WESTERN NORTH AMERICAN DEFOLIATOR WORKING GROUP MEETING

ALBUQUERQUE, NM

OCTOBER 17-18, 2006

Douglas-fir Tussock Moth field trip to the Sandia Crest

Western North American Defoliator Working Group Meeting
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Participants: See attached list.

Action Items for 2006:

1. Defoliator/Forest Resources Database - Willhite

Beth Reported on the status of the database and what she had found out regarding a webbased database. See summary below.

2. FHP Expertise/ Aerial Application Issue – Ragenovich

We have not yet developed a survey to query individuals in the West on existing expertise and interest.

3. Douglas-fir Tussock Moth Virus Projects (Otvos)

Test egg masses from New Mexico to determine if they are infected with TM-BioControl from 1978 projects or from another strain – *Imre determined that the virus in the NM populations were not TM-BioControl but a local single embedded virus (P[SNPV).*

Continue to develop virus detection kit for egg masses – (Sheri will submit as an STDP project in fall of 2006) – *because of reduced budgets, no new STDP projects were funded in 2007.*

Test egg masses from NM and California populations to determine level of viability, natural virus and parasitism. – *Populations collapsed in California. Incidence of parasitism and virus were determined for the Sandia West and Sandia east DFTM populations from NM*

Test susceptibility of NM population to TM-BioControl to add to current manuscript – (Iral will discuss with Dick Reardon about). – *This will be done*.

4. Other Projects and Things to Do

- Encourage Bill Schaupp to write up report on tent caterpillar on chokecherry (Costello) – *Summary of Chokecherry report included in minutes.*

- Continue to follow and document Western Spruce Budworm (WSBW) in hemlock (Randall) - *planned*

- Write report on western Spruce Budworm Trend Plots (Hostetler) - *planned*
- Continue to follow and document WSBW plots in thinned and unthinned stands in Montana (Sturdevant) - *planned*
- Write up DFTM pheromone mating disruption and elution report (Ragenovich) - *planned*

- Prepare letter on recommendations for DFTM traps for 2006 (Ragenovich) – *sent e-mail*
- Re-evaluate appropriate placement of DFTM EWS trapping plots (All participating Regions) - *planned*
- Collect adelgids from spruce and send for identification (Beckman) *??*
- Encourage Chris Niwa to publish WSBW trap/defoliation paper (Ragenovich/Overhulser)

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)

Next Meeting:

2008 Meeting will be hosted by **Darren Blackford in Region 4**. Suggestion was to hold it later in the fall or winter so that more of the results form aerial surveys for Regional Reports will be available and so the timing of the meeting is not so close to the Bark Beetle Working Group meeting. It was suggested that the Chairship for the meeting rotate with the host.

A. REGIONAL REPORTS:

Montana and Northern Idaho:

Acres of defoliation are continuing to increase across many reporting areas in Montana. In 2005, a total of 454,176 acres were mapped as defoliated as compared to 187,000 acres defoliated in 2004. Western spruce budworm continues to be the primary insect responsible for the vast majority of the defoliation. Defoliation from Douglas-fir tussock moth was apparent along the western shore of Flathead Lake between Jette Lake and Somers. Populations at all other historical tussock moth locations have virtually collapsed with corresponding low to non-existent pheromone trap catches. Aerial survey recorded 306 acres of defoliation in the north-western part of the state by an insect that we have not identified to date. Other defoliators such as larch bud moth were infrequent and did not cause significant defoliation or damage.

Montana

Western Spruce Budworm:

The number of acres defoliated by western spruce budworm increased more than two-fold between 2004 and 2005. In 2005, a total of 453,739 acres were mapped in as defoliated by budworm. In 2004, acres that were flown and mapped with defoliation was about 187,000, of which 177,000 was from western spruce budworm. Due to the unpredictable and inclement weather conditions during the survey period in 2004, acreage figures for defoliation were an underestimate.

Very few acres (160 acres total) were defoliated on the Lolo and Bitterroot-two forests west of the divide that have historically had significant defoliation during previous outbreaks. During the outbreak in the 1980s, 2.6 million acres in the region were defoliated by budworm; with almost 200,000 acres defoliated each on the Bitterroot and Lolo NFs. Wildfires in the budworm host type have occurred in several areas on these forests that were historically defoliated by budworm. This may be the reason in part for the decline in defoliation on the Lolo and Bitterroot NFs. On the Kootenai NF, 19,395 acres were defoliated by western spruce budworm in 2005. An additional 228 acres of primarily mature western hemlock were defoliated on the Cabinet RD on the Kootenai NF. During late last summer, we were not able to identify the insect responsible for the defoliation. Historically, defoliation episodes from budworm on the Kootenai have been short-lived and are not very expansive in acres.

Number of acres defoliated by budworm in 2005 not only increased in extent, but, also in intensity. In 2005, we recorded very heavy defoliation on Douglas-fir on the Helena and Gallatin NFs. We are monitoring potential tree mortality from budworm in these areas via ground surveys. We also recorded areas of defoliation from budworm that had never been recorded via aerial survey. Also in 2005, we recorded localized defoliation from an "unidentified defoliator" near Spar Lake on the Kootenai NF. We suspect that this defoliation was caused by either western spruce budworm or hemlock looper.

We did not fly Yellowstone National Park in 2004 but land managers estimated about 3,000 acres of fir-type were defoliated by budworm. In 2005, we recorded 1,332 acres of defoliation caused by western spruce budworm in Yellowstone National Park.

In 2006, we saw an increase in number of acres defoliated by western spruce budworm. Aerial survey numbers are not yet available for 2006. In addition to budworm, we saw defoliation from larch casebearer at many locations on the Kootenai and Flathead NFs.

