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& Cooperative
Forestry
Management

Denver, Colorado



FOREST PEST CONDITIONS IN THE ROCKY MOUNTAIN REGION for 1984



FOREST INSECT AND DISEASE
CONDITIONS IN THE
ROCKY MOUNTAIN REGION
1984

by
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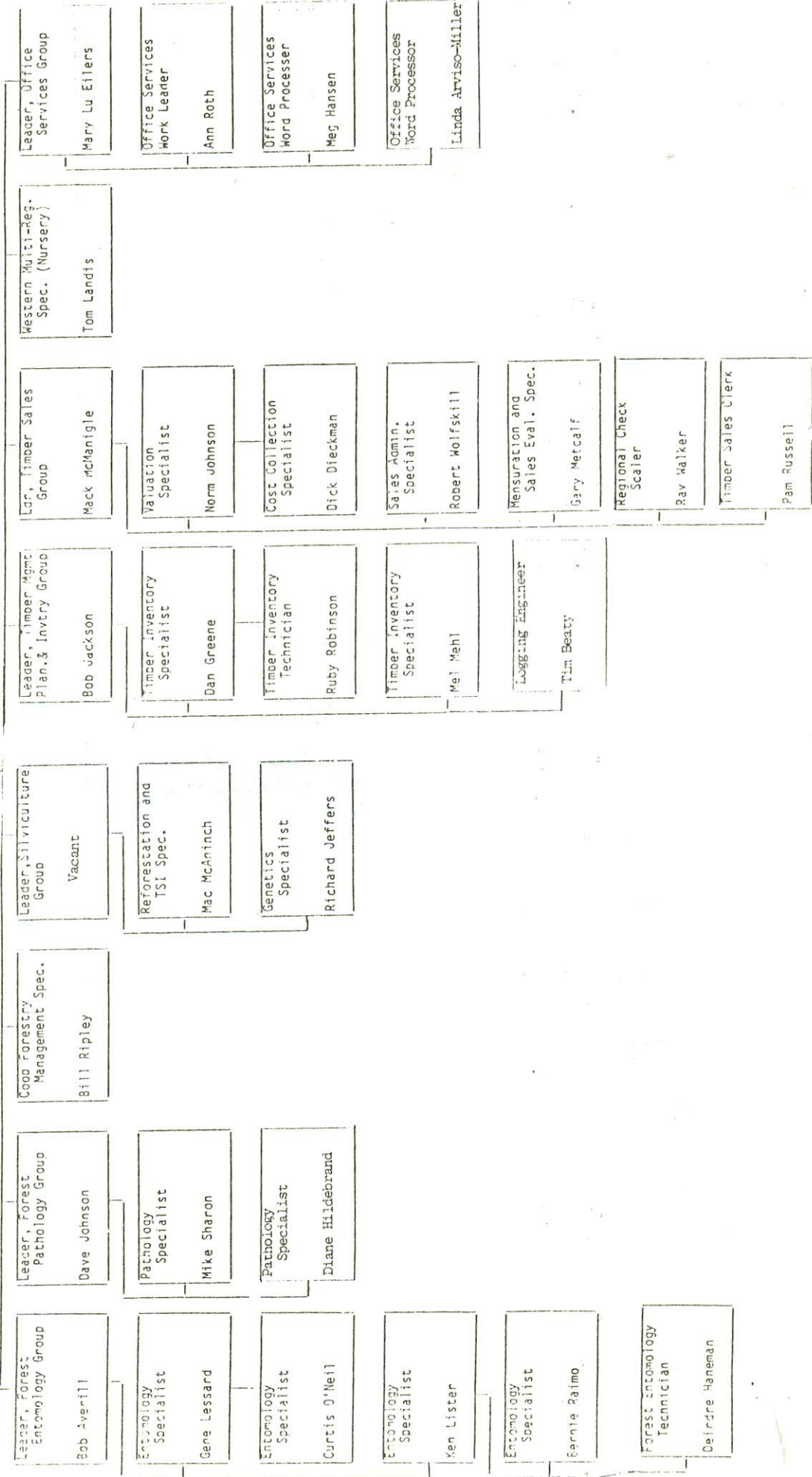
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DISEASE AND INSECT CONDITIONS IN BRIEF

Lodgepole pine dwarf mistletoe and comandra blister rust continued as the most damaging disease agents in the Rocky Mountain Region. Action plans for survey and suppression of lodgepole pine dwarf mistletoe have been continued throughout the Region.

Comandra rust was a major disease problem on the Wind River Ranger District of the Shoshone National Forest. Thirty percent of the basal area in the commercial forest is in lodgepole and 50% of that was damaged by the rust.

Dutch elm disease was down statewide in Colorado except in the south central portion. Pueblo, Canon City and La Junta continued to lose high numbers of mature elms. In South Dakota the disease was confirmed in only five counties. In Nebraska no change has been observed.

A disease complex caused significant mortality of aspen regeneration on the San Juan National Forest. Involved were foliage, shoot and root fungi.

Winter drying and mortality of pine, juniper, spruce and Douglas-fir was the most spectacular disease problem in Colorado this year. Classic examples of "red belt" exist along the Front Range from Magnolia south to Raton Pass, from Walsenburg to LaVeta Pass and on the north and south sides of Cucharas Pass.

Mountain pine beetle continued as the prominent bark beetle in the Rocky Mountain Region. Generally, mountain pine beetle infestations in ponderosa pine continued to decline from high levels recorded in the 1970's. Heavy mortality however, continued on the west side of the Black Hills National Forest of South Dakota. In Colorado significant increases occurred on the Uncompahgre Plateau. In lodgepole pine, mortality continued to increase and broaden-conspicuously in Grand County Colorado. A joint suppression project between the county, Colorado State Forest Service, Bureau of Land Management, National Park Service, and the US Forest Service treated over 100,000 trees through various techniques.

Infestations in Wyoming killed over 81,000 trees covering about 63,000 acres.

Spruce beetle activity continued in relatively small areas in Colorado. Increased infestations occurred on an additional 1,400 acres on the Rio Grande National Forest. Increases have occurred over smaller acreages on the White River National Forest.

Mortality of Douglas-fir to the Douglas-fir beetle increased in Colorado. Infestations occurred commonly in areas of spruce budworm defoliation. Some mortality was noticeable in North-central Wyoming.

Western spruce budworm remained widespread throughout most of its host range in Colorado and Wyoming. The 1984 egg mass survey results indicate moderate defoliation is expected to continue in 1985.

Western tent caterpillar defoliation on aspen continued to increase in severity and distribution. Severe defoliation occurred primarily in southwestern Colorado on the San Juan National Forest and adjacent land ownerships. Egg mass survey results indicate that heavy defoliation is predicted to occur in 1985.

Douglas-fir tussock moth remains a major pest of ornamental spruce, white fir, and Douglas-fir. Defoliation by this insect occurred as far south as Colorado Springs and extended northward through the Denver area to Fort Collins, Colorado. Along this range, it occurred in outlying forested areas where it caused light defoliation. Tussock moth defoliation was reported in Wyoming in the South Shoshone National Forest, here the severity of defoliation was obscured by western spruce budworm defoliation.

