2014 **Alaska State Highlights**

In 2014, aerial surveys mapped about 1.3 million acres of forest damage from insects, diseases, declines and abiotic agents on the 32.2 million acres surveyed (Maps 1 and 2, Table 1). The total recorded damage is up 45% over 2013 (Table 2). Much of the change since last year is due to the large acreage of birch with thin crowns, as well as increases in defoliation of willow, spruce, cottonwoods and mixed hardwoods.

Diseases

Alder dieback continues to affect large areas of Southcentral and Interior Alaska. Dieback can have a variety of causes, but is usually due to canker-causing fungi. Thinleaf alder is regarded as the most susceptible Alaskan alder species, but the incidence of canker disease in Sitka alder has been increasing since 2012. Alder canker was mapped in Southeast Alaska for the first time in 2013 and confirmed in the vicinity of Haines in 2014. The pathogen is presumed to be native, but the severity and extent of damage increases under certain conditions that have yet to be clearly defined.

A localized epidemic of Dothistroma needle blight on shore pine has been ongoing near Gustavus and adjacent areas of Glacier Bay National Park since around 2010 and does not appear to be abating. Shore pine, a subspecies of lodgepole pine, has been impacted in both pine-Sitka spruce-cottonwood forests and pure pine stands. Severe disease symptoms were mapped during aerial detection surveys on about 4,500 acres in 2013 and 2014.

Examination of plots established to monitor shore pine survival found that nearly half of the severely diseased pines monitored between 2013 and 2014 had died. For more information on this project, see the essay on page 14.

An outbreak of hemlock canker disease affecting western hemlock on Prince of Wales Island since 2011 appears to be subsiding. An inoculation trial is underway near Thorne Bay and Staney Creek to determine the causal pathogen. Potential pathogens were obtained from locally diseased western hemlock trees. We consider *Discocainia treleasei* the mostly likely pathogen; trees inoculated with this fungus will be evaluated in 2015.

Hemlock dwarf mistletoe and stem decays are important chronic diseases of coastal forests that do not vary significantly from year to year. Hardwood stem decays are prevalent in Southcentral and Interior Alaska. These diseases can cause timber growth loss and mortality and create hazardous trees in urban and recreational settings. However, they also provide important ecological functions through their influence on forest structure and habitat.

Invasive Plants

A new species of vetch not previously recorded in Alaska, *Vicia hirsuta*, was found growing on a roadside in Fairbanks. Contaminated hay seed may be responsible for bringing scentless chamomile (*Tripleurospermum perforatum*) to a hay farm in the town of Nenana.

The Alaska Association of Conservation Districts awarded a total of $86,000 to 12 different organizations for invasive plant "mini-grants." Among these were funds to the Tyonek Tribal Conservation District to inventory four villages in the district, 100 miles of road and eight remote landing strips.

The Copper River Watershed Project also received funding for reed canarygrass and Bohemian knotweed control projects.

Finally, FHP personnel repeated a 2002 survey of 107 miles of roadside in the Fairbanks area, documenting the spread of bird vetch since the survey was first done. In 2002, 39% of sites visited had bird vetch; by this year it increased to 79% (Figure 1).

Figure 1. Bird vetch (*Vicia cracca*) spread dramatically along major roads in the Fairbanks area between 2002 and 2014.

Noninfectious Diseases & Disorders

Poor birch crown condition (i.e., crown thinning) was the most common type of damage mapped during the 2014 Aerial Detection Survey, affecting more than half a million acres in Southcentral Alaska. Aerial surveyors initially thought thin crowns were caused by birch leafroller defoliation, but ground checks in the weeks following the aerial survey suggested these agents were not the primary cause. Heavy catkin production of birch was observed in 2014 and has been linked to thin birch crowns.

However, early-season defoliators or microscopic pathogens may not have been detectable during ground checks. An essay on this topic can be found on page 54. Focused monitoring of birch stands is slated for 2015.

Nearly 20,000 acres of actively dying yellow-cedar trees were mapped in 2014, the highest acreage recorded since 2011. This climate-driven decline is associated with freezing injury to fine roots; yellow-cedar is most vulnerable on sites with insufficient insulating snowpack and hydrological conditions that lead yellow-cedar to root shallowly.