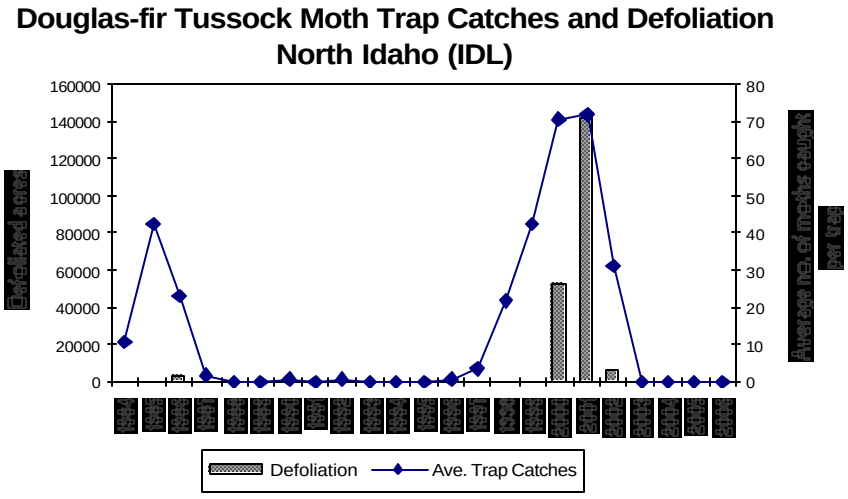
Pine Tussock Moth
On private land just south of Columbus Montana, we confirmed the presence of pine tussock moth, *Dasychira pinicola* (Dyar). Pine tussock moth is native to eastern Montana ponderosa pine forests. However, outbreaks are uncommon. The last one for which we have records was an infestation that occurred south of Ashland in 1965-1966. That outbreak, which ultimately extended to nearly 250,000 acres, collapsed due to the presence of a naturally occurring NPV after about 3 years. The area near Columbus that was defoliated was between 100 and 200 acres and received heavy defoliation. This is the first time it was recorded in the specific area. We believe that this is the 2nd or 3rd year of the outbreak which typically lasts 2-4 years.

Northern Idaho

Due to unpredictable, inclement weather and visual interference from forest fire-generated smoke during peak survey times in 2005 and 2006, actual total acreage of defoliator damage was underestimated. This especially affected western spruce budworm (WSB) detection numbers, as populations are known to be increasing throughout the Region. The Clearwater National Forest wasn't flown at all and parts of the Nez Perce, Coeur d'Alene, and St. Joe forests weren't flown in 2006.

Douglas-fir Tussock Moth (*Orgyia pseudotsugata)*
Defoliation from Douglas-fir tussock moth in northern Idaho dropped from 5,400 acres in 2002 to zero in 2003, 2004, 2005, and 2006. 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 33 FS trap sites, a total of 39 moths were caught on 11 of these sites. Nine moths, caught at Bald Mtn. 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.



DFTM permanent plots
Plots installed in 2001 (during the last DFTM outbreak) in a Douglas-fir and grand fir plantation were measured for mortality in 2006. In the plots, 101 trees were tagged and measured for defoliation in 2001 and 2003. Average diameter of the trees was 3.8 inches

and average height, 25 feet. In 2001, 68% of the trees were greater than 50% defoliated and 53% were greater than 90% defoliated. In 2006, 57% of the trees were dead. A report documenting this mortality and growth affects on the adjacent mature stand will be published in 2007.

Western spruce budworm (*Choristoneura occidentalis*)
On the Kanisku and Coeur d'Alene NF's and bordering lands of Northern Idaho, WSB has been continually feeding on western hemlock and fir for the past four years. Landscapes across these forests include areas north and west of Priest and Upper Priest Lakes, along drainages of Lightning Creek**,** and areas north and west of the Shoshone Range, with budworm feeding heavily on hemlock and to a lesser extent, grand fir. Defoliation was also detected south of Wallace and Kellogg, Idaho for the first time. Although defoliation appears to be more widespread, it is less intense than in previous years. Defoliation has disappeared from permanent plots monitored since 2002. About 53,000 acres were mapped in 2005, down from 56,000 acres in 2004. Many of the defoliated areas were not flown in 2006.

Merit Test
In September 2006, a small test of a Merit soil drench to protect Douglas-fir from western spruce budworm 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.

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

Balsam Woolly Adelgid (*Adelges piceae*)
Aerial detection estimated just over 28,000 acres infested by the balsam woolly adelgid (BWA) in northern Idaho in 2005 compared to about 50,000 acres in 2004. Areas with the heaviest infestations occurred on the St. Joe, Clearwater, and Nez Perce NF's, along with adjacent state, private, and BLM lands. Resulting subalpine fir mortality occurred in all ages and size classes. A state-wide survey to delimit the distribution of BWA and damage is currently underway and planned to continue in 2007. No BWA was detected on the Idaho/Montana border south of St. Regis, MT. However, subalpine fir (SAF) trees are infested just over the Idaho/Montana border east of Lookout Pass in Montana. Very low levels of BWA were detected on SAF along roads leading into the Selkirk Mountains on the Bonners Ferry RD, Kaniksu NF.

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 northern Idaho. No moths were captured on Federal lands. On State lands, no gypsy moths were caught in delimitation trapping where a single Asian gypsy moth was caught along Highway 53 near Hauser Lake in 2004. The Idaho Department of Lands in conjunction with other cooperating agencies conducted an aerial spray project to treat 600 acres south of Hauser to contain and eradicate the insect in May of 2005. One North American gypsy moth was caught along the Coeur d'Alene River, just north of Enaville in 2005. Delimitation trapping conducted in this area in 2006 found no new moths.

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. Needle diseases were also abundant in certain areas, particularly near Lookout Pass near the Montana border and on the Priest River Ranger District.

Fall webworm (*Hyphantria cunea*)

Isolated patches of fall webworm defoliation were noticed on hardwoods along creeks and rivers in northern Idaho.

Southern Idaho, Western Wyoming, Utah and Nevada

Douglas-fir Tussock Moth (*Orgyia pseudotsugata* (McDunnough))
Utah. For 2005, there were no notable acres of Douglas-fir tussock moth defoliation reported. There were no traps placed for 2005.

Nevada. In 2005, there were 5,654 acres infested (118-heavily infested, 5536-lightly infested) on the Humboldt-Toiyabe NF. This is an increase from 2004 (3,720 acres). For 2005, there were 15 traps placed on the Humboldt-Toiyabe NF in Western Nevada. There were no moths caught.

Western Wyoming. For 2005, there was no notable Douglas-fir tussock moth defoliation reported. There were no traps placed in 2005.

Southern Idaho. For 2005, there were 3,401 acres reported for Douglas-fir tussock moth defoliation on the Sawtooth NF. For 2006, ~2,500 acres were estimated to be defoliated in the Sawtooth NF.

Western Spruce Budworm (*Choristoneura occidentalis* Freeman)
Utah. In 2005, there were 37,223 acres defoliated on the Dixie NF, only a slight decrease from the 40,508 acres defoliated on the Dixie NF in 2004. Defoliated acres in 2004 and 2005 on the Dixie increased significantly from the 2003 (8966 acres).
There were 73 acres defoliated on Fishlake NF in 2005.

Nevada. No notable western spruce budworm defoliation was detected for 2005. There was also none reported for 2004.

Western Wyoming. No notable defoliation was detected for 2005 or 2004.

Southern Idaho. For 2005, there were 63,089 total acres defoliated by western spruce budworm, an increase from 10,779 total acres defoliated in 2004.

For 2005, there were 53,718 acres defoliated by western spruce budworm on the Boise NF, a large increase from 2,076 defoliated acres in 2004. This is the largest infestation reported in Region 4.

