



Arizona Forest Health Program (AZFH) Federal FY 2004 Report

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Note: The topics covered in this report are based upon the cooperative agreement between USDA-FS Region 3 Forest Health and the University of Arizona School of Natural Resources to conduct the "Forest Health Protection and Education in the State of Arizona", dated January 25, 2002. Forest Service Cooperative Agreement # 02-CA-11031600-023.

I. Surveys

a. Aerial

In FY04 University of Arizona coordinated with Forest Service R3FHP to divide the state so that UAFH and FHP would not have to fly areas twice. UA was given the northwest section of Arizona to aerial sketch-map (approx. 1,059,804 acres).

UAFH contracted with Arizona Game and Fish Department aviation division to supply aircraft and pilot to conduct the missions. Five flights were taken from September 7 to 16. The computerized digital sketch mapping system that was configured by USDA-FS Forest Health Technology Enterprise Team was deployed. The system is comprised of a lap top computer with Microsoft Windows, Geolink v6.2.10.9, ArcView GIS v3.2a; digital touch screen; and power converter. The system worked exceptionally well. The post processing of the information was conducted by UAFH with assistance from Kelly Barton, USFS-R3 FHP.

In general UA flew: the Hualapai Mountains south of Kingman; the Hualapai Reservation including the Music Mountains, and the Aubrey Cliffs region south of the Grand Canyon; forested areas north of the Grand Canyon surrounding Mt. Dellenbaugh and Mt. Trumbull; and the Tusayan Ranger District Kaibab National Forest and the Grand Canyon National Park north of Hwy 180 and south of the Grand Canyon. These maps have been incorporated with the maps created by USFS-R3 FHP and will be subsequently published by FHP. (See appendix A for 2004 table of forest insect incidence.)

Attended USFS Region 3 Digital Sketch Mapping Training Course in Albuquerque, NM on March 30-31.

b. Ground

Ground surveys were conducted via the placement of bark beetle pheromone traps in various areas of the state. Traps were installed in mid-April and were checked weekly until early-November. (See appendix B for figures of trap counts, lures used, narrative, and cooperators.)

Pheromone traps were put out in the following locations:

Flagstaff: seven traps

Show Low: six traps

Payson: six traps

Hualapai Mtns.: two traps

In addition to these 21 traps UAFH had 90 pheromone baited traps placed at various elevations within the Tonto, Coconino and So. Kaibab National Forests. These traps were baited for 4 species of *Ips* and *Dentroctonus* species of bark beetles.

c. Forest Health Conditions Report

In general 2004 had significantly lower incidence of pine bark beetles. With piñon ips data excluded, the aerial survey of 2004 found nearly a ten fold decrease in the number of acres affected by pine bark beetles. Whereas in the higher elevation conifers (Douglas-fir, spruce, and true fir) the decrease from 2003 to 2004 was only about 50%, and the acres of Douglas-fir affected actually increased slightly. The number of requests for information on bark beetles from non-federal municipalities and private land managers dropped significantly in 2004 from 2002-03 levels.

Bark Beetles

Reports of pine bark beetle (*Ips* and *Dentroctonus* spp.) caused mortality on private properties came from Coconino, Yavapai, Mohave, Gila, Navajo and Apache counties. This problem was still wide spread throughout the ponderosa pine forests of Arizona.

Cypress bark beetle (*Phloeosinus*) caused mortality in Arizona cypress was reported in Cochise, Coconino, and Gila counties. In many of these areas the mortality level was severe. Since much of the Arizona cypress occurs in the drainages there could be a significant impact on the riparian ecosystem due to this event. This was the first year that we have had widespread reports of mortality in shaggy bark juniper. This mortality is linked to *Phloeosinus* bark beetle attacks as well as severe drought conditions.

Banded Elm Bark Beetle (*Scolytus schevyrewi*) was found in the fall of 2004 feeding in elm trees in Prescott, AZ. This is believed to be the first positive identification of this exotic (native to Asia) insect in Arizona south of the Grand Canyon. It was first discovered in the United States in April of 2003.

Aspen diseases and insects

Aspen die-back continues to be common place in natural stands. Frost events in 1999, severe to extreme drought in the late 1990's and early 2000's, coupled with intense elk browsing on new sprouts has led to many clones failing. It appears to be most prevalent at elevations between 7,500 and 8,500 feet.

Cryptosphaeria canker was commonly reported in the Flagstaff area on aspen in urban landscapes. This highly infectious disease kills aspen. *Hypoxylon* and *Encoelia* cankers though common in native stands were not reported in urban landscapes.

Foliar diseases on aspen were common.

American hornet moth (*Sesia tibialis*), although not a problem in native stands, continues to kill most age classes of aspen in urban landscapes. Larval feeding in the root crown destroys the vascular tissue and stability of the tree. This insect is responsible for trees being wind-thrown any time of the year.

Oystershell scale (*Lepidosaphes ulmi*) is found commonly in urban landscapes throughout northern Arizona on aspen. It feeds upon the phloem of mature trees and if left unchecked kills mature trees.

Other

Juniper rust (*Gymnosporangium*) was found on native juniper trees in Gila County. Samples of this disease were identified at the University of Arizona Plant Pathology Clinic in Tucson, AZ.

Yellow-shafted flicker (sapsucker) damage was very common on many tree species throughout northern Arizona.

Tent caterpillars (*Malacosoma* spp.) were found throughout northern Arizona feeding upon deciduous trees in urban landscapes.

Porcupine, elk and deer caused excessive damage to young landscape trees of many species throughout the region.

d. National Forest Health Monitoring Management Team

The UAFH Specialist served as a state representative on the National Forest Health Monitoring Management Team I met with the committee in Washington D.C. and San Antonio to discuss and make recommendations about the national forest health monitoring program.

The UAFH Specialist served on the 2003 Forest Health Monitoring Annual Conference committee. Duties included: Coordinating financial logistics with the University of Arizona, US Forest Service and the Hilton Hotel; co-chaired the plenary panel discussion; and co-chaired the field trip committee.

Served on the intermountain west *Evaluation Monitoring* grant selection committee.

II. Educational Outreach

a. Publications/media

DeGomez, T.E. 2004. Beyond the Ponderosa: Successful Landscape Trees for Higher Elevations in the Southwest, 2nd Edition. J. D. Bailey (Ed.). Flagstaff Community Tree Board, Flagstaff, Arizona. 40 color plates, 108 pp. (5,000 copies printed)

FH Website - The UA Forest Health Web Site has had numerous updates in 2004 including: quarterly news releases, pest photos, links to other FH web sites, technical information on spraying for bark beetle prevention, 2001 to 2003 aerial survey maps and tables showing bark beetle damage in Arizona, and workshop announcements.

Quarterly News Releases - News releases were distributed to the media and other interested parties updating the state of the bark beetle outbreak in Arizona on a quarterly basis.

Media Advisory Group - The Arizona Bark Beetle Task Force was organized with members from University of Arizona, Northern Arizona University, USFS, Arizona State Land Department, and Arizona Public Service. This group was designed to insure that a consistent message was being presented on the state of the bark beetle outbreak in Arizona. This group meets quarterly.

Thirty interviews with media outlets (newspapers, T.V., radio) - These included but not limited to: the New York Times, the Philadelphia Inquirer, the Arizona Republic, the High Country News, Arizona Highways, university news services, state wide television, National Public Radio and regional radio stations.

b. Training and Workshops

County Supported Workshops

- Oct. 2, 03 - Bark beetle presentation, Coconino County.
- Oct. 20, 03 - Bark beetle presentation, Ecological Restoration Institute.
- Oct. 27, 03 - Bark beetle presentation, Coconino Community College.
- Oct. 29, 03 - Forest health presentation, Master Naturalist Training Session.
- Dec. 5, 03 - Forest health presentation, Show Low.
- Feb. 5, 04 - Forest health presentation, Flagstaff
- Feb. 26, 04 - Urban Tree Health, Building with Trees Workshop, Flagstaff.
- Mar. 2, 04 - Forest Health, Arboretum at Flagstaff Docent Training.
- Mar. 9, 04 - Certified arborist training session, Show Low.
- Mar. 10, 04 - Bark beetle presentation, Coconino Community College.
- Mar. 11, 04 - Bark beetle presentation, Coconino Community College.
- Mar. 24, 04 - Insect biology basics, Master Gardener Training Session.
- Mar. 26, 04 - Bark beetle field trip, Mexican Foresters Exchange
- Mar. 27, 04 - Trees and construction damage, Keep Sedona Beautiful.
- Apr. 13, 04 - Fire, Weeds & Bark Beetles, Summit Fire District Seminar.
- Apr. 28, 04 - Fire, Weeds & Bark Beetles, Summit Fire District Seminar.
- May 5, 04 - Urban forests, Master Gardener Training Session..

