Conditions in Brief

Aerial detection mapping is conducted annually to document the location and extent of active forest insect and disease damage. Each of these surveys (southeast Alaska, interior Alaska, and south-central Alaska) covers approximately one-fifth of the forested land in the State. Nearly 26 million acres throughout Alaska were surveyed in 2003. Insect and disease activity, mapped via aerial surveys, nearly doubled in 2003 over 2002 levels (875,288 acres vs. 484,626 acres).

Insects:

Spruce beetle activity remained at a nearly static level in 2003 with 92,306 acres of active infestations observed, a seven percent increase over 2002 levels. Reductions in acres infested in some areas, such as the Anchorage/Eagle River area and the Haines State Forest were off-set by an increase in activity in Dillingham, the Kuskokwim River Valley between Sleetmute and McGrath, and the Kenai Peninsula.

We have yet to identify the bark beetle responsible for subalpine fir mortality in the Skagway river drainage, northeast of Skagway. Weather records show conditions have become more favorable for beetle development for this area in recent years.

The largest outbreak of aspen leaf miner on record in Alaska continues and has expanded in 2003. 351,058 acres of activity were mapped statewide in 2003, a 15 percent increase over 2002 levels. Leaf miner activity continues in the Yukon Flats National Wildlife Refuge, and has expanded in the Fairbanks and Upper Tanana River Valley.

Birch leaf roller infestations increased by 70 percent over 2002 levels, to 185,000 acres. A significant expansion of activity in the Susitna River Valley accounted for the majority of this increase.

Amber-marked birch leaf miner populations once again exploded in the Anchorage Bowl. More than 32,000 acres of heavily defoliated birch were detected this year. This introduced insect has now spread north and south of Anchorage and was recently introduced into the Fairbanks area. Ground surveys have detected leaf miner activity near Talkeetna, Pinnacle Mountain, and Haines and Skagway in southeast Alaska. Biological control actions are underway to address this potentially significant and newly introduced pest.

Due to continued mild weather conditions, insect defoliator populations increased around the Anchorage area with noticeable damage to alder species. Damage was noted from Palmer to Seward, but heaviest in the Anchorage Bowl. The primary defoliator of thin-leaf alder was the alder wooly sawfly.

Spruce aphid defoliation in southeast Alaska occurred on approximately 30,627 acres in southeast Alaska from Dall Island on the south end of Alexander Archipelago to Skagway. Only about 9,000 acres occurred on National Forest Lands; primarily on the western and southwestern beach fringe of Dall, Baranof, and Kruzof Islands. Approximately 16,000 acres of aphid defoliation occurred on National Park land along the outer coast from Cape Spenser to the Yakutat Forelands. Spruce aphid defoliation was also important in the Juneau, Sitka, Ketchikan, and Wrangell Boroughs.

In 2003, black-headed budworm activity was mapped on 16,047 acres, up from 2002 levels of approximately 3,400 acres. The greatest amount of defoliation was mapped near Dillingham.

Diseases and Abiotic Agents:

A stem/branch canker pathogen of alder, *Ophiovalsa suffusa*, was reported for the first time in 2003 killing hundreds, perhaps thousands, of acres of severely stressed and defoliated thinleafed alder (*Alnus tenuifolia*) in riparian areas of south-central Alaska. There are unconfirmed reports of this fungus in interior Alaska. This fungus is likely native since pathogen surveys in the 1950s reported a similar disease from south-central Alaska. The biology of the fungus and ecological impact of mortality of riparian alder is unknown, but currently under investigation.

The most important chronic diseases and declines of Alaskan forests in 2003 were wood decay of live trees, root disease of white spruce, 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 are chronic factors that significantly influence the commercial value of the timber resource and alter key ecological processes including forest structure, composition, and succession. Wildlife habitat is enhanced through the development of hollow tree cavities, by heart rot fungi, and witches' brooms by hemlock dwarf mistletoe and broom rust fungi.