National Forest	*2005 defoliated acres*	*2004 defoliated acres*
Boise NF	53,718	2,076
Payette NF	1,159	2,631
Salmon-Challis NF	1,319	718
Sawtooth NF	400	2,393
Caribou-Targhee NF	1,270	2,961

Gypsy Moth (*Lymantria dispar* (Linnaeus))

Utah. In 2005, a total of about 3,000 gypsy moth traps were placed statewide by state and federal crews, and no moths were caught.

Historical data

Year	Traps Placed	Acres Sprayed	Moth Caught
1988	1,737	0	925
1989	5,398	1,190	2,274
1990	7,469	20,064	577
1991	7,818	29,925	192
1992	10,958	15,718	94
1993	10,126	5,135	5
1994	4,035	0	0
1995	1,680	0	0
1996	1,964	0	7
1997	2,954	0	47
1998	4,599	916	32
1999	5,461	764	7
2000	6,905	0	3
2001	5,046	0	1
2002	3,812	0	1
2003	3,534	0	2
2004	3,270	0	3
2005	**2,917**	**0**	**1**
2006	**3,055**	**0**	**0**

Nevada. In 2005, there were ~450 gypsy moth traps placed statewide with no moths caught.

Western Wyoming. In 2005, there were another 40 traps placed with no moths trapped.

Southern Idaho. In 2005, there were 552 traps placed in southeastern Idaho and around campgrounds in south central Idaho with no moths were trapped.

Tent Caterpillars (*Malacosoma spp*.)
Utah. For 2005, there were no tent caterpillar acres reported.

Nevada. There were no defoliated acres reported for 2005. Data for 2006 infestation levels are not available at this time.

Western Wyoming. No notable forest tent caterpillar defoliation reported for 2005.

Southern Idaho. No notable forest tent caterpillar defoliation reported for 2005.

Balsam Woolly Adelgid (*Adelges piceae (Ratzeburg))*.
Southern Idaho. No notable balsam woolly adelgid damage reported for 2005. Data for 2006 balsam woolly adelgid levels are not yet available, however, initial ground surveys have detected populations throughout Payette National Forest.

Miscellaneous Agents
Utah. Aspen Decline. For 2005, there were, 300 acres for the Fishlake NF, and 300 acres for the Manti-La Sal NF and 200 acres for the Uinta NF.

Other agents. Large aspen tortrix, aspen leaf tier, aspen leaf tier, aspen leafminer, misc. leafrollers, aspen two-leaf tier, Eriophyid gallforming mite, misc. leafhoppers, cottonwood leaf curl mite, poplar leaf aphid, and aspen blotchminer were reported by John Guyon's "aspen crew".

Nevada. Aspen Decline**.** Over 19,600 acres of aspen decline was observed on all districts in central and eastern Nevada. Cytospora canker was present and thought to be a contributing factor.

***Colorado, Kansas/Nebraska, Wyoming, South Dakota*:**

Douglas-fir Tussock Moth:
Colorado

- Pike National Forest, Rampart Range (Northwest of Colorado Springs)
  Early Warning Pheromone System: 9 trap sets caught 211 moths. This is a large increase from the total 29 moths caught in 2005.
- US 285 (SW of Denver)
  Tussock moth populations seem to be on the downward trend with very little change in areas defoliated and NPV was evident.

Western Spruce Budworm:
Colorado

- Bear Mountain (SW of Denver)
  Very low populations, areas were sprayed in 2003 and 2005, egg mass surveys will be conducted before next summer.

- Rio Grand National Forest (East of Wolf Creek Pass, Southern CO)
  Chronic budworm in Douglas-fir.
- Uncompahgre National Forest (Southern CO)
  Budworm continues in both subalpine-fir and Engelmann spruce, with a 3-fold increase from 2005 in Engelmann spruce defoliation, and new areas being defoliated.
- San Juan National Forest (Southern CO)
  Budworm in both subalpine-fir and white-fir. Again, fairly long-term infestations in areas where WSBW appears to be chronic.

Wyoming

- Medicine Bow NF (South-Central WY)
  Chronic budworm populations.
- Wind River Range in the Shoshone National Forest (Northern WY)
  First year light defoliation visible.

Other Defoliators:

Colorado

- San Isabel NF (near Cuchara)
  Approximately 800 acres of noticeable defoliation of western tent caterpillar on USFS and private lands. This has increased from last year 2005.
- Telluride Area
  Populations of western tent caterpillar were high within the town and Bt was sprayed, but not until late summer.
- Uncompahgre National Forest (Southern CO)
  Populations of large aspen tortrix were conspicuous this year.
- Black Forest (east of Colorado Springs)
  Pine sawfly present in low numbers.

South Dakota

- Crow Creek Sioux Reservation
  Heavy tent caterpillar defoliation on Choke Cherry continues to be severe and trees did not produce fruit again. The reservation is considering using Bt. 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 first time in several years and was expected because persistent drought conditions.

Nebraska

- Wildcat Hills, NE (Southwest NE, near Scottsbluff)
  Pine tussock moth population collapsed in one area, but was discovered in another area. Pine sawfly defoliation was also present.

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.
- It was a good year for elm leaf beetle.
- No gypsy moths caught in R2. No moths caught by CSFS traps, checked 1000/1600 traps.

Arizona and New Mexico:

Arizona:

Defoliators in Arizona - 2006

	Acres Low	Acres High	2006 Acres Total	2005 Acres Total
Aspen Defoliation/Decline	58,501	13,626	72,127	47,430
Western Spruce Budworm	1,730	3,925	5,655	11,204
Drought	5,541		5,541	18,286
Western Forest Tent Caterpillar	10		10	
			90,198	76,920

Aspen damage acres increased in 2006 from a combination of defoliation and decline. Western forest tent caterpillar defoliated aspen and other deciduous trees in Arizona in 2006. Since the forest was not flown in early summer when the western forest tent caterpillar had defoliated and before any refoliation might have occurred, damage from defoliation and decline cannot be separated. Aspen decline was not as visible in 2005 due to adequate winter precipitation during the 2004-2005 season. Precipitation during the 2005-2006 season was very late which may account for the increased damage to aspen.
Western spruce budworm was only recorded in the Chuska Mountains in NE AZ/NW NM in 2006. Other areas prone to defoliation did not appear to have outbreak populations this year. Late season moisture was enough to decrease the acreage of discoloration recorded as drought in 2006.