May 29, 04 - Forest Health Seminar, Pinetop-LakeSide.
June 28, 04 - Bark beetle presentation, Coconino Youth Crew.
July 9, 04 - Bark beetle presentation, Coconino Youth Crew.
July 16, 04 - Bark beetle presentation, Coconino Youth Crew.
July 21, 04 - Tree health basics, EnvironThon team training.
Aug. 28, 04 - Forest health field trip, Arboretum at Flagstaff.

Statewide or Out-of-State Workshops

Nov. 12, 03 - Bark beetle presentation, College of Ag. & Life Sciences.
Nov. 17, 03 - Single tree protection research report, Bark Beetle Working Group, Durango, CO
Nov. 13, 03 - Bark beetle presentation, Southwest Vegetation Management Association Annual Meeting.
Feb. 6 - National Forest Inventory Analysis Conference Field Trip, Prescott.
Mar. 10, 04 - Drought & Forest Health, Governor's Drought Task Force.
June 11, 04 - Forest health talk, AZ Community Tree Council Annual Conf.
June 14, 04 - Forest health talk, Senator Kyl's Staff with ERI
Sept. 1, 04 - Forest health, Annual UA Extension Conf.

Major Training Sessions

Feb. 9-12, 2004 - Forest Health Monitoring Conference, Sedona AZ.

Planning Committees for:

2005 Forest Health Monitoring Conference, Miami, FL.

2005 Climate Variability & Ecosystem Impacts in Southwest Forests & Woodlands, Sedona, AZ.

III. Technical Assistance to Non-federal Municipalities and Private

Over 140 requests for technical assistance from private and municipal land managers were responded to. County Extension offices also responded to requests for technical assistance (see county reports page 27).

IV. County Visits

Visits to the counties within Arizona were made on 20 different occasions to consult with local forest managers on forest health. (This does not include trips to counties for county supported workshops.)

V. Administration of Funds for Suppression and Prevention (see appendix C for detailed information on grant accounting)

a. Forest Health Restoration Grants

The UAFH provided administrative support for the Forest Health Restoration Grants program. This includes preparing the RFP for the FY04 projects, finalizing the submitted proposals for submission to USFS-R3 FPH Region III, administering the funds, and following up with the granted offices to monitor progress on the projects. UAFH prepared the RFP for the FY05 project proposals.

FY 03 Projects - Ten Forest Health Restoration Grants were applied for through USFS R3 Forest Health Protection funds. Two of these grants were funded and administered by UAFH for a total of \$161,000. The City of Flagstaff (\$61,250) has treated 185 of the proposed 350 acres of high risk/susceptible property within Flagstaff with selective thinning, sanitation cutting, brush disposal, and prescribed fire. Coconino County (\$99,750) through the Rural Environmental Corps has treated 143 acres of the proposed 180 acres using the same treatment methods as the city. In addition to treating the 143 acres 220 cords of firewood from the treatment area was delivered to the Navajo Indian Reservation by Coconino County free of charge.

FY 04 Projects - Five Forest Health Restoration Grants were applied for through USFS R3 Forest Health Protection funds. Three of these grants were funded for a total of \$1,000,000. These grants are being administered through the University of Arizona Forest Health Program and implemented by the City of Show Low \$350,000, City of Pinetop-Lakeside \$400,000 and Navajo County \$250,000. Cooperative agreements between UA, the City of Show Low, City of Pinetop Lakeside and Coconino County have been completed. Work has begun on the Show Low project with 10.75 acres treated. Work on the other two projects will begin in fall/winter of 2004-05.

b. Invasive Plants Management

University of Arizona Forest Health Program

The UAFH provided administrative support for the invasive plants program. This includes preparing the RFP for the FY03 & 04 projects, selecting and awarding the grants, administering the funds, and following up with the granted offices to monitor progress on the projects.

Cochise County Cooperative Extension

No UAFH Grants in FY04.

- a. A noxious weeds workshop was held at Ag Day in Willcox. Eight of the participants received CEU's from the Arizona Department of Agriculture for attending the workshop. Presentations were from county and campus faculty, ADOT, and a private weed consultant.
- b. Noxious weed presentations were given to the San Pedro NRCD, Willcox-San Simon NRCD, the Gila Watershed Partnership, and Cochise County Master Gardener Association.
- c. Monitoring transects were established on Frye Mesa (state land) to track sweet resinbush infestations. In March, the area was treated with herbicide to control the heaviest portion of the infestation. An article was written for the Southwest Vegetation Management Association newsletter.
- d. Poster presentations describing the mini-workshops for county and state road maintenance crews were given at the Society for Range Management meeting in Salt Lake City, Utah and the Association of Natural Resource Professionals in Wheeling, West Virginia.

Coconino County Cooperative Extension

FY03 UAFH Grant (\$10,000). Expended \$9,306 in FY04. Numerous weed pulls and educational sessions have reached 706 students, parents and teachers from various schools in Coconino County, with 90 acres treated with pulling and bagging noxious weeds, such as: Diffuse Knapweed (*Centaurea diffusa*) and Dalmation Toadflax (*Linaria genistifolia*).

FY04 UAFH Grant (\$10,000). Expended \$150 in FY04. No report of accomplishments.

Additional details on their invasive plant program is found in the "Individual County Reports" beginning on page 27.

Gila County Cooperative Extension

FY03 UAFH Grant (\$9,000). Expended \$4,465 in FY03-04.

- a. Facilitated a *GIS/GPS* for Invasive Species Management workshop series for 39 participants. The three workshops led participants from basic *GPS* functions to importing field collected data files from the *GPS/iPAQ* system into a *GIS* for graphic map display. Workshops were held in Gila County on December 11, 2003, January 8, 2004 and February 5, 2004.
- b. Mapped approximately 20 miles of Saharan mustard along Hwy 88 from Globe to Roosevelt Lake using the *GPS/iPAQ* system. These data were shared with the USFS Tonto Basin RD.
- c. Assisted Coconino County in their setup of *GPS/iPAQ* equipment and software on August, 28, 2004.
- d. Presented an hour lecture of Mapping and Monitoring and Control Methods to 50 people during the White Mountain Noxious/Invasive Weed Short Course, September 23, 2004.
- e. Facilitated a functional *GIS/GPS* workshop for Tonto Weed Management Area, October 12, 2004 to begin mapping weeds in Young.
- f. Beginning to coordinate data collection formats, "pick-lists," in the mapping software to coincide with Forest Service, Gila County, University and Tonto Weed Management (TWMA) formats for ease of data sharing.

Mohave County Noxious Weed Project

FY 03 UAFH Grant (\$7,929). Expended \$7,929 in FY04. This project started in mid-September, 2003 thus most of what was accomplished was in FY04. They surveyed 5,000 acres for noxious weeds in the Hualapai Mountains of Mohave County. Twelve noxious and invasive species were found within the Mojave County Hualapai Park. An additional 5 species were found outside the park boundaries. This grant was for an invasive plant survey. AZFH will encourage Mojave County to apply for funds to start control activities on these properties.

Arboretum at Flagstaff

FY04 UAFH Grant (\$7955). Expended \$2422 in FY04. In FY04 they have treated 51 acres of the 131 proposed.

This private property is bounded on the north side at the tree line by U.S. Forest Service land and on the south side by The NAU Centennial Forest. The *Linaria dalmatica* (Dalmations toadflax) population was the basic focus of the weed pulls at the Arboretum. This was determined by a GPS mapping project that Arboretum Research Assistant, Sheila Murray conducted. Small populations of *Bromus tectorum* (cheat grass) and *Convolvulus arvensis* (bindweed) have also been identified. They determined to implement weed pulls with volunteers to control the toadflax and to use herbicide on the bindweed. No knapweed was currently found on this area of the property. No musk, bull or Scotch thistle were found but the smooth stemmed native *Cirsium neomexicanum* (Arizona thistle) was present but harmless. They pulled toadflax on 51 acres during the FY04 period. They will be treating the remaining acres during FY05.

Flagstaff Ranch

FY04 UAFH Grant (\$4020) - \$2961 expended in FY04.

This private property is bounded on the three sides by U.S. Forest Service land. This newly developed golf course and housing development had large areas of disturbed soil that was susceptible to invasive plant species. They expended 660 hours controlling invasions on 15 acres within the property boundaries. They have implemented control methods in compliance with rules outlined by Audubon International's "Signature Cooperative Sanctuary Program" that they are a member of. They plan to continue treatment in FY05.

Pima County

FY04 UAFH Grant (\$10,000). \$5,561 expended in FY04. This project was primarily designed to prevent the invasion of noxious plants into the Village of Summerhaven in the aftermath of the 2003 84,000 acre Aspen Fire. Thirty acres were seeded in FY04 with native seeds. An additional 25-50 acres will be treated in FY05.

