FIRE MANAGEMENT

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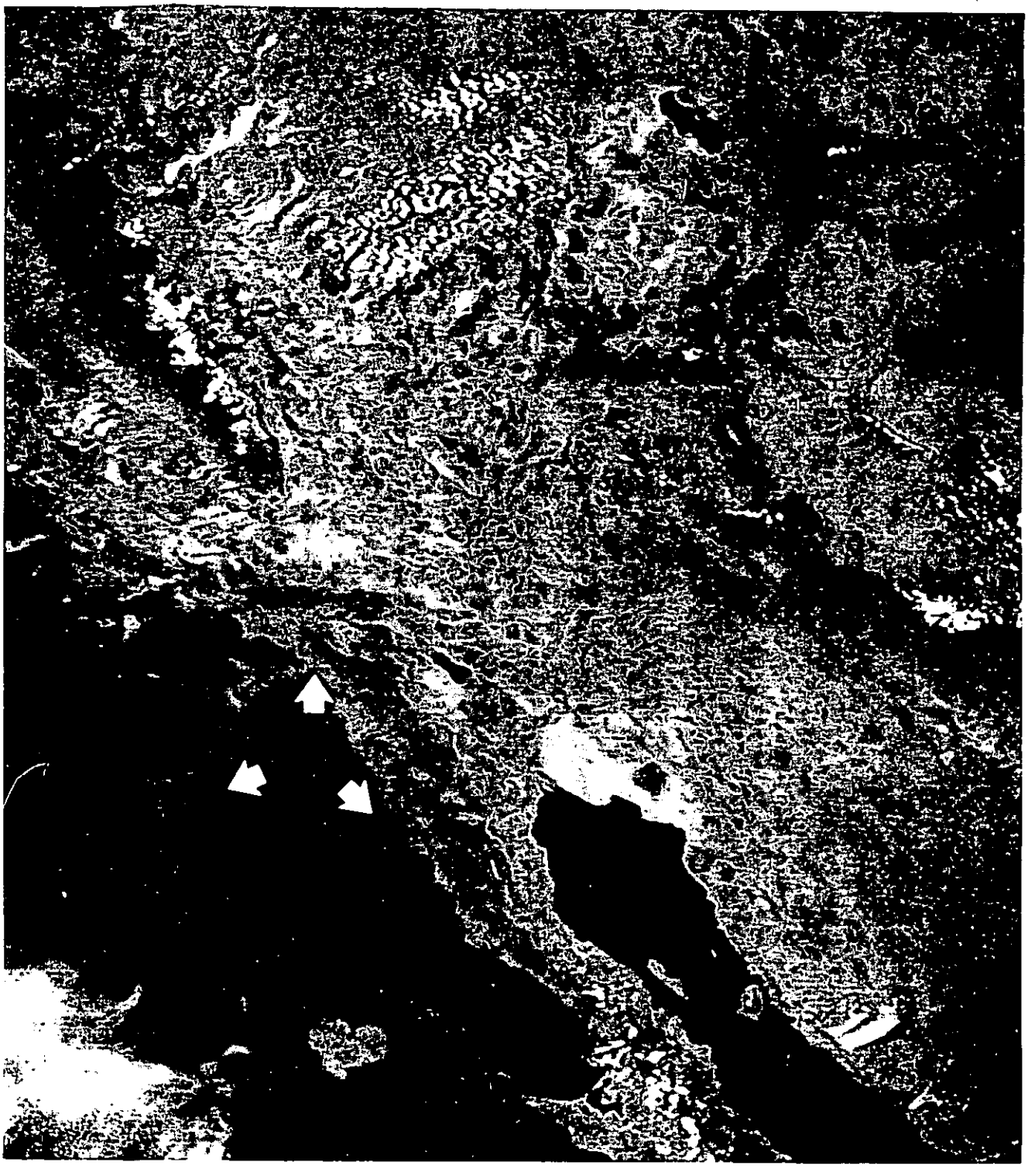
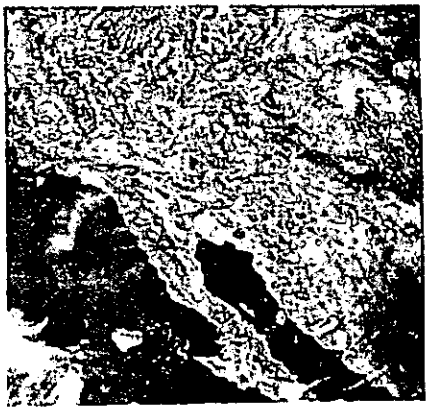


FIRE MANAGEMENT

An international quarterly periodical devoted to forest fire management



THE COVER

The cover photo was taken at 7:45 a.m. P.d.t. on September 24, 1975, by an SMS-2 meteorological satellite in geostationary orbit about 23,000 miles above the Equator. The plume of smoke, which arises northwest of the Salton Sea and swirls counterclockwise over the Pacific Ocean and back across Baja California, was produced by the 11,000-acre man-caused Tenaja Fire which was burning east of Camp Pendleton, Calif. The relative locations of the Great Salt Lake and Lake Tahoe give an indication of the magnitude of the smoke column. (NOAA/NESS photograph.)