INTRODUCTION

Forest Pest Management is responsible for detection, evaluation, prevention, and suppression of insects and diseases on forested Federal lands. Forest Pest Management also administers financial and technical assistance programs, which are available to State and private landowners of forested lands through the Cooperative Forestry Assistance Act of 1978 Public Law (95-313).

In 1984, insect and disease detection surveys were performed on over 32 MM acres throughout the Rocky Mountain Region, many in cooperation with state pest specialists in Colorado, Kansas, Nebraska, South Dakota, and Wyoming.

STATUS OF DISEASES

LOGEPOLE PINE DWARF MISTLETOE: Arceuthobium americanum Nutt.

Action plans for survey and suppression of lodgepole pine dwarf mistletoe have continued throughout the Region. Presuppression surveys were conducted on 11,550 acres on the Medicine Bow, Pike and San Isabel, Routt, Shoshone and White River National Forests. Silvicultural control was conducted on 5,220 acres of infested lodgepole pine stands on the Arapaho and Roosevelt, Gunnison, Medicine Bow, Pike and San Isabel, Routt, Shoshone, and White River National Forests.

COMANDRA BLISTER RUST: Cronartium comandrae Peck

In a cooperative (FPM, RMS, Shoshone National Forest and CSU) study during the summer of 1983, 143 possible comandra sites were visited on the Wind River Ranger District of the Shoshone National Forest, Wyoming. This represented approximately 15,375 acres of rangeland adjacent to or located within forested areas. Of these, 76 sites were found to contain comandra populations. From this sample, comandra was found to commonly inhabit dry, open, southwest facing sites, predominately on the middle to upper slopes and ridgetops. Sagebrush was the dominant vegetation associated with comandra plants on 59% of the sites. Comandra populations were rare on sites where grasses were dominant.

In the summer of 1984, 33% of the sites containing comandra were visited. This was to ascertain and quantify the presence of rust on comandra hosts. Rust was present on all sites but at varying intensities. Three semi-permanent plots at three elevations were established to follow rust intensification on comandra plants over a season. The low elevation site increased from low to high rust intensity. The mid-elevation sites increased from very low to low intensity and the high elevation site increased from zero to very low intensity. Because of the small size of the sample no conclusions were made.

Rust incidence data were taken in lodgepole pine stands located at various distances from comandra populations. Most of the sampled stands had a rust incidence between 11% - 50%. The stands farthest from comandra plant sites were approximately six miles away.

ROOT DISEASES

Investigations of root disease losses in the Rocky Mt. Region are in their infancy. Surveys of root diseases conducted throughout the Region have identified three major root disease organisms: Armillaria mellea, Fomes annosus, and Ceratocystis wagneri. No data are available on volume loss; however, study plots have been established throughout the Region to monitor disease development in various host types. To date, no loss estimates have been generated from this data.

Armillaria mellea occurs commonly in association with bark beetle and woodborer attacked and killed trees. Dendroctonus ponderosae, D. valens, Dryocoetes confusus, Ips spp., Scolytus ventralis, Buprestidae and Cerambycidae have been associated with ponderosa pines infected with A. mellea. Along the Front Range 62% of mountain pine beetle killed ponderosa pine were infected by A. mellea. At low beetle populations, greater than 70% of the mountain pine beetle killed ponderosa pine in the Black Hills are infected with A. mellea.

Armillaria is also common in cutover lodgepole pine stands that have regenerated naturally and in pinyon east of the Continental Divide in Colorado.

Fomes annosus, another important root disease, is primarily of concern on white fir in this Region. Concentrations of annosus root disease centers occur in the southwest quadrant of Colorado. During a survey of mortality of tree species in southern Colorado, it was found that 59% of symptomatic white fir and 3% of subalpine fir were infected.

DUTCH ELM DISEASE: Ceratocystis ulmi (Buism.) C. Mor.

Dutch elm disease (DED) was down in Colorado except in Pueblo, Canon City, and LaJunta. These towns continue to lose high numbers of mature American elms. Seven hundred and nineteen trees in 47 areas were diagnosed by the Colorado State Forest Service laboratory as positive in 1984 (258 from Pueblo). This compares with statewide totals of 962 trees in 66 areas in 1983 and 890 trees in 53 areas in 1982.

In South Dakota DED still remains unconfirmed in only five counties. In Nebraska no change was observed.

THYRONECTRIA CANKER: Thyronectria austro-americana (Spegz.) Seeler.

Management of this disease apparently requires manipulation of various environmental factors and proper tree maintenance according to researchers at Colorado State University. Since predisposing environmental stresses are not easily identified or corrected, host resistance could play a role in disease prevention. Four honeylocust cultivars, Imperial, Skyline, Sunburst, and Thornless were assessed for resistance. Fifty, 3-year-old trees of each cultivar were inoculated in the fall and another fifty in the spring to assess seasonal response. Half of the trees were stressed by deep girdling 75% of the tree base two weeks before inoculation. As of July 1984, the Sunburst variety had significantly larger cankers than the other three varieties. Cankers on Skyline and Imperial did not differ from each other. The Thornless seedling selection had significantly smaller cankers than the other three varieties.

NURSERY DISEASES

An evaluation of soil solar heating for control of soil-borne pests at the Bessey Nursery, Halsey, Nebraska was begun in the summer of 1983 and completed in 1984. Populations of weeds and the damping-off fungi, Pythium spp. and Fusarium spp. were significantly reduced due to the solar heating treatment. Populations of plant parasitic nematodes were also monitored, but only low levels were found in the treatment area. Of the parasitic nematode genera found, only Pratylenchus spp. has been known to cause seedling losses at Bessey. Few Pratylenchus spp. were found in the treatment area. Despite the initial low level, a significant reduction in the population of plant parasitic nematodes due to solar heating was demonstrated.

Lodgepole pine was planted in the treatment area in May, 1984; subplots were monitored for seedling survival throughout the summer. No difference could be detected in the stands of surviving seedlings between check and solar-heated plots at any time. However, an obvious growth increase of the sudan grass cover crop, that had been planted a few weeks after solar heating, was observed in the solar heated plots by November 1983.

By May 1984 the population of Fusarium spp. remained low in all plots but the population level of Pythium spp. had increased to high levels. The sudan winter grass cover crop was probably responsible for the increase in Pythium spp. No Pratylenchus spp. were found in any of the plots in 1984. All plant parasitic nematodes genera were scarce in the treatment area, except for Trichodorus sp., which apparently benefits from the sudan grass cover crop.

A technical report of this project will be available in Spring of 1985.

ASPEN REGENERATION MORTALITY

Several stands of aspen regeneration on the Dolores and Mancos Ranger Districts, San Juan National Forest experienced significant mortality to a disease complex. Several leaf disease fungi including ink spot (Ciborinia whetzelli) and leaf blight (Marssonina populi) and Shepherd's crook (Pollaccia radiosa) were common. Cytospora cankers (Cytospora chrysosperma) were found on damaged sprouts and in some instances had caused dieback to the root crown. Snow and animal browse damage were noted as well.

ABIOTIC: Winter Drying

An extensive area on the Pike and San Isabel National Forest suffered damage from extremely cold temperatures experienced during December 1983. Damaged trees were evident from Wetmore to Raton Pass. All species of conifers were affected.

