



## 2004 Forest Insect and Disease Conditions Report

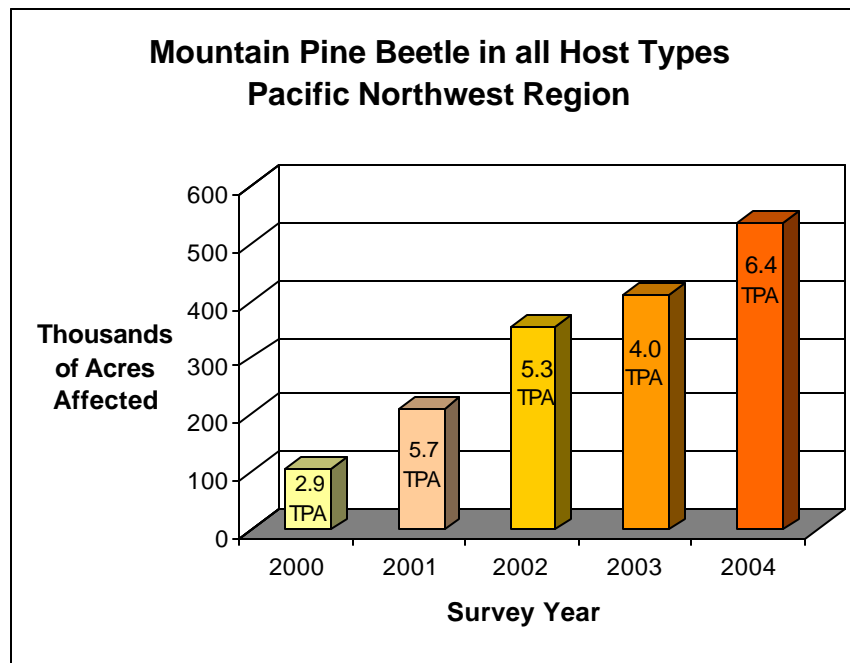
### Native Insects

#### Mountain Pine Beetle, *Dendroctonus ponderosae*

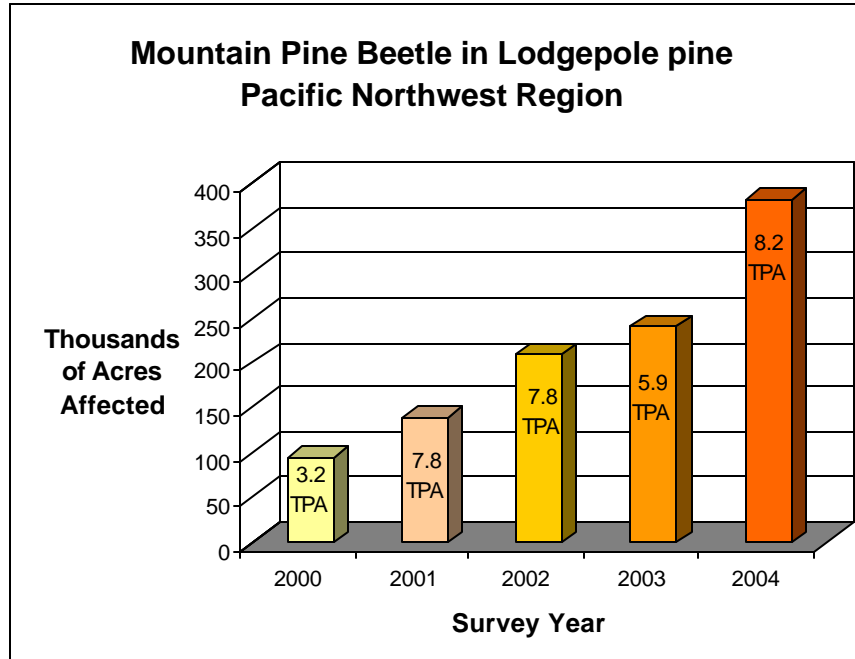
**Hosts:** Jeffrey pine, lodgepole pine, ponderosa pine, sugar pine, western white pine, whitebark pine.

Mountain pine beetles occur throughout the range of the pine type in the Pacific Northwest. Both adults and larvae feed in the phloem layer of the inner bark, producing one generation per year. Fungi introduced by the beetles clog the conductive tissues of attacked host trees and contribute to tree mortality. Some infestations have resulted in extensive mortality over large areas. Dense stand conditions continue to predispose areas to mountain pine beetle infestations.

In 2004, 534,631 acres were affected, with an average of 6.44 trees per acre (TPA) killed, compared to 409,596 acres affected with an average of 4.03 TPA in 2003. Overall increases in mortality were reported in whitebark, lodgepole, and sugar pine host types. Decreases in mortality from 2003 levels were reported in ponderosa and western white pine.



Tree mortality in lodgepole pine increased in both acres and intensity. Total reported affected acres increased from 240,915 acres, 5.92 TPA in 2003 to 380,306 acres, 8.22 TPA in 2004.



**Summary of lodgepole pine mortality attributed to mountain pine beetle  
by ownership for the State of Oregon**

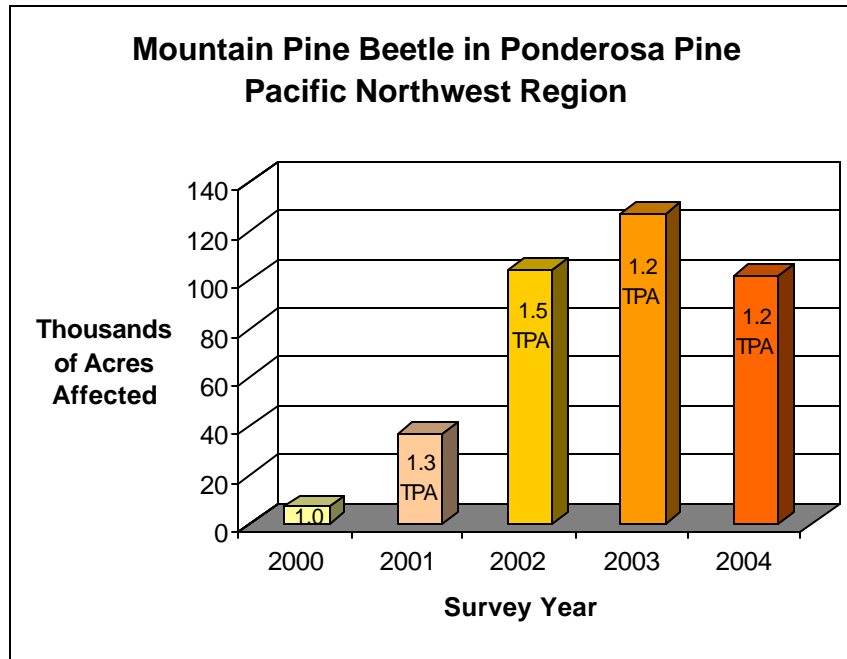
Ownership	Acres with mortality	Average TPA killed
Forest Service	101,196.00	6.28
Congressionally designated lands	23,496.00	10.79
Indian Reservation lands	18,592.00	11.34
National Park lands	1,916.00	0.54
State of Oregon	84.00	0.86
BLM	124.00	1.27
Private	11,187.00	1.98

**Summary of lodgepole pine mortality attributed to mountain pine beetle  
by ownership for the State of Washington**

Ownership	Acres with mortality	Average TPA killed
Forest Service	107,748.00	9.21
Congressionally designated lands	49,215.00	8.33
Indian Reservation lands	21,719.00	13.40
National Park lands	13,795.00	12.61
State of Washington	12,755.00	5.20
BLM	634.00	2.68
Other Federal	583.00	3.80
Private	17,262.00	3.67

Areas that were mapped with the most acres with mortality include Forest Service administered lands on the following National Forests: Okanogan 101,217 acres, Deschutes 51,124, Fremont 36,864, Colville 28,751 and Wenatchee 26,726. Additionally, 18,454 acres (11.4 TPA) with mortality were reported on the Warm Springs Indian Reservation and 17,221 acres (16.3 TPA) were reported on the Yakama Indian Reservation. 13,782 acres were reported within North Cascades National Park (12.6 TPA).

Fewer acres were mapped in the ponderosa type in 2004 than in 2003, but at similar intensities.



**Summary of Ponderosa pine mortality attributed to mountain pine beetle by ownership for the State of Oregon**

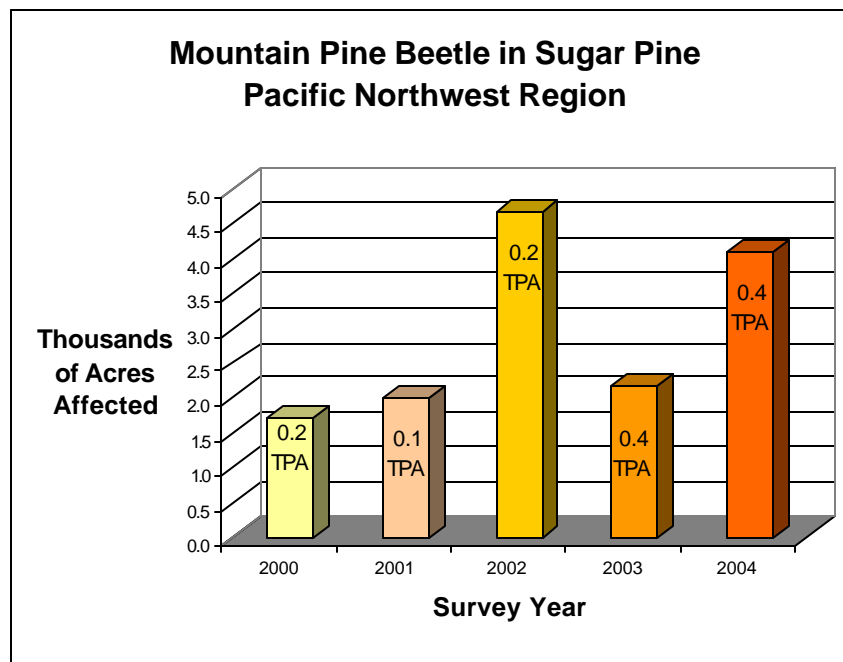
Ownership	Acres with mortality	Average TPA killed
Forest Service	45,509.00	0.78
Congressionally designated lands	5,980.00	1.83
Indian Reservation lands	9,438.00	1.71
National Park lands	405.00	0.23
State of Oregon	133.00	0.28
BLM	1,686.00	0.46
Private	14,722.00	0.66

## Summary of ponderosa pine mortality attributed to mountain pine beetle by ownership for the State of Washington

Ownership	Acres with mortality	Average TPA killed
Forest Service	11,834.00	2.33
Congressionally designated lands	786.00	3.51
Indian Reservation lands	1,271.00	1.66
National Park lands	32.00	3.28
State of Washington	5,650.00	1.39
BLM	56.00	1.32
Other Federal	8.00	2.50
Private	4,355.00	1.53

Most heavily affected areas include lands administered by the Forest Service on the Fremont (14,936 acres with 0.98 TPA), the Deschutes (13,933 acres with 1.37 TPA), the Malheur (9,545 acres with 0.70 TPA), the Okanogan (7,150 acres with 2.28 TPA) and the Wenatchee National Forest (5,207 acres with 2.66 TPA). Additionally, the Warm Springs Indian Reservation reported 9,438 acres with mortality averaging 1.71 TPA.

