations in the Bear River Range. In the Kamas Ranger District, spruce beetle mortality continues south of the Soapstone area, occurring in polygons up to 20 acres in size.

Pockets up to several hundred acres in size continued to expand along the Blacks Fork Drainages on the Evanston District. The largest concentration of newer activity was on the West Fork of the Blacks Fork Drainage, and extended all the way from the wilderness to the northern boundary of the Forest. The largest pockets mapped on the Mountain View District were North of Red Castle and east of Flat Top Mountain in the Wilderness, but some small pockets (up to 20 trees killed) could be found near Bridger Lake and alongside the oil fields in the Henry Forks Drainage.

Piñon Engraver Beetle
Ips confusus LeConte

Hosts: Colorado and singleleaf piñon

Injured or stressed trees are preferred by piñon engraver beetles. Attacks by this insect girdle and eventually kill piñons. Piñon engravers produce multiple generations each year and consequently populations can build rapidly in slash and stressed green trees. Beetles can then spread into

healthy stands. As with other bark beetle species, piñon engravers carry a wood staining fungus into the tree, which in combination with the feeding larva, kills the tree.

Historically, piñon pine was not aerially surveyed in Utah. Drought combined with increased piñon engraver populations contributed to considerable piñon pine mortality in 2001-2002. Piñon-juniper woodlands have subsequently been surveyed each year due to concerns over the loss of this valuable forest type.

In 2013, 1,383 acres of piñon pine mortality was mapped. This was an increase from 2012. Most of the mortality was in southern Utah with approximately 580 trees killed in the southeastern foothills of the La Sal Mountains in pockets located in the lower portions of Pole Canyon just north of La Sal and Pole Spring Canyon. Mortality also occurred west of Hatch and around Horse Valley Park. Along the front between Cedar City and Summitt, mortality was mapped in the piñon pine woodlands.

In 2014, mortality decreased to 751 acres. Sevier County had the majority of mortality- 172 acres. Piñon mortality occurred in small (4-14 trees), scattered pockets largely on the far eastern side of the Beaver Ranger District. One pocket of 50 trees was detected in Order Canyon. Other large pockets were in the vicinity of Kane Canyon on the southwestern portion of the District.

Approximately 122 trees were detected in the southeastern portion of the Pahvant Plateau with the highest concentrations of mortality occurring off the southern slope of Big Bench, and in the East Fork of Corn Creek.

Western Pine Beetle
Dendroctonus brevicomis LeConte

Host: ponderosa pine

Western pine beetle can kill ponderosa pine from six inches in diameter at breast height or larger. This beetle usually targets weakened trees with reduced defenses. Such trees may be crowded in dense, overstocked stands; slow-growing, older ponderosa pine trees; or trees damaged by fire or lightning. When large numbers of trees are weakened across a landscape, western pine beetle populations may increase and kill hundreds of thousands of trees.

In Grand County, 290 acres of ponderosa pine mortality was attributed to this insect and 281 acres on the southern portion of the Paunsaugunt Plateau on the Garfield/Kane County line. In Washington County, a few small mortality pockets were observed northeast of Gardiner Peak and in the vicinity of Pine Valley Campground.

In 2014, in the central and southern Utah counties of Garfield, Kane, and Sevier mortality increased. Drought conditions and the wildfires of 2012 and 2013 are likely responsible for this beetle population increase and subsequent tree mortality. Much of this mortality was mapped in stands burned in the Twitchell Fire.

Roundheaded Pine Beetle
Dendroctonus adjunctus Blandford

Host: ponderosa pine

Roundheaded pine beetle has periodic outbreaks that kill thousands of pine trees, but more commonly this beetle subsists in small groups of weaker trees, often in conjunction with other bark beetles (western pine beetle, mountain pine beetle or pine engravers). Roundheaded pine beetle may attack trees of any size, but usually trees greater than 20 inches diameter at breast height.

No mortality attributed to roundheaded pine beetle was observed by ADS in 2013 or 2014.

Borers

Pitch Mass Borer
Dioryctria spp.

Hosts: piñon pine, ponderosa pine, lodgepole pine, Austrian pine, Scots pine, and occasionally Douglas–fir and true firs

In urban areas, Scots/Scotch (*Pinus sylvestris*), Austrian (*Pinus nigra*), and Ponderosa pine (*Pinus ponderosae*), have been reported damaged by this insect. New or continued infestations have been seen yearly, since 2010.

