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# forest insect & disease management methods application group

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## NEWSLETTER

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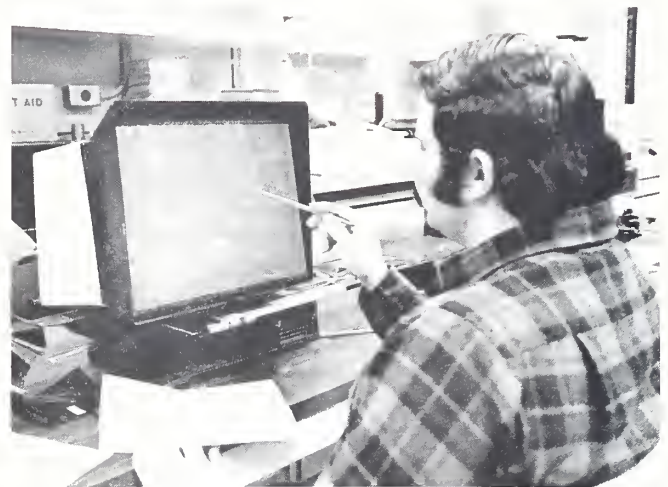
### U2 PHOTOGRAPHY OF MOUNTAIN PINE BEETLE INFESTATION ON THE BEAVERHEAD AND GALLATIN NATIONAL FORESTS

For almost a year, MAG and the Northern Region FI&DM staff in Missoula, Montana, have cooperated in a pilot survey to evaluate the effectiveness of color infrared reconnaissance (optical bar) photography to estimate annual mortality of lodgepole pine in a mountain pine beetle outbreak on the Beaverhead and Gallatin National Forests, Montana.

The medium-scale (1:30,000-40,000) photography was taken by a U2 aircraft in late July 1978, but due to delays in film processing copies of the film were not available until mid-September.

The imagery was gridded into 160-acre blocks and then was classified into damage intensity levels by experienced photo interpreters, including Dayle Bennett, R-1; Emmett Wilson, R-3; Jule Caylor and Walt Salazar, R-5; Jim Prill, Lockheed Electronics Company (under FS contract); and Bill Klein, MAG. Once this first cut in the sampling process was completed, photo plot (PSU) selection was made by probability proportional to size (PPS).

The 120 photo plots were 160 acres (40 x 40 chains) in size, divided into 16 ten-acre subplots. Photo interpretation was done in the stereo mode using Bausch and Lomb 240 zoom stereoscopes. This task was completed by mid-May. Ground truth plots, also selected by PPS, were ten acres (10 x 10 chains) in size.



*Walt Salazar (FI&DM, Region 5) uses a microfiche viewer to estimate number of bark beetle-infested trees on optical bar photographs.*

Ground truth surveys conducted by R-1 personnel began in late May and were completed by early July. Emmett Wilson and Bill Klein assisted in the survey. Observing the field procedures as well as providing assistance were Jim Prill and Dick Hinkel, also of Lockheed, and Hans Scherrer of the Swiss Forest Research Institute, Birmendorf, Switzerland.

SP-1585

The ground truth surveys progressed much better than expected. The 1978 lodgepole faders retained their needles and could be separated readily from both previous (1977) and new (1979) faders. A specially devised stereo field viewer has been used successfully to locate and delimit the 10-acre plots.

The final results of this survey will not be determined until the data has been compiled, computed, and analyzed in the fall of 1979. Some elements worthy of mention at this time are the recognition of features characteristic of panoramic film, chiefly the changes that occur from the center (nadir) of the frame outward. The most significant changes include decreasing scale, panoramic and topographic distortion, obliquity, and most important from an interpretation standpoint, a definite but somewhat inconsistent color shift. For example, newly faded lodgepole pines exhibit a different color at nadir than at 30-40°. However, none of these problems appear insurmountable.