Activity in sugar pine was reported on more acres in 2004 than in 2003, but at similar intensities. Due to the ecological importance of this rapidly disappearing species, observers attempt to record individual tree mortality to better assist land managers.



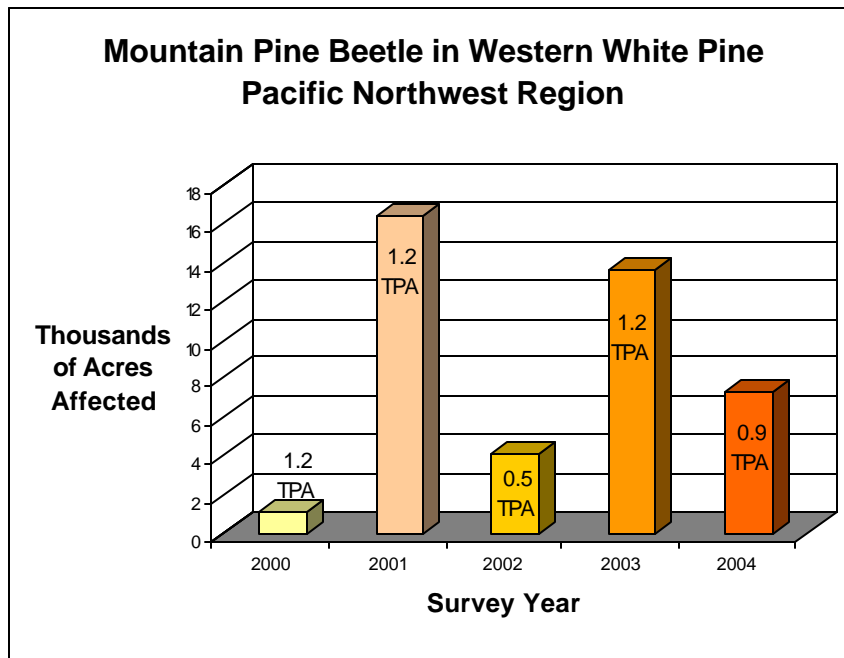
Over 83% of the recorded sugar pine mortality was mapped within the Siskiyou reporting area.

## Summary of Sugar pine mortality attributed to mountain pine beetle by ownership for the State of Oregon

Ownership	Acres with mortality	Average TPA killed
Forest Service	2,755.00	0.32
Congressionally designated lands	326.00	0.50
State of Oregon	4.00	0.75
BLM	631.00	0.57
Private	390.00	0.28

Activity in western white pine decreased, from 13,650 acres (1.15 TPA) in 2003 to 7,245 acres (0.88 TPA) in 2004. Highest levels of mortality were reported on Forest Service administered lands of the Idaho Panhandle National Forest within the State of Washington (our reporting area) with 2,234 acres mapped with an average of 1.33 TPA. Other significant areas of mapped mortality included private lands of the Colville reporting area (1,758 acres with 0.87 TPA), and Forest Service lands on the Colville (1,091 acres with 0.63 TPA) and the Gifford-Pinchot (1,225 acres with 0.25 TPA).

Aerial detection of western white pine mortality is difficult because it is often found as a minor component in mixed conifer stands and has a color signature very similar to that of Douglas-fir.



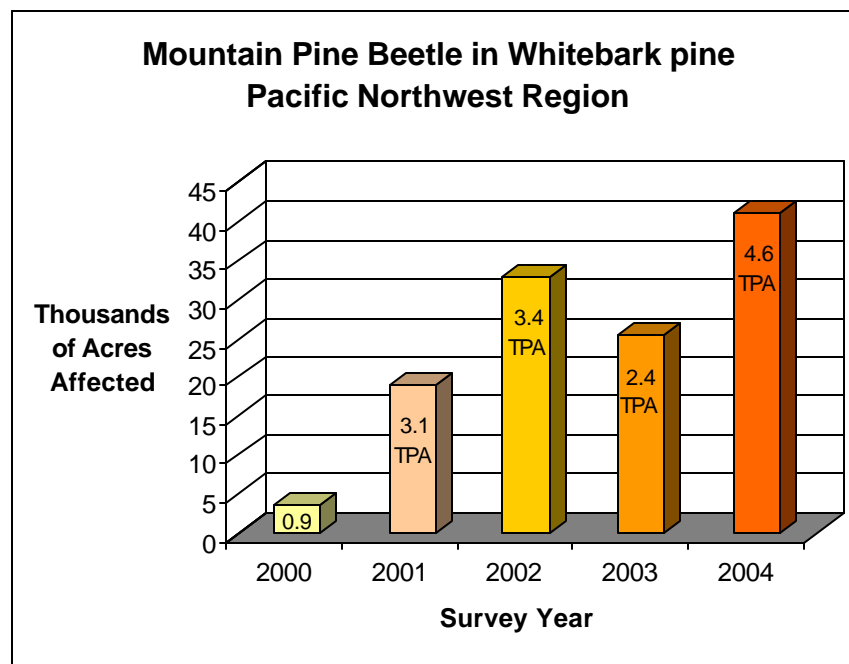
### Summary of western white pine mortality attributed to mountain pine beetle by ownership for the State of Oregon

Ownership	Acres with mortality	Average TPA killed
Forest Service	247.00	0.87
Congressionally designated lands	13.00	1.00
Private	102.00	0.85

### Summary of western white pine mortality attributed to mountain pine beetle by ownership for the State of Washington

Ownership	Acres with mortality	Average TPA killed
Forest Service	4,746.00	0.90
Congressionally designated lands	2.00	2.50
Indian Reservation lands	184.00	0.52
State of Washington	132.00	0.99
BLM	61.00	1.00
Private	1,758.00	0.87

Acres affected in the whitebark pine type increased from 25, 550 acres, 2.41 TPA in 2003 to 41,036 acres, 4.63 TPA in 2004. Highest levels of mortality were reported on Forest Service administered lands on the Okanogan National Forest, with over 13,000 acres reported with mortality averaging 6.54 TPA killed. Approximately 11,300 acres were reported on the Wenatchee National Forest with 4.94 TPA killed. 3,600 acres were mapped on the Yakama Indian Reservation with an average of 2.58 TPA killed. In Oregon, the most significant reported mortality was mapped on Forest Service lands within the Wallow-Whitman Reporting Area (4,046 acres with 0.97 TPA).



**Summary of whitebark pine mortality attributed to mountain pine beetle  
by ownership for the State of Oregon**

<b>Ownership</b>	<b>Acres with mortality</b>	<b>Average TPA killed</b>
Forest Service	1,168.00	0.89
Congressionally designated lands	4,396.00	1.08
Indian Reservation lands	92.00	0.47
National Park lands	34.00	1.32
BLM	24.00	0.21
Private	8.00	1.38

**Summary of whitebark pine mortality attributed to mountain pine beetle  
by ownership for the State of Washington**

<b>Ownership</b>	<b>Acres with mortality</b>	<b>Average TPA killed</b>
Forest Service	10,212.00	6.77
Congressionally designated lands	15,604.00	4.79
Indian Reservation lands	3,644.00	2.62
National Park lands	1,226.00	2.36
State of Washington	2,552.00	5.54
BLM	8.00	5.13
Private	2,068.00	6.65

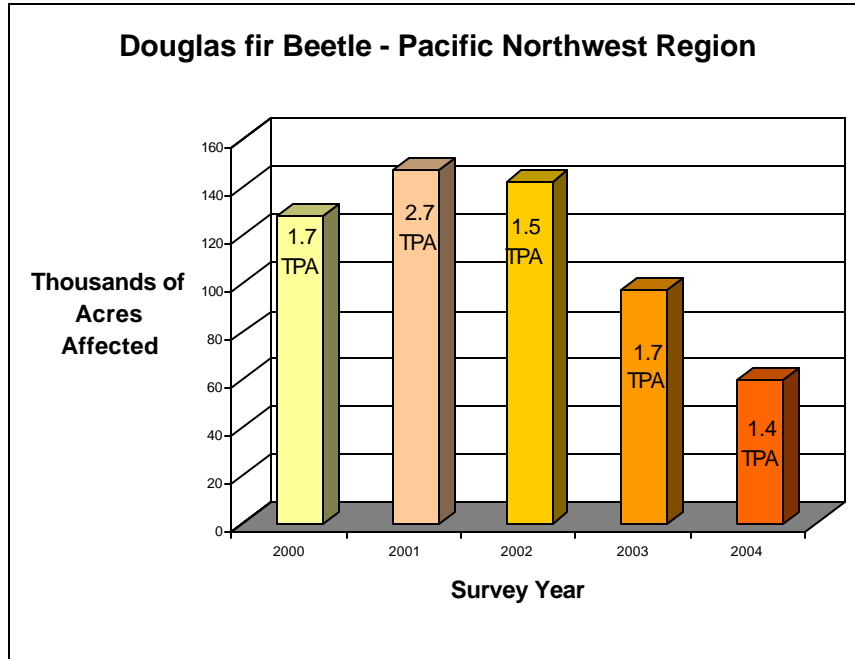
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**Douglas-fir Beetle, *Dendroctonus pseudotsugae***

**Hosts:** Douglas fir

Douglas-fir beetles occur throughout the range of Douglas-fir and are considered the most important bark beetles which cause mortality in Douglas fir. Normally they breed in felled, injured, or diseased trees. The females bore into the bark and tunnel upward through the phloem. Tree mortality occurs when phloem continuity is disrupted by beetle larval galleries or by fungi introduced by the beetles. Mortality is widely scattered when at low levels. At times, these insects reach epidemic levels and kill apparently healthy trees over extensive areas.

We saw an overall decrease in mortality for the fourth straight year. Mapped acres decreased from 97,598 (1.68 TPA) in 2003 to 59,252 (1.39) in 2004.