Pitch mass borer attacks appear as large, oozing masses of soft, light-pink sap that forms in response to larval feeding beneath the bark. Repeated attacks can seriously weaken trees and kill branches. Heavily damaged branches and trunks are often more susceptible to breakage. The most severe damage is usually to trees less than 20 feet tall, though pitch mass borer has been attacking larger trees in the urban landscape.

Pitch mass borer may be attracted to trees that are under stress due to: drought, over-irrigation, soil compaction, root injury, improper pruning cuts, mechanical damage, or other injuries. Infested trees may also be more susceptible to attack by black pineleaf scale or pine engraver beetle.

Figure 4.Pitch mass borer (Photo Eric R. Day, Bugwood.org).

Insects: Non-native

European Gypsy Moth
Lymantria dispar

Hosts: various deciduous tree species

Since the late 1800's, gypsy moth caterpillars have defoliated millions of acres in the northeastern United States. The gypsy moth feeds on over 250 deciduous tree species and infestations can build rapidly causing widespread defoliation. Tree mortality may occur after successive years of heavy defoliation. Infested areas may be subject to quarantine to prevent the spread of the insect.

The caterpillars can also be a nuisance to homeowners by crawling over homes, vehicles, and outdoor furniture. Hairs found on the caterpillars can also cause allergic reactions in some individuals.

The gypsy moth was first detected in Utah in 1988 at Mount Olympus Cove, Salt Lake County. Being notorious hitchhikers they were probably transported into Utah from an infested area in the eastern U.S. Since then, the Utah Department of Agriculture and Food in cooperation with two USDA agencies, the Animal Plant Health Inspection Service and the United States Forest Service, place detection traps throughout the state using the GMWest model BioSIM to determine areas of highest risk of introduction and establishment. This model integrates climate and elevation data to predict the probablility of GM establishment. Eradication treatments have been used to treat over 73,000 acres since 1989. No aerial application projects have been conducted since 1999 within the state and no GM have been caught in traps since 2008.

In 2013 and 2014, 1,669 detection traps and 1,856 detection traps, respectively, were deployed throughout the state with no gypsy moths caught.

DISEASE STATUS

Stem and Branch Diseases

Dwarf Mistletoes

Arceuthobium spp.

Hosts: Douglas-fir, pines, and true first

Figure 5. Southwestern dwarf mistletoe (Photo: John Guyon; FHP, OFO).

Dwarf mistletoes (DM) are the single most damaging agent 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 typically observed in infected trees. Heavy dwarf mistletoe infections can predispose trees to insects and other diseases, reduce incremental growth, affect the forest canopy structure, lower resistance to drought, and influence wildlife habitat, recreation and aesthetics. Since dwarf mistletoe infects trees of all ages, infection may exist in secondary growth and regeneration, as well as young and old forests.

Piñon Blister Rust

Cronartium occidentale

Hosts: Colorado and singleleaf piñon

This native rust causes stem rust cankers and branch flagging on both Colorado piñon and singleleaf piñon in Utah. This disease kills small trees. These rust infections are commonly associated with attacks by the pitch mass borer and tend to be located near streams and wet areas where the alternate host (primarily *Ribes spp*, currants and gooseberries) are located.

Thousand Cankers Disease

Hosts: all walnut species (in UT: Eastern, black, and English)

Figure 6. Adult Walnut Twig Beetle (Photo: Javier Mercado, Bugwood.org).

The walnut twig beetle, *Pityophthorus juglandis*, along with a fungus, *Geosmithia morbida*, are two agents causing dieback and mortality of walnut trees in many western states (Figure 6). The tiny, reddish-brown beetles (1/16" long) create galleries in branches, and introduce *Geosmithia morbida*. *Geosmithia morbida* causes cankers to form under the bark, and these cankers coalesce, eventually girdling off entire branches and the bole of the tree (Figure 7). The large numbers of cankers associated with this disease give it its' name – thousand cankers disease.

Figure 7.Black walnut with branch dieback (Photo: Danielle Malesky; FHP, OFO).