VI. Youth Education

A \$41,000 grant was secured from Coconino County Title III funds to conduct after-schools forestry youth programs. An additional \$40,000 grant was awarded from Coconino County Title III funds to continue this program on through FY 2005.

Two comprehensive programs were offered in FY 2004:

a. After-Schools Forestry Program

Ten high school students joined the Forestry Club at Coconino High School. The club met from February to June. At their weekly meetings they received instruction on the following topics:

- a. Intro to Forestry
- b. Hydrology and Fisheries
- c. Fire Science
- d. Wildlife Biology
- e. Timber Management
- f. Weeds and Forages

This program represents the efforts of Tom DeGomez, Principal Investigator and Jillian Worrmsam, Program Coordinator.

b. Junior Forester Academy

In the summer of 2004, the NAU Centennial Forest initiated the very first program run on the NAU Centennial Forest. UAFH is a partner in this program providing \$15,000 in funding and serving on the planning committee for the program.

The Academy employed NAU students as counselors and mentors for participants. Curriculum was developed jointly by foresters (including senior faculty at NAU's prestigious School of Forestry), environmental educators, public school teachers, and students in various programs on the NAU campus.

The themes of the academy include forest health, land management, restoration, wildfire risk and prevention, sustainable wood harvesting,

wildlife, land stewardship, Native American history, ecological sustainability, and community service. Campers learn important lessons through an integrated, hands-on curriculum that allows kids to explore, discover and learn about the environment while also reinforcing their math, reading, writing, and language skills.

Summer of 2004, 43 junior high and high school students from all over Arizona, and a few from outside the state participated. One group that served as our first overnight "experiment" was the Youth Conservation Corps out of Fredonia, Arizona. Our Academy was the educational component for their program so that the corps members start off with a strong foundation in land ethics and management before they begin their important conservation work for the summer.

VII. Additional Funding Applications

a. Research

The following section represents the efforts many individuals on the AZFH Research Team, they are:

Tom DeGomez - Principal Investigator
Chris Hayes - Research Specialist
Andrew Miller - Research Technician
Steve McKelvey - Research Technician
Mark Trenam - Research Technician
Beverly Loomis - Program Coordinator
Vernon Bunker - Student Technician
Amanda Garcia - Student Technician
Seth Thomas - Student Technician
Grace Hancock - Student Technician
Victoria Henderson - Student Technician
Andrew Sommerville - Student Technician
Michele Shaffer - Student Technician
Paul Bosu - Student Technician
Leon Kie - Student Technician
Kate Murray - Student Technician

Research Grants -

1. Single Tree Protection of Ponderosa Pine and Piñon Pine - \$43,000 grant from USFS-RMRS
2. Single Tree Protection of Arizona Cypress and Juniper - \$38,700 grant from USFS-RMRS
3. Growth Loss of White Fir by Spruce Budworm - \$12,166 from USFS-RMRS
4. Bark Beetle Trapping Along an Elevation Gradient - \$86,000 from USFS-RMRS
5. Significance of Bark Beetle Trapping - \$58,340 from USFS-RMRS
6. Influence of Slash Size on Bark Beetle Success - \$24,992 from AZ Dept. of emergency and Military Affairs

Research Reports -

1) TITLE: Insecticides for the prevention and remedial control of *Ips* attack of ponderosa pine in the Southwestern US (Single Tree Protection of Ponderosa Pine)

A. PURPOSE:

1. The purpose of this project is to determine the efficacy of five insecticides in the control of *Ips* spp. pine bark beetles that attack ponderosa pine in Arizona and New Mexico. This agreement funds phase 1, a first round of data collection and plot installation. Tree mortality data will be collected and this data will be related to the effectiveness of the tested insecticides. Study sites are located within an hour of Flagstaff, AZ. In 2003 three topically-applied insecticides (bifenthrin [Biflex] <three levels> , carbaryl [Sevin SL], and Permethrin plus C), two injected systemic insecticides (dinotefuran and orthene [Acecaps]), and an untreated control treatment were be evaluated in field trials.
2. Due to a lack of attacks on the control trees in 2003 this study was modified in 2004. In 2004 a selected number of trees treated in 2003 were felled and evaluated in the field for bark beetle attacks. This will provide a 12+ month efficacy test on the above insecticides tested.
3. In 2004 three topically-applied insecticides (bifenthrin [Onyx] <two levels> , carbaryl [Sevin SL], and Permethrin plus C), and an untreated control treatment were be evaluated in field trials. Trees were sprayed, felled, and bucked into 120 cm bolts and evaluated in the field for bark beetle attacks.

B. MATERIALS and METHODS (2003)

1. **Marking of the study trees, application of the insecticidal treatments and the attractant pheromones** - On April 28, 30 and May 1, 2003 224 trees (eight treatments x 28 reps) were identified and marked along the road system within the Northern Arizona University Centennial Forest. On May 5 workers from Creative Sales Inc. injected the dinotefuran and the orthene into the base of the trees. From May 13 to May 19 the three levels of bifenthrin, carbaryl and Permethrin plus C were applied to bark surfaces greater than 4 inches in diameter. On May 28 the Lanierone and Ispdienol (+.03/- .97) pheromone bubble caps were stapled to the trees injected with dinotefuran and orthene. On July 2 the same pheromones were applied to the three levels of bifenthrin, carbaryl, and Permethrin plus C. Pheromones were replaced as needed mid summer.
2. **Monitoring** - Starting on May 5 for the injected insecticides and July 10 for the sprayed insecticides the trees were checked weekly for signs of bark beetle attack and death.

B-2. MATERIALS and METHODS (2004)

3. **Felling of the 2003 study trees, and converting the trees into slash-** From May 13 to May 20 a sufficient number of trees from each treatment to produce 25 120 cm logs were selected and subsequently felled and bucked. The ends of the logs were painted with "Tree Seal" brand pruning paint to reduce desiccation. Logs were transported to 25 arrays of eight 120 cm logs (one of each treatment) at 100 m intervals on existing roads at study site.
4. **Marking of the 2004 study trees, application of the insecticidal treatments and converting the trees into slash-** On May 3, 2003 125 trees (five treatments x 25 reps) were identified and marked at 100 m intervals along the road system within the Northern Arizona University Centennial Forest. From May 4 to May 7 the two levels of bifenthrin, carbaryl and Permethrin plus C were applied to bark surfaces of logs greater than 4 inches in diameter. The two injected systemic insecticides (dinotefuran and orthene) were not used due to felling of the trees rendering the injections incapable of translocating in the tree. From May 24 to May 27 each of the 125 trees were felled and bucked into three 120 cm lengths. The ends of the logs were painted with "Tree Seal" brand pruning paint to reduce desiccation. One of the three logs was left exposed to bark beetles whereas the remaining two logs were bagged in mosquito netting to prevent bark

beetle attack. One of the two bagged logs was exposed 6 weeks later with the remaining log exposed 12 weeks later.

5. **Monitoring** - Starting on June 2 the logs were checked bi-weekly for signs of bark beetle attack.

C. RESULTS (2003)

1. As of October 2, 2003 nine trees had signs of bark beetle attack and 2 of those trees have died. The following table summarizes these findings

Treatment	Number of Trees Attacked	Number of Dead Trees
Biflex Low	3	0
Biflex Medium	1	1
Biflex High	0	0
Carbaryl	0	0
Permethrin	0	0
Orthene	3	1
Dinotefuran	0	0
Control	2	0

C-2. RESULTS (2004)

2. The logs from the 2003 trees were exposed to attacks by bark beetles from May 13-20 to June 21, 2004 at which time the logs were bagged in mosquito netting to prevent additional attacks. The results of the attacks are as follows

TREATMENT	n	# logs attacked	% logs attacked	Total Attacks	Attacks /log	SE
Control	25	20	80	397	15.9	5.82
Acecap	25	18	72	268	10.7	2.99
Dinotefuran	25	16	64	247	9.9	3.76
Biflex 0.03%	25	18	72	217	8.7	3.12
Biflex 0.06%	25	11	44	85	3.4	2.31
Biflex 0.12%	25	9	36	33	1.3	0.56
Permethrin 0.19%	25	9	36	102	4.1	1.71
Sevin	25	10	40	172	7.5	2.99

3. The first cohort of logs from the trees sprayed 2004 were exposed to attacks by bark beetles from May 24-27 to July 28 at which time the logs were bagged in mosquito netting to prevent additional attacks. The results of the attacks are as follows

TREATMENT	n	# logs attacked	% logs attacked	Total Attacks	Attacks /log	SE
Control	25	13	56	89	3.6	1.29
Biflex 0.03%	25	3	12	6	0.2	0.14
Biflex 0.06%	25	2	8	3	0.1	0.09
Permethrin 0.19%	24	0	0	0	0.0	0.00
Sevin 1.0%	25	0	0	0	0.0	0.00

4. The second cohort of logs from the trees sprayed 2004 were exposed to attacks by bark beetles from July 9 to August 17 at which time the logs were bagged in mosquito netting to prevent additional attacks. The results of the attacks are as follows

TREATMENT	n	# logs attacked	% logs attacked	Total Attacks	Attacks /log	SE
Control	24	19	79	316	13.2	3.97
Biflex 0.03%	24	13	54	37	1.5	0.56
Biflex 0.06%	25	9	36	36	1.4	0.48
Permethrin 0.19%	24	8	33	38	1.6	0.86
Sevin 1.0%	25	4	12	4	0.2	0.09

D. DISCUSSION

1. The logs that were treated in 2003 had to be felled and loaded into the bed of a pickup truck and then unloaded at one of 25 sites on the Northern Arizona University Centennial Forest. We are confident that a percent of bark was lost from the logs when moved and during transport this may have effected the level of attacks on the treated logs. With this in mind we feel that the performance of the Biflex 0.06%, Biflex 0.12%, Permethrin Plus C and the Sevin was fairly high. When the Biflex 0.06%, Biflex 0.12%, Permethrin Plus C are compared to the Sevin it appears as though they have performed equal.