From a distance trees appeared red to red-brown and entire tree crowns were affected. Upon close examination of individual trees it was noted many trees had some green foliage through the interior of the tree. Many ponderosa pine had green tissue at the base of the needles. The extent of injury varied greatly between and among species. Green cambium and buds were found on some trees whereas others displayed brown necrotic tissues.

It is expected that many trees will recover from the damage. Some twig, branch dieback and top kill will occur on severely damaged trees.

Acid Deposition:

The possibility of acid rain damage to forest vegetation was suggested last summer by two visiting acid rain researchers, one from Germany, the other from Vermont, during an acid rain conference at Western State College in Gunnison, Colorado. According to the scientists, damage to trees near Gothic appeared similar to air pollution damage to forests in the northeastern United States and central Europe.

As a result of press coverage and national exposure on television, a task force of scientists from the Colorado State Forest Service, Colorado State University and USDA Forest Service, observers from the US Environmental Protection Agency, National Park Service and Colorado Departments of Health and Natural Resources conducted a four month survey.

For the study, eight test plots were established in the Gothic area. Samples were taken to determine heavy metal soil concentrations and growth rates of trees. Healthy trees and ones which appeared "sick" were examined for insects and fungi, and needles were analyzed for surface and cell damage. An ozone monitor was set up for four weeks to obtain readings on the ozone levels in the area.

The task force concluded that there was currently no evidence to indicate that air pollution was in any way contributing to the natural forest decline processes in the Gothic area and all specific symptoms which resembled acid rain damage were attributed to naturally occurring disease and insects found in forests.

OTHER DISEASES

<u>Disease</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
<u>STEM & BRANCH DISEASES</u>			
<u>Arceuthobium vaginatum</u> <u>subsp. cryptopodium</u>	ponderosa pine	Colorado	Approximately 20% of the host type is infested causing 885 MMCF loss annually.
Siberian elm canker <u>Botryodiplodia hypodermia</u>	Siberian elm	South Dakota	Continues to be a problem. There were more reports this year than in previous years. This may not reflect an increase in incidence but a result of recent training of personnel.
White pine blister rust <u>Cronartium ribicola</u>	Timber pine	Wyoming	Discovered within 15 miles of the Wyoming/Colorado state line, in the Pole Mountains of the Medicine Bow National Forest.
<u>VASCULAR WILTS</u>			
<u>Verticillium wilt</u> <u>Verticillium sp.</u>	Ginnala maples and green ash	Colorado	Observed in Fort Collins and Aurora.
<u>ROOT DISEASES</u>			
Black-stain root disease <u>Ceratocystis wagneri</u>	pinyon	Western Colorado	Trenching and chemical treatments tested in Mesa Verde National Park had limited success in preventing spread of the disease.

<u>Disease</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
<u>FOLIAGE DISEASES</u>			
Anthracnose <u>Gloeosporium</u> spp.	green ash maple	South Dakota	Extensive on these species due to wet spring.
<u>Gnomonia leptostyla</u>	walnut	East central South Dakota	
<u>Diplodia tip blight</u> <u>Diplodia pinea</u>	ponderosa & Austrian pine	Nebraska South Dakota	Branch dieback and tree mortality was common in windbreaks and urban plantings in Nebraska. In the Black Hills, the disease appears to have stabilized.
Ink spot <u>Ciborinia whetzeli</u>	Aspen	Colorado	Continues to be a concern on the White River National Forest.
Juniper blight <u>Phomopsis juniperovora</u> and <u>Cercospora sequoiae</u>	Eastern redcedar & Rocky Mountain juniper	Nebraska	Numerous reports of light infections scattered throughout state.
<u>Marssonina blight & leaf spot</u> <u>Marssonina populi</u>	Aspen poplars	Colorado Wyoming	Reports down compared to 1983. Assume disease is at a low level.
Needlecast probably <u>Lirula macrospora</u>	white spruce	South Dakota	Common on Christmas trees cut from forest.
Shepherd's crook <u>Venturia tremulae</u>	Aspen	Colorado	Most of the incidence reported were on aspen sprouts.
<u>Dothiora polyspora</u>	Aspen	Colorado	This fungus was also found in areas where Shepherd's crook was reported.

<u>Insect</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
<u>NURSERY DISEASES</u>			
Nematode damage	Eastern redcedar	Nebraska	Some damage due to feeding by <u>Pratylenchus penetrans</u> appeared in late summer in limited pockets in 2-0 stock.
Storage Mold <u>Cylindrocarpon didymum</u>	ponderosa pine	Colorado	Approximately 15% of the container stock in a snow cache on the San Juan NF were destroyed.
<u>ABIOTIC</u>			
Flooding	Hardwoods All pines Black Hills spruce Eastern redcedar	South Dakota	Heavy rains and high water tables resulted in many flooded areas. Trees in these locations showed symptoms of decline.
Herbicide drift	Conifers & hardwoods	South Dakota	Approximately 10% of all service calls to the State Forest Pest Specialist were related to herbicides.
Iron deficiency	maples pin oaks	South Dakota	Urban tree problem.
<u>OTHER</u>			
Decline	Hackberry	Nebraska	Continues to be a problem in urban areas, possibly caused by herbicide injury.

<u>Disease</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
	ponderosa pine	Colorado	A consensus has not been obtained as to the cause of the general decline of pine in the corridor from Pagosa Springs to Durango. Although pine budworm has been discovered it is felt a complex of factors are at work rather than a single agent.
	ponderosa pine	South Dakota	Black Hills National Forest in area of Harney Ranger District. Etiology is undetermined.
Winter drying and mortality	maples ponderosa pine russian olive Scotch pine	South Dakota	
	Douglas-fir juniper lodgepole pine pinon lodgepole pine spruce	Colorado	Was the most spectacular disease problem in Colorado this year. Classic examples of "red belt" existed along the Front Range from Magnolia south to Raton Pass. Conspicuous browning was observed west of Walsenburg to LaVeta Pass, on the north and south sides of Cucharas Pass and in the St. Charles drainage.

STATUS OF INSECTS

Bark Beetles

MOUNTAIN PINE BEETLE: Dendroctonus ponderosae Hopkins

Mountain pine beetle remains the most prominent bark beetle in the Rocky Mountain Region. This year, 430,000 dead trees were aerially detected on 330,800 acres. Infestation in ponderosa pine have generally remained low relative to mortality levels over the past 15 years.

Areas where significant increases occurred included the Sanborn Park area on the Uncompahgre National Forest and adjacent areas near Blue Mesa Reservoir. Based on aerial detection and ground evaluations, the total trees per acre infested in 1984 showed a 72% increase over the numbers infested from 1980-1983. Mountain pine beetle, D. ponderosae, roundheaded beetle, D. adjunctus, and western pine beetle, D. brevicornis are the cause of tree mortality in these areas. Salvage and timber sale activities are being continued in attempt to restrain the current infestation trend.