The fungus and beetle only occur on walnut species. In the Western US, it takes about 8-10 years of continuous feeding of the beetle to deliver enough fungus to kill a black walnut tree. Thousand cankers disease and walnut twig beetle were identified in Tennessee in August 2010. It is not known how the beetle and fungus will act and what the impact of TCD might be in native eastern black walnut ecosystems. Movement of infected black walnut wood products could further spread TCD. Many states have now instituted quarantines on the movement of walnut.

In Utah, a detection and trapping project was

Figure 8. Lure and funnel trap (Photo: Danielle Malesky; FHP, OFO).

Figure 9. Dispersal study of walnut twig beetle (Photo: Steve Seybold; FS, PSW, Davis, CA).

implemented in 2011 at 20 sites from Utah County to Box Elder County (Figure 8). Positive catches were found at 19 sites. In 2012, the detection and trapping project continued and was expanded to southern Utah (Juab County). Two additional subsets were added in 2012. First, a dispersal test was conducted at two of the trap sites to determine the flight range of the beetle (Figure 9), and a baited branch study was initiated to identify life history, number of generations per year, and overwintering life stages of the walnut twig beetle. The dispersal test is complete, and the results have been incorporated into the national trapping guidelines. The project continued into fall 2013/spring 2014 with the baited branch study at ten sites with the highest trap catches of walnut twig beetle. In addition, traps had been placed at four of these ten sites. Positive identifications of walnut twig beetle were made from Preston, ID south to Cedar City, UT. Dissections of baited and un-baited branches assisted research in adequately describing the biology and life history of walnut twig beetle. Three larval instars were described from the baited and un-baited branch study, elucidating specific life history traits previously not described. Adult life stages were present throughout the entire collection period, with increases and presence of larvae and pupae indicating a univoltine lifecycle. Additionally, researchers were able to assess yearly fluctuations in population, trapping guidelines, and predator presence (Dallara, P.L. 2013).

Root Diseases

When present, root diseases spread from the roots of one tree to another, and to a limited extent through the soil. Root diseases are often called "diseases of the site", indicating that once present in a forest they tend to persist throughout the entire lifespan of the trees on that site. Susceptibility of the trees and virulence of the pathogens involved varies from one area to another. In Utah, root diseases are less damaging than in other areas with moister climates and forests that have been impacted by exotic pathogens. True "root disease centers", areas with a high concentration of root disease, are rare in the state. More commonly, evidence of root disease is scattered throughout many forests, with varying degrees of impact. Root diseases are intimately involved with populations of bark beetles, with endemic bark beetle populations often associated with root disease centers.

Several tree conditions are symptomatic of all root diseases. The symptoms can vary if trees are killed rapidly or with size of the tree. The foliage of small trees that have been killed rapidly often turns red. On older trees many of these agents can act as butt or root decays without killing the tree. Trees that have a portion of their root system impacted by root diseases often exhibit several symptoms, including; thinning in the crown from the lowest part towards the highest, and from older foliage towards the younger. In general, the production of conspicuous fruiting bodies of root diseases is rare in Utah, occurring most often in relatively moist years. Several of these diseases can also act as saprophytes, which induce decaying of dead material.

Annosum Root Disease

Heterobasidion annosum

Hosts: Douglas-fir, pines, spruce, and subalpine fir

This disease can be found throughout the state, but frequently acts as butt decay or as a saprophyte on dead trees, stumps, and roots. It occurs in trees of all ages. The symptoms on larger trees include a thinning crown and fruiting bodies or conks that develop in decayed stumps and roots. The conks are woody to leathery with a dark brown upper

Figure 10. Annosum conk at the base of a tree (Photo: John Guyon; FHP, OFO)

surface and cream colored pore surface (Figure 10). Advanced decay in the root tissues looks white, stringy, and somewhat laminate.

Armillaria Root Disease
Armillaria spp.

Hosts: Douglas-fir, Engelmann spruce, subalpine fir, white fir, and pines

Figure 11. Armillaria fans on Ashley National Forest (Photo: John Guyon; FHP, OFO).

Evidence of Armillaria root disease can be found throughout the state. It often functions as a weak parasite killing trees experiencing environmental stress. In southern Utah, it may act as a primary pathogen killing mature and immature ponderosa pine and mature fir and spruce on cool sites at higher elevations. It often acts as a thinning agent in young stands or in areas with shallow, poor soils. Symptoms of Armillaria include heavy resinosis at the root collar, and thick fan-shaped mats of white fungus tissue under the bark where root and root collar tissue are dying (Figure 11). The fungus produces rhizomorphs that resemble black string-like structures that can move through the soil a few feet to infect other roots. When present, Armillaria mushrooms grow in clusters from the roots or at the base of the tree. The decay caused by the fungus is yellowish and stringy/spongy and often contains black lines called zone lines.