#### OTHER MOUNTAIN PINE BEETLE DAMAGE SURVEYS

The field portion of a pilot survey using large-scale color aerial photography and standard multistage techniques to assess annual mortality of lodgepole pine on the Beaverhead and Gallatin National Forests has been completed. The ground surveys were combined with the ground surveys of the optical bar photography evaluation.

Plans for 1979 are to conduct a similar but expanded survey to measure annual lodgepole pine killed by the mountain pine beetle on a statewide basis in Montana. The first phase, involving aerial sketchmapping for stratification, will begin in mid-July.

The present mountain pine beetle outbreak in ponderosa pine along Colorado's Front Range will be the target of two almost simultaneous aerial photographic surveys. One survey will be a conventional multistage survey undertaken by R-2 FI&DM in cooperation with the State of Colorado; the other will be conducted by the Nationwide Forestry Applications Program in cooperation with R-2 FI&DM, and will entail full outbreak coverage with color infrared optical bar photography.

#### SURVEY METHODS MANUAL

The first supplement of the Forest Insect and Disease Survey Methods Manual has been distributed to the field. This loose-leaf binder presently contains eight papers prepared by appropriate specialists representing FI&DM, FI&DR, and cooperating State agencies. These papers describe survey techniques for a variety of important forest insect and disease pests such as fall cankerworm, larch casebearer, dwarf mistletoe, and fusiform rust. Additional supplements for inclusion in this manual will be issued over the next several years. Copies of the manual may be obtained from this office by request.

#### PREDICTING SPRUCE BUDWORM DEFOLIATION

FI&DM/MAG has received funding from the CANUSA-West Expanded Spruce Budworms Research and Development Program to analyze influence of physiographic- and site-related variables in forecasting western spruce budworm population trends and defoliation.

Present techniques involve use of egg mass counts to forecast subsequent years' defoliation. Egg mass densities seem to account for only 50 percent of the variation in defoliation. This evaluation, under the direction of Allan Bullard, will analyze the effects of variables such as slope, elevation, number of previous years of infestation, etc., in concert with egg-mass counts using multiple regression techniques. Data will be taken on plots established during the past three years by western FI&DM staffs in an attempt to achieve comparability between Regions on spruce budworm egg mass surveys.

### IDAHO COOPERATIVE WESTERN SPRUCE BUDWORM PROJECT

Allan Bullard and Bill Ciesla provided technical assistance to the western spruce budworm control project conducted by the Idaho Department of Lands. The project involved spraying approximately 140,000 acres, predominately State and private land, near Cascade and McCall in the south central portion of the state. About 90,000 acres were treated with Sevin 4-oil and the remainder was treated with Orthene. The MAG team assisted Project Leader Ladd Livingston with calibration and characterization of a fleet of spray aircraft consisting of four Grumman 4-TBM's, a Grumman AgCat, and a Hiller 12E helicopter.



*Line of spray deposit cards used to measure aircraft swath width and droplet size.*

*TBM applying dyed spray over spray deposit card line.*





## SEVENTH BIENNIAL WORKSHOP ON COLOR AERIAL PHOTOGRAPHY IN THE PLANT SCIENCES

The Seventh Biennial Workshop on Color Aerial Photography in the Plant Sciences was held May 15-17, 1979, at the Davis Campus of the University of California. Workshop was cosponsored by the American Society of Photogrammetry, Society of American Foresters, and the California Remote Sensing Council. Bill Ciesla, MAG Group Leader, was program chairman.



*Many participants in the Seventh Biennial Workshop on Color Aerial Photography in the Plant Sciences displayed equipment and successful applications of color aerial photography in their work.*

One hundred and three people attended the workshop. A series of papers were presented dealing with applications of color and color infrared photography in mapping vegetation, monitoring water quality, detecting insects and diseases, and other aspects of managing forests,

rangeland, and agro-ecosystems. In addition to submitted papers, two informal workshops and a poster session were held. These workshops were chaired by Dr. F.P. Weber, USDA Forest Service, Nationwide Forestry Applications Program, Houston, Texas; and Dr. Peter A. Murtha, Faculty of Forestry, University of British Columbia, Vancouver, B.C., and dealt with acquisition of photography by high altitude camera platforms and vegetation damage assessment respectively.