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 in old-growth forests. Its impact in managed stands depends on the abundance of large infected trees remaining on site after harvesting.

Nearly 500,000 acres of yellow-cedar decline have been mapped across an extensive portion of southeast Alaska. In 2003, several areas of active decline, totaling 9,114 acres, were noted with a substantial portion of the stand displaying red foliage. Snags of yellow-cedar accumulate on affected sites and forest composition is substantially altered as yellow-cedar trees die, giving way to other tree species. The wood in dead standing trees remains valuable long after tree death, and salvage opportunities for this resource are now being recognized.

Cone and other foliar diseases of conifers were generally at low levels throughout Alaska in 2003. Canker fungi, except for the alder canker, were at endemic levels, causing substantial, but unmeasured, damage to hardwood species in south-central and interior Alaska. Canker fungi on conifers, particularly on western hemlock and subalpine fir occurred at higher than normal levels and caused branch dieback in southeast 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 of spruce bark beetle-killed trees, primarily caused by the red belt fungus, continues to rapidly develop on and degrade dead spruce trees.

A late spring frost damaged vegetation throughout southeast Alaska in 2003 for the second consecutive year. The coldest temperature of the winter in some areas of Southeast Alaska occurred in mid-April, a time when some vegetation had lost their mid-winter cold hardiness. In south-central Alaska, a severe March frost event damaged evergreen plants throughout the region. An unexpected cold arctic wind blast, with sustained winds topping 100 mph and wind chill factors as low as –44 degrees, affected many plants that had broken winter dormancy. With almost no snow protection many native plants suffered severe dessication, resulting in brown needles and leaves.

Animal Damage

In localized areas of southeast Alaska, feeding by porcupine and brown bears continues to cause tree damage to several conifer species. In south-central and interior Alaska, moose and

snowshoe hare continue to cause tree damage to hardwoods and conifers across the region. In winter/spring 2003, hundreds of newly planted spruce trees near Portage Valley were girdled and killed by voles. Vole populations were extremely high in the affected areas. Damage will likely be minimized in the future as grass cover is reduced near newly planted trees.

Exotic/Invasive Organisms

Insects and slugs

In the past several years, several exotic pest introductions have been detected in the Anchorage area. In 2003, three birch leaf miner species (newly described in 2002), uglynest caterpillar, and the European black slug were all reported in Alaska. The amber-marked birch leaf miner caused heavy birch defoliation throughout Anchorage, Eielson A.F.B., Haines and Skagway. This defoliator is the larval form of a sawfly. These invasive pests and others may become established throughout Alaska if detection and eradication methods are not employed early. Primary detection of these introductions has been through the Integrated Pest Management Program sponsored by the USDA Forest Service and administered by the Alaska Cooperative Extension.

Plants:

Several species continue to spread into different areas of the state. White sweet clover, *Melilotus alba*, occupies thousands of acres along the Stikine, Matanuska and Nenana Rivers. This is particularly worrisome on the Nenana which is a tributary to the Yukon River. Bird vetch, *Vicia cracca*, is widely distributed in southern Anchorage, the Matanuska Valley, and in portions of Fairbanks. Canada Thistle, *Cirsium arvense*, is continuing to spread in Anchorage and Fairbanks, but has not yet exploded out of these two areas. New small populations of Spotted knapweed, *Centauria maculosa*, the bane of the interior west, were pulled just south of Anchorage and in Valdez. Another new invasive species for the state, Bull thistle, *Cirsium vulgare*, was discover both in Anchorage and on Prince of Wales Island. Work began on the Anchorage site to remove all the seedheads to prevent seed spread. The Soil and Water Conservation District provided the coordination for continuing the work done in 2002 to control and hopefully eradicate Garlic mustard, *Alliaria petiolata*, from the single Alaska infestation (located just below the Governor's mansion in Juneau).

Several other species are being mapped across the State by many different agencies and other interested groups, these are all being entered into a statewide GIS inventory base that we have helped create and maintain. As a result of these coordination efforts, cooperative control projects are expected to increase to address these relatively newly recognized forest health threats to Alaska resources.