2) TITLE: Insecticides for the prevention and remedial control of *Ips* attack of piñon pine in the Southwestern US (Single Tree Protection of Piñon Pine)

A.. PURPOSE:

1. The purpose of this project is to determine the efficacy of three insecticides in the control of *Ips* spp. pine bark beetles that attack piñon pine in Arizona and New Mexico. Tree mortality data will be collected and this data will be related to the effectiveness of the tested insecticides. Study sites are located within an hour of Flagstaff, AZ. Three topically-applied insecticides (bifenthrin [Biflex] <two levels> , carbaryl [Sevin SL], and Permethrin plus C), and an untreated control treatment will be evaluated in field trials. (Note: We intended to test two levels of Biflex but were unable to find a sufficient number of trees in the study area to include them.)

B. MATERIALS and METHODS

1. **Marking of the study trees, application of the insecticidal treatments and the attractant pheromones** - From March 30 to April 6, 72 trees (three treatments x 24 reps) were identified and marked along the road system within the Northern Arizona University Centennial Forest Turkey Hills site. From April 13-15 carbaryl and Permethrin plus C were applied to bark surfaces greater than 4 inches in diameter. On April 19 the Ipsdienol (+.50/-.50), Cis-Verbenol (+.17/-.83), and Ipsenol (+.50/-.50), pheromone bubble caps were stapled to all of the trees. Pheromones were replaced on June 9, July 26, and September 20.
2. **Monitoring** - Starting on April 30 the trees were checked bi-weekly for signs of bark beetle attack and death.

C. RESULTS

1. As of September 20, eleven of the control trees had signs of bark beetle attack and 4 of those trees have died. The following table summarizes these findings:

Treatment	n	Number of Trees Attacked	Number of Dead Trees
Carbaryl 1.0%	24	2	0
Permethrin 0.19%	24	3	0
Control	24	11	4

3) TITLE: Insecticides for the prevention and remedial control of *Phloeosinus* attack of juniper and Arizona cypress in the Southwestern US

A. PURPOSE:

1. The purpose of this agreement is to determine the efficacy of three insecticides in the control of *Phloeosinus* spp. juniper and Arizona cypress bark beetles that attack juniper and cypress in Arizona and New Mexico. Bolt attack data will be collected and this data will be related to the effectiveness of the tested insecticides. Study sites are located within an hour and a half of Flagstaff, AZ. Three topically-applied insecticides

- (bifenthrin [Biflex] <two levels> , carbaryl [Sevin SL], and Permethrin plus C), and an untreated control treatment will be evaluated in field trials.
2. Three topically-applied insecticides (bifenthrin [Onyx] <two levels>, carbaryl [Sevin SL], and Permethrin plus C), and an untreated control treatment will be evaluated in field trials. Limbs will be felled, bucked into 120 cm bolts and sprayed. They will be evaluated in the field for bark beetle attacks.

B. MATERIALS and METHODS (Juniper)

1. **Locating study trees, removal of limbs and application of the insecticidal treatments** - On April 23-27 sufficient number of trees were identified along the road system within the Northern Arizona University Centennial Forest North. Limbs were removed and sprayed with bifenthrin (two levels), carbaryl and Permethrin plus C were applied to bark. The ends of the limbs were dipped in hot wax to prevent desiccation.
2. **Monitoring** - Starting on May 4 the limbs were checked weekly for signs of bark beetle attack.

B-2. MATERIALS and METHODS (Arizona Cypress)

3. **Locating study trees, removal of limbs and application of the insecticidal treatments** - On June 14-16 sufficient number of trees were identified along the road system within the Payson District of the Tonto National Forest. Limbs were removed and sprayed with bifenthrin (two levels), carbaryl and Permethrin plus C were applied to bark. The ends of the limbs were sprayed with paint to prevent desiccation.
4. **Monitoring** - Starting on July 12 the limbs were checked bi-weekly for signs of bark beetle attack.

C. RESULTS (Juniper)

1. Results as of July 20, 2004. These limbs are being debarked to determine if additional attacks occurred that were not noted in the field.

Treatment	n	# limbs attacked	% limbs attacked	Total Attacks	Attacks/ limb
Control	25	13	56	278	11.12
Biflex 0.03%	25	2	8	2	0.08
Biflex 0.06%	25	0	0	0	0.00
Permethrin 0.19%	25	1	4	2	0.08
Carbaryl 1.0%	25	6	24	165	6.60

C-2. RESULTS (Arizona Cypress)

2. Result as of August 10, 2004. These limbs are being debarked to determine if additional attacks occurred that were not noted in the field.

Treatment	n	# limbs attacked	% limbs attacked	Total Attacks	Attacks/ limb
Control	25	22	84	396	15.84
Biflex 0.03%	25	4	16	210	0.40
Biflex 0.06%	25	1	4	12	0.48
Permethrin 0.19%	25	4	16	6	0.24
Carbaryl 2.0%	25	4	16	19	0.76

4) TITLE: Growth Loss of Rocky Mountain White Fir from Western Spruce Budworm Defoliation.

The purpose of this project is to determine the effect of western spruce budworm defoliation on the height and volume growth of Rocky Mountain white fir, including temporal relationships between radial growth loss and height growth loss.

AZFH role in this project was to select and prepare increment core and cross-sections from existing white fir material (originally collected for other purposes - McKelvey 2004 *in press*, NAU MS Thesis), including multiple cross-sections at different heights from individual trees, for

further measurement. For each individual tree selected, measure the annual rings from at least two radii of each cross-section, standardize the average ring width series at each sample height.