A field trip to the Napa Valley wine region was organized for the final day of the workshop by Dr. Bill Wildman, Extension Soil Scientist, Land, Air and Water Resources, University of California at Davis.

A workshop proceedings will be published by the American Society of Photogrammetry.



*Bill Wildman, Extension Soil Scientist, UC Davis, describes effective use of color and color infrared photography in vineyard management.*

## FIRST OPERATIONAL USE OF TURBO THRUSH AIRCRAFT

The Southwestern Region (R-3) completed an operational project in New Mexico for control of the Douglas-fir tussock moth with virus. This represents the first operational use of the Turbo Thrush aircraft by the Forest Service. The aircraft was used to deliver the virus spray at elevations ranging from 7000 to 9000 feet MSL. Jack Barry provided on-site assistance in spray nozzle selection, configuration, and spray characterization. Preliminary results of the actual project are very encouraging.

## PESTICIDE SAFETY MANUAL

Protection of personnel from exposure to pesticides has always been a high priority concern on pilot and operational control projects. In response to this concern for safety, we have contracted to produce a personnel safety manual. This will cover safety considerations during ground handling, mixing and loading of spray aircraft, and ground sprayers. Close coordination will be maintained with users during development of this manual, and a draft copy will receive wide review.

## SPRAY EVAPORATION MODEL

A contract has been awarded to H.E. Cramer Company of Salt Lake City to incorporate droplet evaporation in the Cramer/Barry/Grim (CBG) forest spray model. Under normal aerial spray applications, we account for only about 25-50 percent of the spray released. To improve aerial application by placing more spray on the target, and to reduce

spray drift, it is necessary to determine how much spray volume is being lost through evaporation. Evaporation data will be incorporated into the CBG model, leading to more effective estimates of spray deposition and drift.

## MAG STAFF ACTIVITIES

Belinda Allen has joined the FI&DM/MAG staff as Clerk-DMT. Belinda is a resident of Davis and has a degree in Zoology from Arizona State University.

Julie Hart has been reassigned as Editorial Assistant for the FI&DM/MAG staff. Her new duties include editing and layout of FI&DM/MAG manuscripts, reports, and this newsletter.

Bill Klein and Bill Ciesla presented a training session to a group of Northeast Area entomologists and pathologists on design, planning, and conduct of aerial detection surveys. This training was held at the Northeast Area's St. Paul, Minnesota, Field Office.

Jack Barry and Allan Bullard provided training to Northeast Area entomologists on calibration and characterization of spray aircraft at the Northeast Area's Delaware, Ohio, Field Office.

Jack Barry was a guest speaker at a Canadian conference on Long Distance Drift of Forest Insecticides sponsored by the University of New Brunswick. He spoke on recent developments and trends in aerial application of pesticides to forests in the United States.

Bob Young, Bill Klein, and Bill Ciesla served as workshop chairmen at the Western Forest Insect Work Conference held in Boise, Idaho, during March. Bob's workshop dealt with computerized mapping, Bill Klein's with loss

assessment surveys, and Bill Ciesla's on the implications of the National Forest Management Act on Forest Insect and Disease Management.

Dr. Fernando Robredo, chief forest entomologist with Servicio de Defensa Contra Plagas e Inspeccion Fitopatologica, Ministerio de Agricultura, Madrid, Spain, spent a week conferring with MAG specialists on the FI&DM program in the United States. Dr. Robredo was awarded a grant to study pesticide application technology at the Department of Agricultural Engineering, UC Davis, and spent part of his time in the U.S. with the MAG team discussing aerial photography, pesticide application, and organization and conduct of FI&DM activities in the USDA-Forest Service.