Black Stain Root Disease
Leptographium wageneri

Host: Colorado and singleleaf piñon pine

Black stain root disease is an important disease of several hosts, but it is only found on piñon pine in Utah. It usually kills infected trees within a few years, and can result in groups of tree mortality several acres in size. Pockets of infected trees are preferred hosts for low-level populations of piñon engraver beetles (*Ips confusus*). No new pockets of black stain root disease were observed by aerial survey in 2013 and 2014.

Leaf and Needle Diseases

Aspen Leaf Spot
Marssonina populi

Host: aspen

Figure 12. Symptoms of aspen leaf spot.

Aspen leaf spot is the most common leaf disease of aspen in the West. Severe outbreaks may cause foliar browning in midsummer and nearly complete defoliation by early August. Re-growth usually follows in late summer and early autumn. Symptoms include small brownish spots on infected leaves in mid- to late-summer. The spots later enlarge and turn black in color. They will vary in size and appear irregular in shape with a yellowish border (Figure 12). Blight and leaf spot caused by this disease have been seen in the past throughout the host type, and although not indicated on ADS maps, it is likely a contributing factor to aspen dieback and decline.

DECLINES / 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 diseases 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.

Recently, an unidentified root collar-feeding weevil killed trees on the Uinta-Wasatch-Cache National Forest. The extent of damage attributed to this weevil has not yet been determined.

In 2013 the total acreage of subalpine fir affected by this mortality complex (SAFMC) increased to 6,700 acres. All counties in Utah except Beaver, Kane, Tooele, Washington, and Wayne counties had some associated mortality. Most mortality was mapped in Summit, Sanpete, and Wasatch counties.

In 2014, mortality increased over three-fold to 24,000 acres. Only Kane and Washington counties had no mortality reported.

Aspen Decline

Host: aspen

Aspen dieback/decline mapped by aerial detection survey increased 14% in 2013 from 2012 numbers, and again in 2014, yet remained at low levels compared to the peak in aspen dieback/decline recorded from 2006 through 2008. Aspen dieback/decline has been attributed to a complex of agents including drought, grazing, poplar borer (Saperda calcarata), bronze poplar borer (Agrilus liragus), Cytospora canker (Valsa sordida) and sooty bark canker (Encoelia pruinosa). The borers and Cytospora canker disease agents are commonly considered secondary pests. Sooty bark canker is usually considered a disease of older stands.

In recent years, aspen bark beetles (Trypophloeus populi and Procryphalus mucronatus) have been associated with damage. Aspen bark beetles are now common in many Utah stands with

dieback and decline symptoms. Field observations indicate that Trypophloeus attack trees that still have a large component of "green bark", while Procryphalus is found in trees in which the bark is almost entirely dead. Aspen mortality caused by bark beetles, borers, and canker diseases increased as a result of significant drought periods during the last decade. Collectively, this suite of damaging agents is associated with stressed, older aspen with high rates of mortality and regeneration damage from grazing pressure. In most of the Intermountain Region aspen stands have at least some suckering and do not have the symptoms of sudden aspen decline reported in other Regions

ABIOTIC DAMAGE

Frost Damage

Hosts: maple, gambel oak, aspen, all conifers can be affected but, Douglas-fir, and spruce are more susceptible

Freeze damage occurs when temperatures drop 2˚ to 5˚ below freezing after tree growth has started in the spring. The young branch tips of trees affected by freeze damage droop, and turn brown, and new shoots or needles of breaking buds are killed. This damage may result in branch dieback, stunted growth, and poor tree form.

There was no frost damage mapped in Utah in 2013 or 2014.

Blowdown

Areas of concentrated, high velocity winds can cause trees to blow over often referred to as blowdown. 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. Epidemic beetle populations may then attack and kill standing live trees, most often adjacent to the blowdown.

There was no blowdown mapped in Utah in 2013 or 2014.

