

**WESTERN NORTH AMERICAN DEFOLIATOR WORKING GROUP
MEETING**

SALT LAKE CITY, UT

DECEMBER 4-5, 2007

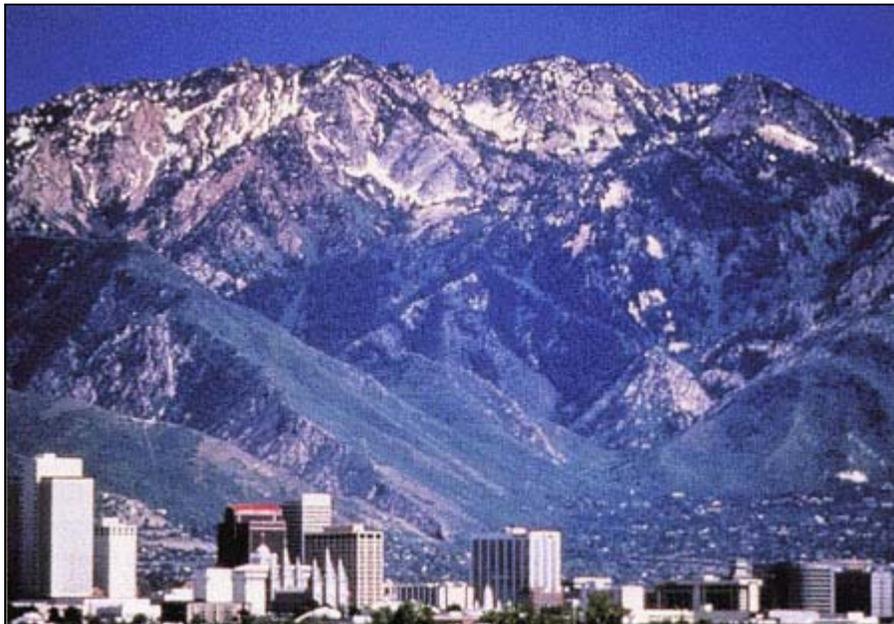


Photo of Downtown Salt Lake City

**Western North American Defoliator Working Group Meeting
Salt Lake City, UT
December 4-5, 2007**

Participants: See attached list.

Action items for 2007:

1. Database (Beth, Darren, Bev)
 - Will find out about cost to convert EndNotes to website
 - Subcommittee- Beth, Bev, Darren, others will address details (maintenance of website, etc.)
 - Workshop at WFIWC-larger than BB and Def.
2. Pesticide Application
 - Raise issue for aerial application expertise at FHPDirector's Meeting (Ragenovich)
 - Ask Jesus if he has any plans to conduct trainings (Ragenovich)
 - Develop a contingency plan, survey regions for interest and expertise (Ragenovich)
3. Re-encourage Chris Niwa to publish WSBW trap/defoliation paper (Ragenovich)
4. Re-encourage Carol Randall to follow and document WSBW in hemlock (Sandy)
5. Collect adelgids from spruce and send for identification (Beckman/Laura)
6. Write-up DFTM pheromone mating disruption and elution report (Ragenovich)
7. Document WSBW plots in thinned and unthinned stands in Montana (Sturdevant)
8. Before going to his happy place, write a report on Western Spruce Budworm Trend Plot (Hostetler)
9. Aspen???
10. Re-visit and document WSBW thinning plots in NM, CanUsa Plots (Rogers/Sandoval)

Action items for 2008:

1. Database (Beth, Darren, Bev) **In progress-ongoing**
 - Will find out about cost to convert EndNotes to website
 - Subcommittee- Beth, Bev, Darren, others will address details (maintenance of website, etc.)
 - Workshop at WFIWC-larger than BB and Def.
2. Pesticide Application – **In discussion**
 - Raise issue for aerial application expertise at FHPDirector's Meeting (Ragenovich)
 - Ask Jesus if he has any plans to conduct trainings (Ragenovich)
 - Develop a contingency plan, survey regions for interest and expertise (Ragenovich)

3. Re-encourage Chris Niwa to publish WSBW trap/defoliation paper (Ragenovich) –**sent Iral draft, Chris is retiring in Jan-2008. Iral will send draft to group. Final product?...Iral will follow up with this.**

Rob Flowers noted after the meeting: Niwa & Overhulser w. spruce budworm trapping guide, 2004 - While Chris had initially offered to publish it, Dave indicated that there is not much credit given to researchers for "how to" guides, especially when its based primarily on another's work (Sartwell.) For these same reasons, it may be difficult to find someone else to move it through the USFS pub. process.

4. Re-encourage Carol Randall to follow and document WSBW in hemlock (Sandy).**In progress. Lee will follow up and update group.**

5. Collect adelgids from spruce and send for identification (Laura) – **Will follow up with Dave and Jeff.**

6. Write-up DFTM pheromone mating disruption and elution report (Ragenovich). – **move to 2008 action items.**

7. Document WSBW plots in thinned and unthinned stands in Montana (Sturdevant) – **in form of trip report.**

8. Before going to his happy place, write a report on Western Spruce Budworm Trend Plot (Hostetler) – **move to 2008 action items...retirement in Jan/2009..?**

9. Aspen Decline Project, **include aspen section in 2008 agenda**– (Blackford)
I've requested brief report from Brytten Steed and her 2008 work on this project. She forwarded this report to Nancy Sturdevant to present to group in Bozeman.

10. Re-visit and document WSBW thinning plots in NM, CanUSA Plots (Rogers/Sandoval) – **Will bring old reports to 2008 meeting...will look at data during 07/08 winter.?**

11. **Make WSBW pamphlet available online (Blackford).**
I've asked Kathy Sheehan to post this on WNADWG website for all to view/print.

12. **DFTM pamphlet and general defoliator pamphlet (Lee/Blackford).**

13. **DFTM FIDL update...(Lee/Bev/Laura).**

14. **WSBW "how to trap" pamphlet (Ripley/Bruce)**

15. **DFTM report (Kings Canyon NP) (Bev)**
"The action item for evaluating DFTM in Sequoia Kings will not happen until summer of 2009. The management there decided to wait until the decade was up to then take a look. They were also very busy this past summer, so they are planning for several weeks next summer."...Bev

16. **More historical trends with ADS overlays in regional reports (all)**

17. **Defoliator FIDLs...updates**

New pubs:

1. **Bev-I and D of oaks in CA publication.**
2. **Darren- send WSBW pamphlet out to group. *I've asked Kathy Sheehan to post this on WNADWG website for all to view/print.***

Pending pubs:

1. **Western Tent FIDL revision – Iral**
2. **R6 field guide..I and D of hardwoods.**

Next Meeting: 2008 Meeting will be hosted by Amy Gannon in Montana.

A. REGIONAL REPORTS:

Region One - *Montana and Northern Idaho: (Compiled by Nancy Sturdevant and Lee Pederson -FHP).*

Montana

Acres of defoliation mapped increased in 2007 across parts of Montana. Defoliation is especially notable on the Helena, Beaverhead-Deerlodge, Gallatin and Lewis and Clark NFs. Defoliation intensity is also increasing across these forests with entire stands in some areas completely defoliated. Western spruce budworm continues to be the most significant defoliator in the region. In 2006, a total of 1,159,619 acres were defoliated from budworm. We do not have acreage figures for 2007 yet, but it is expected to be much higher and more severe in many areas.

Also, in 2006, we mapped 2,247 acres defoliated by larch casebearer and 168 acres defoliated by pine tussock moth on the Custer NF. In 2007, pine needle miner caused some defoliation on the Flathead NF. We also suspect that the pine tussock moth defoliated additional areas on private land near Round-up and Columbus in 2007. (Between 2000-4000 acres, we will ground truth in 2008).

Recent observations in heavily defoliated stands on the Helena National Forest, suggest there may be a relationship between heavy defoliation by WSBW (>90% total crown) and subsequent attack by DFB (Sturdevant and Kegley, 2006). Validity of this relationship has not been tested in the Northern Region. The importance of consecutive years of defoliation also is unknown. In 2007, we established permanent plots in several areas of current WSBW-caused defoliation will allow us to monitor Douglas-fir mortality caused by defoliation and/or bark beetle attack. We may also be able to determine defoliation characteristics most attractive to DFB.

At three locations with high current WSBW defoliation were identified using 2005-2007 aerial detection survey maps and ground assessments. These locations had a history of both WSBW and DFB activity.

