Alaska Forest Health Highlights

2009 Survey Year

Each year the Forest Service's, Department of Agriculture, State & Private Forestry, Forest Health Protection (FHP) program, together with Alaska Department of Natural Resources Division of Forestry's Forest Health Protection Program (AKDOF), conducts annual statewide aerial detection surveys across all land ownerships. In 2009, staff and cooperators identified nearly 660,000 acres of forest damage from insects, disease, declines and selected abiotic agents on over 33.6 million acres surveyed (Map1 and Map 2). This marks an increase in aerially-observed forest disturbance as compared to last year, but compatible with recent years (Table1 and Table 2). The 2008 survey year was relatively cool and wet, while 2009 was closer to normal on average. However, July 2009 was the warmest and driest on record in Interior Alaska, and August rainfall was above normal throughout the state. Smoke from wildfires plagued many areas of the state in July and early-August. Nearly three million acres burned in wildfires in 2009; most in the upper Yukon and Tanana River zones. 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. FHP 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

Above normal temperatures and normal or below normal precipitation for May gave leafminers an early jump on the season. In Interior Alaska, this was the ninth 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. While aspen leaf miner populations appear to be trending downward since 2007, this outbreak has not yet collapsed and may continue chronically for some years to come. Willow leaf blotch miner damage acres increased in 2009, and damaged willows were very visible along road corridors in the Interior (Figure 1). Damage caused by the amber-marked birch leaf miner and the birch leaf roller were less obvious this year than in the recent 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.

Figure 1. Willow leaf blotch miner damage.

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 populations have returned to endemic levels. As it has been for at least three years, damage was noticeable along the Dalton Highway near the Yukon River Bridge again in 2009.

Spruce beetle and northern spruce engraver beetle activity in Alaska was comparable to 2008. Pockets of both spruce beetle and northern spruce engraver beetle 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. A larger proportion of activity was attributed to spruce beetle in 2009 than in 2008, but overall acreage is similar. This year's tally of engraver beetle activity in the Interior part of the state is very likely underestimated because active wildfire areas were excluded 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 2009. Several small and active engraver beetle infestations were located near flooded or ice scoured areas due to an abundance of dead or dying spruce in these zones. Forest health staff provided technical assistance and advice to several affected landowners, including direct assistance with a semiochemical northern spruce engraver beetle baiting and trapout project north of Fairbanks, during 2009.

Diseases

The nearly state-wide decline of alder health continued in 2009. Symptoms of alder canker have been shown to be correlated with decreased physiological performance. While the etiology of alder decline remains under investigation, inoculation experiments at three different labs have proven that the canker fungus *Valsa melanodiscus* is pathogenic on thinleaf alder. Several other canker causing fungal species have also been associated with cankers in Alaska; however pathogenicity tests of these have not yet been completed. In addition to sawfly and canker, root disease pathogens in the genus *Phytophthora* have also been implicated in Alaska's alder decline. Twenty different species of *Phytophthora* were isolated from soil and streams at 81 infected alder stands in Southcentral and Interior Alaska. Of special interest is a species new to science which is closely related to the Sudden Oak Death pathogen *Phytophthora ramorum*. Also of interest is the expansion of the known distribution of *Phytophthora alni* subsp. *uniformis* to include 11 widely distributed sites across Southcentral and the Interior. However, root rot severity in Alaskan alder was shown to be low. Whether species in the "plant-destroyer" genus *Phytophthora* are involved in Alaska's alder decline is a question actively under investigation.

Statewide, wood decay of live trees occurs on every tree species across millions of acres and, on an annual basis, substantially reduces tree volume, and contributes 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.

Hemlock dwarf mistletoe continues its chronic assault on western hemlock trees, causing growth loss, top-kill, and mortality on an estimated 1 million acres in Southeast Alaska. It also contributes unique tree structures (brooms) and associated wildlife habitat. 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 2009, indicating a slowed intensification 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 2009, most diseases were observed at endemic levels in Southeast Alaska, except *Rhizosphaera*. This needle blight fungus was found at the highest levels in memory. The shoot and foliar blight fungus, *Sirococcus tsugae*, was found killing small mountain hemlock trees in 2009, particularly in ornamental settings.