In Washington on the Colville National Forest Douglas-fir mortality was mapped on 13,770 acres at approximately 1.7 TPA. On private lands within the Colville Reporting area mortality was mapped on 4,549 acres at 1.64 TPA. On State lands within the Colville Reporting area mortality was mapped on 1,852 acres at 1.22 TPA. The Colville Indian Reservation was mapped at an average mortality of 1.34 TPA on 5,564 acres.

In Oregon, the most significant mortality was mapped on the Wallow-Whitman National Forest at 1.53 TPA on 2,327 acres and on private lands within the Willamette Reporting area (1.13 TPA on 1,466 acres).

**Summary of mortality attributed to Douglas-fir beetle by ownership for the State of Oregon**

Ownership	Acres with mortality	Average TPA killed
Forest Service	4,014.00	1.30
Congressionally designated lands	1,328.00	1.11
National Park lands	7.00	0.71
State of Oregon	399.00	0.68
BLM	909.00	0.95
Other Federal	8.00	1.13
Private	2,572.00	1.08



## Summary of mortality attributed to Douglas-fir beetle by ownership for the State of Washington

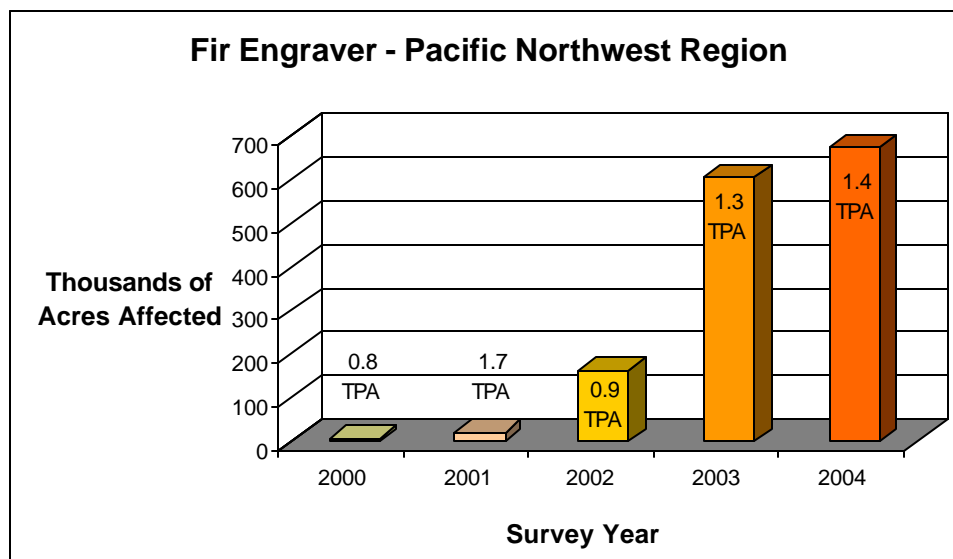
Ownership	Acres with mortality	Average TPA killed
Forest Service	23,278.00	1.59
Congressionally designated lands	1,385.00	1.69
Indian Reservation lands	6,686.00	1.22
National Park lands	1,252.00	1.58
State of Washington	5,090.00	1.20
BLM	323.00	1.75
Other Federal	262.00	0.71
Private	11,643.00	1.31

### Fir Engraver, *Scolytus ventralis*

**Hosts:** True firs

Fir engravers infest true firs in western forests. These beetles attack pole-sized and mature trees, causing significant mortality during and following periods of drought. Trees infected with annosus root disease are especially subject to attack. Trees defoliated by Douglas-fir tussock moth, western spruce budworm or Modoc budworm also are likely to be attacked. These beetles commonly breed in logging slash and windthrown trees.

Acres with mortality and overall numbers of trees killed by fir engraver increased for the fifth straight year killing an estimated 931,000 trees on approximately 672,378 acres in the Pacific Northwest Region in 2004.



The following Reporting areas are listed in order of highest levels of mortality: Colville 111,107 acres, 2.63 TPA, Wenatchee 55,646 acres, 2.02 TPA, Wallow-Whitman 71,203 acres, 1.00 TPA,

Yakama Indian Reservation 28,238 acres, 2.04 TPA, Colville Indian Reservation 26,540 acres, 2.06 TPA, Malheur 60,381 acres, 0.88 TPA, Umatilla 58,745 acres, 0.79 TPA, and Ochoco 40,921 acres, 0.97 TPA.

### Summary of mortality attributed to fir engraver by ownership for the State of Oregon

Ownership	Acres with mortality	Average TPA killed
Forest Service	224,171.00	0.74
Congressionally designated lands	31,027.00	1.22
Indian Reservation lands	1,396.00	1.12
National Park lands	901.00	0.41
State of Oregon	912.00	0.48
BLM	24,518.00	0.60
Other Federal	157.00	0.68
Private	88,835.00	0.87

### Summary of mortality attributed to fir engraver by ownership for the State of Washington

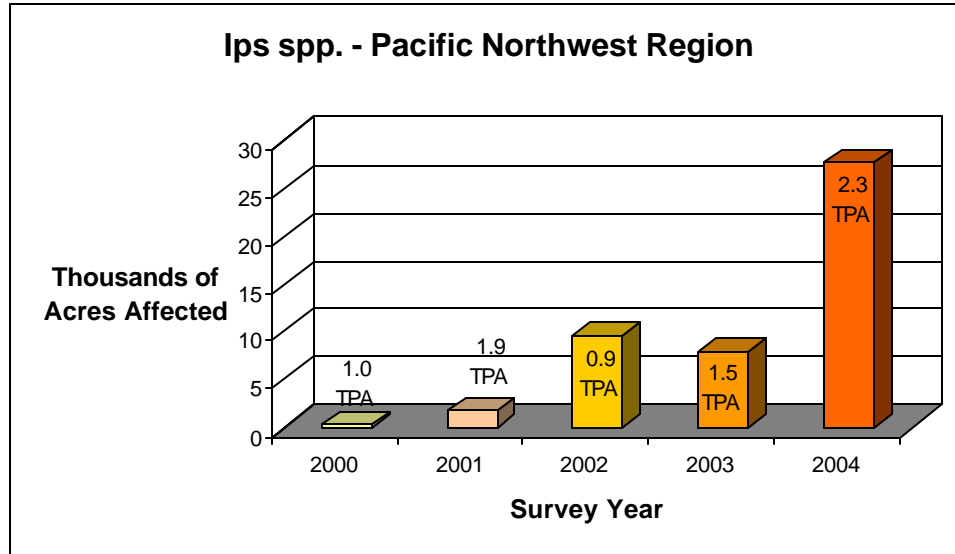
Ownership	Acres with mortality	Average TPA killed
Forest Service	106,641.00	2.45
Congressionally designated lands	19,080.00	1.53
Indian Reservation lands	57,744.00	2.00
National Park lands	4,709.00	1.19
State of Washington	30,920.00	1.90
BLM	2,281.00	3.78
Other Federal	3,018.00	2.53
Private	71,921.00	2.02

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## Pine Engraver Beetles, *Ips* spp.

**Hosts:** Ponderosa pine

Pine engraver beetles affect all species of pine but are most notable for their effect on ponderosa pine. Populations commonly build up in weakened trees, improperly treated logging and thinning slash, and windthrow. High populations in warm, dry years may kill large numbers of apparently healthy saplings and pole-sized trees as well as tops of mature trees.



Acres with mortality increased from 7,835 acres (1.54 TPA) in 2003 to 27,601 acres (2.25 TPA) in 2004. Mortality was scattered throughout the Region with the following Reporting Areas listed in order of the highest levels of tree mortality: Colville Indian Reservation 9,227 acres (2.46 TPA), Okanogan 2,816 acres (5.33 TPA), Glenwood 3,607 acres (2.59 TPA), Wallow-Whitman 1,318 acres (1.97 TPA), and Siskiyou 4,981 acres (0.51 TPA).

**Summary of mortality attributed to pine engraver beetles  
by ownership for the State of Oregon**

Ownership	Acres with mortality	Average TPA killed
Forest Service	3,637.00	0.99
Congressionally designated lands	1,880.00	0.54
Indian Reservation lands	32.00	1.06
State of Oregon	3.00	4.33
BLM	861.00	0.75
Private	3,149.00	1.54

**Summary of mortality attributed to pine engraver beetles  
by ownership for the State of Washington**

Ownership	Acres with mortality	Average TPA killed
Forest Service	3,412.00	4.71
Congressionally designated lands	79.00	1.00
Indian Reservation lands	8,517.00	2.35
State of Washington	840.00	2.08
BLM	9.00	2.11
Other Federal	94.00	1.70
Private	4,849.00	2.84

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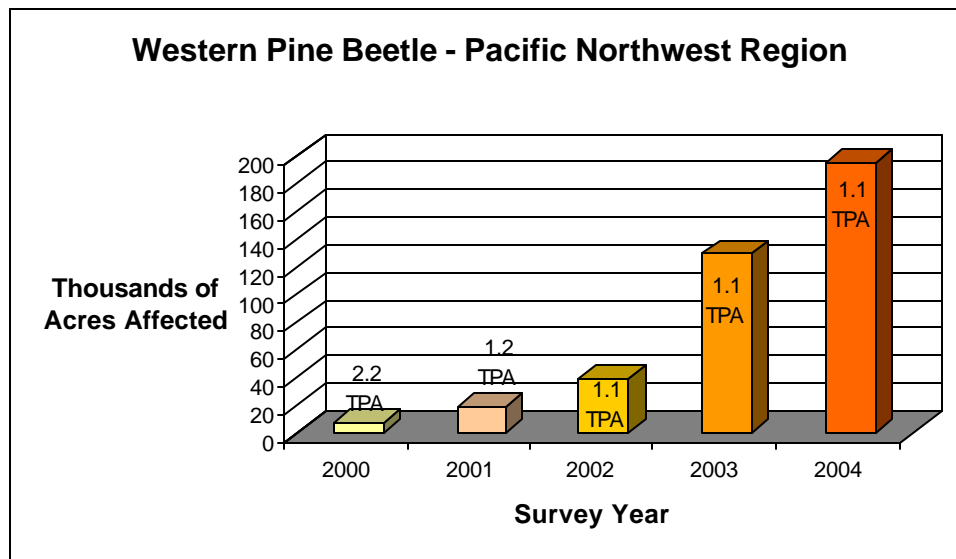
## Western Pine Beetle, *Dendroctonus brevicomis*