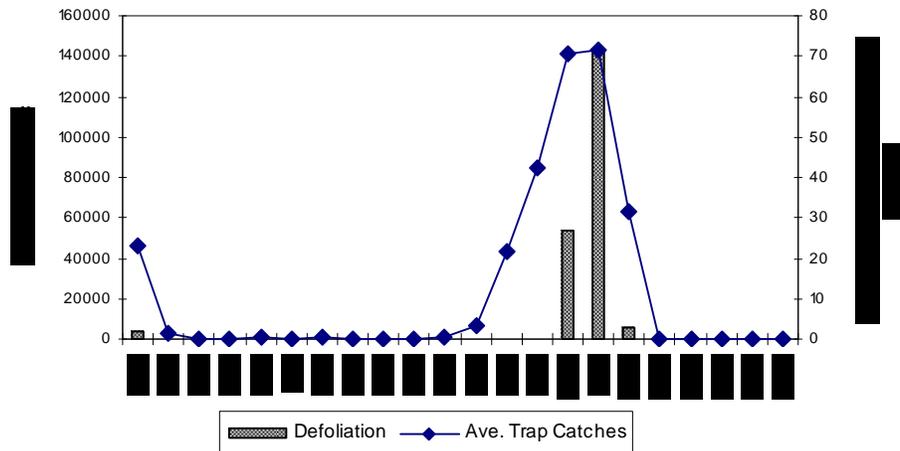
Within each of these locations, we chose three sites (stands), one to three miles apart. Stands were predominantly Douglas-fir with breast-height diameters (dbh) of eight inches or greater. Although we did not examine individual trees for existence of root disease, stands were to have little to no apparent root disease affects (i.e. no visible mortality centers nor thinning crowns not due to defoliation). A full establishment report will be released during late 2007 or early 2008.

Northern Idaho

Due to unpredictable, inclement weather and visual interference from forest fire-generated smoke during peak survey times in 2006 and 2007, actual total acreage of defoliator damage was underestimated. This especially affected western spruce budworm (WSBW) detection numbers, as populations are known to be increasing throughout the Region. The Nez Perce National Forest wasn't flown at all and parts of the St. Joe and the Clearwater weren't flown in 2007.

Douglas-fir Tussock Moth (*Orgyia pseudotsugata*): Defoliation from Douglas-fir tussock moth in north Idaho dropped from 5,400 acres in 2002 to zero in 2003, 2004, 2005, 2006, and 2007. A viral epizootic is assumed to have caused the population to collapse. This year we caught more moths than the past few years. Out of 32 FS trap sites, a total of 72 moths were caught on 10 of these sites. Twenty-three moths, caught at Bergamin Creek on the Clearwater NF, were the most caught at any site. Below is a graph used in yearly reports by the State of Idaho and CDA Forest Health Protection displaying infestation events over the last 22 years.

**Douglas-fir Tussock Moth Trap Catches and Defoliation
North Idaho (IDL)**



Western spruce budworm (WSBW), *Choristoneura occidentalis*: On the Kanisku and Coeur d'Alene NF's and bordering lands of North Idaho, WSBW has been continually feeding on western hemlock and fir for the past five years. Affected landscapes include forestlands on the east side of Lake Pend Orielle (Kanisku NF), and lands going southeast of the lake through a portion of the Kaniksu, and across areas of the Coeur d'Alene Mountain Range on the Coeur d'Alene NF. Some of these areas were surveyed for severity by CFO personnel to corroborate flight maps. Defoliation continued south of Wallace and Kellogg, Idaho, this year, with last year being the first time recorded in those areas. About 29,400 acres were defoliated in 2006, down from 53,000 acres that were mapped in 2005. For 2007, preliminary ADS maps showed acres defoliated to once again be high, so actual reported acres should reflect that. Although defoliation appears to be widespread again this year, overall defoliation was rated more "light" than "heavy."

Arborjet Stem Injection Trial: In September 2006, Carol Randall and Jeff Fidgen conducted a small test using Arborsystem Inc.'s Tree IV stem injection system. They injected 5 grand fir trees with the insecticide Emamectin Benzoate to protect trees from budworm defoliation. Four ml of insecticide per inch of bole diameter was administered. Treatment efficacy will be assessed in July and August 2007-2009. 2007 Update: Treated trees from this study showed an 80% reduction in defoliation levels versus untreated. Follow-ups to gauge residual activity will be conducted every 2 years.

Merit Test: In September 2006, a small test of a Merit soil drench to protect Douglas-fir from WSBW defoliation was installed near Butte, Montana. Twenty tree pairs were selected in an area that was moderately defoliated in 2006. One tree in each pair was treated on Sept. 26, 2006 and the other tree was left untreated as a control. Trees were from 10-12 inches in diameter. Each of the trees in a pair were about 30 feet apart and each pair were at least 66 feet apart. Merit, at a rate of 2.5 oz./gal. of water, was applied to the soil within 12 inches of the bole of the tree. Defoliation of the treated and control trees will be measured in August 2007. 2007 Update: An evaluation of the 2006 Merit soil drench was conducted in August of this year. Of the twenty pairs of treated and untreated (control) trees, eight treated trees had greater defoliation than their controls. Eleven controls had greater defoliation than the treated pair, and 1 pair had equal amounts of defoliation. The results will be statistically analyzed and included in a report.

Balsam Woolly Adelgid (BWA), *Adelges piceae*: Aerial detection estimated just over 42,400 acres infested by the balsam woolly adelgid (BWA) in north Idaho in 2006 compared to about 28,000 acres in 2005. Heaviest infestations occurred on the St. Joe and Clearwater NF's, along with adjacent state, private, and tribal lands. Resulting subalpine fir mortality occurred in all ages and size classes. Preliminary ADS maps for 2007 show a majority of BWA found on the St. Joe NF, with considerably less being detected on the Clearwater NF, compared to last year. A state-wide survey to delimit the distribution of BWA was initiated in 2006 and was concluded this year (see map). It was

found BWA populations expanded well beyond the Livingston et al. survey from the late 90's. Permanent plots are being planned for 2008 for monitoring purposes, in select areas of the survey.

Gypsy moth, *Lymantria dispar*: Cooperative detection monitoring with APHIS, Idaho State Departments of Agriculture, Forestry, and Lands, and the USDA Forest Service continued for the gypsy moth in north Idaho. No moths were captured on either Federal or State lands. The single North American gypsy moth caught along the Coeur d'Alene River, just north of Enaville in 2005, was delimited for its second year. No moths were captured so the infestation is considered eradicated.

Larch casebearer, *Coleophora laricella*: In 2006, larch casebearer populations increased enough to cause visible defoliation detected in ground surveys. These patches of defoliation are widely scattered but very noticeable on the Idaho Panhandle National Forest and adjacent lands. A total of 1,580 acres were mapped for 2006 in the Kaniksu and Coeur d'Alene NF's. Preliminary ADS maps for 2007 show those populations to have fallen back to undetectable levels.

However, located in the southwest corner of the Coeur d'Alene nursery, a block of clonal, genetically-elite western larch have been defoliated heavily by casebearer the last two years. These trees are an important source of scion for establishment of the clones in other areas. As repeated episodes of infestation over time by larch casebearer do have the potential of damaging these important trees, chemical control of this pest was deemed warranted. Since the trees are in close proximity to private residences, a systemic insecticide was determined best suited for application.

Jeff Fidgen, Forest Health Program Manager with the Idaho Department of Lands, treated 10 larch with a systemic insecticide, Greyhound, on September 25, 2007. Greyhound (Arborsystems of Omaha, NE) is an abamectin product derived from the fermentation of the soil bacterium *Streptomyces avermitilis*. Application rate was 1-ml of Greyhound (2% active ingredient in solution) for every 5-in. of main stem (bole) circumference. Ten additional larch were left untreated for comparison purposes. A follow-up evaluation for treatment efficacy in May 2008 will help determine if injections of Greyhound reduce casebearer feeding damage compared to control trees.

Fall webworm, *Hyphantria cunea*: On hiatus.

**Region Four - Southern Idaho, Western Wyoming, Utah and Nevada
(Compiled by Laura Moffitt-FHP and Kris Watson-UDAF).**

Douglas-fir Tussock Moth, *Orgyia pseudotsugata* (McDunnough): Defoliation of Douglas- and subalpine fir attributed to Douglas-fir tussock moth in Region 4 continued to decrease in 2006 and 2007. Approximately 2,700 acres of defoliation were reported in 2006.

Western Spruce Budworm, *Choristoneura occidentalis* Freeman: Western spruce budworm-caused tree defoliation tripled in 2006 from the previous year, affecting 342,900 acres. Defoliation was reported on nearly all ownerships in south-central Idaho and the southern part of Utah in 2006 and 2007.

Gypsy Moth, *Lymantria dispar* (Linnaeus): In 2006 in southern Idaho, no male moths were captured in any traps. The 2007 trapping efforts resulted in 2 male catches for southern Idaho: one near a campground in the eastern Idaho town of Heise (federal land) and one near Mountain Home (private land). No male moths were captured in either year in any detection traps placed in Western Wyoming, or Nevada. In Utah in 2006, there were no positive catches for 2006. However in 2007, there were a total of 2 positive North American moths caught in 2007 around the Sandy and West Valley City, Utah areas.

Tent Caterpillars, *Malacosoma spp.*: In 2006, forest tent caterpillar defoliation was not detected during aerial surveys, but isolated pockets were noted throughout the region based on ground observations. In 2007 there were isolated pockets of oak defoliation in Utah.

Balsam Woolly Adelgid (BWA), *Adelges piceae* (Ratzeburg): *Southern Idaho*-From 2006 and 2007 delimitation surveys, we have identified the presence of BWA on state, private and Forest Service lands as far south as the Trinity Lakes area, as far west as Sturgill Peak, and as far east as Atlanta. Establishment of long-term evaluation plots are planned for 2008.