New Mexico:

Defoliators in New Mexico - 2006

	2006 Acres Total	2005 Acres Total
Aspen Defoliation	19,010	35,800
Western Spruce Budworm	183,970	142,500
Douglas-fir Tussock Moth	870	1,230
Geometrid loopers	5,295	7,270
TOTALS	209,145	186,800

Western Tent Caterpillar
Aspen defoliation, caused by the western tent caterpillar, in New Mexico decreased significantly from 35,800 acres in 2005 to 19,010 acres in 2006. Although the majority of the defoliation occurred in northern New Mexico, areas of aspen defoliation were also occurred in central and southern New Mexico.

Western Spruce Budworm
Defoliation by the western spruce budworm decreased from 183,970 acres in 2005 to 142,500 acres in 2006. The bulk of this defoliation continued to occur in northern New Mexico where the budworm has remained chronic for many years. A new budworm outbreak has been detected in the Sacramento Mountains in southeastern New Mexico. It has been 23 years since the last budworm outbreak in the Sacramento Mountains which occurred in 1983 and was suppressed in 1984.

Douglas-fir tussock moth

Populations detected on the west side of the Sandia Mountain Wilderness in 2004 and 2005 collapsed in 2006. A new DFTM outbreak detected on the east side of the Sandia Mountains in 2006 on the Sandia Ranger District, Cibola National Forest, caused heavy defoliation on approximately 1,230 acres of white fir and Douglas-fir. This outbreak is expected to continue in 2007.

DFTM defoliation along Sandia Crest National Scenic Byway.

Nepytia janetae

Defoliation of the mixed-conifer forest by caterpillars of a geometrid moth, commonly known as loopers, continued to be the major insect activity on the Forest and particularly on the Sacramento Ranger District in the Sacramento Mountains in southeastern New Mexico.

Defoliation damages caused by *Nepytia janetae*, Family Geometridae

A supplemental survey in June 2006 mapped 4,360 acres with some level of defoliation from late winter/early spring feeding by the caterpillars. Additional defoliation was observed over an area of 2,870 acres during the August survey flights. Field-collected caterpillars were reared to adulthood and identified as *Nepytia janetae.* In previous years, defoliation had been attributed to a similar summer-feeding caterpillar, the New Mexico fir looper (*Galenara consimilis*). Since multiple defoliators have been successively active on the Sacramento District in the past several years, overlaps between the end of one outbreak and the beginning of the next has made attribution imprecise. In 2006, *Nepytia janetae* distinguished itself from the other defoliating caterpillars by its late-winter/early spring feeding habits. Since the first observations in 2002, looper activity in general has affected over 20,700 acres on the Lincoln NF and Mescalero

Apache Tribal lands, with the large majority of affected area on the Sacramento Ranger District. Notably, approximately 3,500 acres were mapped this year that appeared to have recovered from the looper defoliation of previous years.

California, Hawaii, and the Western Pacific Islands

California.

Douglas-fir tussock moth (DFTM), *Orgyia pseudotsugata*Douglas-fir tussock moth (DFTM) defoliated over 23,000 acres in the California during 2006 (Table 1). DFTM infestations expanded from last year and additional areas of defoliation were detected on the Eldorado NF and near Mt. Shasta. In the Southern Sierra Nevada range aerial detection surveys reported heavy and widespread defoliation, however follow-up ground surveys indicated that needle loss only increased by 10% from that in 2005 and resulting in the conclusion that few mature trees would be top-killed. Preliminary surveys for egg masses were negative and the few new pupal cases that were found were all parasitized. Predictions are that this is the peak year for DFTM with population decline occurring next year.

In addition to the defoliation caused by DFTM in the Southern Sierra Nevada, there was also a small outbreak centered on Bear Mountain, east of Mt. Shasta. Both white fir and Douglas-fir were being defoliated. Some individual trees were totally stripped. Tachinid fly and braconid wasp parasites were common in the defoliated area. New egg masses were relatively easy to find. Both NFS and private industrial forest land is involved, so there may be different management responses.

Acres of Defoliation caused by DFTM in CA in 2006

Forest	**Acres of defoliation 2005**	**Acres of defoliation 2006**
Eldorado NF	**0**	**72**
Sierra NF	**8,369**	**11,200**
Shasta-Trinity NF	**0**	**2,455**
Private land near Mt. Burney	**0**	**57**
Stanislaus NF	**2,249**	**2,205**
Yosemite NP	**2,093**	**7,250**
Total	**12,711**	**23,239**

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. Feeding appears to have intensified in the currently infested areas, but no mortality has been reported. Ground surveys will be conducted next year (2007) to evaluate extent and intensity.

Fall Webworm, *Hyphantria cunea*
Fall Webworm is evident all throughout the west side of the Sierra Nevada. Depending on location, most webs are predominantly found on specific hosts. In Eldorado County, madrone and occasionally manzanita appeared to be preferred hosts.

Oak leafminer
Oak leafminer (still to be determined which one) feeding injury was observed in black oak (*Quercus kelloggii*) at a few locations on the Plumas and Tahoe National Forests. The largest area, along Interstate 80 near Blue Canyon, Tahoe National Forest, had the highest defoliation levels. The foliage was attacked in early summer resulting in complete or nearly complete crown fade. Some re-growth occurred on a few trees later in the summer. This is the second year in a row for this insect activity. This same type of defoliation was also observed on Bloomer Hill near Berry Creek and Schneider Creek, Plumas National Forest and on Kimshew Point, Butte County.

Jeffrey pine needleminer, *Coleotechnites sp.* near *milleri*
The Jeffrey pine needleminer infestation continued this year near Truckee, Placer County, but at a lower intensity. Approximately 200 acres were affected, which is about the same as last year. The affected area is still entirely to the south of Interstate 80.

Black pine leaf scale, *Nuculaspis californica*
Scales were abundant on the foliage of several large ponderosa pines growing near a dirt surfaced residential road near Janesville, Lassen County.

Gypsy moth, *Lymantria dispar*
Several gypsy moths were trapped in CA during 2006 (Table 2.). 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 gyspy moths trapped during 2006, by county.

County	**# of gypsy moths trapped**
Los Angeles	4
Marin	1
Orange	1
Riverside	3
Sacramento	1
San Mateo	4
Santa Barbara	1
Santa Cruz	1
Total	16

Hawaii and Western Pacific Islands

Aulacaspis cycad scale, *Aulacaspis yasumatsui*
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 currently infests introduced and indigenous cycads throughout Guam. Severe infestations

kill both species within a few months. Various integrated pest management techniques (cultural, chemical, biocontrol releases) on being implemented however the ability to maintain the native cycads as part of the Guam ecosystem will depend on the success of the biocontrols.