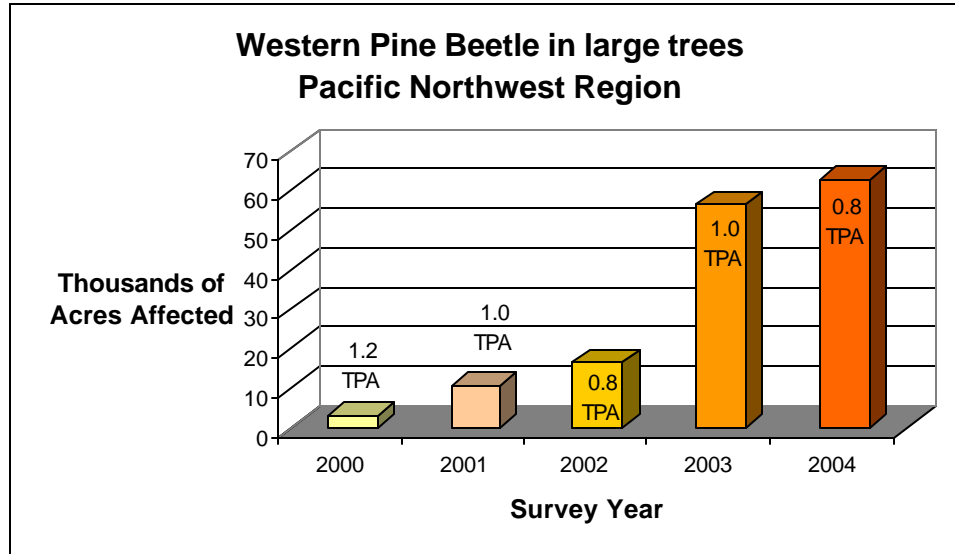
**Hosts:** Ponderosa pine

Western pine beetles periodically kill large numbers of ponderosa pine in the Pacific Northwest. Normally, these beetles breed in large, old trees; in windfalls; in trees infected by root disease; or in trees weakened by drought, overstocking, or fires. Under epidemic conditions, they will attack and kill trees of all ages having bark sufficiently thick to protect the insect during development. Two generations per year of this beetle are typical in the Pacific Northwest.

Acres affected by western pine beetle activity increased from 129,877 acres, 1.11 TPA in 2003 to 195,775 acres, 1.06 TPA in 2004. Activity in large ponderosa pine was reported on 62,941 acres at 0.78 TPA and activity in pole-sized trees was reported on 132,834 acres at 1.19 TPA.

Highest levels of mortality occurred on the following Reporting Areas: Spokane Indian Reservation 27,630 acres (1.86 TPA), Colville Indian Reservation 43,674 acres (1.08 TPA), Ochoco 41,858 acres (0.70 TPA), Colville 22,235 acres (1.03 TPA), Yakama Indian Reservation 15,931 acres (1.00 TPA), and Malheur 11,039 acres (1.11 TPA).



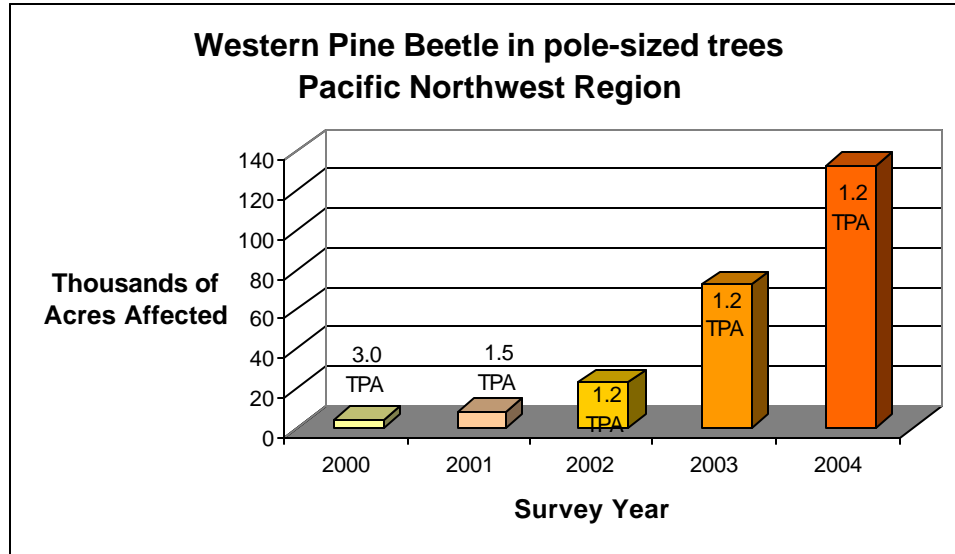


### Summary of mortality attributed to western pine beetle by ownership for the State of Orego

Ownership	Acres with mortality	Average TPA killed
Forest Service	43,915.00	0.69
Congressionally designated lands	5,984.00	0.93
Indian Reservation lands	1,600.00	1.37
State of Oregon	63.00	0.49
BLM	5,460.00	1.10
Private	15,581.00	0.81

### Summary of mortality attributed to western pine beetle by ownership for the State of Washington

Ownership	Acres with mortality	Average TPA killed
Forest Service	12,645.00	1.00
Indian Reservation lands	77,552.00	1.31
State of Washington	6,340.00	0.88
BLM	611.00	1.34
Other Federal	282.00	0.94
Private	25,598.00	1.16



## Spruce Beetle, *Dendroctonus rufipennis*

**Hosts:** Engelmann spruce

Spruce beetles infest all species of spruce and are the most significant mortality agent of mature spruce trees. Populations build up in windthrown trees. Stand susceptibility can relate to a variety of factors including geographic location, tree diameter, basal area, and percentage of spruce in the canopy.

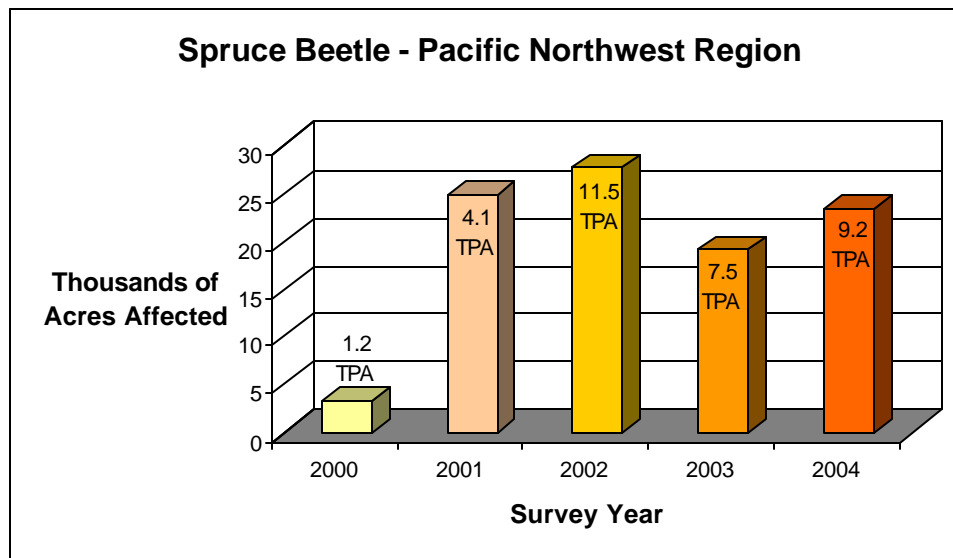
All reported mortality in Oregon and Washington in 2004 was in Engelmann spruce. Reported acres affected went from 19,106 acres, 7.51 TPA in 2003 to 23,444 acres, 9.24 TPA in 2004. The majority of mortality occurred on Forest Service lands within the Okanogan Reporting Area. On the Okanogan Reporting area 18,285 acres were mapped with spruce mortality averaging 10.56 TPA. The Wenatchee Reporting Area reported 2,448 acres with 6.63 TPA.

### Summary of mortality attributed to spruce beetle by ownership for the State of Oregon

Ownership	Acres with mortality	Average TPA killed
Forest Service	474.00	1.62
Congressionally designated lands	32.00	0.59

## Summary of mortality attributed to spruce beetle by ownership for the State of Washington

Ownership	Acres with mortality	Average TPA killed
Forest Service	8,824.00	7.07
Congressionally designated lands	8,713.00	15.09
Indian Reservation lands	1,817.00	2.79
National Park lands	293.00	4.71
State of Washington lands	3,152.00	4.84
Private lands	139.00	2.02



### **Pandora Moth, *Coloradia pandora***

**Hosts:** Ponderosa pine, Jeffrey pine, lodgepole pine

Pandora moths occur in central and southern Oregon in the Pacific Northwest Region, preferring pumice soils. Periods of heavy defoliation during outbreaks can weaken trees, making them more susceptible to bark beetle attacks. Due to the 2-year life cycle (feeding in alternate years) of these crunchy, delicious critters, and the fact that terminal buds are not eaten, trees often have an opportunity to recover.

Special surveys were conducted in 2002 and 2004 to map defoliation caused by the Pandora moth. In 2004, 87,532 acres were mapped within the Winema reporting area, compared to 24,431 acres in 2002.

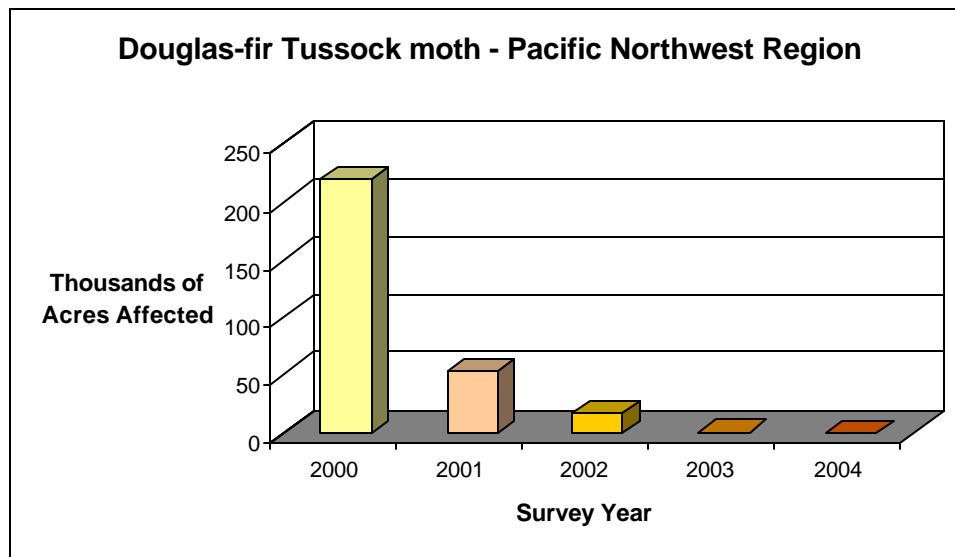
## Summary of defoliation caused by the Pandora moth by ownership for the State of Oregon

Ownership	Acres with defoliation
Forest Service	61,172.00
State of Oregon	43.00
Other Federal	92.00
Private	26,225.00

### Douglas fir Tussock Moth, *Orgyia pseudotsugata*

**Hosts:** Douglas fir, true firs

The primary hosts of the Douglas-fir tussock moth are Douglas fir, grand fir, subalpine fir and white fir. Early instar larvae feed on the current year's foliage as the shoots elongate and later instars feed on all foliage. Normally this insect occurs at very low population levels; however it experiences cyclic population increases every 7 - 13 years, and populations can have significant impacts on resources when these eruptive outbreaks occur.