Miscellaneous Agents

Aspen Decline- Over 7,340 acres of aspen decline was observed on all districts surveyed in central and eastern Nevada.

Aspen Defoliation-Aspen defoliation was noted on 157 acres of the Wasatch-Cache NF, 1,299 acres of the Fishlake NF, 2,372 acres of the Manti-LaSal NF, and on 4,129 acres of the Uinta NF.

Willow scale, *Diaspidiotus gigas*-Aspen mortality and dieback caused by the willow scale, *Diaspidiotus gigas*, was found on private lands in the Big Wood River valley during the summer of 2006. A willow scale detection survey was conducted during October 2007 on National forest lands in the Big Wood River Valley, i.e. on the Sawtooth NF, and no scales were detected on on federal land.

Sagebrush defoliator, *Aroga websteri* (Aroga)-There are approximately hundreds, if not thousands, of acres showing some signs of defoliation in Region 4. Please contact Virginia Jennings with Utah State University for more information.

Utah Department of Agriculture and Food (UDAF): 2007 Review focused on two of UDAF's largest defoliator programs, Gypsy Moth and Japanese beetle along with an introduction to GMWEST BIOSIM Phenology Model used for the Utah Gypsy Moth trapping program.

For the 2007 Gypsy Moth program, UDAF with the help of partnerships caught two North American Gypsy Moths both in Salt Lake County. UDAF placed 2,540 traps statewide. 2,408 detection traps throughout the state, also 132 delimiting traps were placed for the Summit County grid.

UDAF was recently introduced to the GMWEST BIOSIM Phenology Model. UDAF now uses the GMWEST model to determine Gypsy Moth seasonality to predict the overall proportion of susceptible forests, overlapping with the potential distribution of Gypsy Moth throughout the state. By running the GMWest BioSim Phenology Model UDAF has been able to reduce trap numbers in non-potential geographical ranges due to the environments potential of establishment of Gypsy Moth. The model combines the data entered into it such as Weather, Elevation and Host material to determine a species' phenology and seasonality in any given environment. Helping to come up with better trap locations and cover a greater amount of high risk area. The models focus is on egg mortality throughout winter and on forest susceptibility.

For the Japanese Beetle program, in 2006 the Japanese beetle was found in Utah county which triggered the states ongoing eradication program, a large detection program was started in 2006 and 675 beetles were caught. In 2007, the eradication program continued increasing trap numbers and implementing a turf and foliar spray program. UDAF placed roughly 3000 traps statewide, 1200 of them being in Utah County and the small infest station area of Orem city catching a total of 2,153 Japanese Beetles all within the grid area.

Region Two - Colorado/Wyoming/South Dakota/Kansas/Nebraska (Compiled by Sheryl Costello-FHP and Ingrid Aguayo-CSFS).

Colorado

Douglas-fir Tussock Moth:

- Pike National Forest, Rampart Range (NW of Colorado Springs: Early Warning Pheromone System: 9 trap sets caught 324 moths. This is an increase from last year's trap catch of 211 moths and a large increase from the total 29 moths caught in 2005. High levels of defoliation were noticeable on the ground.
- Bear Creek (SW of Denver): 3 distinct drainages with large populations are in a popular mountain biking area.

Western Spruce Budworm:

- Rampart Range (NW of Colorado Springs): Budworm populations mixed in with high level DFTM populations.
- Bear Mountain (SW of Denver): Very low populations in 2007, areas were sprayed in 2003 and 2005.
- Rio Grand, Uncompahgre, San Juan, and San Isabel National Forests and Culebra-Sangre de Cristo Range (Southern CO): Wide-spread budworm outbreaks in white fir, Douglas-fir, and Engelmann spruce across southern Colorado. Fairly long-term, chronic infestations in many areas. Outbreak extends into New Mexico.

Other Defoliators:

- San Isabel NF (near Cuchara): Several thousand acres of heavy defoliation by western tent caterpillar in the Sangre de Cristo/Culebra Range. Especially heavy defoliation occurred at the Cucharas Ski Area, Cucharas Creek and in the North Purgatory River drainage.
- Telluride Area: Populations of western tent caterpillar were high within the town. Dimilin was sprayed early summer 2007. No information has been provided regarding efficacy.
- Black Forest (E of Colorado Springs): Pine sawfly *Neodiprion sp.* present in low numbers.
- Mesa Verde National Park (SW Colorado): A pine sawfly, *Zadiprion rowheri*, caused defoliation of pinyon pine. This insect has rarely been seen in SW Colorado. This year caused heavy defoliation.
- Western Colorado, from Glenwood Springs to Grand Junction: Heavy defoliation of bushes caused by linden looper, *Erannia tiliaria*. Some landowners want to spray next year.
- Town of Aspen: Willow scale (*Diaspidiotus gigas*), non-native, has been present in ornamental aspens and narrowleaf cottonwoods for 4 years. It became a problem to the point that the town tried many control methods, but had no success. This year they tried soil injections with Safari, it seems to be successful.
- Arkansas Valley (Central CO): Pinyon needle scale, *Matsucoccus acalyptus*, caused damage in pinyon pines around the facilities of the Collegiate Peaks look out area.
- Idaho Springs area (I-70 corridor): Juniper aphid, *Cianara sp.*, causing damage to RM juniper. Did not see many aphids, but many species and life stages of coccinelids were present at the time of observation.
- Poudre Canyon (N of Fort Collins): Fall webworm, *Hyphantria cunea*, causing heavy defoliation in lower elevation of riparian areas. Visible from the air.
- Mancos area (SW CO): Juniper scale, *Carulaspis juniperi*, non-native, causing flagging of junipers in private property. The problem seems to be localized, no other area reported with this problem. The owners did heavy spraying during pinyon ips outbreak. Maybe the outbreak of juniper scale is due to lack of predators/parasitoids?

Wyoming

Western Spruce Budworm:

- Medicine Bow NF (South-Central WY): Chronic budworm populations on the east and west margins of the Snowy Mountains, with some stand mortality along the South Platte River in the west.
- Absaroka Mountains, Shoshone National Forest (Northern WY): Light defoliation visible.

South Dakota

Other Defoliators:

- Crow Creek Sioux Reservation: Heavy tent caterpillar populations appeared again on Choke Cherry. Areas were sprayed with Conserve (Spinosad) with excellent control, including of mid- to large-size larvae. Some sprayed trees did produce fruit and some did not. Mortality of unsprayed, defoliated choke cherry occurred, although some later sprouted from the root crown. Conserve was recommended over Bt by FHP because an extended application period was anticipated and rain might finally come, which it did. The fruits are used as a food source for humans and wildlife and have cultural significance.
- Pine Ridge Indian Reservation: Pine sawfly, *Neodiprion autumnalis*, defoliation was noticeable for the second year, but, given the extended drought, it was less widespread than expected.
- Rosebud Indian Reservation: Basswood leaf miner, *Baliosus nervosus* (Chrysomelidae), defoliation of bur oak was far less evident than in previous years.

Nebraska

Other Defoliators:

- Wildcat Hills, NE (SW Nebraska, near Scottsbluff): Pine tussock moth population collapsed. Pine sawfly defoliation was heavy in several areas.

Other:

- Aspen dieback in Southern Colorado has received a lot of media attention. Dieback is occurring in less than 5% of S. Colorado, but is very striking. There is a strong demarcation between areas affected and unaffected, indicating possible dieback of clones.
- Patches of 50-100 acres of aspen defoliation was mapped on the western slope of the Wet Mountains. This is believed to be due to high winds from a June 2007 storm event that also caused windthrow of spruce in the vicinity of Greenhorn Peak.
- 1 North American gypsy moth caught in Rocky Mountain National Park, Wild Basin area. No other gypsy moths were caught.

Region Three – Arizona/New Mexico (Compiled by Bobbe Fitzgibbon and Terry Rogers-FHP).

Arizona

Light to heavy pinyon needle scale defoliation was reported on about 1000 acres of the Tonto National forest and surrounding private lands in Payson, Arizona early in 2007. The defoliation was not visible from the air during the annual aerial detection survey. Western forest tent caterpillar was active on many hosts in 2007. In aspen, 175,500 acres of damage was recorded during surveys, however, it is very difficult to determine from the air if the damage is current or part of the aspen decline being experienced in several western states.

Ponderosa sawfly was active in several areas of the state, only 875 acres were reported during the survey, however much of damage was low to moderate and not visible from the air. Damage was seen around Flagstaff, Heber and on the San Carlos Apache Tribal lands. Pinyon sawfly was reported on Canyon de Chelly National Monument and 2,200 acres was visible from the air on the Monument and surrounding Navajo tribal lands.