Erythrina gall wasp, *Quadrastichus erythrinae*
The erythrina gall wasp (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 (see http://www.hear.org/egw/#egwstatusbyislandinhawaii for EGW status by island). It has also been reported in American Samoa and Guam 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. The rapid life-cycle of EGW (about three weeks) leads to constant insect pressure and rapid defoliation from galling. *Erythrina* trees respond by serial reflushing during the leaf season, leading to carbon deficits. Mortality of deciduous trees is typical after several complete defoliations, so expectations are that significant mortality will be observed among *Erythrina* populations in Hawaii. The native wiliwili (coral tree) is important to Hawaiian culture and Hawaiian dryland forest ecosystems—one of the most threatened ecosystems in the world. Native trees in these dryland forests have a relatively short growing season (depending on rainfall) and therefore have a limited ability to re-foliate.

A primary goal of resource managers over the short-term is to prevent or delay mortality of *Erythrina* until longer-term strategies (i.e., biological control) can be implemented. Work with systemic insecticides and soil drenches, using primarily imidacloprid, has produced inconsistent results. Currently three parasitoids are in quarantine in Hawaii with a 2-3 year estimate for first release. Thousands of non-native EGW killed coral trees are being removed in downtown Honolulu at the cost of millions of dollars.

Pulvinaria urbicola, an invasive scale on Palmyra atoll.
Pulvinaria urbicola is a sap sucking soft scale insect first described in Kingston, Jamaica in 1893. It has a worldwide distribution with a wide host range. Between 2001 and 2003, field researchers reported a reduction in *Pisonia grandis* (Pisonia) canopy density at Palmyra Atoll National Wildlife Refuge (NWR). This decrease has been attributed in part to *P. urbicola*. Since first detected scale populations on Palmyra have declined with low densities occurring throughout the atoll with the exception of a limited number of high density patches. Despite the decline in scale densities, the Pisonia forest continues to die. The ongoing death of Pisonia trees is thought to be due to effects of prior scale infestation. Little is known about the indirect effects of scale infestation on this forest ecosystem including factors affecting ectomycorrhizal associations, presence of phytopathogens, nutrient cycling and uptake, and scale outbreaks. This lack of knowledge severely limits efforts to restore the forest system on Palmyra and elsewhere and leaves the remaining stands susceptible to future scale outbreaks. The U.S. Fish and Wildlife Service (Service), with assistance from the University of Hawaii and the Nature Conservancy, worked to test and implement various scale control measures on Palmyra. As well as establish an inventory and assessment program on Palmyra in order to evaluate the effects of *P. urbicola* on Pisonia. This program includes an annual census of Pisonia quantifying scale infestation, tree health, and tree size and a quarterly survey of scale densities on the dominant plant species throughout the atoll.

Oregon and Washington

Oregon

Western Spruce Budworm, *Choristoneura occidentalis*

Western spruce budworm defoliation was detected on 37,978 acres in 2006, primarily in Grant, Baker and Harney Counties in Eastern Oregon. Much of the affected area is within the Ochoco and Malheur National Forests. A small area was also found in Hood River County in North-central Oregon. Defoliation intensity was considered low to moderate in most areas. This represents a significant increase from the 154 acres detected in 2005.

Spruce Aphid, *Elatobium abietium*

No visible defoliation of Sitka spruce was attributed to spruce aphid in 2006. A significant outbreak occurred along the Oregon coast in 2005, with defoliation apparent on 4,782 acres. Damage may have been decreased this year by colder-than-average conditions in early spring that appear to have reduced aphid populations below injurious levels.

Larch Casebearer, *Coleophora laricella*

Larch casebearer was virtually absent in Oregon from 1980-1999, but since that time has been detected each year. Defoliation of Western larch was evident in 2006 on the east-side of the Cascades as well as throughout much of North-eastern Oregon. Unfortunately, the aerial surveys of these areas were completed too late to capture accurate estimates. In 2005, defoliation was apparent on 2,533 acres, and given the current trend, increased larch casebearer expansion and defoliation is expected to continue in coming years.

Balsam Woolly Adelgid, *Adelges piceae*

Defoliation of sub-alpine fir due to balsam woolly adelgid was detected on 55,096 acres in 2006, primarily along the Cascade Range through Central Oregon and in many areas of Eastern and North-eastern Oregon. Much of the affected area occurs within the Ochoco, Malheur, Umatilla and Wallowa-Whitman National Forests. While this represents a decrease in comparison to the 76,655 acres detected in 2005, it likely reflects limited host availability rather than indicating a reduction in adelgid populations.

Pandora Moth, *Coloradia pandora*

Pandora moth is rarely seen except in outbreaks, which occur at 20-30 year intervals. It has a two-year life cycle so that defoliation occurs every other year. Lodgepole pine defoliation resulting from the current Pandora moth outbreak was detected on 11,182 acres in 2006, located primarily in Klamath County in South-central Oregon. The acreage has decreased from a high of 87,521 acres in 2004, suggesting that the outbreak is collapsing. Terminal buds are not usually damaged, such that even severely defoliated trees often recover. However, defoliation has been severe enough in recent years, along the Highway 97 corridor, that tree mortality has occurred.

Satin Moth, *Leucoma salicis*

The satin moth is a defoliator of poplars that appears in periodic, localized outbreaks. It was first recorded in North America in 1920, and has since spread to many areas of the western United States. Although previously thought to be primarily a pest of shade, park or wind-break trees, it has defoliated thousands of acres of quaking aspen and black cottonwood in natural stands. Defoliation of quaking aspen by satin moth was detected on 893 acres in 2006, located primarily in Klamath and Lake Counties in South-central Oregon. A small area was also detected in Grant County in Eastern Oregon. This represents an increase from the 225 acres reported in 2005.

Western Tent Caterpillar, *Malacosoma californicum*
Only 39 acres of red alder defoliation by Western tent caterpillar was detected in 2006, located along the boundary of Clatsop and Columbia Counties in Northwest Oregon. The last substantial defoliation reported occurred in 2002, and included 3,683 acres along the Highway 26 corridor in Northwest Oregon.

Douglas-Fir Tussock Moth, *Orygia pseudotsugata*
No visible defoliation was attributed to Douglas-fir tussock moth in 2006, similar to findings since 2002, when the outbreak collapsed. Preliminary estimates of "early-warning system" data showed low trap catches on state and private lands and in areas of the Wallowa-Whitman National Forest in Northeast Oregon. However, federal lands in Central and Eastern Oregon, which include the Ochoco and Malheur National Forests, have shown significant increases. A small increase in trap catches was also found in Fremont and Winema National Forests in South-central Oregon.