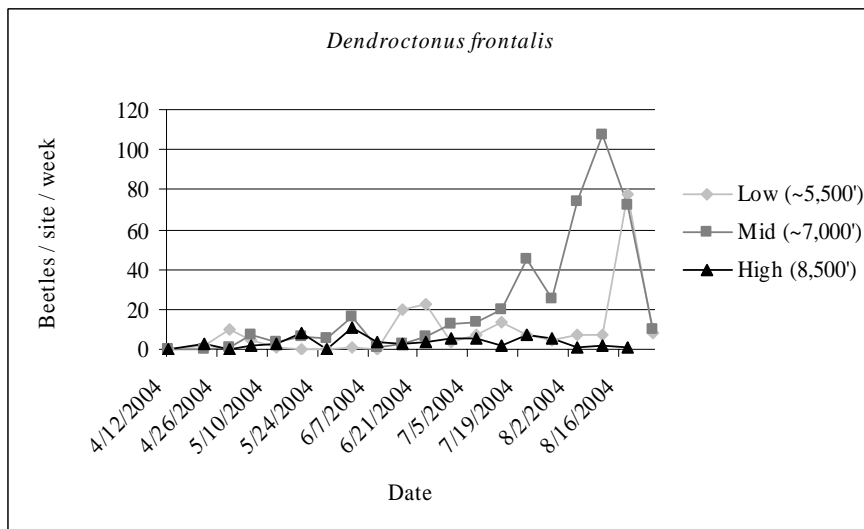
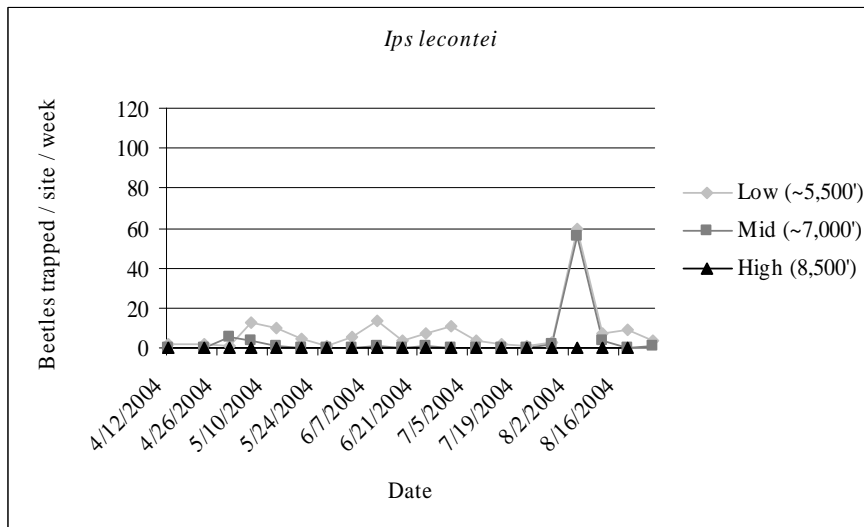
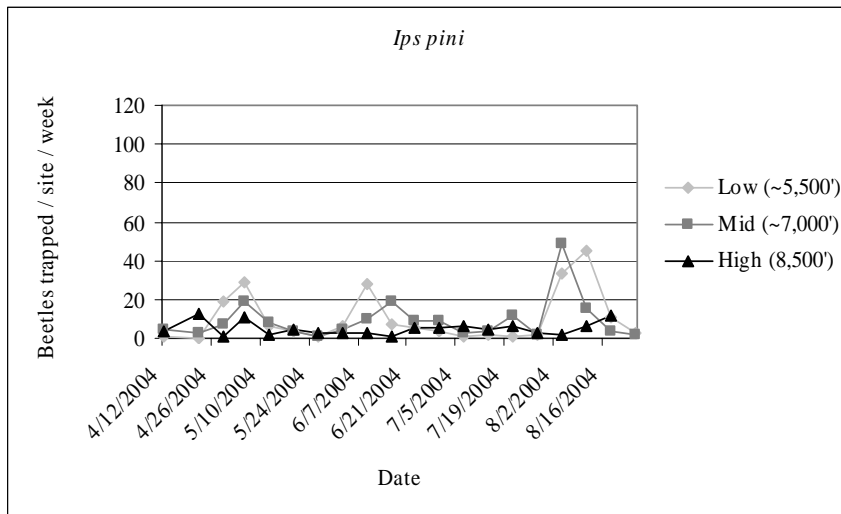
Dr. Ann Lynch, USFS-RMRS will utilize the data collected by UAFH to prepare a publication.

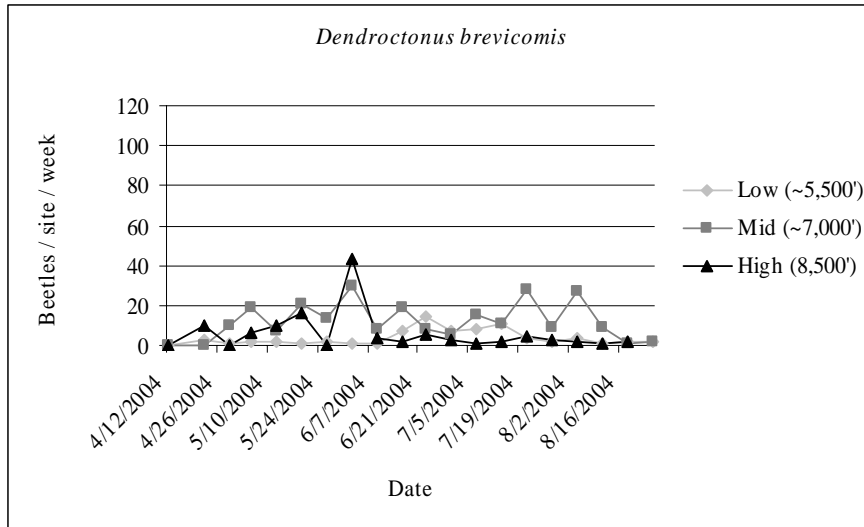
5) TITLE: Seasonal Abundance of Ponderosa Pine Bark Beetles Across an Elevational Gradient in Arizona and Implications for Increased Fuels and Wildfires

The purpose of this project is to identify the community structure of four economically and ecologically important species of bark beetles that attack ponderosa pines in Arizona (*Ips pini* [pine engraver], *Ips lecontei* [Arizona fivespined ips], *Dendroctonus brevicomis* [western pine beetle], and *Dedroctonus frontalis* [southern pine beetle]). Beetles will be collected using Lindgren funnel traps baited with appropriate bark beetle pheromone lures. We will determine if the community structure of this ponderosa pine bark beetle complex varies among three major elevational bands that encompass the range of ponderosa pine in northern Arizona (5500 ± 250 ft., 7000 ± 250 ft., and 8500 ± 250 ft.), and if it changes over time (seasonally from ca. April 1 to September 30 in 2004 and 2005, and between two consecutive years). We will also quantify the relative abundance these four bark beetles at different elevations and at different times in the season, and determine the number of generations per year of each species at the elevational sites.

In FY2004 UAFH located 10 sampling sites within each of the three elevational bands that are a minimum of one mile apart to ensure the sampling sites are independent (total of 90 traps). At each of the 10 sampling sites, three Lindgren funnel traps were set and baited with three different pheromone lures that will attract the four bark beetle species of interest.

Trap contents were collected at weekly intervals during a seven month period about April 12 to November 15. Contents, bark beetles and bark beetle predators (e.g., clerid beetles), were sorted, identified, counted and preserved. Preliminary results for 2004 follow.





6) TITLE: "Southwestern ponderosa and piñon pine bark beetles: Significance of pheromone trap catches"

The purpose of this project is to advance understanding of what pheromone trap catches of bark beetles mean in order to improve methods to predict where, when, and how much bark beetle activity will occur in forests. This study will directly address Priority Topic 2 for the Western Bark Beetle Research Initiative, to "Determine what bark beetle trap catches mean in terms of their flight periodicity and related population levels". It will also support the research priority to "improve methods to predict bark beetle activity" as noted in the Western Bark Beetle Report.

In FY2004 preliminary data was collected from some of the plots and is being analyzed.

7) TITLE: Influence of Slash Size on Bark Beetle Success

The purpose of this project is to further refine slash management guidelines to minimize *Ips* bark beetle attack on live ponderosa pine in Arizona.

The project will evaluate the effectiveness of bucking ponderosa pine slash into various lengths to prevent *Ips* brood production within the slash. Ponderosa pine trees will be felled and cut into various lengths at various diameters and placed on the forest floor. We will test these parameters under heavy, medium and light shaded conditions (high, medium and low basal

area). The study will be replicated every 3 months over a 12 month period to test the effect of seasonality of cutting on potential brood production. The results of the study will be particularly helpful in determining when and how best to treat slash from ponderosa pine thinning and restoration projects.

In FY2004 the study sites were identified.

VII b. Rural Communities Fuel Management Program

The following section represents the efforts many individuals on the AZFH Forest Health Restoration Team and the Rural Communities Fuels Management Partnership, including:

Tom DeGomez - Principal Investigator
Art Mathias - AZFH Program Coordinator, Senior
Beverly Loomis - AZFH Program Coordinator
Rural Communities Fuels Management Partnership - Arizona State Lands Department; U.S. Forest Service Coconino and Kaibab National Forests; Community Fire Departments (Parks, Williams, Summit, Sherwood Forest Estates); City of Williams; Coconino County Public Works, Community Services Department, and Board of Supervisors; Navajo Nation New Dawn Program; Northern Arizona University Ecological Restoration Institute; Arizona Department of Corrections; Woods, Pine Meadows, and Sherwood Forest Estates home owners associations.

The following grants have been secured and are being implemented through the UAFH in partnership with the Rural Communities Fuels Management Partnership during the FY04 period. This program has been recognized for its outstanding work by Secretary of Agriculture, Anne Veneman with the 2003 Honor Award.

Grants awarded and active in FY04:

- \$95,000 - FY2002 State Fire Assistance Grant
- \$12,000 - FY2002 Coconino County Rural Fire District Grant
- \$41,000 - FY2002 Title III Forest Health Grant
- \$20,000 - FY2002 Ecological Restoration Institute Grant
- \$12,589 - FY 2003 USFS Rural Communities Assistance Grant
- \$102,000 - FY2003 State Fire Assistance Grant

- \$40,000 - FY2003 State Forest Health Grant
- \$114,000 - FY2004 State Fire Assistance Grant
- \$110,000 - FY2004 Title III Forest Health Grant

Grants pending:

- \$256,000 - FY2005 State Fire Assistance Grant
- \$242,000 - FY2005 AZFH Forest Restoration Grant

FY04 Accomplishments:

Acres treated - SFA Grant funds (thru UAFH)	69 acres
ASLD FLEP funds	50 acres
CREC (other grant funds)	7 acres
Property Owner	<u>5 acres</u>
TOTAL	131 acres
 Forest Service Interface within the project area (70 acres abutting properties treated above)	 599 acres
 Williams Ecological Restoration Demo Plot	 11 acres
 Acres with cut material piled for burning (SFA Grant only)	 32 acres
Acres of pile burning (SFA grant only)	15 acres
Volume of utilization for firewood (Navajo Nation Free Firewood Program)	125 cords
Number of poles removed	3200 poles
Acres of cut material chipped (by private party)	10 acres
Estimated hours contributed by private property owners	2,230 hours

VIII. County Extension Program Reports

Cochise County Forest Health Report - Kim McReynolds

The Cochise County report is under "Invasive Plants" above.