In northcentral Colorado, attacks in lodgepole pine continue. Aerial surveys detected 65,664 faded trees covering 32,389 acres this year. The High Country Integrated Pest Management Project completed its first year of operation to respond to public concerns on this wide scale outbreak. Suppression efforts resulted in direct treatment (various methods) of 65,600 trees, thinning of 1,090 acres, and preventive spraying of 35,700 trees on state and private lands. The White River National Forest treated about 365,240 trees. These treatments included: direct chemical treatment of infested trees - 47% of total; removal of infested trees (commercial salvage) - 35%; preventive spraying 15%; timber sale harvested - 1%. Additional acres were harvested in the project area to begin correcting the distribution of age classes throughout the type.

SPRUCE BEETLE: Dendroctonus rufipennis Kirby

The spruce beetle outbreak continued on the Rio Grande National Forest. The gross area of infestation is now 27,822 acres. The Forest is continuing efforts to reduce spruce beetle impacts through increased harvesting, salvaging of infested trees, and trap trees. Surveys on the Del Norte District indicate that increased harvesting activity and unfavorable weather conditions are reducing the beetle problem. Cutting efforts are in the fourth year and will continue through 1985.

DOUGLAS-FIR BEETLE: Dendroctonus pseudotsugae Hopkins

Losses to Douglas-fir beetle are continuing in Colorado, particularly around Douglas Pass north of Grand Junction. It is suspected that repeated defoliation by western spruce budworm is causing increases in host susceptibility to attack by Douglas-fir beetle. Increased mortality occurred in these areas of intense budworm defoliation on the Roosevelt NF. Nearly 2,300 acres containing beetle killed Douglas-fir have been detected along the Front Range.

Elsewhere in Colorado, scattered occurrences of Douglas-fir beetle are evident on the Gunnison, San Isabel, San Juan, and White River National Forests covering a total of about 4,700 acres.

In Wyoming, infestations occurred in scattered patches along the west and central slopes of the Bighorn Mountains south of the Bighorn NF and on the Worland District (BLM). Douglas-fir beetle and mountain pine beetle (on lodgepole pine) occur interspersed along the Bighorn Mountains.

DEFOLIATORS

WESTERN SPRUCE BUDWORM: Choristoneura occidentalis Freeman

Western spruce budworm remained the most widespread defoliator in the Region (Figure 1). Again, defoliation damage was mapped from the air and resulting estimates were 2,210,924 acres of defoliation activity in Colorado and Wyoming combined (Figure 2). This is a reduction of 539,387 acres from 1983 acreage estimates. Regionwide, the severity of defoliation remains classed as moderate.

In Wyoming the gross area of defoliation activity increased slightly. Part of the increase is an apparently isolated infestation of 370 acres. This occurs in the Medicine Bow NF, west of Centennial. Intensity of the budworm infestation decreased on the northern (near Cody) and southeastern (near Lander) portions of the Shoshone NF and surrounding land ownerships.

The egg mass survey results for 1984 indicate the overall infestation will be moderate in 1985 where the budworm is present (Figure 3).

Along the Colorado Front Range, gross infestation on private land is now over one million acres. Tree mortality and lesser forms of permanent damage are evident statewide within host stands. About 15,000 acres were sprayed aerially on private land - most along the Front Range from Redfeather Lakes and Estes Park south to Conifer, Evergreen, and Divide. The Colorado State Forest Service is proposing to install silvicultural demonstration areas for budworm in 1985, which will incorporate guidelines developed in the northern Rockies and New Mexico.

WESTERN TENT CATERPILLAR: Malacosoma californicum Packard

The western tent caterpillar infestation continued to expand in southwestern Colorado as predicted. The area of defoliated aspen, Populus tremuloides Michx, now surpasses 70,000 acres (Figure 4). Most expansion has occurred to the north and southeast across private land along the Navajo River and into the Rio Grande National Forest. Egg mass density surveys have been conducted since 1977 to predict proceeding year defoliation intensity. So far, all surveys held true in predicting heavy defoliation. Although a general declining trend has been occurring since 1980, egg mass counts (1984)

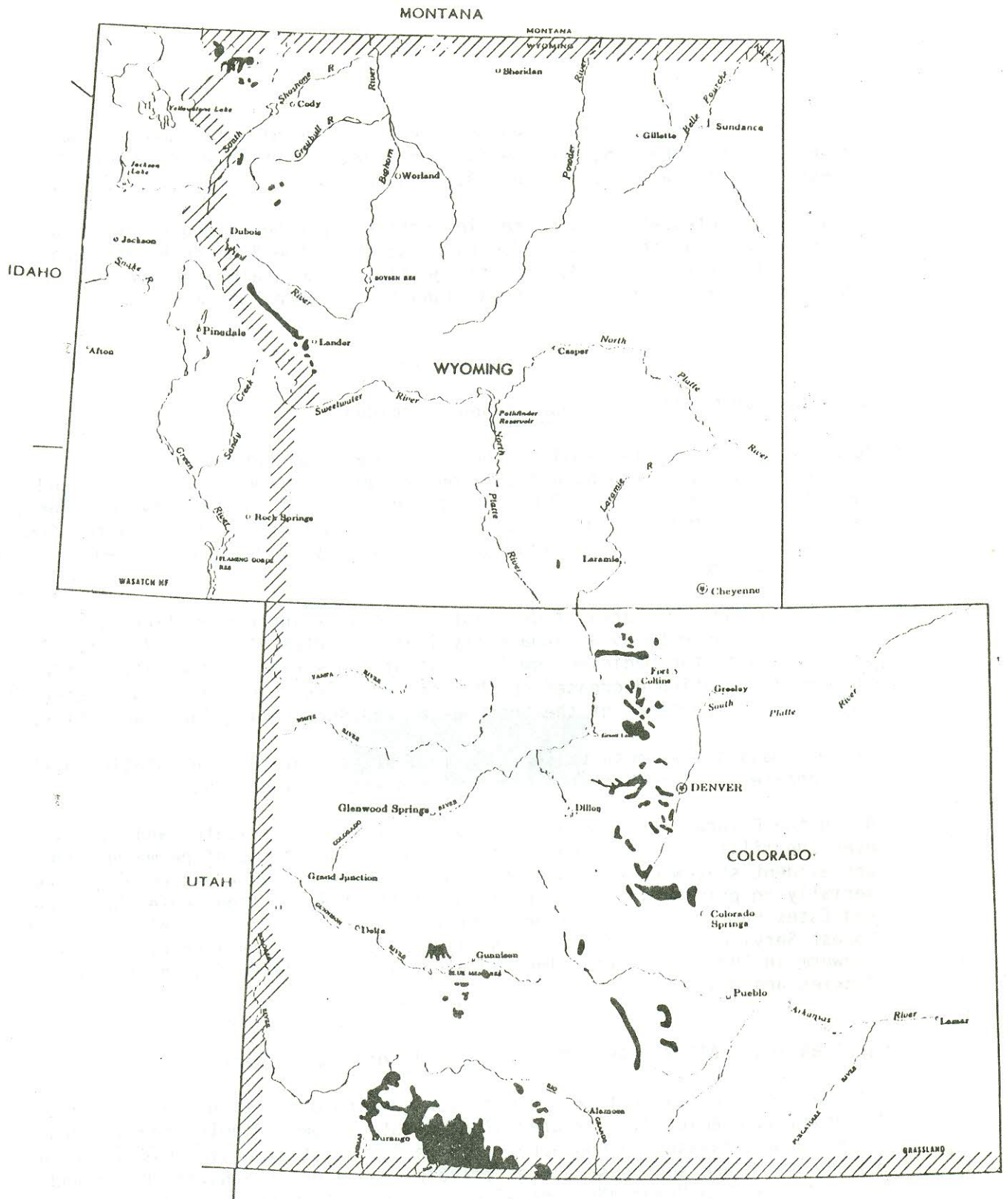


Figure 1. Occurrence of visible western spruce budworm defoliation in the Rocky Mountain Region.