Douglas-fir tussock moth outbreaks were experienced on two ranges of the Tonto National Forest: several canyons in the Sierra Ancha Mountains and one canyon in the Pinal Mountains. Early warning trapping has been set up in both locations since the early 1990's. On two occasions trap lines in the Pinals indicated outbreak potential but no visible defoliation was experienced. Trapping in the Pinals in 2006 predicted the upcoming outbreak. In the Sierra Anchas the trap line at Reynolds creek did not pick up the population increase since it was located some distance from the outbreak; in Workman Creek only one trap was found and no moths were recorded in 2006, the other traps had apparently been vandalized. Significant tree mortality from tussock moth is expected.

Western Spruce Budworm is a chronic problem in the Chuska Mountains on Navajo tribal lands 7,200 acres was recorded in 2007, an increase from 2,500 in 2006. An unknown geometrid was found defoliating spruce on Mount Baldy at about 10,500 feet. While only 600 acres of defoliation was recorded on White Mountain Apache tribal lands and the Apache-Sitgreaves National Forest, spruce beetle activity was high in the heavily defoliated trees. This geometrid appears to be a different species than the one identified as Nepytia janetae found on Mt. Baldy in 1998-99 and the geometrid identified as Nepytia janetae found in New Mexico 2006-7.

New Mexico

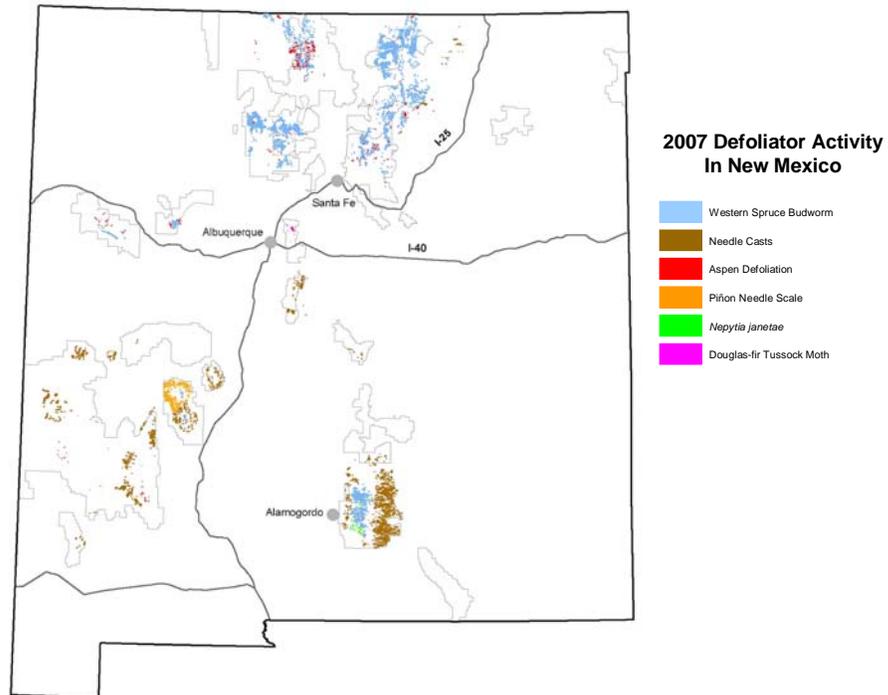
The results of our 2005, 2006, and 2007 aerial surveys are summarized in the table below. As shown in the table, defoliation increased across the board. Piñon needlecast, a disease, was also detected in Southern New Mexico on the Gila and Lincoln National Forests.

Acres with Defoliator Activity

2007 Aerial Detection Surveys

	2005	2006	2007
Western spruce budworm	183,760	142,510	447,290
Piñon needle cast			202,950
Aspen defoliation	35,800	19,010	36,180
Piñon needle scale		2,850	32,990
<i>Nepytia janetae</i>		7,130	12,150
Ponderosa needle cast			4,930
Douglas-fir tussock moth	870	1,230	1,370
Unknown agent			610
New Mexico Total	225,730	172,720	734,780

The following graphic illustration shows where this defoliation occurred in New Mexico in 2007.



Summary of 2007 *Nepytia janetae* Sray Project, Sacramento Ranger District, Lincoln National Forest

In May 2006, extensive areas of defoliation, caused by an unknown species of caterpillar belonging to the family Geometridae, occurred near the Dale Resler Boy Scout Camp east of Cloudcroft, New Mexico. Pupae were collected and reared to adults and sent to Dr. Cliff Ferris, University of Wyoming, Emeritus Professor who identified them as *Nepytia janetae*.

Following is the background portion of the 2007 “Environmental Assessment for *Nepytia janetae* Winter Defoliator Spray Project, Sacramento Ranger District, Lincoln National Forest”, which summarizes the presentation I made at the defoliator meeting.

Background

The western portion of the Sacramento Mountains on the Lincoln National Forest has experienced two successive years of defoliation by an infestation of a winter conifer-feeding species, *Nepytia janetae*. Two aerial surveys of the infested area by the New Mexico Zone Forest Health staff during June and August of 2006 found approximately 6,014 acres of National Forest System (NFS) lands and 159 acres of private lands affected by *Nepytia janetae*. The April 30, 2007 survey found an additional 6,086 acres of NFS land and 214 acres of private land for a total of 6,300 acres affected. The most recent aerial survey conducted in July 2007 mapped about 2,500 additional acres of defoliation. Combined with the results of the 2006 surveys, a total of nearly 14,500 acres on the Sacramento Ranger District (with about 500 acres on private lands) have been mapped with defoliation damage by *Nepytia janetae*. Areas of defoliation occur in the vicinity of the community of Village of Cloudcroft, New Mexico and also to the south about 13 miles around Sacramento Lookout. Of the 15,000 acres defoliated, approximately 1,900 acres of defoliation surround the Village of Cloudcroft. The remaining 13,000 acres are near Sacramento Mountain Lookout and are not adjacent to private land.

Officials from the Village of Cloudcroft and Otero County have expressed concern regarding this latest outbreak. On March 29, 2007, Otero County issued a resolution (No. 03-29-07/95-57), declaring a state of emergency and disaster in and around the Sacramento Mountain’s communities and watersheds concerning insect and disease outbreaks. The resolution called upon the Governor of the State of New Mexico and the New Mexico Office of Emergency Preparedness to declare a state of emergency and disaster in areas affected by severe insect infestation. This resolution was cited as being pursuant to the provisions of 4-36-11 NMSA 1978 (Senate Bill 1), and 4-37-1 NMSA 1978. To date, the Governor has not acted on that request.

Following the issuance of the county resolution, Otero County commissioners requested that the Lincoln National Forest aerially spray the affected area of the forest to minimize further spread of the infestation onto private lands in and around the Village of Cloudcroft. They believe the infested trees pose a fire risk to the community. They also believe the dead trees will impact tourism in the area as well as reduce property values on private lands.

Finally, areas in and around the Village of Cloudcroft provide habitat for the Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*). The checkerspot is an endemic species currently being managed under a Conservation Plan and signed Memorandum of Understanding between the Otero County Commissioners, US Fish and Wildlife Service, the US Forest Service, and the Village of Cloudcroft (USDI FWS 2004). The goal of the Conservation Plan is to provide conservation and management on public and private lands within the range of the checkerspot butterfly. Like the target species, *Nepytia janetae*, the checkerspot butterfly is a member of the Lepidoptera order, an insect classification group containing all the moth and butterfly species.

Spray application, purpose and results

Spray application occurred on November 5 & 6, 2007. The bacterium *Bacillus thuringiensis* Kurstaki was applied at 48 BIU's per acre. The purpose of this action was to suppress winter conifer (*Nepytia janetae*) defoliation on National Forest System lands around the Village of Cloudcroft. Treatment would minimize further spread of winter conifer defoliator infestation onto private lands in and around the Village of Cloudcroft to reduce potential fire risk and potential negative effects associated with social-economic impacts to the Village and Otero County. The boundary of the proposed treatment area is within one-mile or immediately adjacent to private lands and Village of Cloudcroft.

The pre-suppression larval survey was conducted on October 23 & 24, 2007 and the 14-day post-suppression larval survey on November 20, 2007. The results of these surveys are summarized in the table below.

Results of pre-suppression (October 23-24, 2007) and 14-day post-suppression (November 20, 2007) *Nepytia janetae* larval sampling.

Average larvae / m ² foliage sampled		
Site	Pre-suppression	Post-suppression
Apache Campground	8.1	3.2
Dale Ressler	0.9	3.1
Deerhead Campground near shed & site 22	0.0	NS
FS 64 - 3.2 mi East of Sunspot Hwy Junction	0.0	NS
FS 64 - 3.9 mi East of Sunspot Hwy Junction	0.0	NS
FS 640 0.2 miles off 6563 - Out of Block Junction FS162 and Wofford Lookout Rd.	0.0	NS
Pines Campground	0.5	12.6
Sleepygrass Campsites 4 & 5	1.5	0.0
Sleepygrass Picnic 35 & 36	1.4	0.5
NS - Sites not sampled		

As the results show, larval populations were at low levels at the time of treatment. Postsuppression larval densities were variable decreasing slightly at some sites and increasing at others, but overall, remained unchanged at four of the ten sites sampled.

