Alaska Forest Health Highlights

2008 Survey Year

State & Private Forestry, Forest Health Protection (FHP), together with Alaska Department of Natural Resources (DNR), conducts annual statewide aerial detection surveys across all land ownerships. In 2008, staff and cooperators identified over 450,000 acres of forest damage from insects, disease, declines and selected abiotic agents on over 36.4 million acres surveyed (**Map 1**). This marks a notable decrease in aerially-observed forest disturbance as compared to recent years (**Table 1**). The decline may be due to the fact that all across Alaska, 2008 was a relatively cool, wet year. The aerially-recorded damage numbers generally do not represent the acres affected by pathogens, since many of the most destructive disease agents (i.e. wood decay fungi, root diseases, dwarf mistletoe, canker fungi, etc.) are not visible by aerial survey. Additional information regarding forest health provided by ground surveys and monitoring efforts is also included in this report, complementing the aerial survey findings. Forest Health Protection staff also continually work alongside many agency partners on invasive plant issues, including roadside and high-impact area surveys, public awareness campaigns, and general education efforts.

Insects

The cool, wet weather that Alaska experienced in 2008 may have contributed to the lower damage levels for insect defoliators than were observed in previous years. In interior Alaska, this was the eighth consecutive year of outbreak of the **aspen leaf miner**, which normally attacks early in the summer and within a short time infests much of the aspen in that part of the state. At this point, aspen leaf miner populations appear to be collapsing and next year's trend will likely reveal whether this outbreak has run its course or will continue indefinitely.

Similarly, **willow leaf blotch miner** damage acres declined compared with 2007 levels. Damage caused by the **amber-marked birch leaf miner** and the **birch leaf roller** were much less obvious this year than in recent years past. Many of the birch trees examined in the Fairbanks area had some level of leaf damage caused by these two insects, but for the most part, the damage was light.

Monitoring of the **spruce budworm** continued this summer. There were very few reports of budworm larvae this spring and damage to trees was light, indicating that the

Table 1. 2008 forest insect and disease activity as detected during aerial surveys in Alaska by land ownership[1] and agent[2]. All values are in acres[3].

Damage Agent	National Forest	Native Corp.	Other Federal	State & Private	Total Acres
Aspen defoliation[4]		117	2,156		2,273
Aspen Leaf Miner		37,909	33,878	138,448	210,235
Black-headed budworm	1,737	549	121	334	2,741
Cedar decline faders[5]	8,070	254		705	9,029
Cottonwood defoliation[4]		2,259	969	9,994	13,172
Flooding/high-water damage	193	437	951	1,270	2,851
IPS and SPB[6]		3,608	4,482	7,661	15,751
Ips engraver beetle		14,006	21,710	8,159	43,875
Landslide/Avalanche	496			141	637
Large aspen tortrix		60	2,960	4,164	7,184
Porcupine damage	611	73		446	1,130
Spruce beetle	976	9,329	25,780	33,306	69,391
Spruce budworm		1,385	162	4,546	6,093
Unknown hemlock mortality	1,731	36		261	2,028
Western gall rust	35	276	3,806		4,117
Willow defoliation[7]		23,722	37,097	15,996	76,815
Windthrow/Blowdown	163	34	155	40	392

[1]Ownership derived from 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 of patented disposed federal lands, municipal, 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 detectable in aerial surveys. Damage acres from animals and abiotic agents are also not shown in this table.

[3] See appendix for a discussion about the nature and limitations of aerial detection survey data.

[4]Significant contributors include leaf miners and leaf rollers for the respective host. Drought stress also directly caused reduced leaf size or premature foliage loss.

[5] Acres represent only spots where current faders were noticed. Cumulative cedar decline acres can be found in Table 9.

[6]These acreage values are a cumulative effect IPS engraver beetle (*Ips perturbatus)* and Spruce Bark Beetle (*Dendroctonus rufipennis)* working in tandem on the same stands of trees.

[7] Acres recorded for willow defoliation are primarily from leaf miners. The affected acreage is much more extensive than can be mapped.

current outbreak is likely in decline. Again, a possible reason for the reduced activity this year may have been the unusually cool and wet summer of 2008.

In contrast to other insect activity, there was a pronounced increase in **spruce beetle** and **engraver beetle** activity in interior Alaska during summer 2008. Pockets of both spruce beetle and northern spruce engraver are still active on the fringes of the large burns of 2004 and 2005 and it's becoming more apparent that these two species are working in concert over significant areas of the interior. This complicates our survey estimates for these species. Also, this year's tally of total spruce beetle activity in the southcentral part of the state is very likely underestimated, because an unexpected

reallocation of Federal funding midway into the summer eliminated that area from survey coverage. Regardless, both spruce beetle and northern spruce engraver beetles continued to maintain active populations in Alaska's interior and across several other areas in 2008.

Several small and active engraver beetle infestations were located on privately-owned parcels between Tok and Fairbanks. These likely resulted from improper slash management or the disposal of infested slash from building-site clearing, firewood cutting, or white spruce house-log cutting activities.

