

Alaska Forest Health Highlights

2006 Survey Year

Aerial detection mapping is an indispensable tool in documenting the location and extent of active forest insect and disease damage. In 2006, staff and cooperators identified over 841,278 acres of forest damage from insects, disease, declines, and select abiotic agents (Table 1) out of nearly 33 million acres surveyed (Map 2). Additional information regarding forest health provided by ground surveys and monitoring efforts is also included in the report, complimenting the broad-scope aerial survey findings.

Table 1. 2006 forest insect and disease activity as detected during aerial surveys in Alaska^{1,5}

Damage Agent²	National Forest	Native Corp.	Other Federal	State & Private	Total Acres
Alder defoliation ³	112	1,743	697	8,111	10,663
Aspen defoliation ³		5,614	10,526	1,087	17,228
Aspen leaf miner		101,507	101,611	254,764	457,882
Birch defoliation ³			785	904	1,689
Birch leaf roller		2,849	279	459	3,588
Black-headed budworm	1,267	161		35	1,463
Cedar decline faders ⁴	30,146	394	54	1,632	32,226
Cottonwood defoliation ³	3	8,209	5,193	11,214	24,618
IPS and spruce beetle		1,945	256	1,099	3,300
Engraver beetle	102	4,502	1,843	1,205	7,653
Larch sawfly		33	145	2,488	2,666
Large aspen tortrix		3,335	5,329	25,766	34,431
Spear-marked black moth		2,348	2,987	2,611	7,946
Spruce aphid	3,568	1,575	345	3,632	9,120
Spruce beetle	3,145	5,526	79,765	31,174	119,610
Spruce budworm		1,449	896	50,834	53,178
Spruce/Larch budmoth		2,391		403	2,793
Subalpine fir beetle	87		35	375	498
Willow defoliation ³	10	27,017	18,367	5,333	50,726

¹ Ownership derived from 2006 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 Significant contributors include leaf miners and leaf rollers for the respective host. Drought stress also directly caused reduced foliation or premature foliage loss.

⁴ Acres represent only spots where current faders were noticed. Cumulative cedar decline acres can be found in Table 10.

⁵ All values are in acres.

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. Trends this year indicate both ongoing range expansion of established invasives and new species establishment in Alaska. However, public familiarity and agency participation in addressing the issue continue to increase.

Insects

Hardwood defoliators continued to be the most significant functional group of insect pests in 2006. The most noteworthy is the **amber-marked birch leaf miner**, an invasive pest from Europe. This insect affected urban areas and some native forests throughout much of south-central and interior Alaska. Although not detected aurally in 2006, road surveys identified amber-marked birch leaf miner damage along nearly 20 percent of the road system between Livengood, the Canadian border, and the Susitna River. The biological control program initiated in 2003, continued in 2006 with new partners from the University of Massachusetts, Amherst. Monitoring efforts have been unable to show that the parasitoid has yet established at the release sites. The largest outbreak of **aspen leaf miner** on record in Alaska appears to be in decline possibly due to a disease affecting the insects. Activity mapped statewide was 30 percent less than in 2005 with lighter intensity in the center of recorded polygons. In 2006, over 34,000 acres of **large aspen tortrix** defoliation were identified. The majority of the statewide tortrix activity, 80 percent, was mapped in the central interior, nearly all concentrated in the Japan Hills, 70 miles south of Fairbanks.

Nearly 24,000 acres of **willow leaf blotch miner** activity were recorded during the 2006 aerial surveys. This is the 14th year in a row that this insect has been observed—a period associated with large fluctuations of leaf blotch severity. After six years of steadily increasing populations, **Sunira** in Katmai National Park appears to be on the decline. Not quite 14,000 acres of defoliation by this insect were observed during the 2006 aerial surveys, representing a 38 percent drop in activity from the previous year.

Alder defoliation mapped by aerial observers in 2006 exceeded 7,000 acres statewide. A suite of insects are associated with alder defoliation in Alaska, the most significant is the **woolly alder sawfly**, a European invasive that is well established throughout the northern U.S. and Canada. Since the discovery of the **European yellow underwing** in Haines, Juneau, and St. Lazaria Island (near Sitka), last year, this non-native moth has spread throughout southeast Alaska as well as north and west to Anchorage in 2006. Based on the rapid movement of this species, it is likely to be found in the Mat-Su valley in the next year and will likely be in Fairbanks within three years.