Figure 2--Western spruce budworm defoliation in Region 2, 1979-1984.

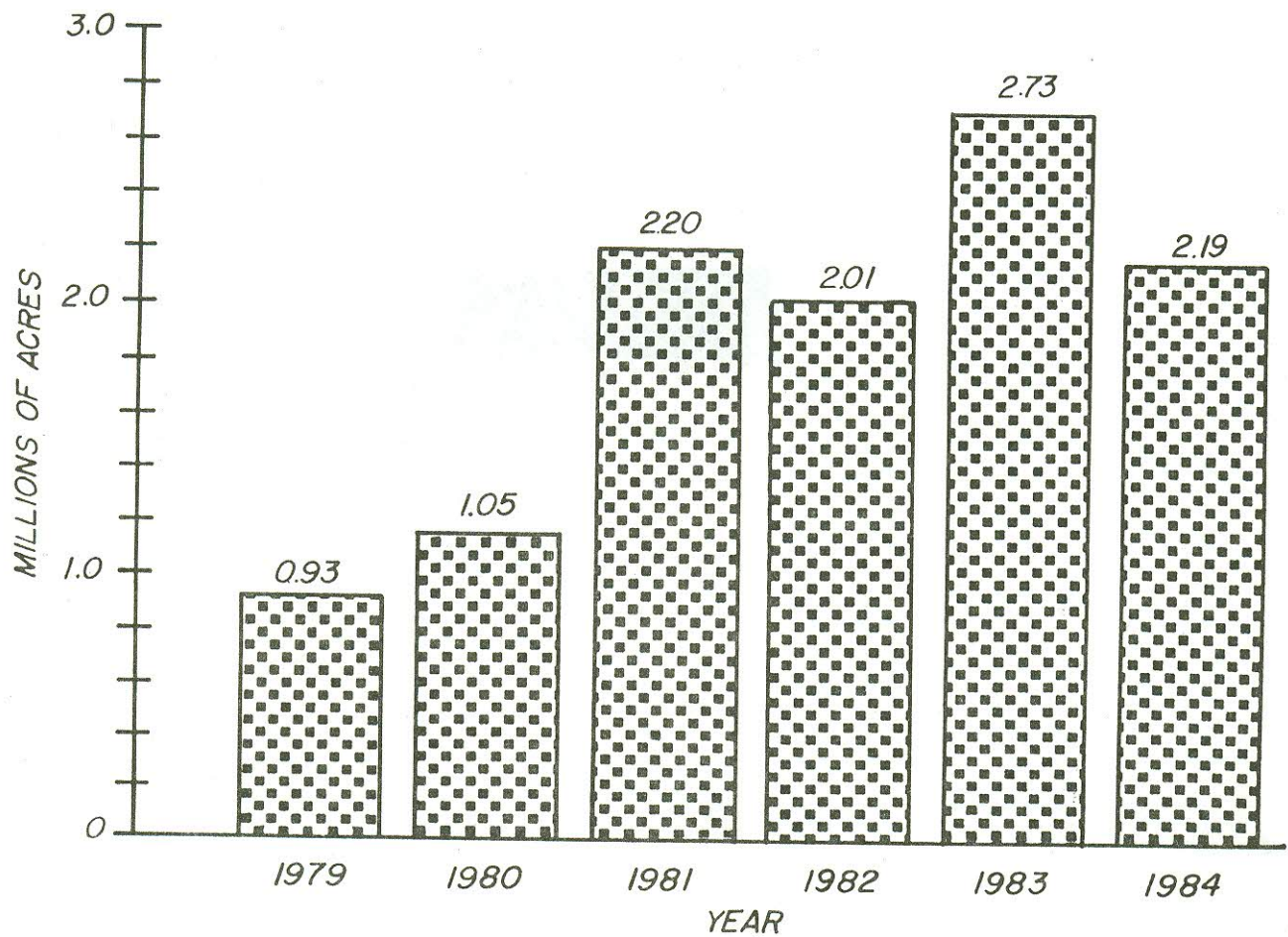
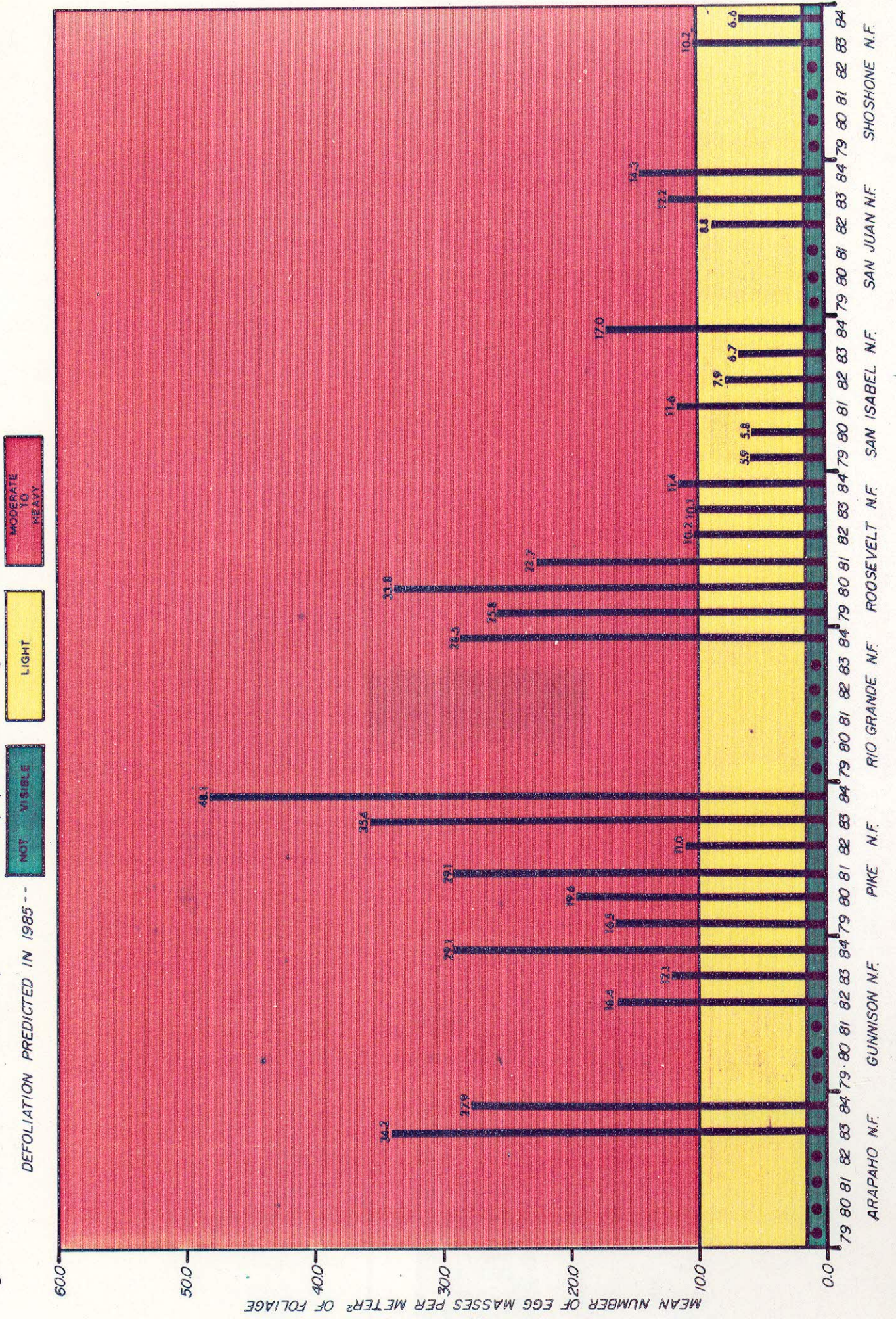