Coconino County - Wade Albrecht

FY03 UAFH Grant - \$10,000

Activity	Short narrative
Publications or other educational tools	A) Brochure: Biological Pollutants B) Poster Materials: Recognizing Rosettes, 2 others C) Banner: "War on Weeds" SFPWMA

- D) Weed Pull Flyers (4 total)
 E) U of A Fact Sheet, "Community Weed Management Program"
 F) Articles for Plateau Gardener "The Silent Scourge"; and Coconino County Report to Citizens 6/04 "Invasive Weeds: A Growing Problem"
 G) Four power point presentations developed and used
- Meetings held
 A) Two meetings hosted for the San Francisco Peaks Weed Management Area, **24 total attendance**
 B) One meeting of the Northern Arizona Weed Council, **11** in attendance,
 C) Five meetings with former coordinator
- Youth activities
 A) Weed Pulls w/various Flagstaff Public School classes, 9/5/03, 9/9/03, 10/23/03, 10/24/03, 10/25/04: **332** students, **16** teachers and parents, **43 acres, 460 bags**
 B) Weed Pull, 4/7/04 Pioneer House: **17** FALA students, **41 bags, 2 acres**
 C) Weed Pull, Ft. Tuthill, 5/24/04: **49** students, teachers, & parents from CHS, **20 acres**
 D) Weed Pull @ Coconino High, 6/2/04: **38** students, **5 acres**
 E) Weed Pull @ Cromer School, 6/24/04: **7** from teenworks, **41 bags, 5 acres**
- Consultations/technical assistance (face to face, phone, email)
 A) **8** on-site visits/consultations
 B) **25** phone consultations
 C) **7** email consultations
- Talks or presentations given
 A) U of A, V Bar V Ranch Day 8/23/03, **250** people
 B) Presentation for Master Naturalist Class **21** people
 C) Board of Supervisor Presentation, 1/27/04, **10** people.
 D) Healthy Forests Workshop, 2/5/04, **12** People;
 E) Master Gardener Present., Cottonwood, 2/18/04, **23** people
 F) CREC Presentation, 2/19/04, **39** people
 G) No. AZ Audobon Society 3/24/04, **23** people
 H) Keep Sedona Beautiful, "Weeds of the Verde Valley Weed Management Area," 3/27/04, **90** people
 I) The Three Dangers: Noxious Weeds, Fire and Bark Beetles, @ Doney Park and Fernwood 3/15/04, 4/2/04, 4/13/04, **32** people

	J) Arboretum Docent Presentation, 14 people
	K) NRCD Weed Presentation @ Willow Bend, 6 people
	L) Coconino County Public Works Department, Noxious Weed Education, 5/6/04, 5/11/04, 5/13/04, 46 people
Surveys or monitoring	A) Continued monitoring of the Wildcat Treatment Plant yellow starthistle population B) Photos taken for use in long-term monitoring of population growth patterns of diffuse knapweed in east Flagstaff and Kachina Village.
Invasive plant work	A) Master Naturalist Weed Pull, 9/27/03, 18 people, 44 bags, 5 acres; B) McMillian Mesa Weed Pull, 4/28/04, 36 people, 10 acres
Other	A) Attended a Southwestern Noxious/Invasive Weed Short Course workshop in Farmington NM in July 2003. B) Active participant in the Arizona Wildlands Invasive Plant Working Group, which meets every other month, utilizing science based criteria to evaluate non-native plants for invasiveness and potential listing as noxious. C) Noxious Weeds is an established component of the Master Naturalist Curriculum.

Gila County Forest Health Report - Chris Jones

FY03 UAFH Grant (\$9,000)

Activity	Short narrative
Publications or other educational tools	A) Developing updated tabloid "Living with Fire: A Guide for Homeowners in the Southwest" Expected publication date Spring 2005. B) Assisted Pine Fires Department with Forest Education CD> Expected publication date Spring 2005. C) Gila County Forest Health Program Poster. Presented at the Forest Health Monitoring Workshop, Sedona, AZ Feb 9-13.
Youth activities	Held teacher-training workshop for PLT/WET curriculum in Globe, April 14-15. 15 teachers attended.

Consultations/technical assistance (face to face, phone, email)	Approximately 20 by phone and 15 by email.
Talks or presentations given	<p>A) Pine Beetle Update - Pine, AZ. December 12, 2004; 40 attendees.</p> <p>B) Healthy Forests Neighborhood Educational Series. Held at Gila County Community College in Payson. February 27-June 4, 2004. Eight sessions; 60 attendees.</p> <p>C) Second Homeowners Firewise Seminar Series. Held at various locations in Phoenix metropolitan area, March 25 - June 24. Five sessions; 70 attendees.</p> <p>D) Firewise Educational Trailer at Gila County Fair. September 16-19. Continuously staffed; approximately 150 attendees.</p>
Surveys or monitoring	<p>A) Observed sycamore anthracnose along Pinal Creek, Globe area tributaries and other waterways in Gila County, April through May 2005.</p> <p>B) Observed widespread outbreak of juniper rust (<i>Gymnosporangium</i>) in Payson area April. Followed up on concerns with alternate host symptoms with apple I the Young, AZ area.</p> <p>C) Observed many patches of mortality of pine seedling/saplings along the northern portion of the Young Road in October.</p>
Invasive plant work	<p>A) Gila County Noxious Weed Poster Display. Presented at Gila County Courthouse, Globe, AZ February 23-27, National Noxious Weeds Awareness Week.</p> <p>B) Noxious Weed Education Seminar, Show Low Master Gardeners, March 2; 20 attendees.</p> <p>C) Noxious Weed Seminar, San Carlos, May 15; 23 attendees.</p> <p>D) Noxious Weed Seminar, Whiteriver, Sept. 23; 50 attendees</p>
Other	A) Assisted with development of Northern Gila Community Wildfire Protection plan; August and

September of 2004.

B) Assisted Christopher Kolh's Fire Dept/Community to acquire a \$103K matching State Fire Assistance grant in September 2004. Ranked seventh out of 43 proposals, awards have yet to be announced.

C) Prepared with AZFH a \$250,000 proposal for Forest Health Restoration funding.

Yavapai County Forest Health Report - Jeff Schalau

Activity

Short narrative

Publications or other educational tools

Maintained *Yavapai County Forest Health Forest Health* web page (cals.arizona.edu/yavapai/anr/fh/). The site had 8,275 total pageviews, 3,721 pageviews on *Pine Bark Beetles in the Prescott Area*, & 2,406 pageviews on *Frequently Asked Questions About Bark Beetles*. This site also links with other forest health resources on the web & generates email contacts.

Meetings held

A) Field Trip, Beaver Creek Experimental Watershed, Yavapai County Master Watershed Steward Course, discussed forest health issues, 10/25/03, 17 adult participants

B) Workshop: *The Art and Science of Firewise Landscaping*, Prescott, 5/8/04, 26 adult participants

C) Attended monthly Prescott Area Wildland Urban Interface Commission (PAWUIC) meetings, Prescott. Activities included:

- Co-chair Education/Outreach Task Force
- Created educational posters
- Held meetings to introduce group to Project Learning Tree (PLT)
- Public outreach at Yavapai County Fair 9/23/04 to 9/26/04 (about 70 contacts)

Consultations/technical assistance (face to face, phone, email)	Agent assisted homeowners with forest health information (primarily bark beetle related). Contacts were 43 face-to-face (9 were site visits), 35 phone, and 76 email.
Talks or presentations given	Half Hour Radio Interview, KQNA, Prescott, <i>Bark Beetle Activity in the Prescott Area</i> , aired 6/20/04.
Surveys or monitoring	Spent approximately 20 hours surveying noxious weed populations for GIS database.
Invasive plant work	<p>A) Pesticide Applicator Training/Testing for Noxious Weed Control in Agricultural Settings, Prescott, 12/12/03, 14 participants</p> <p>B) Pesticide Applicator Training/Testing for Noxious Weed Control in Agricultural Settings, St George, UT (for Arizona Strip Land Managers), 3/30/04, 11 participants</p> <p>C) All-day Noxious Weed Workshop for the general public, 5/10/04, 11 participants</p> <p>D) Coordinated the West Yavapai Weed Management Area, activities included:</p> <ul style="list-style-type: none"> • Monthly meetings of 4 to 15 people • Site visits to inventory/map/control noxious/invasive weeds • Technical support and volunteer training for inventory and mapping • Approximately 150 volunteer hours in surveying and eradication