There were no areas of visible defoliation caused by tussock moth recorded in 2004. This marks the fifth straight year in declines.

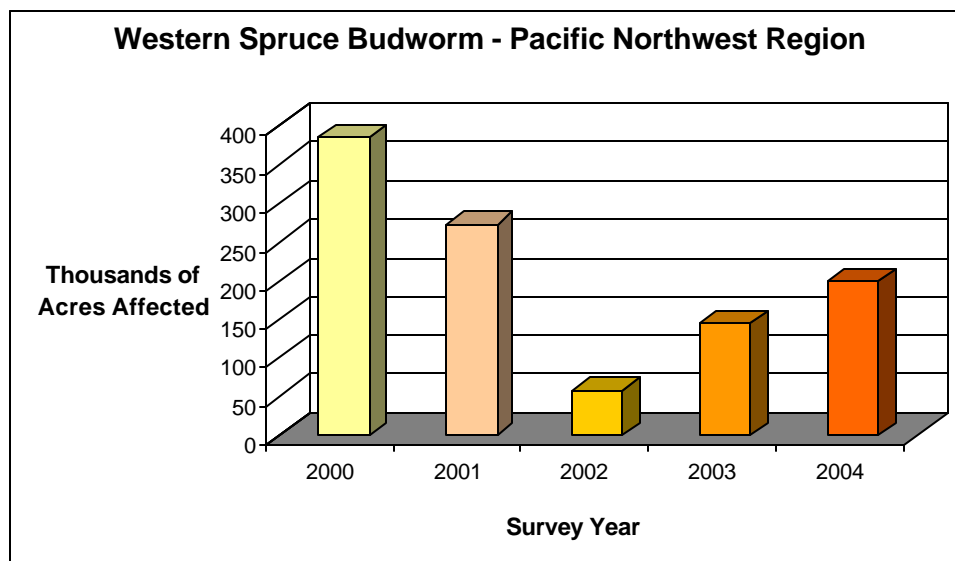


## Western Spruce Budworm, *Choristoneura occidentalis*

**Hosts:** Douglas fir, true firs, Engelmann spruce, western larch

Western spruce budworm is a common defoliator of conifers in the Pacific Northwest. Budworm outbreaks commonly occur in the true fir/Douglas-fir forest types east of the Cascade Mountains crest. Larvae prefer new foliage but also feed on older foliage when new foliage is in short supply. On western larch, larvae not only feed on the needles but also sever new shoots. Repeatedly defoliated trees experience substantial radial growth reduction and, if defoliation is great enough, are predisposed to lethal infections by root pathogens or attack by various bark beetles.

Increasingly effective fire prevention and suppression during this century have eliminated many major fires and nearly all surface fires. As a consequence, host trees have increased, resulting in an abundant and expanding source of the budworm's favorite food: shade-tolerant, late-successional species such as true fir.



Areas of visible defoliation increased from approximately 143,412 acres in 2003 to 199,684 acres in 2004. The most notable increase in budworm defoliation occurred within the Wenatchee Reporting Area for the third straight year, where acres of visible defoliation increased from 125,010 acres in 2003 to 157,489 acres in 2004. Other Reporting areas showing an increase in acres defoliated by western spruce budworm include: Okanogan (1,756 acres in 2003 to 20,088 acres in 2004); Yakama Indian Reservation (6,010 in 2003 to 6,573 in 2004); Malheur (3,435 acres in 2003 to 5,343 in 2004); Idaho panhandle (955 acres in 2003 to 4,143 acres in 2004) and North Cascades National Park (1,581 acres in 2003 to 3,594 acres in 2004).

The most notable decrease occurred once again on the Gifford-Pinchot Reporting Area, where no detectable defoliation was reported by aerial surveys.

### Summary of defoliation caused by western spruce budworm by ownership for the State of Oregon

Ownership	Acres with defoliation
Forest Service	6,157.00
BLM	153.00
Private	183.00

### Summary of defoliation caused by western spruce budworm by ownership for the State of Washington

Ownership	Acres with defoliation
Forest Service	96,833.00
Congressionally designated lands	68,560.00
Indian Reservation lands	6,559.00
National Park lands	3,826.00
State of Washington	8,950.00
BLM	5.00
Private	8,458.00

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### Western blackheaded budworm, *Acleris gloverana*

**Hosts:** Western hemlock (preferred), Sitka spruce, white spruce, true firs, Douglas-fir and mountain hemlock

Larvae feed within buds and on current year's foliage and can cause top-kill, growth loss, and, sometimes, death of the host. Defoliation becomes apparent in June and July as partially eaten needles dry and turn red, giving crowns of host trees a red or brown appearance. Weather plays an important role in regulating budworm populations. Relatively warm, dry days in June through August following a warm September in the previous year can result in a rapid increase in blackheaded budworm. Natural controls have resulted in significant decreases of blackheaded budworm populations. Some wasps parasitize budworm eggs, larvae, and pupae. A virus, fungi, and larval starvation also have contributed to budworm declines. Songbirds are also effective natural enemies.

Acres of defoliation decreased from 2,390 acres in 2002 to 2,247 acres in 2003. There were no reported areas of black-headed budworm defoliation in 2004

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### Phantom hemlock looper, *Nepytia phantasmaria*

**Hosts:** Douglas-fir and western hemlock

The primary hosts of the phantom hemlock looper are western hemlock, although western red cedar, Sitka spruce, true firs, and pines have also been recorded as hosts

Larvae feed first on the new foliage, then on the old. Outbreaks of phantom hemlock looper are often not observed because they tend to be local and sporadic. Populations of phantom hemlock looper have been found to be abundant in identified outbreaks of western hemlock looper and western blackheaded budworm.

Approximately 5,700 acres of defoliation were mapped in 2002. No areas of phantom hemlock looper defoliation have been mapped since 2002.

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## Western hemlock looper, *Lambdina fiscellaria lugubrosa*

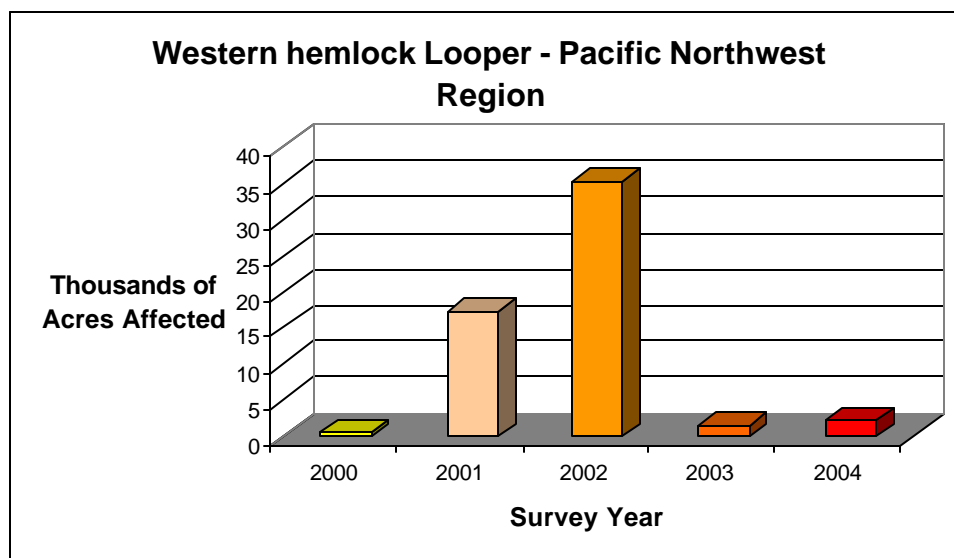
**Hosts:** Western hemlock, and associated conifers.

The primary hosts of the western hemlock looper are western hemlock; however, during outbreaks other associated conifer species are also defoliated, including western red cedar, true firs, Douglas-fir, spruces, western white pine and larch.

The larvae are wasteful feeders, chewing off needles at their bases and thus causing the stand to appear yellowish-red and brown in color. In heavy infestations, trees may be stripped in a single season. Defoliation starts in the upper crown, but as feeding progresses more and more of the crown is affected, increasing the risk of mortality. Late in summer, larvae are very mobile, crawling over tree trunks and shrubs, and by dropping by silken threads from the trees to the ground.

Western hemlock looper has caused more mortality of western hemlock than has any other defoliator. Outbreaks generally last for 2 to 3 years on any one site, and mortality seems to be greatest in old growth, although 80 to 100-year old stands can be heavily defoliated. Outbreak collapse is usually brought about by the combined effects of pathogens, parasites, predators, and sometimes, adverse weather conditions or larval starvation.

Acres defoliated in Washington State decreased significantly from over 35,200 acres in 2002 to 1,411 acres in 2003. In 2004, 2,189 acres were mapped in the vicinity of Baker Lake, Washington.