Gypsy Moth, *Lymantria dispar*
European Gypsy Moth
The Oregon Department of Agriculture placed 19,000 gypsy moth traps in 2006. Currently, 66 total moths have been captured, with 57 of the trap catches occurring in Bend, Deschutes County, in Central Oregon. This is the highest number of trap catches in Oregon recorded at a single location on the east-side of the Cascades. The introduction resulted from an automobile shipment to a private residence from the Northeast United States. The remaining moths were trapped in low numbers in rural areas of Central and Northwest Oregon. More intensive trapping efforts are underway in Bend and an eradication program is planned for spring 2007.

Asian Gypsy Moth
The Oregon Department of Agriculture trapped a single Asian gypsy moth in 2006. It was found in St. Helens, Columbia County, located along the Columbia River in Northwest Oregon. This marks only the third time that the Asian variety has been found in Oregon. Areas along the Columbia River Gorge are at high risk for introductions due to the large number of container ships arriving from infested areas in Asia. Intensive trapping efforts are underway and an eradication program is planned for spring 2007.

Uncategorized Defoliation
There were small areas of defoliation detected, totaling 1,079 acres, that were scattered along the Oregon Coast and west-side of the Cascades in 2006. These have not yet been attributed to a particular agent, but ground-surveys are continuing to examine and categorize these areas.

Washington
Western Spruce Budworm
Another significant increase in budworm activity was recorded in eastern Washington. Over 550,000 acres of defoliation were mapped via Aerial survey in 2006. Approximately 350,000 acres were mapped in 2005 and 200,000 in 2004. Increases in activity were most notable along the eastern slopes of the North cascades and many new "hotspots" were detected in the northeastern part of the state. Pheromone trap results indicate continued widespread activity again in 2007.

Douglas-fir tussock moth
No defoliation detected during the 2006 aerial survey could be attributed to DFTM. Pheromone trap results indicate a modest increase in catch numbers in a few locations, but no widespread activity is expected for 2007.

Western hemlock looper
A small area of activity was again detected in the vicinity of Mt. Baker in northwestern Washington. This outbreak has been ongoing for several years, but has mostly subsided. Sporadic tree mortality was again recorded in many areas where Western hemlock looper defoliated trees in previous years. Much of this can be attributed to this defoliation event.

Balsam woolly adelgid
Over 36 thousand acres were recorded statewide in 2006 a significant increase from 2005.

Larch casebearer
Aerial survey detected landscape level larch casebearer/foliar disease signature particularly in Kittitas, Yakima, Stevens and Pend Oreille counties. It is unknown what ratio of casebearer to foliar disease agents are active, but landscape levels of activity were reported.

Spruce aphid
The spruce aphid outbreak detected along the Washington coast in 2005 has subsided. Significant but widely scattered spruce mortality was observed in 2006, but not mapped due to signature challenges of trees with no foliage.

Tent caterpillar
The tent caterpillar outbreak throughout the Puget Sound area of the past several years has finally subsided. Significant amounts of top kill and whole tree mortality resulted from this multi-year outbreak event.

Black pine leaf scale
Landscape levels of activity were reported in Okanogan and Chelan counties. This event was not mapped well during the aerial detection survey due to smoky flying conditions.

B. PROJECT AND INDIVIDUAL REPORTS

1. Aerial Application Project Planning and Execution - *Amy H. Onken, FS, FHP, NA*

PREPARATION OF A CONTRACT

The Aerial Spray Contract is the MOST IMPORTANT component of implementing a SAFE and effective spray project.

The USDA Forest Service "strongly" recommends including the following specifications in state and federal aerial application contracts:

- GPS
- Rotary Atomizers (insecticides)
- Calibration
- Flow Control
- Flight and Duty limitations
- Environmental Limitations
- Experience and Safety Record of Firm and Pilots

SAFETY: The primary responsibility for aviation safety begins in the cockpit, but all personnel are responsible to insure the operation is safe from the beginning planning stages to the last day of the operation. During an aviation project, *Safety should be considered as an attitude……*.*not a program.*

When preparing an aerial application contract proposal, several safety considerations should be included:

- Avionics – VHF-AM Aeronautical radios
- The Use of Observation Planes or constant communication to ground crew or base
- No private spraying until contractor is released from the project
- Pilots must recon the blocks prior to treatment
- The contracting agency will prepare aerial hazard maps for pilots
- Aircraft and pesticides must be secured

THE CONTRACT IS OUT FOR SOLICITATION, NOW WHAT?

When the contract is out on the streets, you may think your work is done until the start of the project. In the meantime…..

• Discuss radio frequencies

In the contract, a pre-bid conference call should be scheduled with a date, time, and dial in number. Offerors should be encouraged to submit questions 5 days prior to the call and inform them that nothing will change unless by amendment. This will also give the agency an idea of how many offerors are interested.

•Communication efforts should be initiated which may include:

Working with Public Relations folks
County Extension
Sheriff's Office
911
Post Spray Blocks on Website
Establish 1-800 number
Preparing a Radio Communication Plan
Ground to Air Radios
Ground to Ground Radios
Frequencies
Satellite Phone (backup for emergencies

•Preparation of Maps for:

Field Crews
Work Plan
Airport/Command Post
Shape files for on board GPS

THE CONTRACT IS AWARDED, NOW WHAT?

After the contract is awarded, start an open line of communication with the contractor…..

- Discuss radio frequencies
- Airport locations or LZs
- Lodging
- What type of hard copy maps would pilots like
- Send shape files to make sure they load properly

A Safety and Security Plan must be prepared which includes:

- Emergency Contact Numbers
- Security of Aircraft and Pesticide
- General Safety
    - Personal
    - Vehicle
    - Aviation

A Work Plan must be prepared which includes:

- Organizational Responsibilities
    - State/Federal Agency and Contractor
- Treatment Areas – Maps
- Pre-Spray Operations
    - Calibration and Biological Monitoring
- Spray Operations
    - Communications
    - Application Monitoring
    - Public Notification

Field Evaluations

- Field Crews should be monitoring insect development
- Provide training if needed
- Use of Phenology Models

TIME FOR PROJECT IMPLEMENTATION, NOW WHAT?

Reporting date for contractor is usually 2 days prior to the start of the project (this should be in the contract)**.**

Day before:

- Set up Command Center or LZ
- Check Radios
- Calibrate Aircraft
- Prepare an Action Plan for next day
- Pre-spray safety meeting
- Go watch the weather channel and try to get a good nights sleep

Project Start Date:

- Get up before the roosters and check the weather
- Report to Airport

- Check with field crews to clear blocks for treatment
- Monitor weather and keep records
- Tailgate safety briefing
- Check Radios, flight following
- Get out of the way and let the contractor do his job
- Good record keeping is essential (Load Sheets and Flight Following)
- At the end of the day, conduct a brief critique of the days activities
- Prepare an Action Plan for next day ad meet with pilots
- Have contractor/pilots sign the load sheets
- Go back to the hotel for a good nights sleep to do it all again tomorrow

THE BOTTOM LINE

CONTRACTS HAVE SPECIFICATIONS: THEY ARE THERE FOR A REASON…..Project Managers need to make sure they enforce what is stated in their contract!!