Appendix A

Arizona: Forest Insect Incidence by Site for 2004 (in acres)

	Western Pine Beetle	Mountain Pine Beetle	Round- headed Pine Beetle	Ponderosa Ips	Pinon Ips	Doug- fir Beetle	Spruce Beetle	True Fir Beetles	Bark Beetle Totals	Western Spruce Budworm	Spruce aphid	Aspen defol	Drought	Defoliation Total
2004														
Apache-Sitgreaves NF	228			11,444	2,975	5,644	3,895	2,449	26,635	11	5,185	5,329		10,525
Coconino NF	303			11,048	748	4,367	267	1,713	18,446			2,290	18,208	20,498
Coronado NF	6		314	628	64	978		1	1,991				845	845
Kaibab NF	3			29,807	6,922	615		1,065	38,412			5,329	14,683	20,012
Prescott NF				8,851		45			8,896				1,858	1,858
Tonto NF				6,365	26	687			7,078			72	198	270
Grand Canyon NP		6		3,196		11		140	3,353			5,741	4	5,745
Chiricahua NM			210			2			212					0
Saguaro NM				11					11				563	563
Walnut Canyon NM				13		16			29				317	317
BLM	1			2,834	160	145		45	3,185					0
Fort Apache Tribal	144			7,450	69	92	2,256	27	10,038		23,515	4,820		28,335
Hualapai Tribal				196	180				376					0
Navajo Tribal	108			419	10,275	6	122	58	10,988	10,702		5,090		15,792
San Carlos Tribal	62			53	29			2	146					0
Hopi Tribal					15				15					0
Nav-Hopi JUA					5				5					0
State & Private	7			2,248	2,296	161	1	3	4,716		28	222	2,636	2,886
2004 Arizona Total	862	6	524	84,563	23,764	12,769	6,541	5,503	134,532	10,713	28,728	28,893	39,312	107,646

Appendix B

Bark Beetle Funnel Trap Collection in Flagstaff, Payson, Hualapai Mountain and Navajo County.

Flagstaff traps were set out beginning in mid-March, with Hualapai Mountain and Payson areas following in early April. Traps collections continued until late October. Navajo County collections were very sporadic and too few for meaningful graphing.

Lures consisting of these combinations were refreshed every six weeks.

Ponderosa Pine (PiPo): IPSD 03/97 and Lanierone

Piñon ips: IPSD 50/50, Ipsenol 50/50 and Cis verbenol

Pesticides were placed in the cups of the funnel traps to kill the predators and prevent the predators from eating the bark beetles. The pesticide consisted of a 1" square by 1/8" thick rubber impregnated with 18.6% dichlorvos pesticide ("No-Pest-Strip").

Trap location, elevation, predominate tree species and lure type at each site were:

Flagstaff-collected by Beverly Loomis

Walnut Canyon	6,660	Ponderosa and P-J mix	Piñon Lure
Cosnino	6,500	Piñon - Juniper	Piñon Lure
Winona	6,300	Piñon - Juniper	Piñon Lure
ORV Area off 89	7,200	Ponderosa and P-J mix	Piñon Lure
N Highway 89	6,520	P-J	Piñon Lure
East Route 66 E.	7,150	Ponderosa	Piñon Lure
East Route 66 W.	7,140	Ponderosa	Ponderosa Lure

Hualapai Mtn at Pine Lake-collected by Dave Haydon

Trap #1	6,300	Ponderosa	Piñon Lure
Traps #2	6,300	Ponderosa	Ponderosa Lure

Payson Area-collected by Chuck Jacobs

Blattner Brush Pit	5034	P-J + brush/slash	Piñon Lure
Hirsch Residence	5595	Ponderosa and P-J	Ponderosa Lure
Payson Police	4900	Ponderosa	Piñon Lure
Strawberry Fire	5890	Ponderosa	Ponderosa Lure
Pine Brush Pit	5100	Ponderosa & P-J + brush	Piñon Lure
Gage Residence	5050	Ponderosa	Ponderosa Lure

Navajo County - collected by Steve Campbell

Six traps were placed at 6,400' to 7,250' elevations in Pinetop-Lakeside. All lures were the ponderosa combination. Yields were basically *Ips pini* with a few *Ips calligraphus* and *Dendroctonus valens*. Levels of bark beetles trapped were low. The collector reported on October 1st that the traps continued to have few if any beetles in them even with fresh lures.

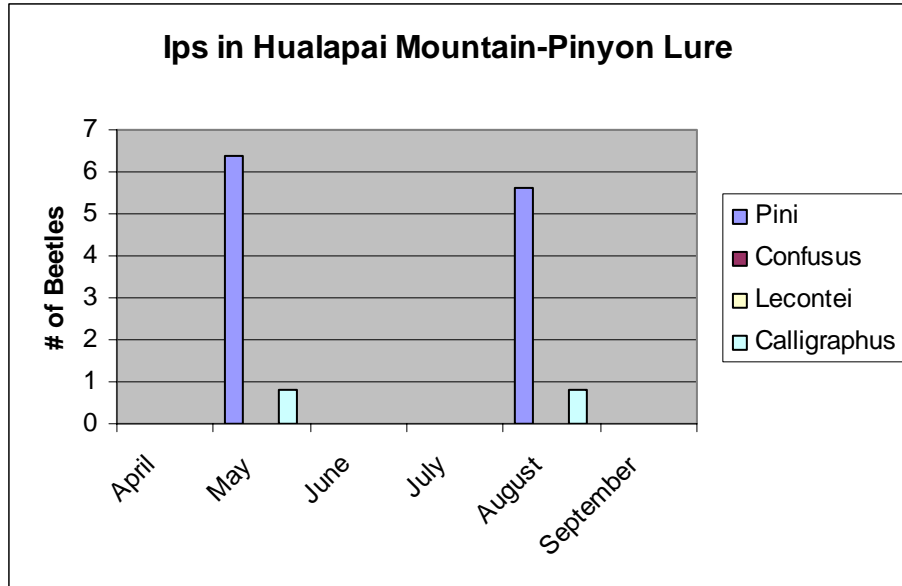
2004 Collections

Compared to collections in 2003, fewer bark beetles were collected in the Flagstaff and Hualapai Mountain areas. Neither Payson nor Navajo County trapped in 2003. There were more *Ips confusus* (piñon ips) in the piñon ips lure traps in 2003 and *Ips confusus* first appeared at these same trap locations in late August in very small numbers. During the summer *Ips lecontei* were instead found in the piñon ips baited traps. It was not uncommon the nine traps in Flagstaff and Hualapai Mtn. to yield no bark beetles in spite of lures being refreshed every 6 weeks.

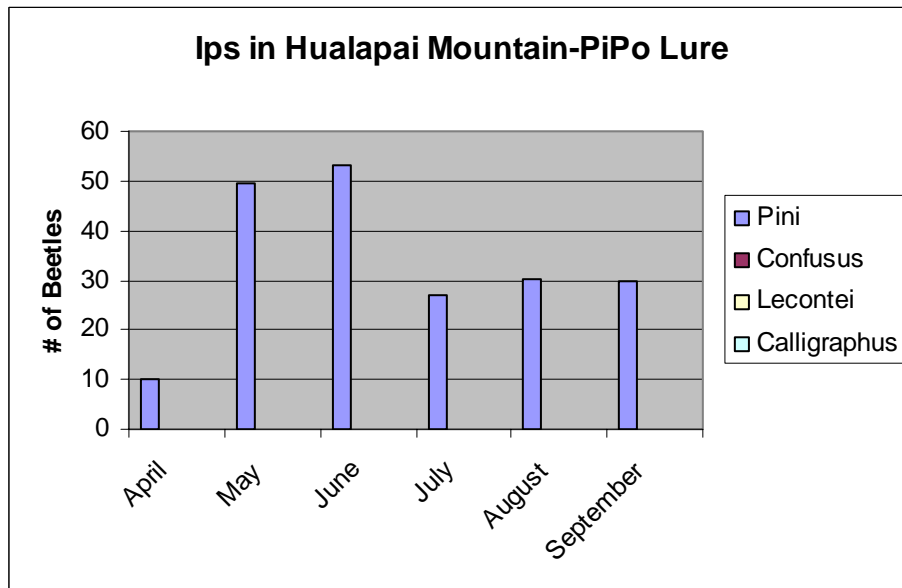
The Blattner and Pine Brush Pit traps were located in brush disposal pits. These pits received up to 100 loads of brush per day when opened. The Pine Brush pit was burned and closed in July. There had been a heavy bark beetle kill of ponderosas in this area. As in Flagstaff, *Ips lecontei* predominated the catches even in the piñon ips baited traps.