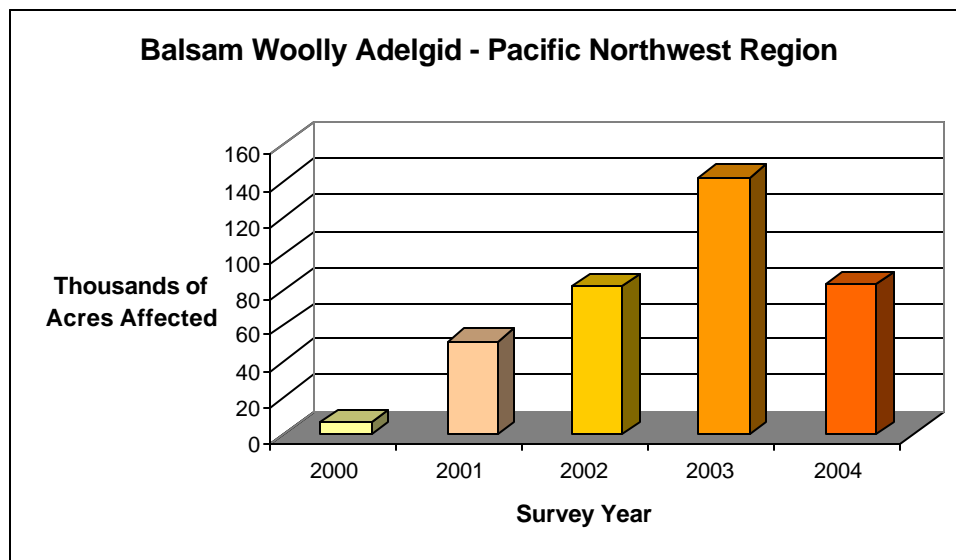


## Insects: Non-Native

### Balsam Woolly Adelgid, *Adelges piceae*

**Hosts:** True firs

The balsam woolly adelgid is an introduced insect that has had significant impact on grand fir, silver fir and sub alpine fir in Washington and Oregon. It can kill trees slowly by infesting the twigs or branches, or quickly, by infesting the bole. It also causes gouting of branch nodes. During the 1950's and 1960's it caused extensive mortality primarily along the Cascade Range. Since that initial mortality, BWA damage has been chronic and subtle and is not often visible from the air.



Acres affected by balsam woolly adelgid (BWA) decreased from 142,052 in 2003 to 83,325 in 2004, the first decrease in the past five years. BWA was mapped throughout the Region in high elevation stands dominated by subalpine fir.

In Oregon, 34,438 acres were mapped within the Wallowa-Whitman Reporting area, 10,831 acres on the Umatilla, and 3,591 acres on the Mount Hood Reporting Area. In Washington, 8,961 acres were mapped within the Gifford-Pinchot Reporting area, 4,781 acres on the Olympic National Park and 4,145 within the Wenatchee Reporting area.

### Summary of acres affected by balsam woolly adelgid by ownership for the State of Oregon

Ownership	Acres with defoliation
Forest Service	37,352.00
Congressionally designated lands	19,640.00
Indian Reservation lands	157.00
National Park lands	193.00
Private	540.00

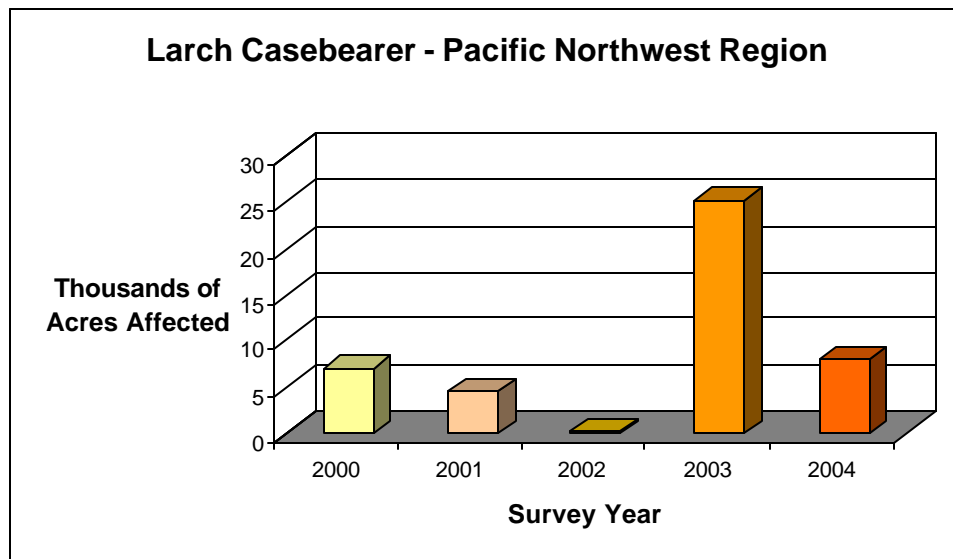
## Summary of acres affected by balsam woolly adelgid by ownership for the State of Washington

Ownership	Acres with defoliation
Forest Service	8,354.00
Congressionally designated lands	7,259.00
Indian Reservation lands	1,906.00
National Park lands	6,980.00
State of Washington	540.00
Private	404.00

### Larch Casebearer, *Coleophora laricella*

**Hosts:** Western larch

After years of negligible occurrence, larch casebearer-caused defoliation of western larch slowly increased in the late 1990's to 15,836 acres reported in 1999. Ideal timing for a larch casebearer survey in the Pacific Northwest is in June; however, most of the surveys in larch type occur in late July through early September.



Approximately 7,877 acres were mapped in 2004, a decrease from 25,176 acres mapped in 2003. Reporting areas with the greatest number of reported acres affected included: Mt. Hood 2,902; Wallowa-Whitman 1,721; Colville 1,266, and Ochoco 1,148.

Introduced parasites released in the Pacific Northwest in the early 1960's and established years ago, along with needle diseases on larch, helped maintain low levels of casebearer for many years. As casebearer populations declined, so did the introduced parasites. Parasites are expected to respond to the increasing casebearer population, although there may be several more years of defoliation before they increase to effective levels. Refoliation of larch in late

summer typically masks most of the defoliation, and because of this these trees are not as evident to observers late in the season. The ability of larch to refoiate is one of the reasons we do not expect to see tree mortality as a result of this insect.

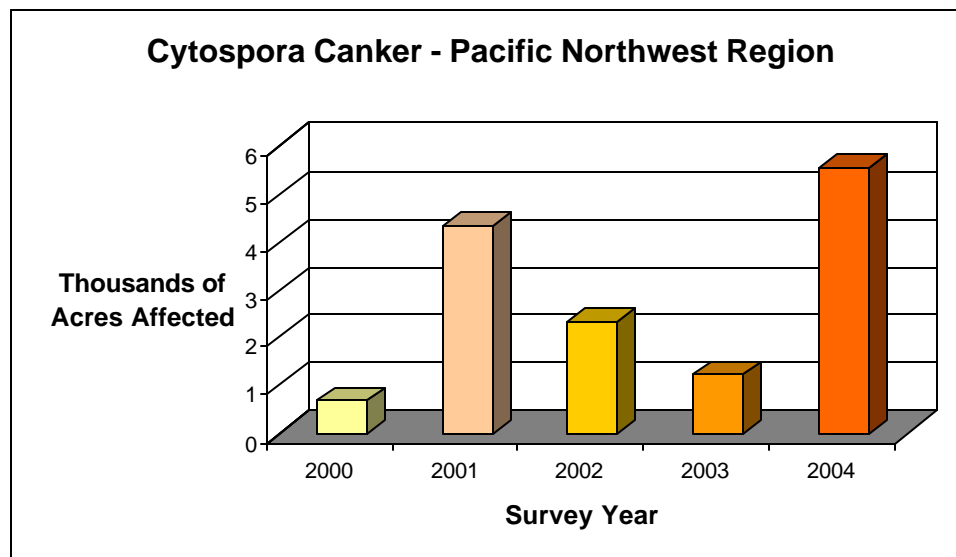
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## Diseases: Native

**Cytospora canker of true firs, dwarf mistletoe, sawfly (unknown species), and fir engraver beetle complex, *Cytospora abietis*, *Arceuthobium spp.*, *Neodiprion sp.* and *Scolytus ventralis***

**Hosts:** True firs

The various agents of this complex are widely distributed throughout Oregon and Washington wherever true firs occur. Activity levels of each agent typically fluctuate more-or-less independently among locations and over time. *Cytospora abietis* is a weak, canker-inducing fungus that attacks stressed trees. It commonly infects branches bearing dwarf mistletoe infections (described below), causing branch death. Conifer-feeding sawfly larvae feed on old foliage, temporarily weakening trees and slowing their growth. Outbreaks are usually sporadic and subside quickly. Fir engraver beetle (described above) activity is strongly associated with tree stress.



Aerially detected damage increased from 1,209 acres in 2003 to 5,551 acres in 2004. This was due, in part to field checks of areas initially mapped as 'unknown defoliator'. Areas checked revealed a complex of cytospora, silver fir beetle and fir engraver. Most of the aerially detected damage occurred within the Willamette Reporting Area (2,994 acres) and the Siskiyou Reporting area (1,328 acres).

Aerial observers sometimes mistake the color signature of cytospora with that of balsam woolly adelgid. Incidence was associated with mature noble fir and silver fir stands located near ridge tops, and is probably related to drought stress.

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## Swiss Needle Cast caused by *Phaeocryptopus gaeumannii*

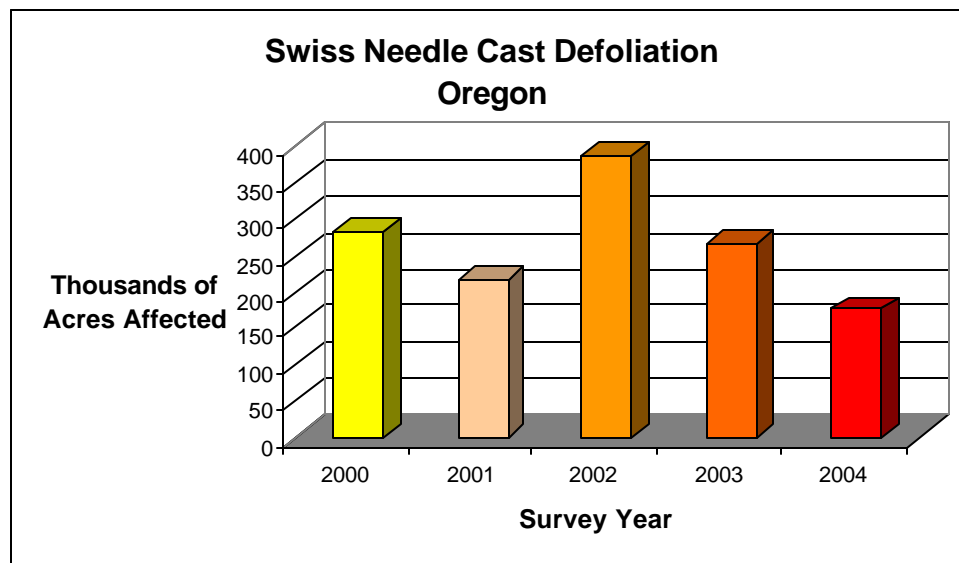
**Hosts:** Douglas-fir

In Oregon, acres with defoliation caused by Swiss needle cast decreased from 266,846 acres reported in 2003, to 176,142 acres in 2004 (ODF report states 176,594 acres). Acres in the heavy category of defoliation were ½ of 2003 reported levels. (2003 moderate = 229,675; 2004 = 163,862) (2003 heavy - 37,171; 2004 = 12,280).