Insects

In 2014, more than 380,000 acres of external feeding damage and 146,000 acres of internal feeding damage on hardwood trees was mapped during aerial detection survey. Birch and alder trees were impacted by defoliators throughout the state. Leaf roller activity was reported throughout the state; especially on birch in Port Alsworth, Tanalian Falls, Fairbanks, and on Sitka alder along Perseverance Trail in Juneau (Figure 2).

There was a 125% increase in the amount of large aspen tortrix damage mapped in 2014, most of which was observed in areas around the upper Kuskokwim, the upper Kobuk and the Koyukuk Rivers. Aspen leaf miner activity also increased slightly from 2013, with damage especially heavy south of Fairbanks along the Tanana River.

Conifer defoliation was mapped on 68,000 acres during the 2014 aerial survey. Hemlock sawfly activity was down by more than half compared to 2013. Western black-headed budworm activity was also down throughout the state; the large outbreak recorded in 2013 around Wood-Tikchik Lakes was undetectable in 2014. A large infestation of the spruce bud moth (*Zeiraphera canadensis)* was noted during a site visit to Yakutat. Bud moths have repeatedly caused damage in this area; however, the impacts are typically aesthetic.

Spruce beetle activity continues to decrease, yet still remains the leading cause of spruce mortality in Southcentral, Southwest and Southeast Alaska. The decreased activity in 2014 may be attributed to a summer with above-average precipitation during the beetle's flight period. Northern spruce engraver beetle activity was also down compared to 2013; most of the reported activity occurred in the northeastern and central portions of Interior Alaska. Damage by the western balsam bark beetle was observed northeast of Skagway for the first time since 2011.

Figure 2. Leaf roller damage on Sitka alder as seen from the air.

Aerial Insect and Disease Detection Survey 2014

Significant Pest/Disease Activity

- Alder Defoliation/Dieback — 177,000 Acres
- Aspen Defoliation — 139,000 Acres
- Spruce Bark/Engraver Beetle — 22,100 Acres
- Birch Defol/Lf Roller/Aphids/Abiotic Thinning — 583,000 Acres
- Cottonwood Defoliation — 53,400 Acres
- Willow Defoliation/Dieback/Miners — 149,500 Acres
- Spruce Defoliation — 58,900 Acres
- Cedar Decline — 19,900 Acres

Land Cover

- Conifer Forest
- Mixed/Broadleaf Forest
- Shrub
- Non-Forest
- Water

Note: Many of the most destructive diseases are not represented on the map due to these agents not being detectable from aerial surveys.

Activity polygon area may be larger than actual area because activity polygons are enhanced with a large border to aid visualization.