Aerial application (Part 137) is one of the most challenging mission profiles in aviation today. Although most projects focus primarily on a target or pest, we need to remember that these projects are AVIATION projects and should be managed as aviation projects. Sometimes we get so caught up the "process" that we really don't see the big picture.

The BIG PICTURE IS…..our number one priority is that our pilots come home safe and sound at the end of each day.

2. Gypsy Moth in Washington and Oregon – *prepared by David Bridgwater, FS, FHP R6*

There is a reproducing population in NW Bend, and an Asian GM captured in St Helens.

Molecular diagnostics have found a very unusual probable Asian gypsy moth from Oregon. OR06 3.01 (Trap # 09-28422 collected 8/30/06 in St Helens, OR) tested Asian for the FS1 marker, positive with Nla III and negative with Bam HI. Normally gypsy moths that test Asian on the FS1 marker and positive on Nla III are also positive on Bam HI. This specimen is rather unusual in that it tested negative rather than positive with Bam.

Although rare, there is precedence for this combination of results. I searched our historic database of foreign gypsy moths and found seven moths that matched these results. Four moths collected in 1992 in Seoul, South Korea and 3 moths collected in Dayi County, Sichuan Province, China in 1993 were also FS1 Asian, Nla positive, and Bam negative. However, this is the first occurrence of this particular combination of results found in a moth captured in North America. These results along with the unusual appearance of this moth compared to the other moths captured in Oregon (its much larger and lighter in color than the other moths)strongly suggest that it is of Asian origin.

The remainder of the moths submitted from Oregon were all North American. I also just received a shipment of gypsy moths from Washington State. In light of the Oregon results, these moths will be the next to be processed.

But, we also have a similar reproducing population in Kent, WA (male and female moths, larvae, and new egg masses) There is also a suspicious large pale male in Kalama, WA. Hopefully the determination will be made prior to this meeting. (It is interesting to note the distance between the two sites!) The final determinations on size of infestation, who is responsible and treatment methods will probably not be made or proposed before November which seems a bit late for this meeting, but one could suggest that both the Kent and Bend site meet the criteria for treatment in 2007.

3. Asian GM Port Trapping in Japan – *provided by Steve Munson FS, FHP, R4*

We visited with Japan's Ministry of Agriculture, Forestry and Fisheries the week of Sept 4-8th to discuss initiating a ship inspection program in monitored high risk ports. Discussions on this topic were difficult to say the least since Japan feels they are being picked on since we don't have a similar program in Korea or China. Vic Mastro, Mike Simon (Senior Staff Officer in DC for Port Operations) and I were the working group that met with MAFF. Ralph Iwamoto (APHIS - International Services Director for Japan) and Mark Prescott, Deputy Director IS, Japan) also attended the meetings.

They really pushed what is called the Captains Oath which simply is a form signed by the Captain that indicates his or her crew successfully completed the inspection and the ship is pest free. As you can imagine we have problems with this method and we were pushing for third party inspections conducted by a company that would contract this work with the shipping lines since MAFF apparently does not have the authority to do ship inspections. After much discussion I think they have a company in mind but have not approached them yet regarding a contract or an implementation date. Ralph and Mark met with MAFF yesterday to push them a little to get this done.

APHIS has provided Japan with the training materials necessary to teach individuals on the methods and techniques used to inspect ships for AGM egg life stages. We have also invited port officers from Japan and representatives of whichever company they select to do the inspections to visit us in the U.S. to work with our inspectors for hands-on training.

As of this date, they have until March 15th, 2007 when we will fully implement an inspection program in the U.S. for ships transiting from Japanese ports that we consider high risk. Our procedures will be costly to the shipping industry since our inspectors will do instream boarding to inspect ships before they are allowed to berth. So, the pressure is on Japan to implement an inspection process while the ships are in their ports which will be much less expensive for the shipping companies.

Regarding Japan's insistence that they have been unfairly treated regarding an AGM monitoring and inspection program compared to China and Korea - we are in Japan because 3 infested ships from Japan were intercepted in the port of Vancouver, Canada. Neither us nor the Canadians have found AGM egg masses on ships arriving from China or Korea as of this date. However, we have met with the North American Plant Protection Organization and they have informed Korea and China that a port monitoring program should be implemented in both countries as well. APHIS International Services has met with officials in both countries to begin discussions for port monitoring. Vic Mastro has also sent one of his research entomologists to China to meet with their plant quarantine folks to identify potential ports for monitoring. So, in response to Japan's concerns we have initiated steps to begin the monitoring program in both countries.

We currently monitor 19 ports in Japan based on AGM history in or near the port areas and the amount of ship traffic coming from these ports to N. America. Of the 19, eight were considered high risk in 2006 based on 2005 AGM trap data. This number could change once we receive the port monitoring data for 2006. I'm attaching the table Vic and I put together for 2006 below.

Table 1. Japan 2006 AGM Program

Japan Port	*GM Density	**Ship Traffic*	Period of Risk
Ooita	High	High	*May 15 – August 15*
Kokura	Low	Medium	May 15 – August 15
Nagahama	Medium	Low	May 15 – August 15
Ube	Low	Medium	May 15 – August 15
Matsunaga	Low	Low	May 15 – August 15
Hiroshima	High	High	May 15 – August 15
Kishiwada	High	Low	May 15 – August 15
Shimizu	Medium	High	May 15 – August 15
Tsuruga	Low	*Medium*	June 15-September 15
Kanazawa	Low	Medium	June 15-September.15
Fushiki	Low	Low	June 15-September 15
Toyamashinko	Low	Low	June 15-September 15
Chiba	*Medium*	High	June 15-September 15
Sakata	Medium	High	June 15-September.15
Hachinohe	High	High	July 15-October 15
Aomari	Medium	Medium	July 15-October 15
Hakodate	High	*Medium*	July 15-October 15
Tomakomai	*Medium*	High	July 15-October 15
Otaru	Medium	Medium	July 15-October 15

* GM Density – L-M-H, based on male moth catches throughout the flight period.
* Ship Traffic – L-M-H, based on ships visiting ports during period of risk.