Figure 3-- Results of the annual spruce budworm population survey from 1979 to 1984.



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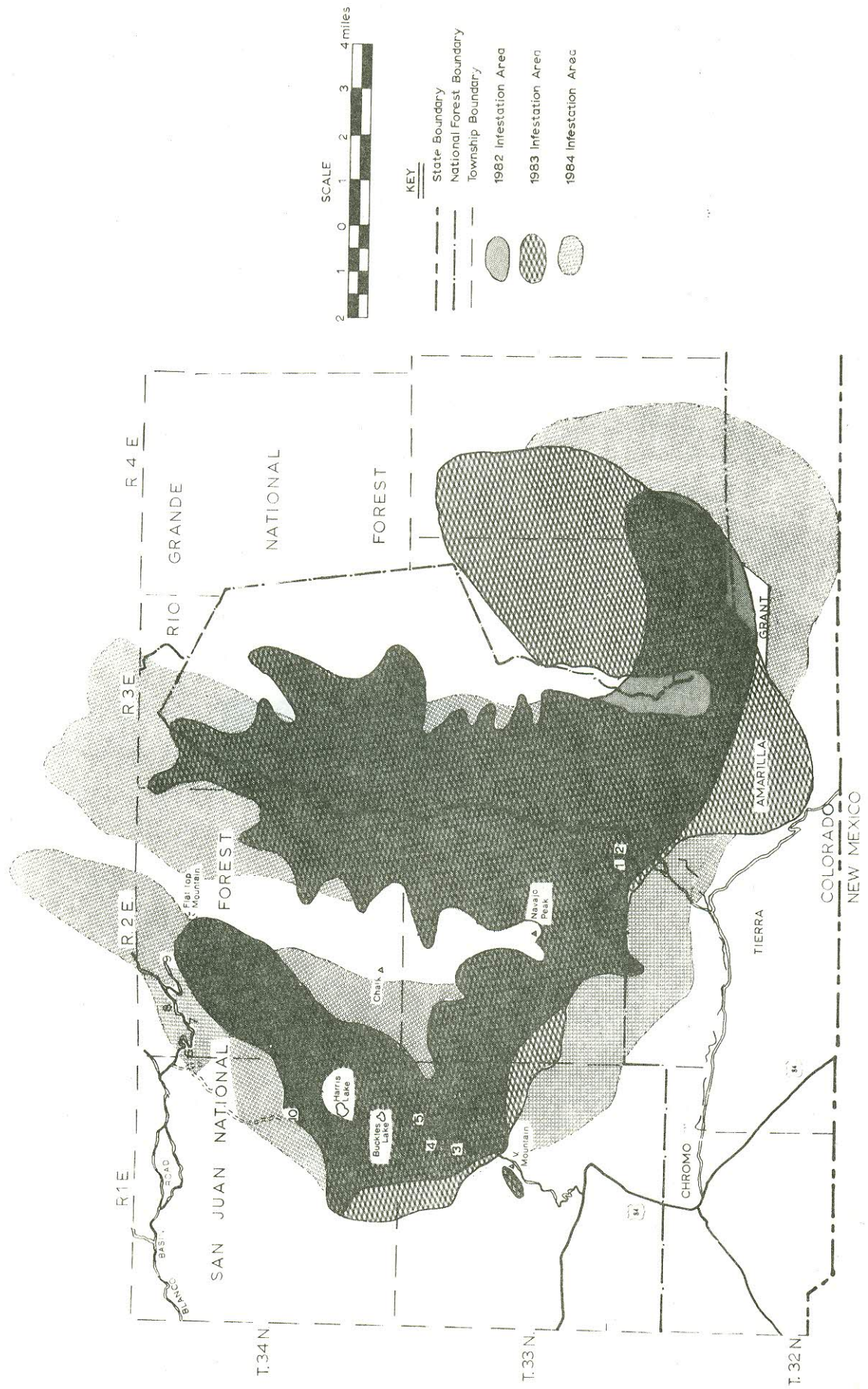


Figure 4--Western tent caterpillar defoliation on the San Juan and Rio Grande National Forests and adjacent land.

indicate heavy defoliation will continue in 1985. In addition, age, growth, and defect data were gathered to determine the impact of continuous defoliation on aspen.

Large aspen tortrix, Choristoneura conflictana Walker, egg masses were found in numbers exceeding tent caterpillar egg masses in three sites contiguous within the western tent caterpillar defoliated area.

DOUGLAS-FIR TUSSOCK MOTH: Orgyia pseudotsugata McDunnough

The tussock moth continued as a major pest of ornamental blue spruce, white fir, and Douglas-fir. Varying levels of defoliation occurred as far south as Colorado Springs and extended north through the Denver area to Fort Collins. Larvae were found in several forested areas along the Front Range in areas of spruce budworm defoliation.

In Wyoming, Douglas-fir tussock moth was detected around Sinks Canyon in the south Shoshone NF. Here the level of tussock moth defoliation is also obscured by western spruce budworm feeding activity.

Efforts to delineate and evaluate the significance of outlying (forest) populations along the Front Range will be conducted in 1985 by the Colorado State Forest Service and Forest Pest Management.

GYPSY MOTH: Lymantria dispar Linnaeus

Pheromone trapping continued (third year) in all five states of Region Two. Three adult moths were reported caught in 1984 - all suspected as hitchhikers on vehicles from infested areas in the eastern US. In Colorado, 850 traps were placed on Federal land. One moth was caught in Rocky Mountain National Park. This is the first recorded for the State. In South Dakota, 900 pheromone traps were placed throughout the State. Two male moths were trapped - one at Mt. Rushmore and one near Rapid City. Considerable inter-agency cooperation is planned for the trapping program in 1985.