Forest health staff provided technical assistance and advice to several affected landowners, including direct assistance with one semiochemical *Ips* baiting and trapout project north of Fairbanks, during 2008.

Diseases

Alder *Phytophthora*, *Phytophthora alni* subsp. *uniformis*, was detected in five riparian locations in Alaska in 2007 and 2008. A very closely related pathogen is responsible for widespread mortality of alder across Europe. No alder *Phytophthora* subspecies were known to exist in natural alder ecosystems in North America before the Alaska findings. The significance of this finding and impact to Alaskan alder species is not yet understood. Monitoring and research is underway.

An apparently **new *Phytophthora* species**, currently undescribed, was also found during riparian alder surveys. Although we know very little about the hosts, ecology or pathology of the new species, we do know it is taxonomically related to several other tree pathogens of importance, including *P. lateralis*, a canker pathogen of Port Orford-cedar; *P. hibernalis*, a citrus pathogen that also can cause cankers on Port Orford-cedar; *P. foliorum*, a new species of unknown virulence and host range; and *P. ramorum*, an oak pathogen. It is agreed that the new Phytophthora isolate is unique and that its formal description is worth pursuing. Since the new isolate is in the same group (Clade 8C) which contains *P. ramorum*, the new isolate may be useful for improving the accuracy of detection assays for *P. ramorum*.

Statewide, **wood decay** and **root rot** of live trees occur on every tree species across millions of acres and, on an annual basis, substantially reduce tree volume and contribute to tree mortality. In southeast Alaska, for example, approximately one-third of the gross volume of forests is defective due to stem and butt rot fungi. Also, wood decay fungi annually cause considerable defect in mature white spruce, paper birch, and aspen stands of southcentral and interior Alaska.

In southeast Alaska, **hemlock dwarf mistletoe** continues to cause growth loss, top-kill, and mortality but also provides wildlife habitat in old-growth forests. **Yellow-cedar decline** has been mapped on approximately 500,000 acres across an extensive portion of southeast Alaska. Active tree mortality was at fairly low levels in 2008, indicating a slowing of the problem on previously-impacted acres. The cause appears to be related to spring freezing injury in open canopy forests characterized by reduced snowpack, although many areas received heavy snow the last two winters. In 2008, **spruce needle rust** (*Chrysomyxa ledicola)* occurred at the highest levels in memory in interior Alaska. Reports were received of rivers running yellow with the extremely high rust spore load.

Table 2. Affected area (in thousands of acres) for each host group and damage type over the prior five years and a 10-year cumulative sum.

Host Group/ Damage Type[1]	2002	2003	2004	2005	2006	2007	2008	Ten Year Cumulative[2]
Alder Defoliation[3]	1.8	2.8	10.5	17.3	10.6	10.0	0.7	60.0
Aspen Defoliation	301.9	351.4	591.5	678.9	509.5	796.0	2,190.7	2,923.5
Birch Defoliation	83.0	217.5	163.9	47.5	13.2	1.5	0.1	452.2
Cottonwood Defoliation	19.9	13.1	16.7	8.0	24.6	11.5	13.1	116.6
Hemlock Defoliation	1.4	0.2	0.5	0.2	0.0	0.1	0.1	8.9
Hemlock Mortality	0.2	0.0	0.0	0.1	0.0	0.0	2.0	2.6
Larch Defoliation	0.0	0.6	14.2	16.8	2.7	0.1	0.2	269.4
Larch Mortality	4.8	22.5	11.8	0.0	0.0	0.0	0.2	69.8
Spruce Defoliation	11.0	61.5	93.4	31.9	68.1	41.9	6.9	433.6
Spruce Mortality	53.6	92.8	145.2	93.8	130.6	183.9	129.1	1,115.0
Spruce/Hemlock Defoliation	3.4	15.1	1.5	1.4	1.5	10.3	2.8	81.1
Spruce/Larch Defoliation	0.0	0.3	0.0	0.3	2.8	0.0	0.0	3.4
Sub Alpine Fir Mortality	0.2	0.0	0.2	0.8	0.5	0.1	0.0	1.7
Willow Defoliation	0.3	83.9	111.2	44.5	50.7	92.7	76.8	649.3
Total damage acres	**481.5**	**861.7**	**1,160.50**	**941.5**	**814.8**	**1,148.1**	**451.75**	**6,187.09**
Total acres surveyed	24,001	25,588	36,343	39,206	32,991	38,365	36,402	
Percent of acres surveyed showing damage	**2.0**	**3.4**	**3.2**	**2.4**	**2.5**	**3.0**	**1.2**	

[1]Summaries identify damage, mostly from insect agents. Foliar disease agents contribute to the spruce defoliation and hemlock mortality totals. Damage agents such as fire, wind, flooding, slides and animal damage are not included. Cedar mortality is summarized in Table 9.

[2] The same stand can have active infestation for several years. The cumulative total is a union of all areas from 1999 through 2008 and does not double count acres.

[3] This total includes defoliation on alder from alder canker, drought and insects.