Invasive Plants

Alaska's network of Cooperative Weed Management Areas continues to expand, and Alaska Forest Health Protection is actively involved in many of the groups. In 2009 the Juneau CWMA was officially formed, replacing a long-standing and active group, Juneau Invasive Plant Action. Paperwork is moving forward in the ratification of a Sitka CWMA as well. Several other CWMAs in the state continue to sponsor innovative and effective projects. During Alaska Weed Awareness Week, hundreds of people took advantage of Fairbanks CWMA's table at the Fairbanks Farmers' Market, where weed identification services and pocket guides were also available. About 20 people attended the Fairbanks CWMA's second annual "Weeds Gone Wild" workshop in late July.

FHP has long been an active participant in the development of the Alaska Exotic Plant Information Clearinghouse (AKEPIC) database. The database, designed and managed by the Alaska Natural Heritage Program, now has over 90,000 records of invasive plant locations in the state. The database is heavily used by the Alaska invasive plant community, but until recently it could be downloaded only as an enormous spreadsheet. A collaboration between R10 FHP and the University of Georgia's Center for Invasive Species and Ecosystem Health has lead to the development of an internet portal that allows AKEPIC data to be viewed online in Google Maps. The Early Detection Distribution Mapping System (EDDMapS) allows anyone with internet access to view the distribution of invasive plants in map format. This portal makes AKEPIC data easily accessible and viewable to people without GIS skills or software. A related project, funded by R10 FHP and conducted by HDR, Inc., makes invasive plant absence data viewable as well, vastly increasing the information content of these online maps.

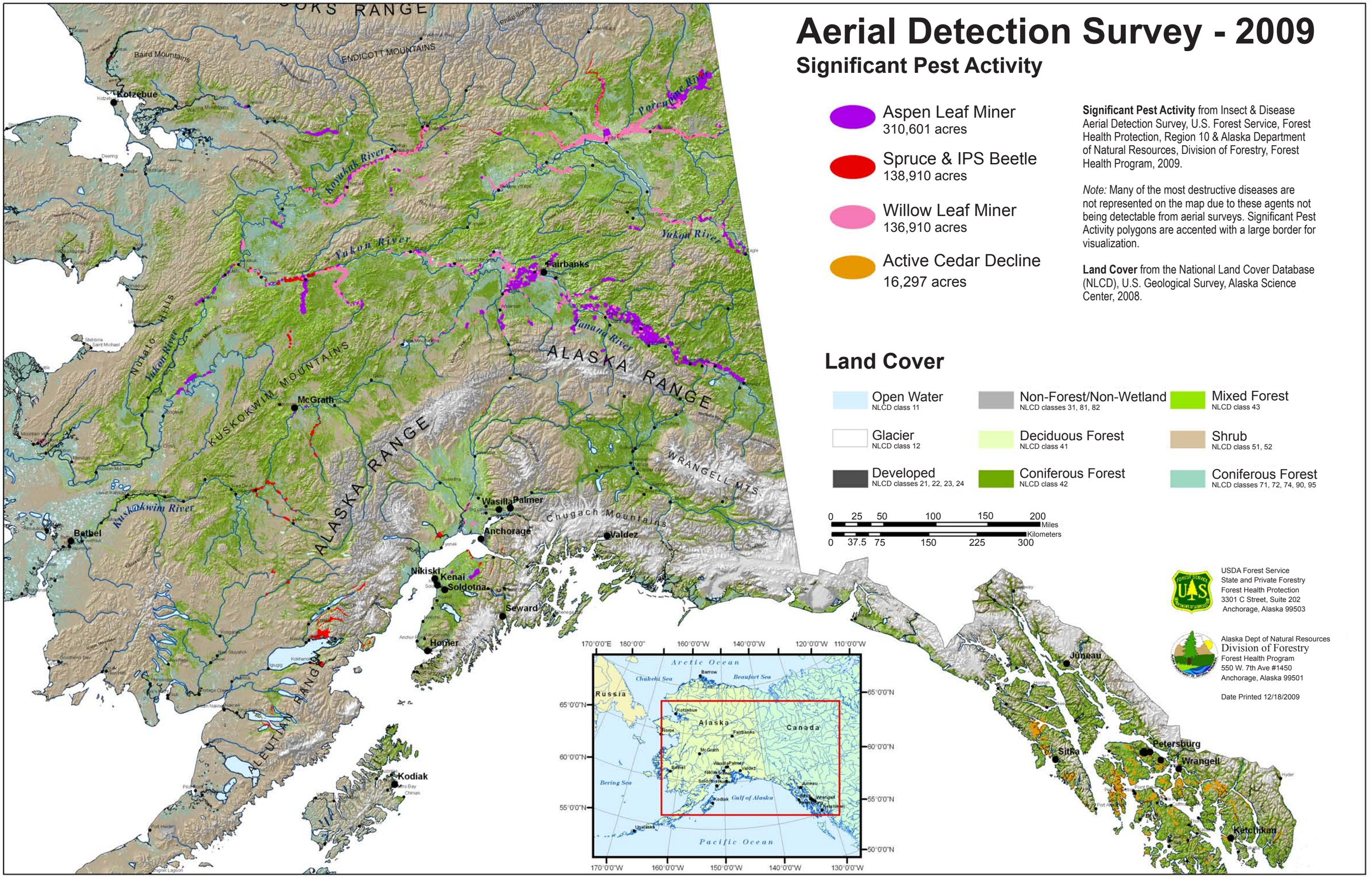
In 2009, Alaska FHP joined a project of the US Fish and Wildlife Service and the Alaska Division of Agriculture, Plant Materials Center (PMC) to develop a field guide to Alaska grasses. FHP support ensured that a number of non-native grass species that are showing invasive tendencies in Alaska would be included in the guide.