OTHER INSECTS

<u>Insect</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
Ash/lilac borer <u>Podosesia syringae</u> (Harris)	Green ash Lilac	Nebraska South Dakota	A major problem of ornamentals, moderate damage occurring, particularly in Omaha. Occurring primarily on young trees in South Dakota.
Cerambycid wood borer complex (various sub-families)	various pine and hardwoods	Colorado South Dakota	A nuisance to households. Several calls received by state and Federal pest specialists regarding beetle emergence from firewood.
Cecropia moth <u>Hyalophora cecropia</u> (Linnaeus)	cherry plum	South Dakota	Increases of defoliation reported in urban areas. Extent of damage undetermined.
Cooley spruce gall adelgid <u>Adelges cooleyi</u> (Gillette)	blue spruce Douglas-fir Engelmann spruce	Colorado	Continues to be common on ornamentals.
Cottonwood twig gall aphid <u>Pemphigus</u> sp.	Cottonwood	Wyoming	Undetermined damage occurring. Reports of occurrence in Goshen County, Wyoming.
Cylindrical bark beetle <u>Chrysopogonius</u> sp.	pinyon pine	Colorado	Specimens were submitted to the National Systematics Museum (NSM) and confirmed a new species. Collected at Mesa Verde National Park under root bark. Plans are to collect and submit more specimens to NSM. Damage to host unknown.
Elm leaf beetle <u>Pyrrhalta luteola</u> (Muller)	American elm Siberian elm	Colorado Nebraska South Dakota	Static levels of moderate defoliation occurred commonly on ornamentals. Also reported as a nuisance in urban area households.

<u>Insect</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
Fall webworm <u>Hyphantria cunea</u> (Drury)	chokecherry cottonwood plum, wild rose	Colorado Nebraska South Dakota	Widespread in Colorado and Nebraska primarily in drainages. Extent and trend undetermined. South Dakota populations declined this year and during the past 3 years.
Forest tent caterpillar <u>Malacosoma disstria</u> (Hubner)	crab apple green ash	Wyoming	Light defoliation reported scattered throughout the state.
Fruittree leafroller <u>Archips argyrospilus</u> (Walker)	boxelder green ash	Wyoming	Light defoliation reported. Larvae were collected west of Douglas, Wyoming.
Fungus gnat <u>Bradyzia</u> spp.	aspen	Colorado	Girdled and stripped roots of 50% of small experimental planting of aspen container seedlings sown late in July.
Gray willow leaf beetle <u>Pyrrhalta decora</u>	aspen	South Dakota	Heavy defoliation occurred on young aspen in a small aspen clearcut. In the Black Hills NF we have no previous records of this insect in the area. Infestation trends will be monitored.
Honeylocust podgall midge <u>Dasineura gleditschiae</u> (O.S.)	honeylocust	Colorado Wyoming	Static light to moderate infestation in urban areas. Causing light aesthetic impact.
Jack pine budworm <u>Choristoneura pinus</u> Freeman	jack pine	Nebraska	None to light defoliation. Populations show no significant increase since Bt and Dipel® treatment in 1980. Population levels will be determined this year (1985)
Large aspen tortrix <u>Choristoneura conflictana</u> (Walker)	aspen	Colorado	Light defoliation reported in the state. Primarily in southwest Colorado.

Insect	Host	Location	Remarks
Mites (probably clover mite) <u>Bryobia</u> spp.	ponderosa pine	Colorado	30% of 2 year old container stock in shadehouse exhibited extensive needle stippling and chlorosis due to feeding by red mites.
Oak twig girdler <u>Oncideres cingulata</u> (Say)	red oak	Nebraska	Continues to cause light branch mortality.
Peachtree borer <u>Synanthedon exitiosa</u> (Say)	peach plum	Colorado	Causing an undetermined amount of damage.
Pine budworm <u>Choristoneura lambertiana</u> (Busck)	ponderosa pine	Colorado	Light defoliation along the Front Range. Found commonly in combination with other defoliators in southern Colorado.
Pine butterfly <u>Neophasia menapia</u> (Felder & Felder)	ponderosa pine	Colorado	Outbreaks reported near Parker, CO. Moderate to heavy defoliation occurred in southern Colorado where pine butterfly and pine budworm infestations overlap. Other biotic agents are common in the area. Underlying reasons for these occurrences are suspected. An investigation may be conducted in 1985-86.
Pine engraver beetles <u>Ips</u> spp. complex	all pines	Colorado South Dakota	Remains common particularly in areas near thinning operations. Increases occurred in southern part of the Black Hills NF.
Pine moth complex <u>Dioryctria ponderosa</u> Dyar <u>Dioryctria tumicollella</u>	Austrian pine ponderosa pine Scotch pine	Colorado Nebraska South Dakota	Causing moderate defoliation primarily in young pine. Most severe in central and western Nebraska. <u>D. zimmermani</u> prominent in South Dakota <u>sheiterbelts</u> .
Zimmerman pine moth <u>Dioryctria zimmermani</u> (Grote)			

<u>Insect</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
<u>Dioryctria pseudotsugella</u> (Munroe)	Douglas-fir	Wyoming	Common in spruce budworm infestation areas of the Shoshone NF. Formerly thought to be another budworm species. Feeding activity apparently not restricted to cones and cambium. Damage undetermined due to budworm feeding.
Pine needle miner <u>Coleotechnites ponderosae</u> (Hodges & Stevens)	ponderosa pine	Colorado Wyoming	Static to decreasing along the Front Range. Most notable defoliation activities occur near the Big Thompson Canyon area of Colorado. Light infestations occur in Wyoming.
Pine needle scale <u>Chionaspis pinifoliae</u> (Fitch)	pine	Colorado Nebraska	Common in metropolitan and outlying forested areas in Colorado. Population trends undetermined in both states.
Pine needle sheath miner <u>Zelleria haimbachi</u> (Busck)	ponderosa pine	Colorado	Undetermined amount of damage near Pagosa Springs and north of Durango. Occur with other defoliators in southern Colorado.
Pine tip moth complex Southwestern pine tip moth <u>Rhyacionia neomexicana</u> Dyar Pine tip moth <u>Rhyacionia</u> sp.	pine	Wyoming Colorado Kansas Nebraska South Dakota	Reported near Casper, Wyoming. Damage undetermined. Moderate damage reported in young pine throughout Nebraska. Numbers continue to increase.
Poplar and willow borer <u>Cryptorhynchus lapathi</u> (Linnaeus)	poplars willow cane	Wyoming	Larvae were reported in Evanston, Wyoming. Damage undetermined.
Silver spotted tiger moth <u>Halisidota argentata subalpina</u> (French)	Juniper pinyon pine	Colorado	Light defoliation spread over several thousand acres west of Colona. Other small outbreaks present in southern Colorado near Durango.