Only 3,500 acres of **birch leaf roller** activity were observed during the survey this year. This represents a 46 percent decline from 2005 levels. However, low-level leaf roller populations are often difficult to ascertain during aerial surveys, and it is quite likely that the current cycle of leaf roller activity is considerably more extensive than it appears to be from the air. A substantial amount of leaf roller activity was observed at ground level as casual observations in Anchorage and on the Kenai Peninsula.

Spruce aphid defoliation in southeast Alaska occurred on approximately 9,000 acres scattered throughout southeast Alaska. The current outbreak started in 1998, the worst year was in 2003 when defoliation occurred on 30,627 acres and was distributed over more of the area surveyed than in the previous five years. In 2006, four low temperature events occurred in southeast Alaska, temperatures below -15 °C killed 94 percent of the aphids in March 2006.

Spruce budworm was mapped on 53,000 acres of the Interior, concentrated along the hills and ridges around Fairbanks. Ground surveys indicate that populations are still expanding and that the outbreak will continue to intensify.

Western black-headed budworm populations are currently at endemic levels, with approximately 1,400 acres of defoliation mapped in Prince William Sound and southeast Alaska for the past three years.

Larch sawfly defoliation decreased to just over 2,500 acres in 2006. Nearly all of the defoliation occurred on Minto Flats west of Fairbanks. Smaller infestations were also noted east of McGrath where larch sawfly has been very active for a number of years. In 2006, a special aerial survey was initiated to document the extent of healthy stands of larch in Alaska.

Spruce beetle activity in Alaska has increased for the third time in the past five years. A total of 119,610 acres were mapped in 2006, an increase of 68 percent since 2005. Katmai National Park has the most intense spruce beetle outbreak in the state. Populations at Katmai increased 300 percent since last year. Nearly 70,000 acres of mature spruce, primarily at the west end of Naknek Lake and Lake Brooks, are currently under attack. Intense beetle activity has occurred over the past 10 years in the Iliamna area to the south and the Lake Clark Pass area to the east. Throughout this period, beetle populations in the vast, mature, susceptible spruce stands around Lake Clark have remained at endemic levels. If conditions become favorable for an outbreak of spruce beetle, the forests around Lake Clark are capable of sustaining widespread activity for a number of years to come. On the Kenai Peninsula, spruce beetle activity has doubled over the last year, increasing to over 10,000 acres. In addition to beetles moving into previously uninfested stands, trees too young and too small in stands infested earlier are now mature and large enough to be susceptible. The most active spruce beetle infestations on the Kenai Peninsula are in the Kenai National Wildlife Refuge north and east of Nikiski, the Point Possession–Chickaloon Bay area, and the Six Mile River Valley, and west shore of Turnagain Arm. Populations near the Kuskokwim River and in the Anchorage/Mat–Su areas and in southeast Alaska have remained at earlier endemic levels.

Aerial surveys in 2006 identified 7,653 acres of **engraver beetle** damage statewide. When combined with the figures for engraver–spruce beetle damage (both pests active in the same stand) the total exceeds 10,000 acres. Although there was engraver activity reported on the Kenai Peninsula this year in the Granite Creek area of the Chugach National Forest, it remains primarily a pest of interior spruce forests.

Western balsam bark beetle has moved down the Taiya Inlet and was causing mortality 1.5 kilometers south of Skagway in 2006. Mortality throughout the outbreak occurred on 498 acres in 2006.

Diseases

The most important chronic diseases and declines of Alaskan forests in 2006 were wood decay and **root rot** of live trees, **hemlock dwarf mistletoe**, and **yellow-cedar decline**. Except for yellow-cedar decline, trees affected by these diseases are difficult to detect by aerial surveys. Nonetheless, all diseases and declines are chronic factors that significantly influence the commercial value of timber resources and alter key ecological processes such as forest structure, composition, nutrient cycling, and succession.