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Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. 75 cents, or by subscription at the rate of $3.00 per year domestic, or $3.75, foreign. Postage stamps cannot be accepted in payment.

High-Lead Scarification: An Alternative for Site Preparation and Fire-Hazard Reduction

Franklin R. Ward and James W. Russell

It is essential, in most instances, that logging residue on clearcut units be treated to reduce fire hazard to a desired level, to permit establishment of regeneration, and to provide access for wildlife and dispersed recreation activities. The residue should be treated as soon as possible after harvesting operations are completed. Prescribed burning has been accepted as an economical and practical method of reducing residue; but public awareness of air quality, esthetics, recreation, and soil damage has prompted a search for other methods of treating residue. Equipment is needed to scarify, break, or masticate the residue to reduce fire hazard and insure immediate regeneration.

The Study

A study was conducted to evaluate a scarifying tool[1] connected into a cable logging system. Objectives were to learn if this tool would reduce the fire hazard and adequately prepare an area for planting and to determine production rates and costs.

The tool was a 1½ by 4½ foot steel cylinder, concave on both ends, filled with concrete. The tool was connected into a cable system with a 25-foot mobile yarding tower and a specially modified crawler tractor which served as a mobile tailblock. The scarifying action was attained when the weighted cylinder was dragged back and forth between the tower and the tractor (fig. 1). Extent of yarding distance that the unit could work was 800 feet.

Data were collected on residue loading, depth and area covered by duff and litter, and height and area covered by brush. These data were collected before and after treatment by an adaptation of a line-intersect sampling method (2). Fire hazard was rated before and after treatment by the Region 6 fuel classification

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[1]Constructed by Michener Reforestation Co., Inc., Vemonia, Oreg.

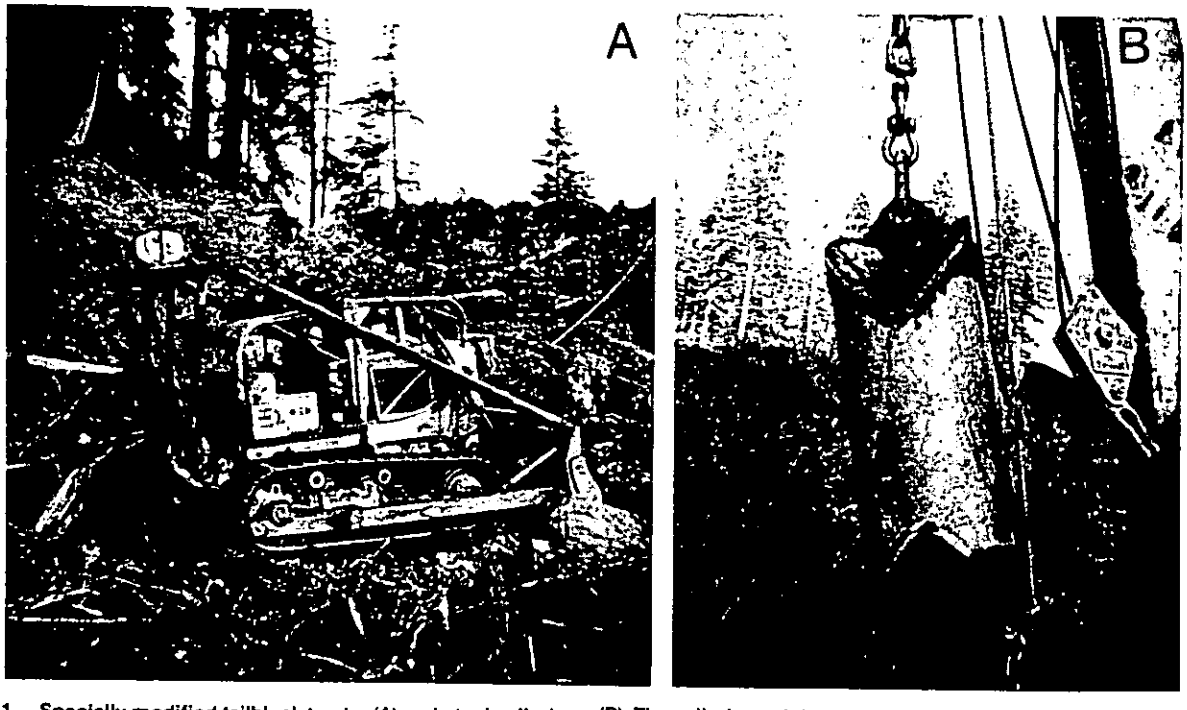

Figure 1.—Specially modified tailblock tractor (A) and steel cylinder (B). The cylinder weighs 1 ton when filled with concrete.