We believe the application of the insecticide was well-executed. The weather was very good during and following the application, so larval ingestion of the material should have taken place. Since the majority of sites having measurable population levels did see a reduction, it is very possible the treatment was successful. We will have to wait to see if there is a discernable reduction in foliar damage in the spring.

Summary of Santa Clara Pueblo DFTM Spray Project 2007

In April 2007, Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata*, egg masses were discovered on the Santa Clara Pueblo in Santa Clara Canyon. As a result of this discovery, a sequential egg mass survey was conducted on May 1, 2007 to determine the status of tussock moth populations in Santa Clara Canyon. The results of this sequential egg mass survey revealed tussock egg masses were very abundant and that defoliation would be severe with some top-killing and tree mortality. Based on these results, the Santa Clara Pueblo Tribal Counsel and its members chose to implement a suppression strategy using the virus, TM-Biocontrol. This option was chosen because it is ecologically more environmentally friendly, very host specific to DFTM caterpillars, and would not impact non-target lepidopteron caterpillars.

To avoid lengthy delays involved in doing an Environmental Assessment, which would have postponed the project until following year, the Santa Clara Tribal Counsel declared Sovereign Immunity and engaged a full-service aerial applicator to provide all aircraft support and application needs and assumed the cost of the contract and carrier for the virus.

Under a “Participating Agreement between the USDA Forest Service, Southwestern Region and the Santa Clara Pueblo”, the Forest Service provided the Tribe 1200 acre-equivalents of the TM-Biocontrol virus and provided technical assistance for proper handling and application of the material. No Federal funds were used to fund the cost of the project.

Timing of virus application was based (1) DFTM egg hatch and (2) dispersal of the first instars from the egg masses onto the foliage. According to Lessard and Holland (1985), larval development and dispersal were optimal at ca. 500 degree-days. On May 30, 535 degree-days had accumulated. The actual spray date, however, was June 14, 2007 at which time over 1,291 degree-days had accumulated.

DFTM larval population densities sampled 15 days after treatment remained relatively unchanged from pretreatment densities. Caterpillars sampled 15 days after treatment were a mix of 3rd, 4th, 5th, and, 6th instars. The caterpillars were very active and showed no signs of virus infection. A few dead, virus-killed tussock moth caterpillars were found hanging from the branches of a several host trees.

DFTM larval densities 25 days after treatment were variable. Larval densities decreased slightly in the lower half of the treatment area, but increased in the upper portions of the treatment area. Although there was a significant increase in the number of virus-killed caterpillars 25 days after treatment, there were still large numbers of tussock moth caterpillars actively feeding at all of the plots sampled.

Approximately 250-300 active, sick and dead DFTM caterpillars were collected and sent to the Canadian Forest Service, Natural Resources, Pacific Forestry, B.C, Canada to be bio-assayed for virus contamination. A total of 190 caterpillars were bio-assayed. All of them were found to be infected with TM-Biocontrol. These bio-assay results indicate the virus may have been starting to exert control.

Because viruses are slow acting and feeding is not inhibited until the larvae are close to pupation, there was no foliage protection achieved in Santa Clara Canyon during year of treatment. As the egg mass data collected in the spring of 2007 predicted defoliation was heavy (Figure 1 and 2 below). Some top-killing and tree mortality is also expected to occur.



Figure 1. Aerial view of DFTM defoliation, Santa Clara Canyon 2007



Figure 2. DFTM defoliation, Santa Clara Canyon, 2007

Conclusions

1. The spray deposit cards placed along the Canyon showed the virus application was successful applied.
2. The results of our posttreatment larval surveys were inconclusive. Large numbers of DFTM were still actively feeding 25 days after treatment.
3. Based on the bio-assays conducted by the Canadian Forest Service, Natural Resources/Canada, Pacific Forestry, the virus, TM-Biocontrol, may have been increasing to epizootic levels 25 days after treatment.

4. Because viruses are slow acting and feeding is not inhibited until the larvae are close to pupation, there was no foliage protection achieved in Santa Clara Canyon during year of treatment.
5. Because we could find no new egg masses in the fall of 2007 we believe TM-Biocontrol was successful in collapsing the outbreak in Santa Clara Canyon.
6. Because large numbers of DFTM caterpillars were actively feeding 25 days after treatment, project effectiveness could not be determined with certainty. Project effectiveness will, therefore, be re-evaluated next spring to determine whether-or-not TM-Biocontrol was effective in reducing DFTM populations to low levels.

Literature Cited

Lessard, Gene and David G. Holland. 1985. The use of degree-day accumulation for monitoring Douglas-fir tussock moth populations. Timber, Forest Pest, and Cooperative Forestry Management, USDA Forest Service, Rocky Mountain Region. Technical Report R2-31.

Region Five – California/Hawaii/ Western Pacific (Compiled by Sherri Smith and Beverly Bulaon-FHP)

Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata*: DFTM defoliated over 7,000 acres in the California during 2007. DFTM-caused defoliation, as detected by aerial survey, was down considerably compared to 23,000 acres in 2006. Defoliation detected from the aerial survey was limited to scattered sites (east of Mt. Shasta, near Bear Mountain) on the Shasta-Trinity National Forest and interspersed private land.

Lodgepole needleminer, *Coleotechnites milleri*: Lodgepole needleminer continues to injure mature lodgepole pine stands in Yosemite National Park. Aerial surveys have detected injury occurring since 2002; 15,300 acres were mapped in 2007, a 1,600 acre increase over 2006

Jeffrey pine needleminer, *Coleotechnites sp. near milleri*: A Jeffrey pine needleminer infestation was detected during 2007 on the south end of Lake Tahoe on private land between Oflying Drive and Pioneer Trail, Eldorado County. Approximately 5 acres were affected.

California Oak Moth, *Phryganidia californica*: California oak moth defoliated over 8,000 acres in 4 coastal counties in California during 2007.

Non-native defoliators

Gypsy moth, *Lymantria dispar*: Nine gypsy moths were trapped in CA during 2007. The California Department of Food and Agriculture (CDFA) has trapped AGM at the port in Long Beach for three years in a row. CDFA thinks they are trapping adequately for

AGM and GM. They are currently doing grid trapping and extra trapping at the sea ports. There are no current plans for pesticide treatments in 2007. Number of gypsy moths trapped during 2007, by county.

County	# of gypsy moths trapped
Los Angeles	3 (2 were Asian type)
Orange	1
Santa Clara	1
Ventura	4
Total	9

Light Brown Apple Moth (LBAM), *Epiphyas postvittana*: LBAM was first reported in early Feb. 2007 near Berkeley, CA. It is originally from Australia and is considered established in New Zealand, New Caledonia, Hawaii, and the British Isles. It's discovery in CA was a new North American record. As of Nov. 2007, it had been confirmed in 12 counties. Over 41,000 traps were deployed and over 12,000 were trapped. The greatest concentrations of moths (77%) were caught in Santa Cruz and Monterey counties. Quarantines were put into effect over a 182 square mile area. Hosts include at least 200 plants in 20 genera and 50 families. Many agricultural crops are threatened but hosts also include many native hardwoods, coast redwood and pine species. Treatments included destroying infested materials in nurseries, ground applications of Bt, hand applied pheromone applications and aerial applications of the pheromone CheckMate OLR-F. More information can be found at http://www.cdfa.ca.gov/phpps/PDEP/lbam/lbam_main.html.

Aulacaspis cycad scale (ASC), *Aulacaspis yasumatsui*: ASC was first detected in Tumon, Guam in late 2003 in front of a hotel where *Cycas revoluta*, an introduced ornamental cycad and *C. micronesica*, an indigenous cycad, were planted. The scale is believed to have been imported from Hawaii on ornamental cycads. ACS was widespread on Guam and had killed many cycads prior to the release of *Rhyzobius lophanthae*, a biological control agent in 2005. As of 2007, the scale is under control in most locations due to the success of the ladybird beetle. Current concerns involve small immature cycads as the beetles seem to not be interested in feeding on scales on the smaller reproduction.

During March 2007 the scale was detected on Rota. *R. lophanthae* were released in May. As of September the scale infestation had grown 2 km from the initial infestation site (entire north coast is contiguous habitat).

Coconut Rhinoceros Beetle, *Oryctes rhinoceros*: The coconut rhinoceros beetle was first detected on Guam in the Tumon Bay area in September 2007. This large scarab beetle is a serious pest of palm trees, including coconut and betelnut. Adult beetles bore into the center of the crown, where they injure the young, growing tissues and feed on exuded sap. As they bore into the crown they cut through developing leaves. When the leaves grow out and unfold, the injury appears as V-shaped cuts in the fronds and holes through the mid-rib. An aggressive eradication program is underway.

Cycad blue butterfly, *Chilades pandava*: The cycad blue butterfly, *Chilades pandava*, another nonnative insect, was first detected on Guam in July 2005. Severe defoliation of native cycads by the caterpillars was observed as early as November of the same year. The native range of this species is Sri Lanka to Thailand and eastern Indonesia. Prior to its detection on Guam, the butterfly had been reported on Saipan, Rota and Mauritius. With the biological control efforts successfully reducing scale populations, the consensus among entomologists is that the cycad blue butterfly now presents another threat to cycads on Guam.