<u>Insect</u>	<u>Host</u>	<u>Location</u>	<u>Remarks</u>
Spring cankerworm <u>Paleacrita vernata</u> (Peck)	ash, elm hackberry honeylucust	South Dakota	Populations have collapsed since 1983 in the northeast corner of the state.
Spruce mycorrhizal aphid <u>Rhizomaria piceae</u> (Hartig)	spruce	Colorado	Reported occurring in spruce containers at Colorado State University Nursery, Fort Collins, CO.
Spider mites <u>Oligonychus</u> sp.	spruce	South Dakota Wyoming	Increasing damage is occurring in South Dakota. Heavy infestations were reported near Newcastle, Wyoming.
Twig beetle <u>Pityogenes carinulatus</u> (Le Conte)	ponderosa pine	Colorado	Moderate to heavy mortality occurring in stands heavily infested with dwarf mistletoe along the Poudre River in northern Colorado.
Variable oakleaf caterpillar <u>Heterocampa manteo</u> (Doubleday)	Bur oak	South Dakota	Populations have collapsed suddenly due to natural agents.
Western balsam bark beetle <u>Dryocoetes confusus</u> Swaine	subalpine fir	Colorado	Scattered mortality remains common in conjunction with vascular wilt disease throughout host range.
Western conifer seed bug <u>Leptoglossus occidentalis</u> Heidemann	Pine	Colorado Nebraska	Common on Scotch pine mainly in seed orchards. Degree of damage unknown.

FOREST PEST MANAGEMENT WORKSHOPS

The Forest Pest Management staff group conducted two workshops on recognition and suppression of major forest diseases and insects in the Region. Training consisted of two-day workshops each, held in Spearfish, South Dakota (May 15-16) and Leadville, Colorado (June 13-14). Sessions were attended by resource managers from the South Dakota State Division of Forestry, Custer State Parks, the Bureau of Land Management, and the USDA Forest Service.

PESTICIDE USE IN REGION 2 - FY 84

Type of Pesticide	Chemical Used	Target Pest	Units	
			Treated ^{1/}	User ^{2/}
Fumigant	Methyl bromide	Nematodes, root disease fungi and weeds in nursery beds.	15	I
Fungicide	Benomyl	Phomopsis blight in eastern redcedar nursery beds.	65	I
	Chlorothalonil	Tip blight in nursery stock.	10	I
	Copper	Tip blight in nursery stock.	10	I
	Dodine	Shothole disease in nursery stock	12	I
	Ammonium chloride	Fungus, mildew	60 Toilets	I
Herbicide	Bromacil and Diuron	Vegetation control around oil and gas facilities	20	III
	DCPA	Annual and perennial broadleaf weeds in nursery beds.	34	I
	Dicamba	Canada thistle, leafy spurge, noxious weeds	331	I
	Diphenamid	Annual and perennial broadleaf weeds in nursery beds	3	I
	Glyphosate	Annual and perennial broadleaf weeds in nursery beds	11	I

^{1/} Units are in acres unless otherwise indicated

^{2/}
 I = USFS
 II = Other Federal or public agencies
 III = Permittees, licensees, and grantees

<u>Type of Pesticide</u>	<u>Chemical Used</u>	<u>Target Pest</u>	<u>Units Treated</u>	<u>User</u>
Herbicide	Glyphosate	Canada thistle, leafy spurge, larkspur, toad-flax, noxious weeds	235	I, II
	Picloram	Canada thistle, leafy spruce, larkspur, toad-flax, henbane, noxious weeds	2,782	I, III
	Simazine	Annuals weeds around planted trees	5	I
	2,4-D	Canada thistle, leafy spurge, field bindweed, noxious weeds	814	I, II
	2,4-D	Sagebrush	640	I
	2,4-D	Wyethia	350	I
	2,4-D	Range improvement	175	I
Insecticide	Carbaryl	Cottonwood leaf beetle, grasshoppers in nursery beds	6	I
	Carbaryl	Mountain pine beetle prevention	6,619 trees	I
	Coumaphous	Cattle flies	900 head	III
	Dimethoate	Pine tip moth in nursery beds	30	I
	Ethylene dibromide	Mountain pine beetle control	3,000	I
	Lindane	Mountain pine beetle control	1,946 trees	I
	Lindane	Mountain pine beetle control	9,900	I
	Resmethrin	Crawling insects in dumpsters	50 dumpsters	I

<u>Type of Pesticide</u>	<u>Chemical Used</u>	<u>Target Pest</u>	<u>Units Treated</u>	<u>User</u>
	Toxaphene	Lice control on cattle	400 head	III
Rodenticide	Aluminum phosphide	Black-tailed prairie dogs	6,866	I, III
	Aluminum phosphide	Ground squirrels	150 burrows	I
	Strychnine	Pocket gophers	---	I
	Zinc phosphide	Black-tailed prairie dogs	22,449	I, III

OUTLOOK FOR CONTINUED USE OF HERBICIDES IN R-2

(Major herbicide uses only) ^{1/}

Herbicide	Application Method	Acres Treated				
		1980	1981	1982	1983	1984
2,4-D	Ground	1,036	1,155	585	1,011	1,971
2,4-D	Aerial	9,950	14,297	15,646	8,287	^{2/}
Picloram (Tordon)	Ground	2,747	2,202	3,161	2,151	2,782
Glyphosate (Roundup)	Ground	162	197	242	98	235
Dicamba (Banvel)	Ground	269	399	291	153	339

^{1/}

Major target species are big sagebrush, sand sagebrush, Canada thistle, leafy spurge, Wyethia and various broadleaf weeds for range improvement and roadside management projects.

^{2/}

No aerial application of herbicides in FY 84.

ACTIVE PROJECTS

* FPM Involvement

Dwarf mistletoes

- * Silvicultural control of dwarf mistletoe in young lodgepole pine stands (FPM, RMFRES)

Development of a growth and yield model for mistletoe-infested, uneven-aged ponderosa pine stands in the Colorado Front Range (CSU, RMFRES).

Refinement of growth and yield models for even-aged lodgepole pine and ponderosa pine (RMFRES).

Development of a growth and yield model for dwarf mistletoe-infested mixed conifer stands in the Southwest (RMFRES, Univ. Northern Ariz.)

Taxonomy, host, and distribution of the genus Arceuthobium (RMFRES, PSWRES, Univ. of Utah)

Bird and mammal vectors of lodgepole pine dwarf mistletoe (RMFRES, NCFES)

Chemical control of dwarf mistletoe with Etherel (NCFES, RMFRES, Univ. of Minn.)

Decays

Rate of deterioration of beetle-killed Engelmann spruce in Colorado (RMFRES)

Stem Diseases

- * Evaluation of aspen cankers and stem rots in relation to timber harvesting in Colorado and New Mexico (FPM, R-2, R-3; RMFRES)
- * Evaluation of diseases associated with sprout damage and mortality in clearcut aspen stands (RMFRES, FPM, R-2)
- * Evaluation of damage and recommendations for control of comandra rust in lodgepole pine (CSU, FPM, R-2; Shoshone NF, RMFRES).

Root Diseases

- * Armillaria root rot spread plots (FPM, R-2).
- * Blackstain root disease - chemical and mechanical treatment (FPM, R-2).

Bark Beetles

- * Association of Armillaria root disease with mountain pine beetle infestations in ponderosa pines in the Black Hills National Forest, South Dakota (FPM, R-2; MAG).
- * Mountain pine beetle preventive spray treatment evaluation in Tabernash Campground, Arapaho National Forest, Colorado (FPM,R-2).
- * Post control evaluation of mountain pine beetle in Grand County Colorado (FPM, R-2).

Defoliators

- * Western spruce budworm damage assessment evaluation along the Front Range (FPM, R-2).
- * Gypsy moth detection program (trapping) (APHIS, Regional Cooperators).

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