The 2004 survey was conducted between May 6 and May 17 and covered approximately 2.35 million acres in northwestern Oregon. This represents about 650,000 fewer acres surveyed than last year, due to a lack of discernable signature in the eastern most extent.

Recent research results suggest that precommercial thinning does not have detrimental effects on Douglas-fir plantations affected by Swiss needle cast. The causal fungus in Oregon is divided into two reproductively isolated sympatric lineages; one with a worldwide distribution and the other is restricted to Oregon's coastal forests. Permanent plots established in the north Oregon Cascades are planned to be remeasured in 2006 to determine 5-year effects of Swiss needle cast on Douglas-fir growth and needle retention.

Swiss needle cast defoliation in Washington is not discussed because special surveys have not been conducted since 2000, and results from overview surveys conducted in July are unreliable.



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## Larch Needle Cast and Larch Needle Blight, *Meria laricis* and *Hypodermella laricis*

**Hosts:** Western larch

Larch needle blight and larch needle cast, which are reported as a complex because of their similar signatures as viewed from the air, increased from 1403 acres in 2003 to 2,117 acres in 2004. This includes 1,660 acres mapped on the Gifford-Pinchot National Forest, and 434 acres on the Wenatchee National Forest. Concentrations of infections were quite localized and mainly involved dense thickets of seedlings and saplings. These foliage diseases were most severe in stands of western larch growing in moist grand fir and moist sub-alpine fir plant associations as well as in riparian areas.

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### **Lodgepole Pine Needle Cast, *Lophodermella concolor***

**Hosts:** Lodgepole pine

Appearance of this needle disease on lodgepole pine is sporadic and strongly influenced by weather conditions. Infected trees will shed foliage prematurely, and vigor and growth may be reduced with successive years of infection. Trees are affected with heavy discolorations of the lower crowns of lodgepole pine. Areas mapped as affected by lodgepole pine needle cast in 2004 totaled 1,385 acres down from the 5,315 acres reported in 2003. The Wenatchee reporting area totaled 957 acres with Southwest Washington reporting area totaling 331 acres, mostly in coastal areas.

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## **Diseases: Non-Native**

### **Port-Orford-cedar Root Disease, *Phytophthora lateralis***

**Hosts:** Port-Orford-cedar

Port-Orford-cedar root disease continues to cause mortality of Port-Orford-cedar on sites with conditions favorable for spread and establishment of the causal pathogen. The annual aerial survey reported evidence of the disease on 9,910 acres (0.54 TPA) in 2004, up from 8,701 acres (0.89 TPA) in 2003. The vast majority of the reported mortality was mapped on private lands within the Coos-Douglas (4,673 acres) and Siskiyou (4,143 acres) Reporting Areas.

Hosts growing in riparian areas, swamps, drainage ditches, and low-lying areas downhill from roads suffer by far the greatest impacts. Trees on about 9 percent of the area within the limited range of Port-Orford-cedar are affected. Management activities such as road gating during the wet season, washing vehicles before they enter uninfested areas, and roadside sanitation treatments help slow the spread of the pathogen.

A major cooperative effort between the Forest Service, Bureau of Land Management, and Oregon State University to develop Port-Orford-cedar that is resistant to *P. lateralis* now has results. In fall 2002, the first operational collections of resistant seed from the Dorena containerized seed orchard occurred. Sowing will occur in winter 2002 / 2003 and seedlings will



be available for outplanting in the spring of 2004. Approximately 26,000 resistant seedlings will be planted in 2004, many of them in the 500,000 acre area burned in the 2002 Biscuit fire.

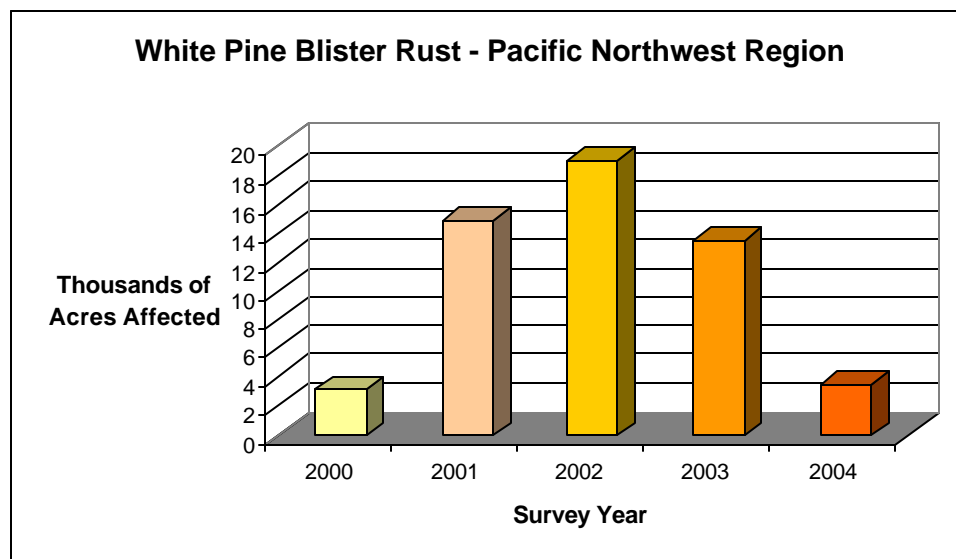
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## White Pine Blister Rust *Cronartium ribicola*

**Hosts:** Western white pine, sugar pine, whitebark pine

*Cronartium ribicola* was introduced to the west coast in 1910. Its impacts include top-kill, branch flagging, and tree mortality. While much of the mortality associated with this disease occurred earlier in the century, its impacts are still great in wild populations of five-needled pines throughout their range.

Locally, this disease, in combination with mountain pine beetle, still kills many host trees. Of particular concern are the effects of blister rust in whitebark pine at high elevations in the Cascades and in the Blue and Wallowa Mountains and in sugar pine in southwest Oregon where about 45 percent of stands with host components are affected.



An attempt was made to identify areas symptomatic of blister rust through aerial survey beginning in 1994. Blister rust is known to occur extensively throughout the range of susceptible host type. Observers mapped approximately 3,488 acres in 2004, down from 13,510 acres in mapped in 2003.

With the exception of blister rust in whitebark pine (which grows at higher elevations and in more open conditions), blister rust is very difficult to detect from the air. In Washington, 1,246 acres were mapped within the Wenatchee Reporting area, 1,070 acres on the Idaho Panhandle National Forest, and 573 acres in the Okanogan Reporting area. In Oregon, the most heavily mapped area was on the Siskiyou National Forest (425 acres).

## Diseases: Unknown Origin

### Sudden Oak Death, *Phytophthora ramorum*

*Phytophthora ramorum*, the causal agent of Sudden Oak Death (SOD), was first discovered in Oregon by aerial survey in July 2001. Since fall of 2001, state and federal agencies have been attempting to eradicate *P. ramorum* from infested sites by cutting and burning all infected host plants and adjacent apparently uninfected plants, and treating stumps to prevent sprouting. As of the end of 2004, eradication was in progress on approximately 42 sites, totaling 70 acres.

As of the end of 2004, the area under federal and state quarantine remained at 11 mi<sup>2</sup> near Brookings, Curry County, Oregon. The number of new infected trees discovered each year has decreased since the pathogen was first discovered in Oregon. The infested sites occur on federal, private industrial and private non-industrial forestlands.

2004 : In Washington, nursery surveys and surveys of the forest environs adjacent to nurseries were surveyed using the national survey protocol. There are no positive findings to date.

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## Abiotic Damage

### Bear Damage, *Ursus americanus*

**Hosts:** Douglas fir, western hemlock, Port-Orford-cedar

Loss of crop trees and reduction in value due to feeding by bears is a widespread problem in the Pacific Northwest. Bark peeling by black bear can kill trees, and result in stain, decay, breakage, and loss of value in trees that are not killed outright. Bears are attracted to thinned plantations and feed on trees from April to July. Bears tear off large patches of bark and feed on the cambium, and can damage many trees per day. Loss in merchantable volume in Douglas-fir trees that have suffered past bear damage can run 7 to 10 percent.

Acres with trees killed by bear as interpreted by aerial observers decreased from 321,600 acres (1.99 TPA) in 2003 to 178,709 acres (1.66 TPA) in 2004. The vast majority of recorded damage was mapped in Western Oregon and Western Washington. The aerial survey only detects trees that have been recently killed by bear feeding. A ground survey on Quinalt lands found that at least 3.5 times as many Douglas-fir trees are damaged as killed.

Noteworthy Reporting areas include: Southwestern Washington, 23,305 acres, 2.08 TPA, Gifford-Pinchot, 42,113 acres, 1.62 TPA, Mount Baker-Snoqualmie, 23,235 acres, 2.11 TPA, Olympic, 34,124 acres, 1.85 TPA, Northwestern Oregon, 15,332 acres, 0.92 TPA, and Quinalt IR 10,811 acres, 1.77 TPA.

## Summary of mortality attributed to Bear by ownership for the State of Oregon

Ownership	Acres with mortality	Average TPA killed
Forest Service	7,145.00	0.78
Congressionally designated lands	31.00	4.68
State of Oregon	3,914.00	0.71
BLM	2,893.00	0.94
Other Federal	26.00	0.42
Private	19,909.00	0.94

## Summary of mortality attributed to Bear by ownership for the State of Washington

Ownership	Acres with mortality	Average TPA killed
Forest Service	21,207.00	1.52
Congressionally designated lands	1,057.00	1.09
Indian Reservation lands	11,036.00	1.76
National Park lands	187.00	1.60
State of Washington	26,982.00	2.10
Other Federal	642.00	2.21
Private	83,679.00	1.85

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## Nursery Insects and Diseases

### Aphids, Family *Aphidae*

**Hosts:** Pacific madrone

Aphids damaged a small number of madrone seedlings in a greenhouse. The infestation was treated by washing the affected plants with a high pressure spray to remove the insects.

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### Black Vine Weevil, *Otiorhynchus sulcatus*

**Hosts:** Containerized hardwoods, shrubs and conifers

Monitoring was conducted weekly from April through September but no evidence of root weevil activity was observed. In December when plants were extracted from the containers prior to shipping a few larvae were found in containers of alder and dogwood that had been held over from the previous year. Damage was minimal and no treatment was necessary.

## **Cranberry Girdler, *Chrysoteuchia topiaria***

**Host:** Conifers

Monitoring for the girdler was done with the standard pheromone trap system. Inspection of seedlings in the seedbeds did not reveal any damage on the plants at the end of the growing season. No chemical treatments were used.