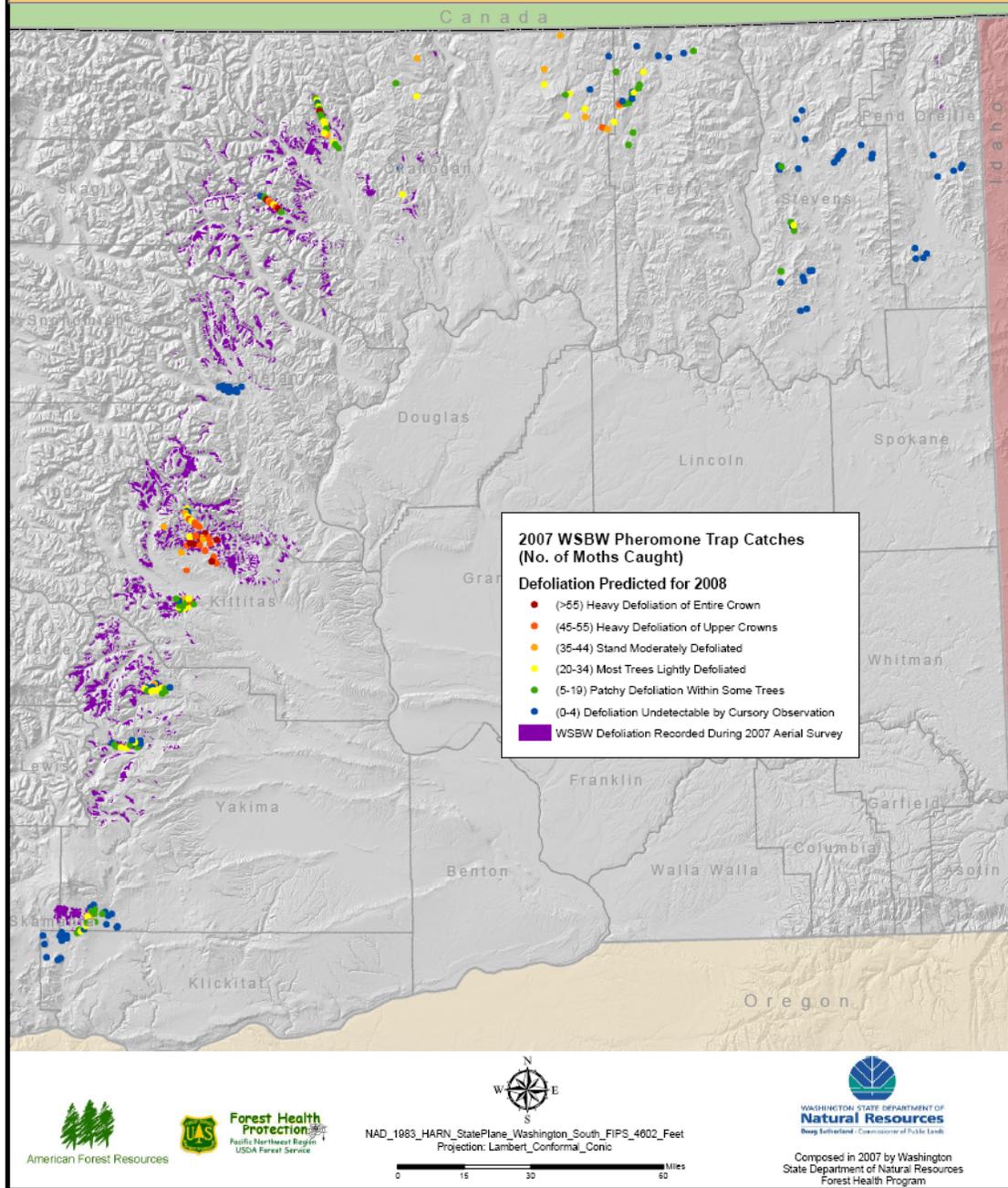
Erythrina gall wasp (EGW), *Quadrastichus erythrinae*: The EGW was first recorded forming galls on coral trees in Taiwan in 2003. EGW was first detected on Oahu in April 2005. It spread extremely rapidly and was detected throughout the Hawaiian Islands by the end of 2005. It has also been reported in American Samoa, Guam and Florida, among several other locations, since its detection in Hawaii. This tiny wasp oviposits into soft tissues of *Erythrina*, preferring new leaves and petioles; however, nearly all soft tissues are attacked (flowers, older leaves, seed pods, etc.). Feeding causes extensive injury, deformation and physiological disruption. Thousands of non-native EGW killed coral trees were removed in downtown Honolulu at the cost of millions of dollars. In addition, many of the native populations of trees have experienced high levels of mortality. A draft environmental assessment is completed with the hopes of releasing a species of *Eurytoma*, a biological control agent, in 2008.

Region Six – Oregon/Washington (Compiled by Lia Spiegel, Iral Ragenovich-FHP, Karen Ripley-WDNR, and Rob Flowers-ODF)

Washington State. Several of the defoliators such as the hemlock looper and western tent caterpillar that have been important in recent years in Washington have subsided and are no longer at active levels. Unfortunately, many areas around central Puget Sound are continuing to be impacted by the tent caterpillar which caused severe topkill to red alder. The decaying, breaking tops have caused significant hazard and nuisance; and in many cases the trees continue to decline.

Western spruce budworm: A major western spruce budworm outbreak is affecting the east side of the Cascade Mountain range. Topkill and mortality are common in areas that have been affected for several years. Aerial survey recorded a decline in budworm-defoliated acres in 2007 (355,362 acres) from 555,748 acres in 2006. However, pheromone trapping indicates that defoliation will continue in some currently affected areas (western Okanogan County, Kittitas County), and will likely increase in the eastern part of Okanogan County. (See image that depicts 2007 defoliation recorded by aerial survey and the 2007 pheromone trapping data).

Western Spruce Budworm Pheromone Trap Results in Eastern Washington State 2007



Douglas-fir tussock moth (DFTM): DFTM trapping performed by Washington State staff indicates that, in general, DFTM populations are rising over a broad area. The highest trap catches were made in Okanogan County. At least one DFTM egg mass was observed by Connie Mehmel on the Okanogan-Wenatchee National Forest, in an area that subsequently burned in the Domkey Lake Fire. Although no forest defoliation has

been observed, several occurrences of defoliated ornamental grand fir and blue spruce have been observed over a wide area of eastern Washington.

Light brown apple moth (LBAM): LBAM is another item on the meeting's agenda. The Washington State Department of Agriculture surveyed 360 sites in western Washington for LBAM in 2004. The focus of the survey was fruit trees, not nursery sites where detections have been made in California. A pdf copy of a one-page report with contact information for their Chief Entomologist Eric LaGasa (elagasa@agr.wa.gov) is provided below. He is happy to discuss LBAM.

November 15, 2004

2004 Pheromone-trap Detection Survey for Light-brown Apple Moth, *Epiphyas postvittana* (Walker) (Lepidoptera: Tortricidae), an Exotic Pest of Many Crops.

Eric H. LaGasa¹, Diane MacLane², Jasmine Loucks², and Lisa Spurrier²

Background

Native to Europe and Asia, the light-brown apple moth (LBAM) is a highly polyphagous foliage feeder that attacks many ornamental plants as well as grapes, apple, pear, and other fruit trees, damaging leaves and developing fruits (Figures 1, 2). To date LBAM has not been found in continental North America and, as an exotic pest threat to North American agriculture, is regulated by both the USDA and the Canadian Food Inspection Agency.

2004 Project Objective

Conduct pheromone-trap survey of populous western Washington for SFT.

- Place and monitor pheromone-traps in areas of commercial, home orchard, and feral *Malus*, *Pyrus*, and *Prunus* culture.
- Screen and identify captured specimens, including non-target material.

Project Methods and Materials

Three hundred and fifty-seven pheromone-lure baited traps were placed in counties along the Interstate-5 corridor in western Washington, from the Canadian border south to Clark County on the Columbia River / Oregon border (Table 1). Traps were hung in roadside or residential yard trees, primarily in areas where home orchards could provide appropriate hosts.

Trap placement began in June and most traps were removed by the end of August. Traps were checked and pheromone lures changed every two weeks as much as possible during the expected (probable) period of adult flight. Traps with specimens were processed at the Olympia Entomology Lab, where suspect target and non-target specimens present were identified and counted.

Pherocon 2® type traps (a.k.a. "diamond" traps) were used in this survey, baited with pheromone-lures provided by the USDA APHIS Otis Methods Development Center. The PFM pheromone-lures consisted of gray rubber septa (West Co., Lionville, PA, cat. no. 1060-0275), each loaded with the following components:

- E,11-14:AC / 0.962mg
- E,9,11-14:AC / 0.038mg

Project Results

No LBAM specimens were collected in this survey.

A complete list of non-target species captured in this survey (22 spp. / 10,976 specimens) is available from the author.