0 100 200 Miles

0 150 300 Kilometers

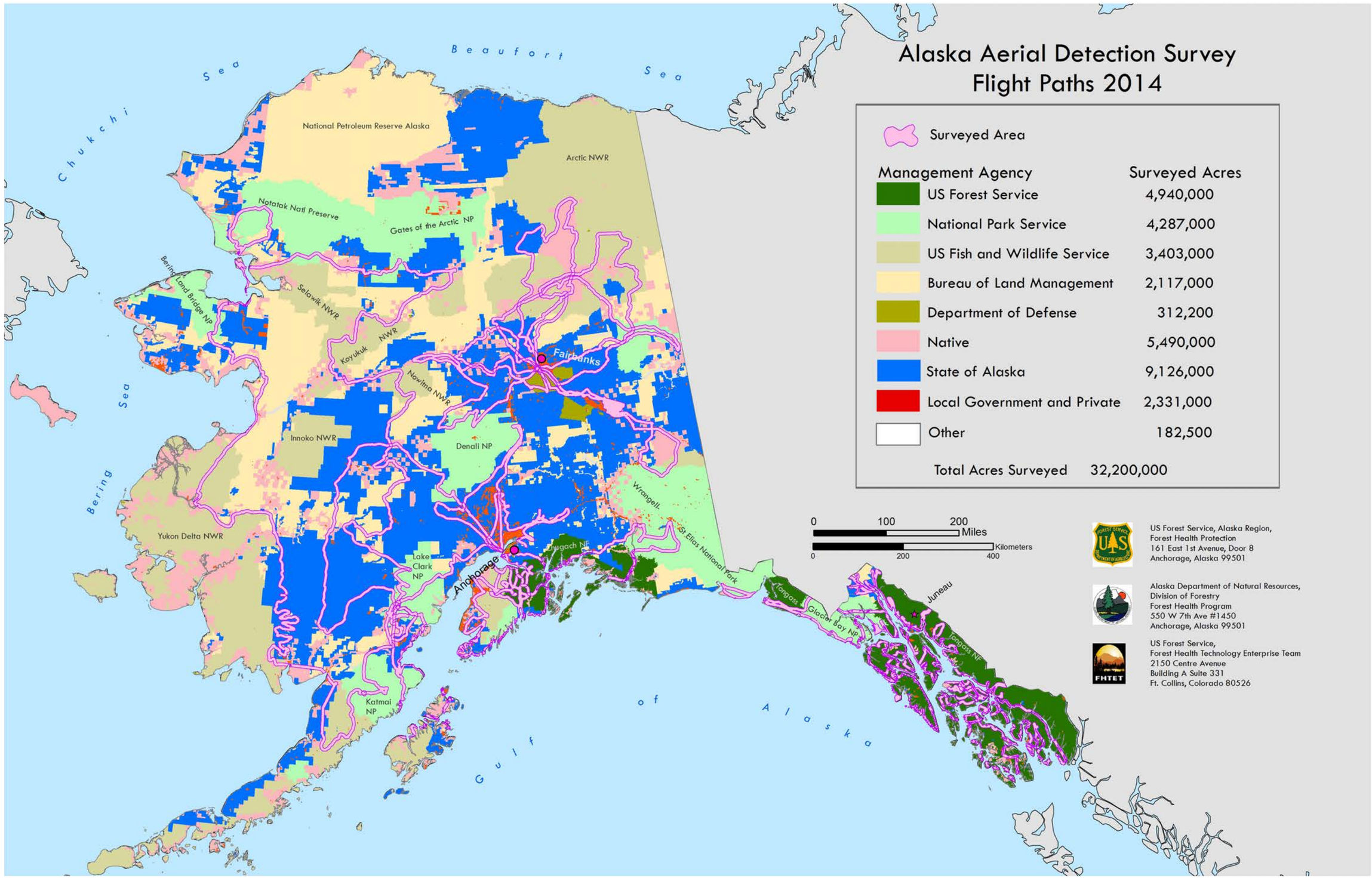
US Forest Service, Alaska Region,
Forest Health Protection
161 East 1st Avenue, Door 8
Anchorage, Alaska 99501

Alaska Department of Natural Resources,
Division of Forestry
Forest Health Program
550 W 7th Ave #1450
Anchorage, Alaska 99501

US Forest Service,
Forest Health Technology Enterprise Team
2150 Centre Avenue
Building A Suite 331
Ft. Collins, Colorado 80526

Land Cover: U.S.G.S. EROS
Alaska Field Ofice

Map 1. Aerial insect and disease.detection survey 2014.



Map 2. Alaska aerial detection survey flight paths 2014.

Table 1. Forest insect and disease activity detected during aerial surveys in Alaska in 2014 by land ownership[1] and agent. All Values are in acres[2].