Table 1. 2003 forest insect and disease activity as detected during aerial surveys in Alaska by land ownership[1] and agent[2]. All values are in acres.

Damage Agent	National Forest	Native Corp.	Other Federal	State & Private	Total 2003
Aspen Leaf Miner	0	37,246	227,933	85,879	351,058
Birch Leaf Miner	0	75	201	32,126	32,402
Birch leaf roller	0	401	0	184,619	185,020
Black-headed budworm	1,713	3,359	8	9,970	15,050
Cedar decline faders[3]	8,520	31	100	464	9,114
Cottonwood defoliation[4]	3,133	9,494	0	441	13,068
Ips engraver beetle	0	335	120	10	465
Larch beetle	0	18,724	3,813	0	22,537
Larch sawfly	0	298	258	0	556
Large aspen tortrix	0	0	244	107	351
Spruce aphid	9,286	1,330	16,188	3,823	30,627
Spruce beetle	1,843	37,769	14,362	38,334	92,308
Spruce budworm	0	0	1,449	29,435	30,884
Spruce/Larch budmoth	0	0	0	332	332
Willow defoliation[5]	0	26,752	25,828	31,274	83,854
Total Acres	24,495	135,814	290,504	416,814	867,627

[1]Ownership derived from 2002 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, of patented disposed federal lands municipal or other private parcels.

[2]Table entries do not include many of the most destructive diseases (e.g., wood decays and dwarf mistletoe) these losses are not detectable in aerial surveys. Some I&D damage acres are not shown in this table because a specific agent could not be identified. Damage acres from animals and a biotic agents are also not shown in this table.

[3]Acres represent only spots where current faders were noticed. Cumulative cedar decline acres can be seen in Table 7.

[4]Significant contributors include cottonwood leaf beetle and leaf rollers.

[5]Significant contributors include leaf miners and leaf rollers for the respective host.