system (1)—rate of fire spread and resistance to conrol were rated extreme (E), high (H), medium (M), or low (L). Production rates were kept by the operator and District personnel.

The tool was used on two old-growth clearcut units on the Wind River Ranger District, Gifford Pinchot National Forest, in Washington. The District had been unsuccessful in reducing the residue by broadcast burning on the first unit studied. Logging residue on that unit averaged 175 tons per acre. Smaller diameter material and fine fuels were scattered throughout the unit; larger pieces were concentrated on the flats and gentler slopes. Average diameter was 13.5 inches; however, pieces ranged up to 30 inches. A duff-litter layer, averaging 2.5 inches in depth, covered 95 percent of the area. Rocky outcroppings and steep slopes ruled out tractor scarification.

The second unit was clearcut and burned with the majority of the logging residues consumed. This site was quickly taken over by chokecherry, vine maple, and ceanothus. Brush covered almost 100 percent of the area and ranged up to 6 feet in height. The combined effect of the overtopping brush and an extensive duff layer, averaging 3 inches in depth, eliminated any chance for natural regeneration. Pacific silver fir seedlings were growing on some skid trails where mineral soil was exposed. Stocking and seedling growth adjacent to the clearcut appeared normal. The general steepness of this area precluded scarifying by tractor.

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Results

It required 43 hours to scarify 34 acres of the first unit. An additional 17 hours were expended in moving the yarder and building a road for the tailblock tractor. Total cost of production for move in, setup time, and treating the unit was $8,295, or $244 per acre.

Logs, up to 12 inches in diameter or larger, if decayed, were broken into smaller pieces. Mineral soil was exposed on 25 percent of the area treated and well distributed so that adequate planting space was available throughout. Although there were still some concentrations of residue rated HH, the unit as a whole was reduced to MM (fig. 2).

About 42 hours were required to scarify 29 acres in the second area. Easy access for the tailblock tractor on this unit reduced the setup time to 5 or 6 hours. Total cost for treating this unit was $7,657, or $264 per acre. This slightly higher production cost for the second unit is due to occasional hangups for the scarifying device on the heavy brush, thus necessitating additional work. Scarifying this unit reduced 62 percent of the standing brush (fig. 3) and exposed mineral soil on 72 percent of the unit. The rate of spread and resistance to control were rated extreme-high (EH) before treatment and were reduced to high-medium (HM) after treatment.

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Figure 2—Pretreatment (A) and posttreatment (B) of logging residue.

A Prevention Opportunity

Arthur N. Creelman

The decision to use Fort Indiantown Gap near Harrisburg, Pa., as a Vietnamese Refugee Center set the wheels in motion in the Division of Forest Fire Protection, within the Pennsylvania Bureau of Forestry, to take advantage of a unique opportunity for fire prevention education. After some discussion as to what might be done, the Division contacted Miss Ginny Long, Youth Coordinator for the American Red Cross in Harrisburg.

A meeting was held with Miss Long to try to set up some sort of method of exposing these new American residents to fire prevention. She inquired as to the possibility of the Division providing some materials to keep the incoming Vietnamese refugee children entertained and occupied. It seems that all kinds of provisions had been made to aid and process the adult refugees, but nothing had been done to keep the little ones occupied and happy. The children could also serve as a vehicle to get fire prevention information to the adults.

Within 24 hours the Division had provided the Red Cross with: 4,000 copies of Smokey Bear's "Story of the Forest," 4,000 Smokey Bear Balloons, 4,000 Smokey Bear Coloring Sheets, and 2,500 copies of "True Story of Smokey Bear." The Division wanted each child to have his own item and not have to share it with several other children. What will be the results of this? Only the future can tell. These children may not be able to speak English, but they already know about one famous American and what he stands for—Smokey Bear.

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These Vietnamese refugee children at Ft. Indiantown Gap near Harrisburg, Pa., may not be able to speak English, but they already know about one famous American and what he stands for—Smokey Bear. (Photo by Harrisburg Chapter of the American Red Cross.)