This survey was funded in part by a Cooperative Agricultural Pest Survey (CAPS) grant from the USDA APHIS Western Region (#02-8553-0249-CA) and does not necessarily reflect APHIS' views.

¹Chief Entomologist - Washington State Dept. of Agriculture, PO Box 42560, Olympia, Washington 98504-2560 / Phone (360) 902-2063
²Entomology Aides (Project) - Washington State Dept. of Agriculture, Olympia, Washington 98504-2560

Inquiries regarding availability of this publication in alternative formats should be directed to the WSDA Receptionist at (360) 902-1976 or Telecommunications Device for the Deaf (360) 902-1996.

Figure 1. Adult Male LBAM



Figure 2. Male Genitalia Characters

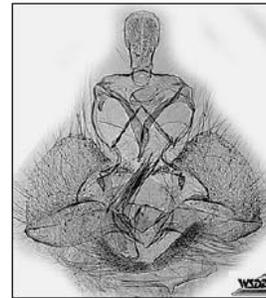


Table 1. LBAM Trap Placement

County	Number of LBAM Trap Sites
Whatcom	51
Skagit	41
Snohomish	39
King	52
Pierce	50
Thurston	41
Lewis	15
Cowlitz	20
Clark	51
Total	360

Oregon

In 2007, there were 317,000 acres of defoliation detected by aerial survey, a significant increase from the 97,000 acres mapped in 2006. The majority of defoliation this year was attributable to Western spruce budworm, balsam woolly adelgid and larch casebearer, whose detections were

greatly increased due to improved aerial survey conditions and timing in Northeast Oregon. Low levels of defoliation by other agents were also observed, consistent with recent years. Pheromone trap captures of Douglas-fir tussock moth were variable, with large increases in some areas and declines in others. Pheromone traps caught a total of eleven European gypsy moths statewide.

Western Spruce Budworm (WSBW), *Choristoneura occidentalis*: WSBW defoliation was detected on over 96,000 acres in 2007, a significant increase from the 38,000 acres mapped in 2006. The majority of new damage occurred adjacent to existing infestations on the Ochoco and Malheur National Forests in Northeast Oregon. Defoliation intensity was considered low to moderate in most areas.

Balsam Woolly Adelgid (BWA), *Adelges piceae*: Damage by BWA was detected on over 132,000 acres in 2007, up from 55,000 acres in 2006. Damage was scattered throughout the Cascades from Mt. Hood National Forest south to Rogue River National Forest. More widespread damage was apparent in Northeast Oregon on the Wallowa-Whitman, Umatilla, and Malheur National Forests as well as Hells Canyon National Recreation Area. Eight sets of plots have been installed in subalpine fir stands infested with BWA to evaluate and monitor stand decline, tree mortality and regeneration.

Subalpine fir in northeastern Oregon/southeastern Washington appears to be heavily impacted by Balsam Woolly Adelgid. Although studied extensively in the western climates of Washington and Oregon, the impact and severity of Balsam Woolly Adelgid infestations has not been documented east of the Cascades. BWA was found east of the Cascades in 1974 near Walla Walla. A cooperative survey between the states and FHP documented presence/absence in 1998-2000. Mortality in northeastern Oregon/southeastern Washington Subalpine fir is very extensive and appears so severe in some areas that the continued existence of the species on some sites is in question. However, there is not much data. Lia Spiegel (ento, La Grande, Oregon), Connie Mehmel (ento, Wenatchee, Washington), and Kris Chadwick (patho, Bend, Oregon) are cooperating on an FHM grant that will document the extent and severity of BWA infestations east of the Cascades in Washington and Oregon. We are installing permanent fixed plots and taking stand data on all trees within the plots. BWA information taken includes percent crown, presence of gouting, counts of gouted nodes, density estimates of woolly adelgids on boles, and "BWR" ratings. BWR ratings are adapted from Hawksworth DMR ratings. Individual crown third ratings are recorded as well as the sum of the thirds for the whole tree. Immediate products will be geographic extent and severity/impact on overstory trees and regeneration for all true fir species. Long term plan is to resurvey at 5 year intervals to document stand and tree changes over time. Plots have been installed in 13 sites in 2007, additional plots will be installed in 2008. We hope to combine our data with that of data planned for collection in Idaho in 2008.

Larch Casebearer, *Coleophora laricella*: Larch casebearer damage has been seen in Oregon since 1999, but aerial survey results have been highly variable due to difficulty in detecting its early-season damage signature. In 2007, over 82,000 acres of light defoliation was mapped in Northeast Oregon, primarily on the Wallowa-Whitman and Umatilla National Forests, as well as some private lands. Fall ground surveys showed substantial casebearer activity, but foliar diseases were also common. Additional ground surveys will be completed in spring to assess the relative contributions of these agents.

Pandora Moth, *Coloradia Pandora*: Pandora moth outbreaks usually occur at 20-30 year intervals. Defoliation occurs every other year due to populations having a two-year lifecycle and

synchronized lifestages. Defoliation of lodgepole and Ponderosa pine from the current Pandora moth outbreak was detected on over 11,000 acres in 2006, located primarily in central Oregon on the Winema National Forest. This was the off-year for defoliation, but outbreak status will become apparent in spring of 2008.

Minor agents:

Black pine leaf scale, *Nuculaspis californica*

Defoliation due to black pineleaf scale was detected on over 1,200 acres in 2007, up from approximately 200 acres in 2006. Damage is often observed on private lands in Hood River and Wasco Counties, as outbreaks are usually associated with spray drift onto Ponderosa pine at the edge of fruit orchards. However, in recent years it has been detected at damaging levels in many areas of Central Oregon and at low-elevation, drier sites on Douglas-fir, a secondary host.

Satin Moth, *Leucoma salicis*

The satin moth is a non-native defoliator of poplars that appears in periodic, localized outbreaks. Aspen defoliation was estimated at 250 acres in 2007, located primarily on BLM lands in Southeast Oregon. Although damage from satin moth was confirmed initially, ground surveys in these areas have not been completed for several years. It is possible that a number of other damaging insect or disease agents may be involved, similar to findings in other Western states. Satin moth adaptive evolution project: Contact *Monica Phillips* (M.S. student/SUNY-Syracure, 518-429-9802, mlphil01@syr.edu) to donate insects for this effort.

Western Tent Caterpillar, *Malacosoma californicum*

Only 100 acres of defoliation by Western tent caterpillar was detected in 2007, located primarily in the Clatsop State Forest in Northwest Oregon. The last substantial defoliation event occurred on red alder in this area in 2002.

Spruce Aphid, *Elatobium abietum*

The spruce aphid outbreak that occurred along the Oregon coast in 2005 appears to have subsided. Only 80 acres of widely-scattered damage to Sitka spruce was observed in 2007, located mainly in the Siuslaw National Forest and Elliott State Forest.

Fall webworm, *Hyphantria cunea*

Isolated patches of fall webworm defoliation were apparent on ash and other hardwoods along riparian areas in Western Oregon in 2007, consistent with normal activity.

Pine needleminers, *Coleotechnites* spp.

Reports of lodgepole and Ponderosa needleminer damage increased in Central Oregon in 2007. Activity was described as intensifying within infested areas, but with no mortality observed.

Pheromone Trapping:

Douglas-Fir Tussock Moth, *Orygia pseudotsugata*: In 2007, no visible defoliation due to Douglas-fir tussock moth was observed, similar to findings since 2002, when the last outbreak collapsed. Pheromone trap captures increased substantially on the Wallowa-Whitman and Malheur National Forests this year, with traps on the Pine Ranger District of the Wallowa-Whitman averaging 50-100 moths. Preliminary surveys for egg masses were positive and visible defoliation is anticipated in this area in 2008. In contrast, trap captures on the Ochoco,

Deschutes, and Fremont-Winema National Forests in Central Oregon declined. Tussock moth captures on the Umatilla National Forest were very low, similar to recent years.

Gypsy Moth, *Lymantria dispar*: Approximately 18,000 traps were placed in 2007, with a total of 11 gypsy moths found to date. Six moths were captured in Shady Cove, north of Medford, at a single location along the Rogue River. Moths were also captured here in 2005 and 2006, and additional trapping is underway. Two moths were captured in Eugene, while single moths were found in Murphy, south of Grants Pass, in Wasco, near the Columbia River, and in Sunriver south of Bend. No moths were found in delimitation trapping in Bend, where 57 moths were caught in 2006, or in St. Helens, where a single Asian gypsy moth was found. Eradication spray-projects covering 640 acres were completed at both sites in 2007.