In southeast Alaska, approximately one-third of the gross volume of forests is defective due to **stem and butt rot fungi**. 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 occurred in many of these locations in 2006, indicating an intensification of the problem on previously impacted acres. Although still not completely understood, the cause appears to be related to spring freezing injury in open canopy forests characterized by reduced snowpack.

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 Type¹	2001	2002	2003	2004	2005	2006	Ten Year Cumulative²
Alder defoliation ³	1.2	1.8	2.8	10.5	17.3	10.6	49.9
Aspen defoliation	9.4	301.9	351.4	591.5	678.9	509.5	2,243.6
Birch defoliation	3.2	83	217.5	163.9	47.5	13.2	454.1
Cottonwood defoliation	9.9	19.9	13.1	16.7	8.0	24.6	106.9
Hemlock defoliation	1.3	1.4	0.2	0.5	0.2	0.0	20.9
Hemlock mortality	0.1	0.2	0	0.0	0.1	0.0	0.6
Larch defoliation	17.8	0	0.6	14.2	16.8	2.7	1,290.8
Larch mortality	0.0	4.8	22.5	11.8	0.0	0.0	69.6
Spruce defoliation	61.1	11	61.5	93.4	31.9	68.1	699.7
Spruce mortality	104.2	53.6	92.8	145.2	93.8	130.6	2,080.8
Spruce/Hemlock defoliation	50.7	3.4	15.1	1.5	1.4	1.5	72.5
Spruce/Larch Defoliation	0.0	0.0	0.3	0.0	0.3	2.8	3.8
Subalpine fir mortality	0.1	0.2	0.0	0.2	0.8	0.5	1.6
Willow defoliation	10.9	0.3	83.9	111.2	44.5	50.7	641.7
Total damage acres	269.9	481.5	861.7	1,160.5	941.5	814.8	7,736.50
Total acres surveyed	22,296	24,001	25,588	36,343	39,206	32,991	
Percent of acres surveyed showing damage	1.2	2.0	3.4	3.2	2.4	2.5	

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 10. Acres reported in thousands of acres.

² The same stand can have active infestation for several years. The cumulative total is a union of all areas from 1996 through 2006 and does not double count acres.

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

Cone and other foliar diseases of conifers were generally at low levels throughout Alaska in 2006. A stem/branch **canker pathogen of alder**, continues to infect thin-leaf alder in riparian areas across thousands of acres in south-central and interior Alaska. **Canker fungi on conifers**, particularly on Sitka spruce and subalpine fir, occurred at higher than normal levels and caused branch dieback in southeast Alaska. **Canker fungi of hardwoods** were at endemic levels in south-central and interior Alaska.

In south-central and interior Alaska, **tomentosus root rot** continues to cause growth loss and mortality of white spruce in all age classes. Various stem and butt rot fungi cause considerable defect in mature white spruce, paper birch, and aspen stands.