Category	Agent	*Total Acres*	*national forest*	*native*	*other federal*	*state & private*
Forest Diseases	Alder dieback	125,358	712	8,665	59,189	56,792
	Dothistroma needle blight	4,155		166	2,033	1,955
	Willow dieback	3,391		88	413	2,891
	Spruce broom rust	801		517	279	5
Leaf Feeders (Defoliators, Miners, and Aphids)	Willow defoliation	126,104	178	50,592	62,124	13,211
	Aspen leaf miner	123,676		47,440	51,686	24,551
	Large aspen tortrix	7,984		3,197	2,507	2,280
	Aspen defoliation	6,933	32	2,664	1,897	2,340
	Birch leaf roller	121,148		36,798	48,056	36,294
	Birch defoliation	18,486	70	8,506	6,841	3,070
	Birch leaf miner	2,407				2,407
	Birch aphid	1,483			1,286	197
	Dwarf birch defoliation3	3,866			3,866	
	Spruce defoliation	58,898	12,693	109	46,061	35
	Cottonwood defoliation	52,922	7,515	10,972	22,577	11,858
	Cottonwood leaf beetle	448		355	79	15
	Alder defoliation	50,642	1,210	13,094	26,174	10,164
	Alder leaf roller	818	356	9		453
	Hardwood defoliation	42,052	15	11,623	23,593	6,821
	Willow leaf blotch miner	19,970		14,172	5,010	787
	Conifer defoliation	4,051	2,487	546	84	933
	Spruce needle aphid	425	72		141	212
	Black-headed budworm	98	98			
	Hemlock sawfly	3,946	3,579	122		245
Bark Beetles	Spruce beetle	14,795	212	115	9,284	5,183
	Northern spruce engraver	7,340		1,265	3,802	2,273
	Western balsam bark beetle	186				186
Abiotic and Animal Mortality	Birch crown thinning	439,342	1,304	13,730	90,024	334,285
	Cedar decline[4]	19,907	18,810	331	51	715
	Flooding/high-water	12,877	1,319	4,632	2,551	4,375
	Porcupine damage	1,815	1,606	48	55	105
	Windthrow/blowdown	367	240		20	106
	Landslide/avalanche	313	241	5	57	9

[1]Ownership derived from the 2008 version of Land Status GIS coverage, State of Alaska, DNR/Land records Information Section. State & private lands include: state patented, tentatively approved, or other state-acquired lands, and patented disposed federal lands, municipal lands, or other private parcels.

[2]Acre values are only relative to survey transects and do not represent the total possible area affected. Table entries do not include many of the most destructive diseases (e.g., wood decays and dwarf mistletoe), which are not readily detectable in aerial surveys.

[3]Defoliation of birch trees and dwarf birch has been reported separately. “Dwarf birch defoliation” primarily represents defoliation of dwarf birch, but also includes defoliation of Labrador tea, small willows, Spiraea and other woody shrubs, and is attributable to several external leaf-feeding insects. In contrast, birch tree defoliation is caused by a combination of internal and external leaf-feeding insects.

[4]Acres represent only areas with actively dying yellow-cedars. More than 400,000 acres of cedar decline have been mapped over the years in Southeast Alaska.

Table 2. Affected area (in thousands of acres) for each host group and damage type from 2010 to 2014. Note that the same stand can have an active infestation for several years. For detailed list of species and damage types that compose the following categories, see Appendix II on page 86.

Host Group / Damage Type[1]	2010	2011	2012	2013	2014
Abiotic damage	12	16.3	15.8	6.2	13.6
Alder defoliation	7	123	58.5	83.9	51.5
Alder dieback	44.2	142	16.4	15.7	125.4
Aspen defoliation	464	145.6	82.7	53.4	138.6
Birch defoliation	33.3	76.7	177.8	278.2	586.7
Cottonwood defoliation	14.1	23.4	27.1	9.4	53.4
Hemlock defoliation	9.1	11.1	5.5	13.3	3.9
Hemlock mortality	0.4	6.2	0	0	0
Porcupine damage	0.9	0.2	0	0.5	1.8
Shore pine damage	0	0	2.9	4.8	4.5
Spruce damage	40.9	5.5	14.2	7.5	60.1
Spruce mortality	101.8	55.5	19.8	35.1	22.1
Spruce/hemlock defoliation	0.3	0	0	121.2	4.1
Willow defoliation[2]	562.7	63.9	47.7	16.2	146.1
Willow dieback	0.7	0.3	0	0	3.4
Total Damage Acres[3] **-**	**1291.4**	**669.7**	**448.4**	**645.4**	**1257.5**
Total Acres Surveyed[3] **-**	36,878	31,392	28,498	31,497	32,172
Percent of Acres Surveyed Showing Damage	3.5%	2.1%	1.6%	2%	3.9%

[1]Values summarize similar types of damage, mostly from insect agents, by host group. Disease agents contribute to the totals for alder dieback, hemlock mortality, shore pine damage, spruce defoliation. Abiotic damage agents include fire, wind flooding, landslides, and freezing damage.
[2]Although these acreage sums are due to defoliating agents, a large portion of the affected area has resulted in mortality.
[3]Total damage and surveyed acres represented in thousands of acres.