Non-native Moth Surveys: In 2007, Oregon Department of Agriculture trapping surveys did not detect pine moth (*Dendrolimus pini*), light brown apple moth (*Epiphyas postvittana*), nun moth (*Lymantria monacha*), rosy gypsy moth (*Lymantria mathura*), or Siberian moth (*Dendrolimus superans sibericus*). Pest profiles and survey methods can be found @ http://www.oregon.gov/ODA/PLANT/IPPM/pest_profile_and_survey_index.shtml

B. PROJECT AND INDIVIDUAL REPORTS

1. The History of Douglas-fir Tussock Moth, *Orgyia pseudotsugata*, in Colorado and Wyoming. Tech Report R2-67. (Compiled by Bill Schaupp, Sheryl Costello, and Bill Ciesla-FHM)

Abstract: An historical record of defoliation by Douglas-fir tussock moth, *Orgyia pseudotsugata* (McDunnough) (Lepidoptera: Lymantriidae) in urban and wild forest lands of Colorado and Wyoming is presented. The biology of this insect species is described, as are efforts to trap and monitor populations. Since at least 1956, this insect has been a chronic, localized pest of urban blue spruce. In contrast, Douglas-fir tussock moth caused relatively little wildland defoliation from 1913 - 1992, with four localized episodes documented in Colorado and one in Wyoming. Some episodes were concurrent with outbreaks of western spruce budworm, *Choristoneura occidentalis*, which may have masked the full extent of tussock moth activity. The first large-scale, wildland forest epidemic of tussock moth occurred between 1993 and 1996. Significant mortality of Douglas-fir resulted on 30-40% of the approximately 18,000 acres affected, with additional mortality in adjacent areas due to the Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins (Coleoptera: Curculionidae, Scolytinae). Survey, monitoring, and evaluation activities are described for this epidemic, which occurred in the South Platte River drainage, primarily on the Pike National Forest. Detection techniques of aerial survey sketchmapping and aerial photography are compared. The epidemic aftermath is discussed, including Douglas-fir beetle development within defoliated trees and altered wildfire behavior in the impacted area. More localized outbreaks occurred between 2004 and 2007. Changes in forest composition and structure over the past 100 years may have resulted in

conditions more conducive to outbreaks of both Douglas-fir tussock moth and Douglas-fir beetle at the lower elevations of eastern Colorado's forests. Future wildland forest epidemics of Douglas-fir tussock moth in Colorado are expected.

2. Web-based Defoliator Database – Darren Blackford, Beth Willhite-FHP

Forest Insect and Disease Gray Literature Database Initiative: A Pilot Project Proposal

Project Leaders: Darren Blackford, Forest Entomologist, USDA Forest Service, Intermountain Region, dblackford@fs.fed.us, 801-476-9732

Beth Willhite, Forest Entomologist, Westside Forest I&D Service Center, Mt. Hood National Forest HQ, bwillhite@fs.fed.us, (503) 668-1477

Cooperators: Carol Ayer, Program Manager, National Forest Service Library, RMRS-Fort Collins, cayer@fs.fed.us, 970-498-1310

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Sally Dunphy, Web Site Specialist, National Forest Service Library, RMRS-Fort Collins, sdunphy@fs.fed.us, 970-498-1268

Project Description: This is a one-year pilot project. An estimated one thousand FHP gray literature hardcopy documents will be scanned, cataloged in the FS Library catalog, and deposited into an electronic document repository on a centralized server. Each FS Library catalog entry will provide a link to the full-text electronic document on the centralized server. This project will provide basic infrastructure and information to assist future efforts to preserve, organize, and make accessible important forest insect and disease gray literature in the United States, and possibly Canada and Mexico.

Statement of the Problem: Valuable hardcopy insect and disease gray literature is at risk for loss and is relatively inaccessible to potential users:

- 1) Looming retirements will result in significant cumulative loss of historical and specialized knowledge that is unlikely to be passed on to new employees due to lack of sufficient mentoring overlap.
- 2) Danger of physical loss of gray literature due to “house-cleaning” after someone retires and as units move, combine and reduce office space.
- 3) Hardcopy documents deteriorating due to age, use, or storage conditions.
- 4) Thousands of FHP gray literature hardcopy documents currently exist scattered across the nation in small office libraries and individual’s file drawers, with no systematic inventory or organized access.
- 5) Researchers (USDA FS Research and academics) have expressed a high level of interest in gaining better access to forest insect and disease gray literature.

Project Objectives: Preserve, organize, and make accessible to potential users a pilot subset of FHP insect and disease hardcopy gray literature; track costs, evaluate methods, equipment, and infrastructure.

Methods: Conduct pilot study at the Ogden Field Office. An FHP specialist will presort documents to identify those for scanning. Information for selected documents will be entered into a “skeleton record” (for inventorying purposes to prevent duplication) that meets FSLibrary standards, and the document will be scanned either on-site or at National Forest Service Library’s Ogden Center. Scan quality checks will be conducted on an ongoing basis by FHP personnel. Scanned documents then will be deposited into a repository on FHTET’s server in Ft. Collins. Productivity rates, costs, and equipment performance will be monitored for later evaluation. Scanned documents also will be cataloged according to FSLibrary standards and entered into the FSLibrary system at a remote location by a trained contractor, library employee, or intern.

Project Timeline:

Spring/summer 2009: Select, scan and electronically deposit documents.
 Spring/summer/fall 2009: Catalog documents in FSLibrary system.
 Fall 2009: Evaluate methods, costs, and infrastructure function. Develop recommendations for future efforts.

Costs:

	Item	Requested Funding
Administration	Salary	\$2,000
	Travel	\$1,200
Procurement	Contracting	\$6,250
	Equipment lease	\$600
	Total	\$10,050

Cost estimates for 1,000 documents based on the following assumptions:
 Scanning services will be provided by a work-study or STEP student.
 Average scanning productivity = 5 documents/hour x 20 hours/week = 100 documents/week
 Quality checks will be conducted by FHP and library personnel at no cost to the project
 One week of library training in Ft. Collins for skeleton record entry will be required for two people.
 Cataloging services will be provided by contractors, interns, or temporary library employees.
 Average cataloging productivity = 4 items/hour @ 20 hours per week = 80 documents per week
 Scanning equipment will be leased on a monthly basis.

Cost estimation worksheet

Scan

1000 documents/100 documents per week = 10 weeks
 10 weeks * 20 hours per week * \$10.00 per hour = \$2,000
 Scanner lease = \$200.00 per month * 3 months = \$600

Library training

\$1,200 travel and per diem for 2 people to train at Ft. Collins, CO for a week.

Catalog

1000 documents/80 documents per week = 12.5 weeks
 12.5 weeks * 20 hours * \$25.00 per hour = \$6,250

2. Systemic pesticide use for high value trees: – Rob Flowers-ODF, Jeff Fidgen-IDL

I spoke with *Jeff Fidgen* from the ID Dept. of Lands and *Brian Eisenback* from Virginia Tech regarding the potential use of systemic pesticides to reduce damage by w. spruce budworm and balsam woolly adelgid. Their comments are summarized below.

**Imidacloprid/Merit:* Although it has been shown to sink in the needles following treatment (ELISA, LC/MS methods), imidacloprid doesn't appear to work well on many leps. While it has been effective on certain leps in ag. environments, most company reps (Bayer) currently do not recommend it for budworm. Preliminary stem and soil injection studies have not shown good results. However, imidicloprid does appear to show good activity against balsam woolly adelgid.

**Soil injection/drench:* Often sporadic and slow uptake in conifers, from a few months to 3 years to reach the canopy. Variation is related to tree species/size, crown health, soil type and especially water availability. As translocation is tied to soil moisture, it can be difficult to use this method in drier areas and/or where the majority of the moisture occurs during tree dormancy (winter).

**Stem injections:* Results also quite variable, but activity shown against budworm and balsam woolly adelgid. In testing of 3 compounds/2 injection systems on 3 tree species in ID, emamectin benzoate applied using the ArborJet system seemed to be most effective against budworm. The compound is an avermectin, a fermentation product from a strain of *Streptomyces avermitilis* which show insecticidal activity. Results of these studies will be presented at the FHM National Meeting and WFIWC.

Recent (and Soon to be) Publications

Azuma, David L. and David L. Overhulser. 2008. Effects of a western spruce budworm outbreak on private lands in eastern Oregon, 1980-1994. *West. J. Appl. For.* 23(1): 19-25.

Duncan, Robert W. 2006. Conifer defoliators of British Columbia. Natural Resources Canada, Canadian Forest Service. 359 p.

Filip, Gregory M., J.J. Colbert, C.G. Shaw III, Paul F. Hessburg, and Kevin P. Hosman. 1993. Influence of dwarf mistletoe and western spruce budworm on growth and mortality of Douglas-fir in unmanaged stands. *For. Science* 39(3):465-477.

Goheen, Ellen Michaels and Elizabeth A. Willhite. Field guide to the common diseases and insect pests of Oregon and Washington conifers. USDA Forest Service, Pacific Northwest Region. R6-NR-FID-PR-01-06.

Ragenovich, Iral R. and Russel G. Mitchell. 2006. Balsam Woolly Adelgid. Forest Insect and Disease Leaflet 118. USDA Forest Service. 11p.

Future Publications

R2-History of Douglas-fir Tussock Moth in Colorado and Wyoming.

R3 – Insect and Disease Field Guide

Niwa – trapping/defoliation paper

R 1/4 – ID and Management of budworm – summary of current knowledge
Bruce's summary of budworm plots.

Western North American Defoliator Working Group Meeting

Salt lake City, Utah
December 4-5, 2007

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