Note that the number of beetles or Y-axis varied in each graph. Payson ponderosa lured traps had the highest range and the Hualapai mountain piñon lure trap had the lowest range.

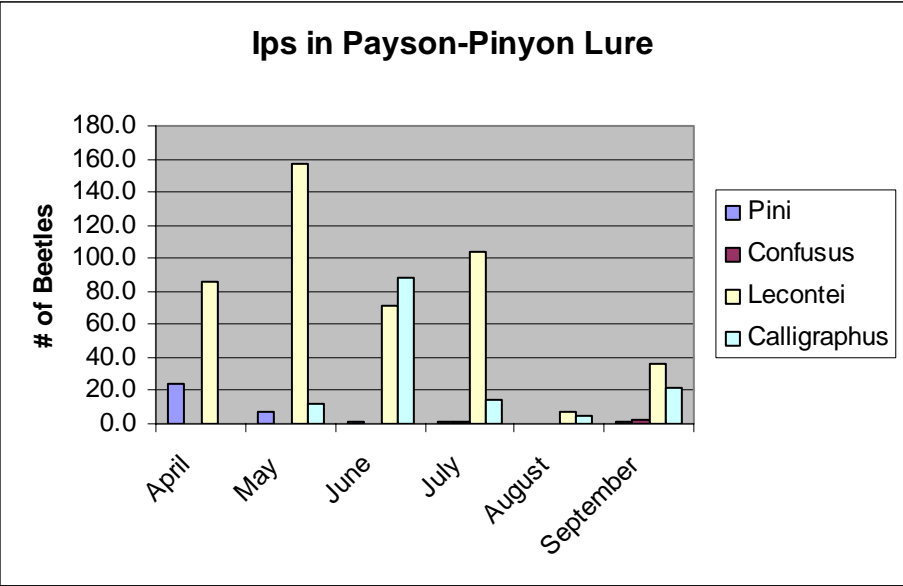
The number on each figure represents the monthly totals of the weekly averages per species.



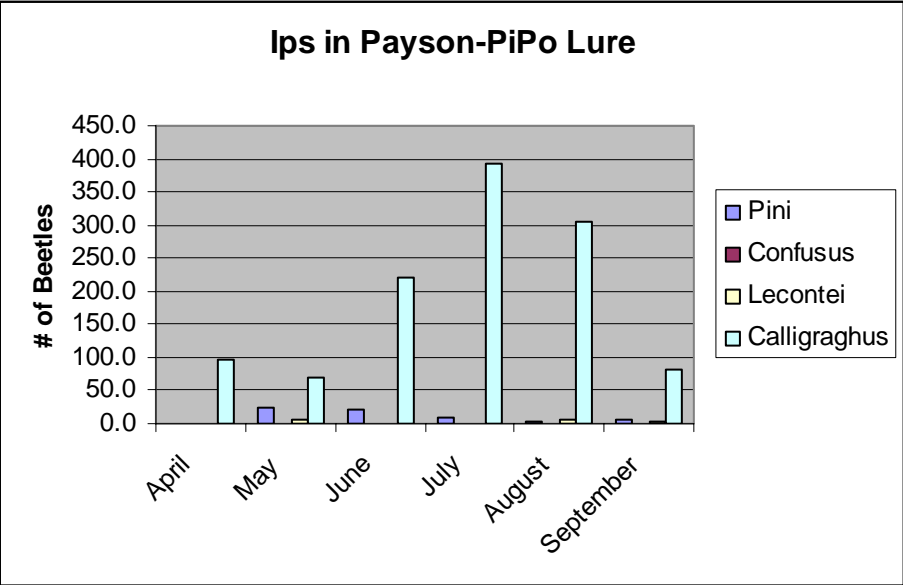
Monthly totals of the weekly averages per species.



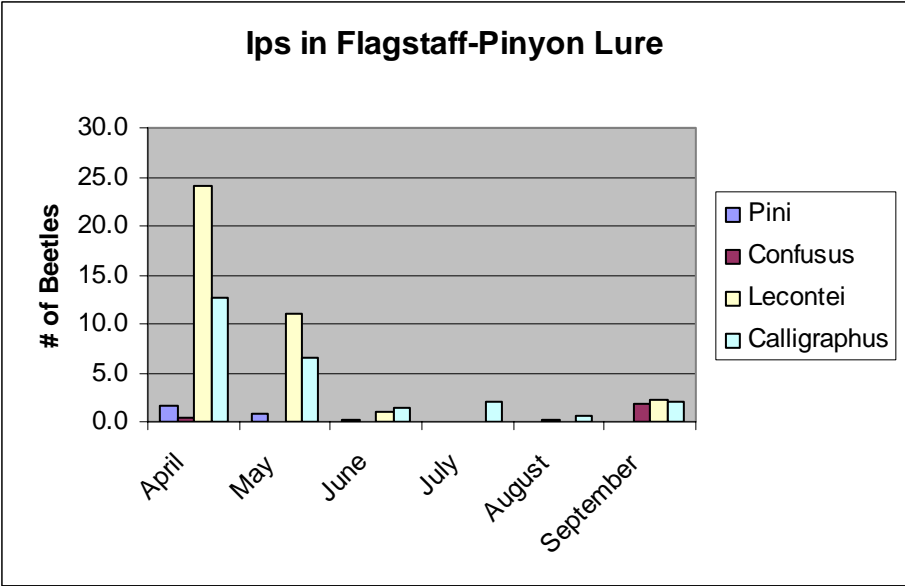
Monthly totals of the weekly averages per species.



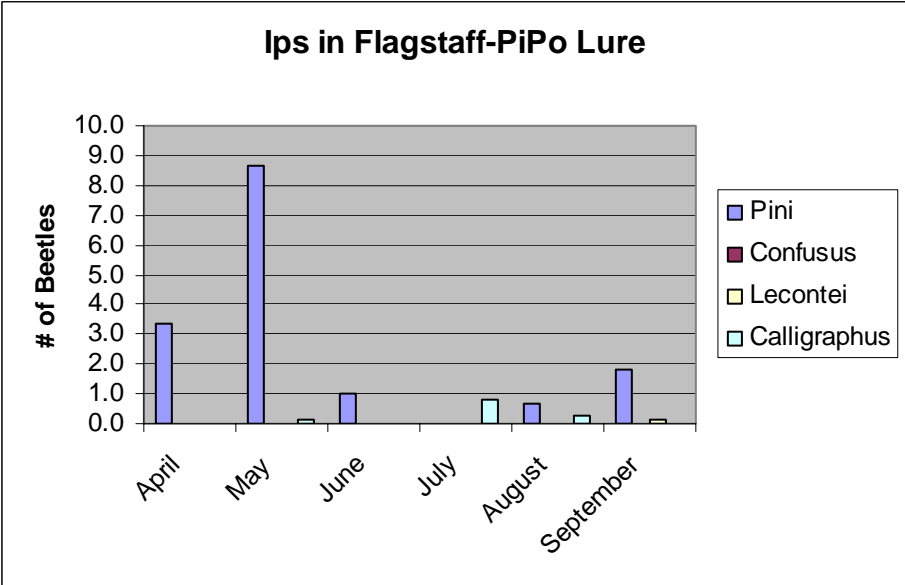
Monthly totals of the weekly averages per species.



Monthly totals of the weekly averages per species.



Monthly totals of the weekly averages per species.



Monthly totals of the weekly averages per species.

Appendix C.

Administration of Funds for Suppression Prevention

Agency - Grant	Grant Total	Grant Balance
Coconino County Cooperative Extension - 2003 Invasive Plants	\$10,000	\$694
Gila County Cooperative Extension - 2003 Invasive Plants	\$9,000	\$4,454.86
Mohave County Cooperative Extension - 2003 Invasive Plants	\$7929.	\$0
Flagstaff Fire Department - 2003 Forest Health Restoration	\$58,187	\$27,576
Coconino County Rural Environment Corps - 2003 Forest Health Restoration	\$94,762	\$52,745
Arboretum at Flagstaff - 2004 Invasive Plants	\$7,955	\$4,754
Coconino County Cooperative Extension - 2004 Invasive Plants	\$10,000	\$9,612
Flagstaff Ranch - 2004 Invasive Plants	\$4,020	\$706
Summerhaven - 2004 Invasive Plants	\$10,000	\$4,439
Navajo County - 2004 Forest Health Restoration	\$245,000	\$245,000
Pinetop-Lakeside - 2004 Forest Health Restoration	\$392,000	\$392,000
Show Low - 2004 Forest Health Restoration	\$343,000	\$343,000