Rust fungi were at low to moderate levels in southeast in 2008, down from the peak year of 2007. The **shoot and foliar blight fungus**, ***Sirococcus tsugae***, was found at high levels and killed small mountain hemlock trees in 2008, particularly where they were planted in ornamental settings in the Juneau area. Also, the **canker fungus *Grovesiella abieticola*** was found killing ornamental true fir in Juneau.

In southcentral and interior Alaska, widespread alder mortality caused by ***Valsa melanodiscus* and other alder canker fungi** continued to intensify in all alder species. Hardwood canker fungi of birch and aspen continue to be widespread, contributing to growth loss and stem breakage. **Saprophytic decay** continues to degrade spruce beetle-killed trees. A wood deterioration study on Kenai Peninsula indicated a relatively slow overall decomposition rate (1.5%/year). Beetle-killed trees are predicted to influence fire behavior and present a hazard for over seven decades.

Except for yellow-cedar decline and foliar pathogens, most disease agents in Alaska are (1) rarely detected by aerial surveys and (2) underestimated for their presence and impacts. Most native diseases and declines are chronic factors that annually significantly influence the commercial value of timber resources and alter key ecological processes such as forest structure, composition, nutrient cycling, and succession.

Invasive Plants

FHP personnel, other Region 10 employees and a wide network of cooperators contributed to several landmark events related to invasive plant management in Alaska in 2008. Some of these events were the culmination of years of effort.

At a June 24, 2008 weed fair in Anchorage, **Governor Sarah Palin signed HB 330,** "an act relating to noxious weed, invasive plant and agricultural pest management and education." This legislation established a position of weed and pest coordinator for the state. A citizen-initiated **Cooperative Weed Management Area** in Anchorage was formally established in January 2008, with State and Private Forestry as one of the original signatories. A logo was unveiled by Governor Palin in June, and five weed pulls were conducted over the summer, focusing on **Canada thistle, orange hawkweed, Ox-eye daisy, birdvetch**, and **purple loosestrife**. On July 1, **Forest Service Chief Gail Kimbell** and **Regional Forester Denny Bschor** were briefed on cooperative invasive plant control efforts on, and adjacent to, the Chugach National Forest. They assisted in a reed canary grass control effort adjacent to the Forest.

FHP partnered with the University of Alaska Fairbanks to map invasive plants on the UAF campus. FHP will continue to be involved in the University's development of a long-term weed management plan. Many years in the making, the ***Invasiveness Ranking System for Non-Native Plants of Alaska*** was published in hard copy in 2008. The publication is the result of the combined efforts of several different authors and agencies, but FHP was among the most significant and sustaining contributors. The approach developed in this weed ranking system is being used as a model by the Invasive Plant Council of British Columbia and by The Nature Conservancy in New York.

In 2008, Forest Health Protection worked with the Alaska Committee for Noxious and Invasive Plant Management, and the Alaska Division of Agriculture to encourage the government of the Yukon (Canada) to respond immediately to an infestation of **leafy spurge** that had been documented in 2007 near Dawson City, YT. This species has not yet been found in Alaska. The Yukon Branch of Agriculture has begun an active management effort coupled with follow-up monitoring.

This year, Forest Health Protection delved into **citizen science** in its collaboration with the Alaska Association of Conservation Districts to develop an early-detection, rapid-response system focusing on five invasive plant species: "A citizen's guide to identifying and reporting infestations in Alaska." The booklet describes how citizens can identify the species, distinguish them from similar-looking plants, and report the finding. Hundreds of these booklets were distributed around the state.

Map 1. General forest pest activity, from 2008 aerial survey

Aerial Detection Survey - 2008

Significant Pest Activity

- Aspen Leaf Miner
  210,234 acres
- Spruce & Ips Beetle
  129,126 acres
- Willow Leaf Miner
  72,382 acres
- Active Ceder Decline
  9,105 acres

Significant Pest Activity from Insect & Disease Aerial Detection Survey, U.S. Forest Service Forest, Health Protection, Region 10 & Alaska Department of Natural Resources, Division of Forestry, Forest Health Program, 2008.

Note: Many of the most distructive diseases are not represented on the map due to these agents not being detectable from aerial surveys. Significant Pest Activity polygons are accented with a large border for visualization.

Land Cover from the National Land Cover Database (NLCD), U.S. Geological Survey, Alaska Science Center, 2008.

Land Cover

- Open Water — NCLD class 11
- Non-Forest/Non-Wetland — NCLD classes 31, 81, 82
- Mixed Forest — NCLD class 43
- Glacier — NCLD class 12
- Deciduous Forest — NCLD class 41
- Shrub — NCLD classes 51, 52
- Developed — NCLD classes 21, 22, 23, 24
- Coniferous Forest — NCLD class 42
- Wetlands/Herbaceous — NCLD classes 71, 72, 74, 90, 95

0 25 50 100 150 200 Miles
0 37.5 75 150 225 300 Kilometers

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Map 2. Survey flight paths and general ownership