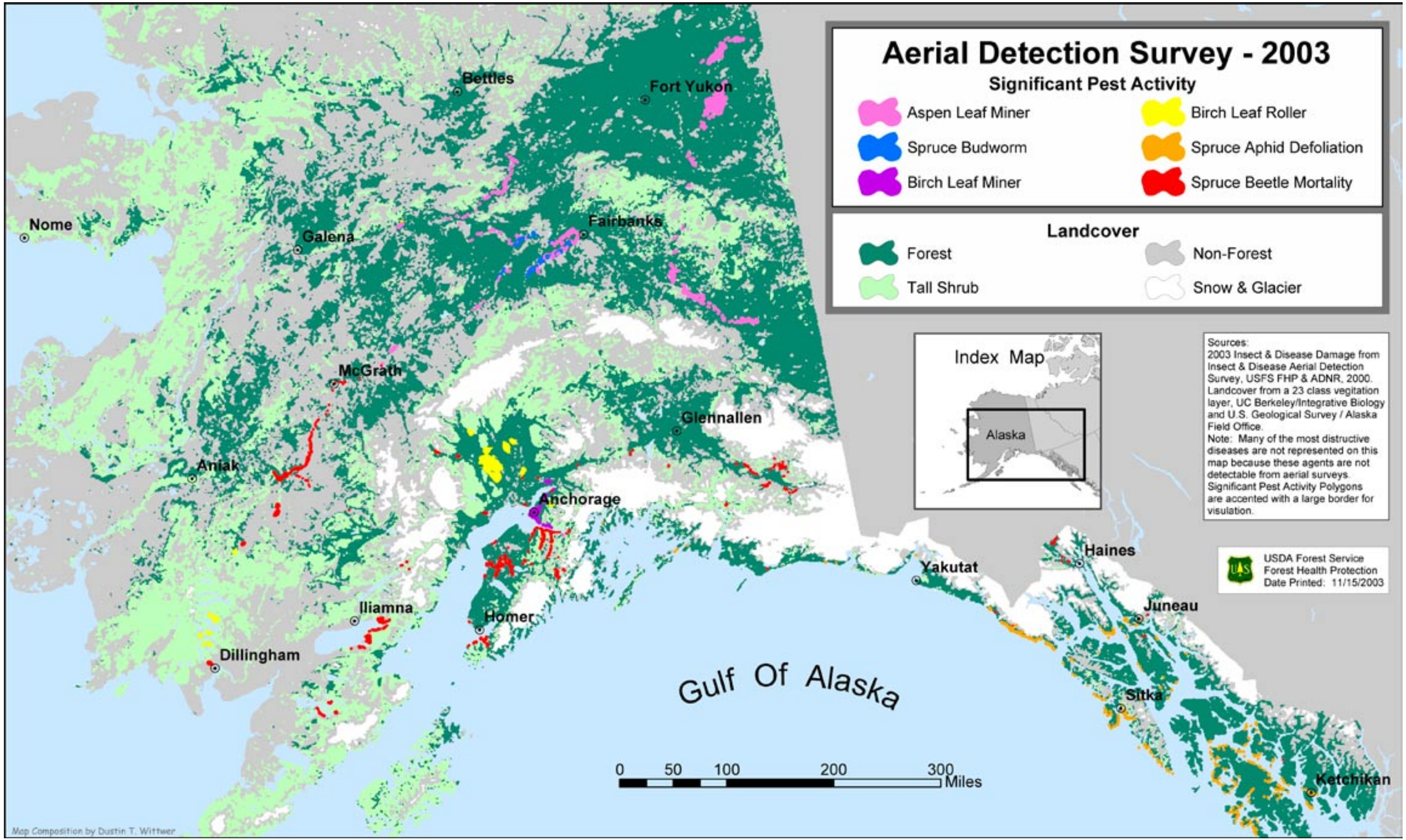
Table 2. Affected area (in thousands of acres) for each host group and damage type over the prior five years and a 10-year cumulative sum.

Host Group / Damage Type[1]	Prior Five Years (thousand acres)						Ten Year Cumulative[2]
	1998	1999	2000	2001	2002	2003	
Alder Defoliation	0.8	1.8	5.6	1.2	1.8	2.8	13.6
Aspen Defoliation	21.9	13.4	12.6	9.4	301.9	351.4	748.6
Birch Defoliation	0.7	2.8	2.8	3.2	83.0	217.5	541.7
Cottonwood Defoliation	6.6	5.6	5.4	9.9	19.9	13.1	72.5
Hemlock Defoliation	3.9	0.1	5.2	1.3	1.4	0.2	30.7
Hemlock Mortality	0.0	0.0	0.0	0.1	0.2	0.0	0.6
Larch Defoliation	461.8	159.5	64.9	17.8	0.0	0.6	1556.1
Larch Mortality	0.0	18.4	0.0	0.0	4.8	22.5	45.9
Spruce Defoliation	136.0	5.1	84.7	61.1	11.0	61.5	834.3
Spruce Mortality	331.0	258.0	120.9	104.2	53.6	92.8	3434.9
Spruce/Hemlock Defoliation	0.0	0.1	0.0	50.7	3.4	15.1	302.8
Spruce/Larch Defoliation	0.0	0.0	0.0	0.0	0.0	0.3	17.1
Sub Alpine Fir Mortality	0.0	0.0	0.0	0.1	0.2	0.0	0.3
Willow Defoliation	123.2	181.6	36.5	10.9	0.3	83.9	535.7
Total thousands acres	1,085.9	646.4	338.6	269.9	481.5	861.7	8134.8

[1]Summaries here 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 cause damage are not included. Cedar mortality is summarized in Table 7.

[2]The same stand can have active infestation for several years. The cumulative total is a union of all areas from 1994 through 2003 and does not double count acres.

Map 1. General Forest Pest Activity in 2003



Map 2. 2003 Survey Flight Paths