Table 2. Japanese High Risk AGM Ports

Japan Ports	Period of Risk
Ooita	May 15 – August 15
Hiroshima	May 15 – August 15
Shimizu	May 15 – August 15
Chiba	June 15 – September 15
Sakata	June 15 – September 15
Hachinohe	July 15 – October 15
Hakodate	July 15 – October 15
Tomakomai	July 15 – October 15

Table 3. Japan Medium Risk AGM Ports

Japan Ports	Period of Risk
Aomari	July 15 – October 15
Otaru	July 15 – October 15

4. Malcosoma Defoliation and Effects on Chokecherry fruit production along Carpenter Creek – Crow Creek Souix Reservation in South Dakota – *from Forest Health Site Report prepared by R2 Forest Health Specialists*

During the site visit, Tony and Merle reported a near total absence of fruit production by chokecherry bushes in 2005. They said this lack of chokecherries hindered traditional subsistence food gathering and production, as well as limited traditional food preparation for ceremonial purposes. This is important because it is common among the Tribal Nations in the Great Plains to combine dried meat and dried fruit into a product that has a long shelf life and is important in preserving food without refrigeration. One example of this is dried buffalo meat combined with dried chokecherry, known in the Lakota language as "wasna". There are other uses for chokecherries as food such as chokecherry pudding and jelly. Concern over this lack of fruit caused us to visit stands of chokecherry bushes along Carpenter Creek.

While examining the chokecherry bushes along Carpenter Creek, characteristic egg masses of tent-forming caterpillars, *Malacosoma* sp., were easily located around almost every branch tip on every chokecherry bush. The egg is the life stage in which *Malacosoma* sp. spend the winter. The density of tent-forming caterpillars must have been very high in 2005, as evidenced by their abundant abandoned tents that we easily located. This would explain both the severe defoliation that reportedly occurred in the spring and the extreme number of egg masses located during the site visit. The defoliation combined with a significant drought is coincident with the lack of fruit production. It is highly likely that this situation was repeated across the Reservation.

Follow-up phone conversations in April and August, 2006, with BIA - Natural Resources staff reported widespread, heavy defoliation by tent caterpillars again, ongoing drought despite some spring rains, and yet another year of no chokecherry fruit. This means that there has been no appreciable crop of chokecherry fruit for at least the past 4 years and for as many as the past 6 years. This long period without fruit was also a time of significant, persistent drought and annual chokecherry defoliation by tent caterpillars. A common response among plants to moisture stress or defoliation is to produce few or no seeds, allocating what energy they have to maintenance and

growth. It is therefore likely that the drought and/or defoliation contributed directly to this lack of chokecherry fruit production.

Because this problem is so pervasive across a large area and because the Crow Creek Sioux Reservation has few funds available for forest pest management, direct control of tent caterpillars using pesticide seems both impractical and highly unlikely. Removal and/or destruction of egg masses during the Fall and Winter might cause more harm than help, given the high density of egg masses and the fact that many, many chokecherry branch tips would be removed or injured by vigilant application of this treatment. Mechanical destruction of tents early in the spring in localized chokecherry areas is the best recommendation for control, as the tent caterpillar colonies often fail to survive it. A stiff brush is an excellent tool to accomplish this. Destroying tents would have local impact. The pervasive nature of the problem and the large effort required to tear up most of the tents offers little hope for area-wide control. The end of the drought combined with the expected increase in tent caterpillar natural enemies will most likely herald the return of a decent chokecherry crop.

5. Web-based Defoliator Database – *Beth Willhite, FHP R6*
Beth contacted Marla regarding the web-based database for defoliator literature. Marla suggested that we have a similar database to the Bark Beetle database, and one suggestion was to look at expanding that database to include all forest insects. We would need to determine what categories we would need on the website.

Beth proposed to hold a workshop regarding the database at the WFIWC in Boise.

Considerations for the database are:
-marketing
-commitment by users to enter info into the database
-it is time consuming to enter info
-other databases already exist (innotes already has 800 entries)
-older literature and gray literature is primarily what would need to be entered

Conclusions –
-Most were in favor of a bigger website
- Need to find out what would be the cost of getting a translator to convert innotes to the website
- A subcommittee will work out some of the details and report back (Beth, Bev and Darren)

6. Management of Western Spruce Budworm – *Nancy Sturdevant, R1 FHP*
What is new or different since the last western spruce budworm outbreak?

Mortality estimates
-WSBW has been chronic on the Carson and Santa Fe for years. Get topkill with some local exceptions. Does set trees up for bark beetles in some cases.
-In R1, plan to look at areas with heavy defoliation and try to correlate with DFB. Defoliation can have long term effects – it appears there is an association with budworm and Armillaria, where Armillaria is increasing in areas stressed by defoliation. Fir engraver is coming in later.
- In the Blue Mountains (OR), there were some patches of 80% mortality on about 15% of the total outbreak area.

Thinning in budworm stands
-Eastern spruce budworm – trees refoliated better if the stand was thinned.

- What may be important is how much more foliage the tree has in the end, rather that than defoliation in the current year.
- Bruce – thinned vs. unthinned plots – difference is not real obvious.
- we need an update of management strategies.

Douglas-fir Tussock Moth – *summary of I.Otvos' recent work*
Imre tested field collected dead larvae from the west and east slopes of the Sandia Mtns, in NM. There was some speculation that the virus in the Westside populations at least, may be a carryover from the 1970's treatment with TM-Biocontrol-1 in the late '70's in the next canyon over from the current infestation. He isolated a single embedded virus (OpSNPV). It is a naturally occurring strain and is not from TM-Biocontrol-1 which is a multicapsid virus (OpMNPV).

He also reared field collected egg masses from NM to determine parasitism and incidence of virus. Larval hatch was less than normal from both the East (72%) and West (48%) – normal larval hatch would be around 80%. Incidence of naturally occurring virus was low in both cases. Egg parasitism was relatively high especially in the West side locations (29% overall – 21% *Telenomus* sp and 8.5% *Tetrasticus*), and 20% overall (18% *Telenomus* and 1.0+% *Tetrasticus*) for the East side of the Sandias.

Susceptability of the DFTM population from NM (based on laboratory bioassay) and comparing it with susceptibility of DFTM larvae from other locations. DFTM from NM are similar in sensitivity to those from Idaho and California and are more sensitive than DFTM populations from BC.

Lot 5 was used in the test. There was no detectable loss in potency of the TM-Biocontrol-1 than reported from the bioassay conducted 6 years earlier – when the virus was stored at -20 degrees Centigrade. The recommendation is that in the future any newly produced lots of TM-Biocontrol -1 be stored at -20 degrees C.

Recent (and Soon to be) Publications

Azuma/Overhulser – impact of budworm on state and private lands in Oregon during the 1980's outbreak. Accepted in the Western Journal of Applied Forestry (possibly Oct 2007 or later).

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

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
Albuquerque, NM
October 17-18, 2006

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