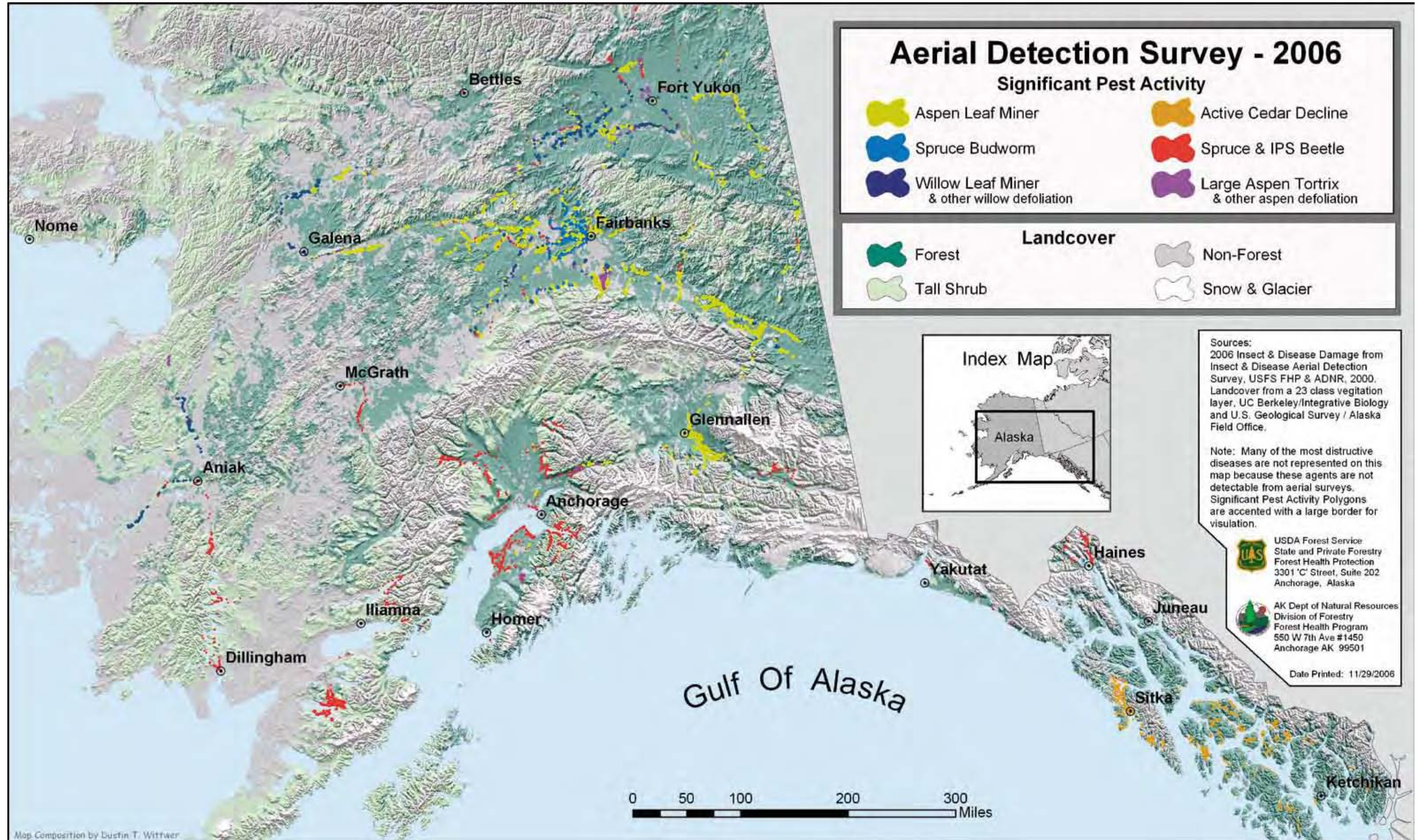
Saprophytic decay continues to degrade spruce beetle-killed trees. A deterioration study on Kenai Peninsula indicated a relatively slow overall decomposition rate (1.5 percent/year). Thus, beetle-killed trees are likely to influence fire behavior and present a hazard for over 75 years.

Invasive Plants

Invasive plant infestations in Alaska continue to be discovered, but an increased awareness of the threats posed by invasive plants to the state's economy and natural resources has given rise to new detection and management efforts on the part of municipal and state governments and conservation organizations. Among the newly-detected exotic invasive plant species in 2006 were **common hawkweed**, **rough hawkweed**, and **New England hawkweed**. Invasive exotic **thistles**, **spotted knapweed**, seven species of exotic **hawkweeds**, **knotweeds**, **sweetclovers**, **bird vetch**, and wetland invader **purple loosestrife** remain high concern, high priority species in Alaska.

Mapping and inventory of these and many other exotic invasive plant species continues around Alaska. Exotic plant data available online through the Alaska Exotic Plant Clearinghouse (AKEPIC) database rose from a total of 37,000 records in 2005 to over 43,400 points taken at over 9,900 sites in 2006. Three Cooperative Weed Management Areas (CWMA) are making progress in the areas of invasive plants public education, early detection, and management; addressing regionwide invasive plant problems across geopolitical boundaries in collaboration with the NRCS Soil and Water Conservation Districts and the Alaska Association of Conservation Districts. The UAF Cooperative Extension Service initiated the formation of the statewide Alaska Invasive Species Working Group (AISWG) in 2006, with funding from the U.S. Environmental Protection Agency.

Map 1. General forest pest activity, from 2006 aerial survey



Map 2. Survey flight paths and general ownership, 2006