The Alaska Committee on Noxious and Invasive Plant Management (CNIPM) has held annual meetings since 1999. The meetings are well attended, and over the years have become the must-attend opportunity for people concerned with invasive plants Alaska to interact and coordinate their efforts. The meeting location has alternated between Fairbanks and Anchorage, where most of the state's population resides. In an effort to bring residents of Southeast Alaska more into the fold of Alaska's invasive species community, in 2009 the CNIPM meetingwere moved to Ketchikan, the southernmost city of Alaska's panhandle. Many new faces joined us this year, including many folks from the Tongass National Forest and the Forest Service's Alaska Region office. Presentations focused on species of particular concern in southeast Alaska, including the knotweed complex (Japanese knotweed and other knotweed species), garlic mustard, and spotted knapweed. The latter two species are present in Alaska in extremely limited areas, and have been targeted by a multi-agency consortium for eradication from the state. Alaska Forest Health Protection was actively involved in the organization of the meetings, and in partnership with the Alaska Center for Coastal Studies, sponsored an Invasive Plant Curriculum Workshop for southeast Alaska teachers.

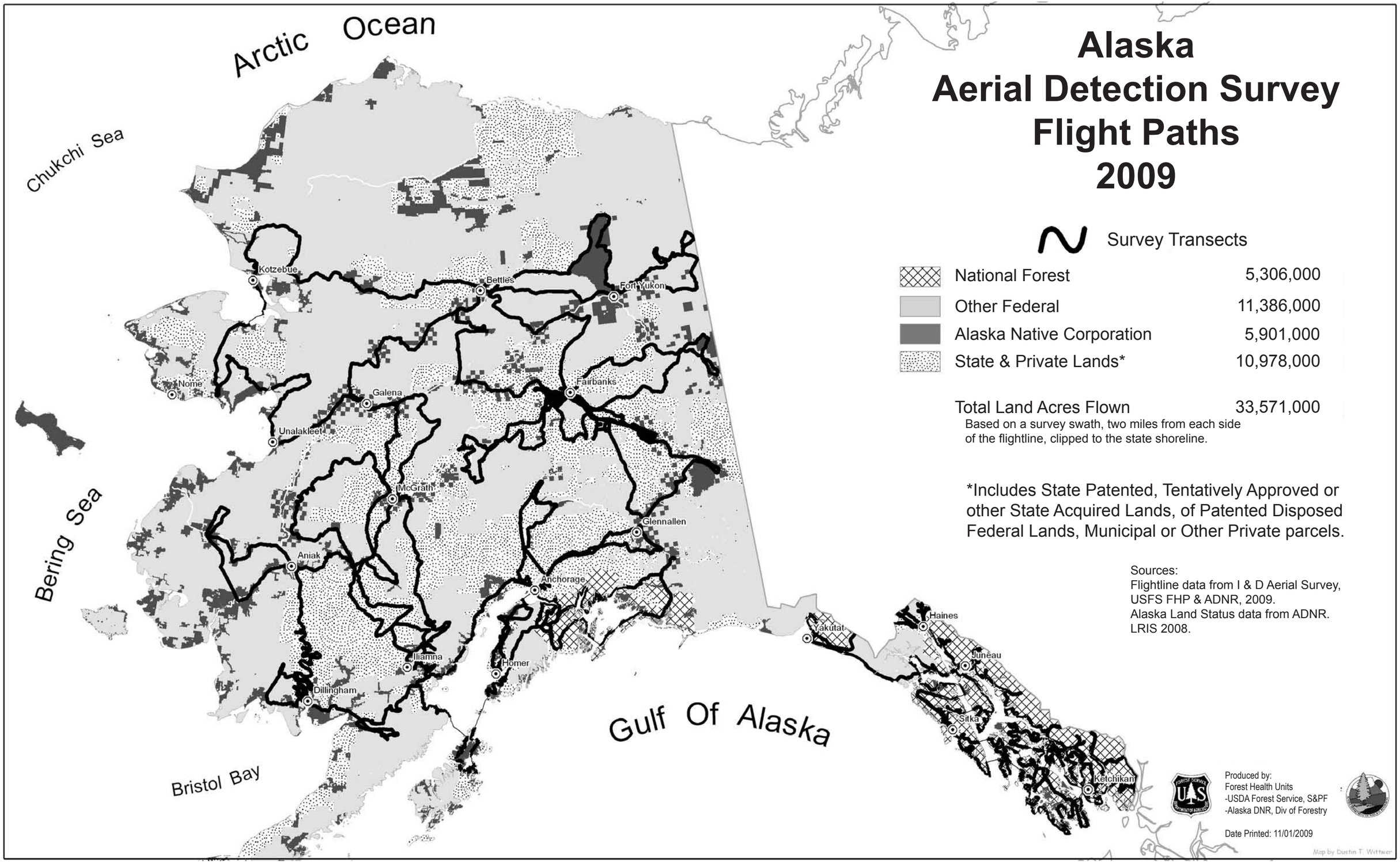
R10 Forest Health Protection sponsored a special session at the 2009 meeting of the Alaska Chapter of the Wildlife Society. The session, "Impacts of invasive plants on wildlife: a growing threat in Alaska," was held in Fairbanks in April. Three wildlife biologists from the lower 48 were sponsored to speak on the spread of invasive plants in their regions, and the associated impacts to wildlife habitat.

In 2009, Alaska Division of Agriculture staff identified a well-established infestation of reed canarygrass in Fairbanks. This was one of only a few times this species has been documented north of the Alaska Range. Control efforts are planned for 2010.

Map 1. General forest pest activity from 2009 aerial survey.



Map 2. Survey flight paths and general ownership



Alaska Aerial Detection Survey Flight Paths 2009

Survey Transects

National Forest	5,306,000
Other Federal	11,386,000
Alaska Native Corporation	5,901,000
State & Private Lands*	10,978,000
Total Land Acres Flown	33,571,000

Based on a survey swath, two miles from each side of the flightline, clipped to the state shoreline.