Jack Barry was one of four recipients of a USDA Certificate of Merit and cash award for his role as a compiler of USDA Technical Bulletin 1596, Methods for Sampling and Assessing Deposits of Insecticidal Sprays Released Over Forests. Others who were recognized for their involvement in this work were George Markin of the Pacific Southwest Forest and Range Experiment Station; Galen Trostle, FI&DM in R-6, Portland; and Bob Ekblad of the Missoula Equipment Development Center.

## RECENT PUBLICATIONS

Ciesla, W.M. 1979. The mountain pine beetle/lodgepole pine pest management system: opportunities for putting new knowledge into practice. IN Proc. Theory and Practice of Mountain Pine Beetle Management in Lodgepole Pine Forests. Forest, Wildlife, and Range Exp. Stn., Univ. of ID, Moscow, ID. pp. 209-212.

Ciesla, W.M. 1979. Passing the information to the user. IN Entomology Working Group Technical Session Proceedings, 1978. Joint Convention of the Society of American Foresters and Canadian Institute of Forestry, St. Louis, MO. pp. 293-296.

Ciesla, W.M. 1979. Preparing slides with colored backgrounds--another approach. Bull. Entomol. Soc. America. 25:145.

Ekblad, R., J.W. Barry, R. Banaugh. 1979. Deliverable dose index: an approximate method for comparing effectiveness of pesticide droplet sizes. USDA-For. Serv., Equip. Devel. Center, Missoula, MT. Special Rpt. ED&T 2664. 8 pp.

Hostetler, B. and R.W. Young. 1979. A pilot survey to measure annual mortality of ponderosa pine caused by the mountain pine beetle in the Black Hills of South Dakota and Wyoming. USDA-For. Serv., Rocky Mountain Region, FI&DM, Lakewood, CO. Tech. Rpt. R-2-15. 20 pp.

Hostetler, B. and R.W. Young. 1979. Estimation procedure for determining annual tree mortality caused by mountain pine beetle (Dendroctonus ponderosae). USDA-For. Serv., Rocky Mountain Region, FI&DM, Lakewood, CO. Tech. Rpt. R-2-20. 25 pp.

Johnson, D.W., F.G. Hawksworth, and D.B. Drummond. 1979. 1979 dwarf mistletoe loss assessment survey--Big Horn and Shoshone National Forests, Wyoming. USDA-For. Serv., FI&DM/MAG, Davis, CA. Rpt. 79-3. 8 pp.

Klein, W.H. 1979. Measuring damage to lodgepole pine caused by the mountain pine beetle. IN Current Topics in Forest Entomology. USDA-For. Serv. Gen. Tech. Rpt. WO-3. pp. 35-42.



- Klein, W.H. 1979. Strategies and tactics for reducing losses in lodgepole pine to the mountain pine beetle by chemical and mechanical means. IN Proc. Theory and Practice of Mountain Pine Beetle Management in Lodgepole Pine Forests. Forest, Wildlife, and Range Exp. Stn., Univ. of ID, Moscow, ID. pp. 148-158.
- Klein, W.H. D.D. Bennett, and R.W. Young. 1979. A pilot survey to measure annual mortality of lodgepole pine caused by the mountain pine beetle. USDA-For. Serv., Intermountain Region, Ogden, UT, and FI&DM/MAG, Davis, CA. FI&DM/MAG Rpt. No. 78-4. 15 pp.
- Stipe, L., J.E. Knopf, R.L. Livingston, R.W. Young, and G.P. Markin. 1979. A cooperative pilot project to evaluate Orthene forest spray for control of the western spruce budworm [*Choristoneura occidentalis* Freeman (Lepidoptera: Tortricidae)], McCall, Idaho. USDA-For. Serv., Intermountain Region, Ogden, UT. 34 pp.



*Mention of commercial products does not imply endorsement by USDA.*

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