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## **Cutworm, Family *Phalaenidae***

**Host:** Incense cedar

Cutworms completely defoliated a small number of young containerized seedlings in a greenhouse. The infestation was treated by removing the affected seedlings.

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## **Flea Beetles, Family *Chrysomelidae***

**Hosts:** Rocky Mountain Bee Plant

Flea beetles caused extensive damage by feeding on leaves of bareroot crop. Sticky traps were set up but did not control the insects effectively. Two applications of Pydrin were effective at reducing the population below the damage threshold.

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## **Fungus Gnats, Family *Sciaridae***

**Hosts:** containerized conifers and aspen

The fungus gnat population built up in conifers growing in Q-plugs, and in aspen rootstock in a greenhouse. Inspection revealed a small amount feeding damage on young roots. One application of *Bacillus thuringiensis* was successful in preventing further damage.

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## **Corky Root Syndrome, *Cylindrocarpon destructans* and *Fusarium* spp.**

**Hosts:** Western white pines and sugar pines

Mortality attributed to root disease caused by *Cylindrocarpon destructans* and *Fusarium* spp. was evident in western white and sugar pines during the growing season. However during grading fewer seedlings with corky roots were observed than in previous years.

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## **Damping-off, *Fusarium* spp., *Pythium* spp.**

**Hosts:** Conifers

Damping off caused significant mortality in containerized sugar pine seedlings in a greenhouse. The seed was not pretreated and germination was inhibited by use of a fine grit topping that hardened after wetting. Diseased seedlings were removed and conditions changed to create an environment less conducive for disease.

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### **Fusarium Root Rot, *Fusarium oxysporum***

**Hosts:** Western red cedar

Two lots of large containerized western red cedar experienced high mortality due to root disease. It appeared the seedlings were infected in the field prior to transplanting into the containers. After lifting they were stored for a several months at temperatures above 32° F, allowing disease to develop in the roots. The affected seedlings were removed and destroyed.

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### **Gray Mold, *Botrytis cinerea***

**Hosts:** Port-Orford-cedar and Douglas-fir

Containerized Port-Orford-cedar and Douglas-fir seedlings in a greenhouse were damaged by gray mold. The diseased seedlings were treated by cutting off infected foliage and spot treating with Zerotel.

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### **Phytophthora Root Rot, *Phytophthora* spp.**

**Hosts:** Conifers

The nursery decided to turn off the chlorination system and experiment with using untreated irrigation water. No evidence of root disease caused by *Phytophthora* species was observed in any of the nursery crops irrigated with this water. The water was sampled periodically for *Phytophthora* at several locations during the growing season. *P. gonapodyides* and *P. citricola* were found in creek water above the intake for the irrigation system. No *Phytophthora* species were found in water within the nursery system. Monitoring of both water and crops will be continued.

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## **Seed Orchard Insects and Diseases**

### **Black Vine Weevil, *Otiorhynchus sulcatus***

**Hosts:** Western larch

*O. sulcatus* was found to be fairly wide spread in western larch growing in large containers causing tree stress and occasional mortality. No treatment was necessary.

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### **Fir Cone Worm, *Dioryctria abietivorella***

**Hosts:** Douglas-fir

In one seed orchard cone worms were evident in mature Douglas-fir that were girdled for stimulation of a seed crop; however damage was considered to be minor. Minor insect damage was also noted in mature cones. At another orchard cone worms were caused damage to cones and seeds of grafted trees. Treatment was removal of all unharvested cones and installation of bird boxes to attract insectivorous birds. Larvae were also found mining twigs and tissue at graft unions. Trees were treated with an application of sun protection paint.

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### **Cone Worm, *Dioryctria* spp.**

**Hosts:** Western white pine, whitebark pine, sugar pine

At one seed orchard signs of cone worm damage were evident in older western white pine used for controlled crosses for resistance breeding. Year old control cross conelets were treated to prevent infestation. Cone worms were also found on two year old whitebark pine as tip borers. Leader mortality was wide spread. This seed orchard is now designing a monitoring and treatment program to prevent future damage. At another seed orchard the cones of some sugar pines were damaged by mining. Trees were sanitized (unharvested cones removed) and developing cones covered with cloth bags during the second growing season.

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### **Douglas-fir Cone Gall Midge, *Contarinia oregonensis***

**Hosts:** Douglas-fir

At one orchard cone gall midges were noted in the 2004 cone crop, though damage was controlled through insecticide application. Imidacloprid injectors were used on 43 orchard acres for the primary purpose of reducing damage. An application study found there were significant differences in the number of filled seed and number of galled scales between trees injected with imidacloprid and those in an untreated control.

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### **Douglas-fir Seed Chalcid, *Megastigmus spermotrophus*.**

**Hosts:** Douglas-fir

Seed chalcids were noted during seed extraction and seed testing. Damage was generally low. No chemical control measures were used to limit damage in 2004.

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### **False Chinch Bug, *Nysius* spp.**

**Hosts:** Port-Orford-cedar

Damage caused by false chinch bugs may have contributed to a reduction in the percentage of filled seed in controlled crosses in containerized Port-Orford-cedar. The seed orchard will experiment with control treatments in 2005.

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### **Sawfly, Hymenoptera spp.**

**Hosts:** Sugar pine

A few trees in an orchard unit were found to have sawfly larvae, which were defoliating tree crowns. The larvae were mechanically removed by shaking the trees or spraying with water, then crushing the larvae on the ground.

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### **Strawberry Vine Weevil, *Otiorhynchus ovatus***

**Hosts:** Port-Orford-cedar

Root damage attributed to vine weevils was found sporadically in Port-Orford-cedar seedlings grown in ten cubic inch containers in a greenhouse. No action was taken due to their limited occurrence. Some of the damage may have been caused by cranberry girdler.

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### **Western Conifer Seed Bug, *Leptoglossus occidentalis***

**Hosts:** Western white pine, sugar pine and Douglas-fir

Seed bugs were widely observed in Douglas-fir seed orchards and caused some damage to seeds in cones. Orchards were sanitized by removal of unharvested cones. At an orchard with western white pines and sugar pines, seed bugs had a severe impact on seed yields. Orchard blocks used for production of seed for fire restoration and trees used for controlled cross breeding were treated with esfenvalerate to control insect damage. At another orchard developing second year sugar pine cones were covered with cloth bags before the insects emerged.

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### **Unidentified Cone Midges**

**Hosts:** Port-Orford-cedar

Damage caused by cone midges may have contributed to a reduction in the percentage of filled seed in controlled crosses in containerized Port-Orford-cedar. The seed orchard will experiment with control treatments in 2005.

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## Cypress Canker, *Seiridium cardinale*

**Hosts:** Port-Orford-cedar

Cypress canker was found on one Port-Orford-cedar in an older planting at one seed orchard. Judging by the number of cankers and dead branches present, that tree was very susceptible to the disease. It was cut and the material was removed and destroyed.

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## Douglas-fir Rust, *Melampsora occidentalis*

**Hosts:** Douglas-fir, black cottonwood

Rust was observed in Douglas-fir trees along the edge of an orchard unit adjacent to a riparian area with black cottonwoods. No treatment was necessary.

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## Gray Mold, *Botrytis cinerea*

**Hosts:** Whitebark pine, western white pine and sugar pine

An outbreak of gray mold in the rust inoculation chamber damaged five-needle pine seedlings. Temperature and humidity conditions required for inoculation with *Cronartium ribicola* are also very conducive to the development of gray mold. The outbreak was treated by removal of visibly affected seedlings, installation of a fan to improve air circulation, and treatment with fungicides.

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## Larch Needlecast, *Meria laricis*

**Hosts:** Larch

The incidence of needlecast on western larch growing in large containers was greatly reduced through cultural means, namely protection from spring rains during and following bud burst. There were scattered occurrences of the disease along the edges of containerized seed orchard trees subjected to rain drift. Because of the limited distribution and spread potential, no treatment was necessary.

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## Phytophthora Root Rot, *Phytophthora cinnamomi*, *Phytophthora* spp.

**Hosts:** Whitebark pine, sugar pine

In one orchard *Phytophthora cinnamomi* caused severe mortality in two year old whitebark pine seedlings used for testing resistance to white pine blister rust. The affected seedlings and soil were removed and destroyed, and the containers were sanitized. A new water treatment system and improvements in preventive measures, early detection and sanitation will be used to reduce damage from this disease in the future. At another orchard *Phytophthora* root rot was likely the cause of mortality of over 100 sugar pines. The remaining trees were treated with mycorrhizae to improve tree nutrition and disease tolerance.



## White pine blister rust, *Cronartium ribicola*

**Hosts:** Sugar pine

A few orchard trees were identified with white pine blister rust cankers in branches or stems. Some tree branches were pruned and a few trees were removed.

### Summary Table

Insect or Disease	State	Ownership	Acres Infested	Volume Killed (m3)	# Trees Killed
Douglas-fir Beetle	OR	federal	5,300	1,284,300	6,700
		state	900	316,400	900
		private	3,000	984,500	3,100
	WA	federal	24,700	4,591,000	39,400
		state	8,500	1,366,500	10,900
		private	16,700	2,909,200	21,400
Fir Engraver	OR	federal	255,200	10,963,700	203,800
		state	27,000	1,150,200	16,800
		private	89,700	4,500,600	77,500
	WA	federal	125,700	15,842,600	290,000
		state	67,800	7,279,500	137,300
		private	102,800	10,880,300	204,300
Mountain Pine Beetle	OR	federal	185,000	13,710,600	942,900
		state	32,900	3,722,300	229,500
		private	26,600	477,700	32,200
	WA	federal	200,100	21,453,500	1,581,300
		state	43,200	6,781,600	483,800
		private	46,500	2,346,900	173,900

<b>Insect or Disease</b>	<b>State</b>	<b>Ownership</b>	<b>Acres Infested</b>	<b>Volume Killed (m3)</b>	<b># Trees Killed</b>
<b>Western Spruce Budworm</b>	OR	federal	6,200	0	0
		state	200	0	0
		private	200	0	0
	WA	federal	165,400	0	0
		state	10,400	0	0
		private	17,400	0	0
<b>Western Pine Beetle</b>	OR	federal	49,900	2,083,700	36,000
		state	7,100	546,300	8,200
		private	15,600	591,000	12,600
	WA	federal	12,600	558,100	12,600
		state	78,400	6,003,500	102,500
		private	31,900	2,085,900	35,300
<b>Douglas-fir Tussock Moth</b>	OR	federal	0	0	0
		state	0	0	0
		private	0	0	0
	WA	federal	0	0	0
		state	0	0	0
		private	0	0	0