*Includes State Patented, Tentatively Approved or other State Acquired Lands, of Patented Disposed Federal Lands, Municipal or Other Private parcels.

Sources:
Flightline data from I & D Aerial Survey, USFS FHP & ADNR, 2009.
Alaska Land Status data from ADNR. LRIS 2008.

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-USDA Forest Service, S&PF
-Alaska DNR, Div of Forestry

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Map by Dustin T. Wittwer

Table 1. 2009 forest insect and disease activity as detected during aerial surveys in Alaska by land ownership[1] and agent. All values are in acres.[2]

	National Forest	Native	Other Federal	State & Private	Total
Alder defoliation[3]			1,208	2,202	3,410
Alder mortality		207	319	791	1,317
Aspen Leaf Miner		67,680	106,363	136,558	310,601
Black-headed budworm	535			593	1,128
Cedar decline faders[4]	15,626	174	12	485	16,297
Cottonwood defoliation[3]	325	2,758	5,730	2,338	11,152
Flooding/high-water damage	106	138	802	301	1,346
Hemlock sawfly	2,539	35		981	3,555
IPS and SPB[5]		4,407	739	1,451	6,596
Ips engraver beetle		9,226	18,865	3,581	31,672
Landslide/Avalanche	426			20	447
Porcupine damage	792	14		146	952
Spear-marked black moth		13,913	251	146	14,310
Spruce beetle	210	28,502	45,855	26,075	100,642
Spruce/Larch budmoth	694		20	12,485	13,199
unknown hemlock mortality	1,916			220	2,136
Willow Leaf Blotch Miner		53,771	65,130	17,435	136,336
Totals	23,169	180,825	245,294	205,808	655,096

[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. The affected acreage is much more extensive than can be mapped. 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 some types animals and abiotic agents are also 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 Map 9.

[5] Acreage values are cumulative from engraver beetle (*Ips perturbatus*) and Spruce Beetle (*Dendroctonus rufipennis*) working in the same stands.

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]	2003	2004	2005	2006	2007	2008	2009	Ten Year Cumulative[2]
Alder Defoliation	2.8	10.5	17.3	10.6	10.0	0.7	3.4	61.0
Aspen Defoliation	351.4	591.5	678.9	509.5	796.0	219.7	310.8	3,097.3
Birch Defoliation	217.5	163.9	47.5	13.2	1.5	0.1	14.3	463.8
Cottonwood Defoliation	13.1	16.7	8	24.6	11.5	13.2	11.2	121.5
Hemlock Defoliation	0.2	0.5	0.2	0	0.1	0.1	3.6	12.0
Hemlock Mortality	0	0	0.1	0	0.0	2.0	2.1	4.5
Larch Defoliation	0.6	14.2	16.8	2.7	0.1	0.2	0.1	117.2
Larch Mortality	22.5	11.8	0	0	0.0	0.2	0.1	39.5
Spruce Defoliation	61.5	93.4	31.9	68.1	41.9	6.9	0.8	429.7
Spruce Mortality	92.8	145.2	93.8	130.6	183.9	129.1	138.9	1,006.4
Spruce/Hemlock Defoliation	15.1	1.5	1.4	1.5	10.3	2.8	1.1	82.2
Spruce/Larch Defoliation	0.3	0	0.3	2.8	0.0	0.0	13.2	16.6
Sub Alpine Fir Mortality	0	0.2	0.8	0.5	0.1	0.0	0.0	1.7
Willow Defoliation	83.9	111.2	44.5	50.7	92.7	76.8	139.7	608.6
Total damage acres - thousands	861.7	1,160.5	941.5	814.8	1148.1	451.8	639.3	6,062.0
Total acres surveyed	25,588	36,343	39,206	32,991	38,365	36,402	33,571	
Percent of acres surveyed showing damage	3.4	3.2	2.4	2.5	3.0	1.2	1.9	

[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 Map 9.

[2] The same stand can have active infestation for several years. The cumulative total is a union of all areas from 1999 through 2009 and does not double count acres.