Snow Avalanches/Mudslides

Like blowdown damage, snow avalanches and mudslides knock down trees and may provide an abundant, local food source for certain bark beetles, enabling populations to build.

There were no avalanches or mudslides mapped in Utah in 2013 or 2014.

Drought

Drought can influence insect and disease activity. Drought- related damage to gambel oak was mapped in Utah, Washington, Piute, and Weber counties in 2013 but not in 2014.

NOXIOUS WEEDS

Noxious weeds are a continuing problem for all Western states. They have the ability to aggressively colonize disturbed habitats thus displacing native plant species and altering ecosystems. Several state and federal agencies have the responsibility for monitoring and controlling noxious weeds. As of 2014, approximately 338 species of exotic aquatic and terrestrial plants infest lands in the State of Utah (EDDMapS- Early Detection & Distribution Mapping System-University of Georgia, Center for Invasive Species and Ecosystem Health). Utah has declared 27 of these species as noxious weeds. Noxious weeds are grouped into one of three classes, depending upon their management priority. "Class A" weeds have a relatively low population size within the State and are of highest priority being an Early Detection Rapid Response (EDRR) weed. "Class B" weeds have a moderate population throughout the State and generally are thought to be controllable in most areas. "Class C" weeds are found extensively in the State and are thought to be beyond control. Statewide efforts would generally be towards containment of smaller infestations. Most counties in Utah have listed additional noxious weeds that are of local concern.

Class A weeds include, spotted knapweed, leafy spurge, black henbane, medusahead, Oxeye daisy, sulfer cinquefoil, Johnsongrass, purple loosestrife, yellow starthistle, leafy spurge, St. Johnswort, yellow toadflax, and diffuse knapweed. Class B weeds include Bermudagrass, hoary cress, musk thistle, perennial pepperweed, Russian knapweed, Scotch thistle, Dalmation toadflax, dyer's woad, and poison hemlock. Class C weeds include quackgrass, houndstongue, field bindweed, Canada thistle, and saltcedar. The exact acreage of lands infested by these noxious weeds in each county is unknown, however, Table 4 lists the noxious weeds by county as of 2012.

For more up-to-date information on Utah Noxious Weeds go to: **http://www.utahweed.org**

The following noxious weed websites, while not inclusive, give additional information on noxious weeds; such as biology, history, and control.

http://www.invasivespeciesinfo.gov/
This website is the gateway to federal, state, local, and international efforts concerning invasive species.

http://www.ipm.ucdavis.edu
University of California integrated pest management website has information on how to identify and manage pests, educational resources, and research information.

http://invader.dbs.umt.edu
The University of Montana's INVADERS Database is a comprehensive database of exotic plant names and weed distribution records for five states in the northwestern United States. It is used as 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.

https://www.cdfa.ca.gov/plant/ipc/encycloweedia/encycloweedia_hp.html

California Department of Food and Agriculture has a very comprehensive website. Information includes description, biology, distribution, habitat, and management of plants and control methods. Pictures of the plants in various stages are just a click away.

http://www.nwcb.wa.gov
State of Washington's noxious weed control board website has information on numerous weeds. Topics include identification, why it's a noxious weed, geographic distribution, reproduction, and control options such as mechanical, herbicide, cultural, and biocontrol potentials.

http://www.invasiveplantatlas.org
The Invasive Plant Atlas of the United States website is a collaborative project between the National Park Service, The University of Georgia Center for Invasive Species and Ecosystem Health, the Invasive Plant Atlas of New England, and the Lady Bird Johnson Wildflower Center, that assists users with identification, early detection, prevention, and management of invasive plants.

EDDMapS 2016- Early Detection and Distribution Mapping System. University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at: **http://www.eddmaps.org/**.

Table 6. The county locations of Utah noxious weeds grouped by priority class.

Sources: Noxious Weed Field Guide for Utah (Belliston et al. 2010), USDA National Plants Database (http://plants.usda.gov/index.html), EDDMapS 2012-Early Detection & Distribution Mapping System. The University of Georgia-Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/

State Declared Noxious Weeds	Utah Counties																												
	Beaver	Box Elder	Cache	Carbon	Daggett	Davis	Duchesne	Emery	Garfield	Grand	Iron	Juab	Kane	Millard	Morgan	Piute	Rich	Salt Lake	San Juan	Sanpete	Sevier	Summit	Tooele	Uintah	Utah	Wasatch	Washington	Wayne	Weber
	Class A Weeds (Early Detection, Rapid Response)																												
Black Henbane	x	x	x	x	x		x	x	x	x	x	x			x		x	x	x	x	x	x	x	x	x	x			x
Diffuse Knapweed	x	x	x			x	x		x	x	x	x		x	x		x	x	x	x		x	x	x	x	x	x			x
Johnsongrass	x	x	x	x		x			x			x	x			x		x	x	x		x	x	x	x		x	x	x
Leafy Spurge		x	x	x	x	x	x	x	x			x		x	x		x	x	x	x	x	x	x	x	x	x		x	x
Medusa head		x	x															x	x				x						
Oxeye Daisy		x	x				x	x					x		x		x	x		x		x		x	x	x			x
Purple Loosestrife		x	x	x		x	x	x		x	x	x	x	x	x			x				x	x	x	x		x		x
St. Johnswort		x	x			x						x											x						x
Spotted Knapweed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x
Sulfur Cinquefoil																			x					x	x		x		x
Yellow Starthistle		x	x			x	x	x					x	x			x	x					x		x	x	x		x
Yellow Toadflax	x		x	x		x	x	x	x					x		x	x	x		x	x	x	x			x		x	x

State Declared	Utah Counties

Noxious Weeds	Beaver	Box Elder	Cache	Carbon	Daggett	Davis	Duchesne	Emery	Garfield	Grand	Iron	Juab	Kane	Millard	Morgan	Piute	Rich	Salt Lake	San Juan	Sanpete	Sevier	Summit	Tooele	Uintah	Utah	Wasatch	Washington	Wayne	Weber
Class B Weeds (Control)																													
Bermudagrass	x	x	x			x		x		x		x	x	x	x			x	x				x		x		x		x
Dalmation Toadflax	x	x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x			x
Dyer's Woad		x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x
Hoary Cress	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Musk Thistle	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Perennial Pepper weed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
Poison Hemlock	x	x	x			x	x	x	x			x		x	x		x	x		x	x	x	x	x	x	x	x		x
Russian Knapweed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
Scotch Thistle	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
Squarrose Knapweed	x	x	x				x		x			x	x	x	x			x	x	x	x		x		x	x	x		
Class C Weeds (Containment)																													
Canada Thistle	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Field Bindweed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Houndstongue	x	x	x	x		x	x	x	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Quackgrass	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Saltcedar	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x

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If you require this information in alternative format (Braille, large print, audiotape, etc.), contact the USDA's TARGET Center at (202) 720-2600 (Voice or TDD).

If you require information about this program, activity, or facility in a language other than English, contact the agency office responsible for the program or activity, or any USDA office.

To file a complaint alleging discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call toll free, (866) 632-9992 (Voice). TDD users can contact USDA through local relay or the Federal relay at (800) 877-8339 (TDD) or (800) 845-6136 (in Spanish). USDA is an equal opportunity provider, employer, and lender.

You may use USDA Program Discrimination Complaint Forms AD-3027 or AD-3027s (Spanish) which can be found at: http://www.ascr.usda.gov/complaint_filing_cust.html and
http://www.ascr.usda.gov/es_us/sp_complaint_filing_cust.html or upon request from a local USDA office.

Declaración de política de no discriminación de USDA

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Si usted necesita la información de este anuncio en un formato diferente (Braille, letras grandes, o por medio de sonido, etc.), llame al Centro TARGET del Departamento de Agricultura al teléfono 202-720-2600 (voz y TDD).

Si usted necesita información sobre este programa, actividad o instalaciones en un idioma diferente del inglés, llame a la agencia del Departamento que maneja este programa o actividad, o a cualquier oficina del Departamento de Agricultura.

Para someter una queja de discriminación, escriba al USDA, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, o llame gratis at 1-866-632-9992 (voz). Para llamadas TDD, llame al USDA al número 1-800-877-8339 (TDD) o (800) 845-6136 (en Español). Usted puede usar la forma de discriminación AD-3027 o AD-3027 en Español, la cual se puede encontrar en:
http://www.ascr.usda.gov/es_us/sp_complaint_filing_cust.html o puede obtener en cualquier oficina local del Servicio Forestal. El Departamento de Agricultura ofrece oportunidades de programas y de empleo libres de discriminación.