Roscommon Equipment Center: A 20-State Approach to ED&T

William G. Herbolsheimer

The State Foresters and Fire Supervisors of the 20 Northeastern States are involved in the fourth year of a cooperative effort in equipment development and testing. The program began in June 1971 when the Northeast Forest Fire Control Supervisors agreed to accept the offer of Bob Compeau, Chief of the Forest Fire Division for the State of Michigan, to share the Michigan Forest Fire Control facilities at Roscommon, Mich. The proposal was approved on a 3-year trial basis at the summer meeting of the Northeastern Area State Foresters.

ED&T Committee

To give the program direction, a committee representing the various geographical locations in the area was appointed from the membership of the Northeast Forest Fire Supervisors. The committee meets two times a year to review and approve project proposals, set priorities, and review progress. Members of the committee confer frequently with the fire equipment specialists at Missoula and San Dimas, as well as with technical personnel at other locations. This ensures a coordinated program with maximum input of related information about each project.

All States are polled periodically for project proposals. These proposals are then reviewed by the committee and are either approved or disapproved. Priorities are established, based on such considerations as safety needs, foreseeable benefits, work being done at other locations, and information available from other sources. An example of high priority work not being done elsewhere was the designing of fire control modifications for excess property.

Figure 1.—The Roscommon Equipment Center is located at the Michigan Forest Fire Equipment Station near Roscommon, Mich.

Operation Began in 1972

The Roscommon Equipment Center went into operation with a full staff under the direction of Supervisor Steven Such in January 1972. A mechanic and draftsman were hired for the program. Work began on eight projects originally selected by the ED&T Committee. Nine more projects were selected after the Orono, Maine, meeting of the committee at the Fire Supervisors Meeting in 1972.

At that time a binder with the initial project reports and accomplishments was presented to each Northeastern State Forester and Fire Control Supervisor. The binder was also available to others on request.

In 1973 the Second Annual Report was presented. Four of the

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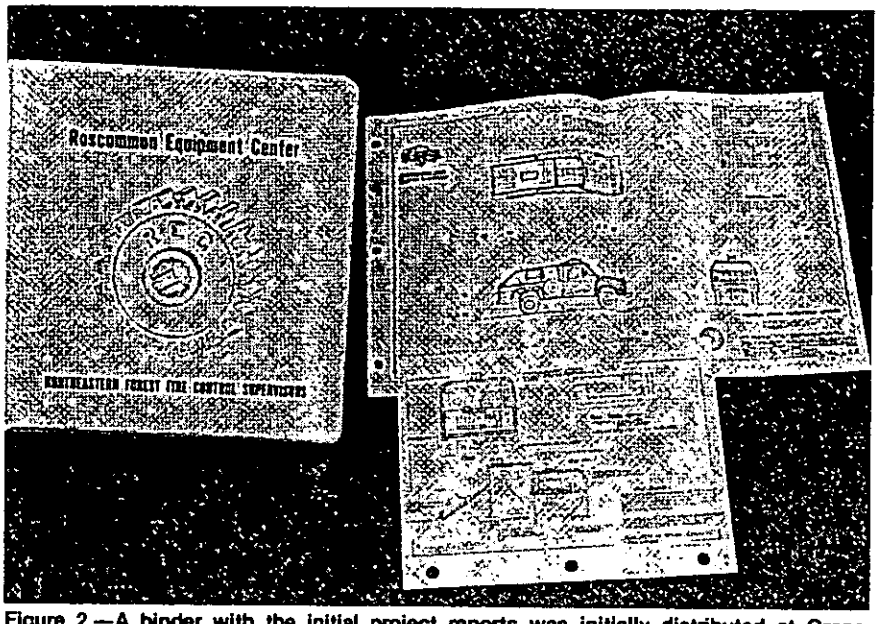


Figure 2.—A binder with the initial project reports was initially distributed at Orono, Maine, in 1972.

17 projects had been completed, and at least half of the work had been done on five others. One project was canceled, and two additional projects were approved.

Seven more projects were approved at a December 1973 meeting of the ED&T Committee, making a total of 25 projects approved under the program at that time.

In 1974 the Annual Report summarized the work done during the 3-year trial period.

Impressive Progress Made

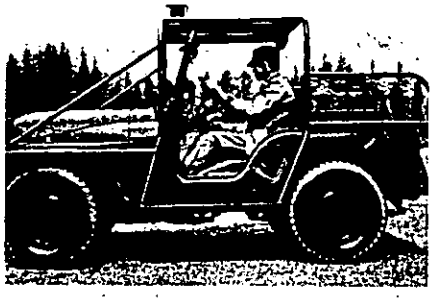
The progress that was made was an impressive example of how 20 States had joined in a program of common interest and mutual benefit, and pooled their talents and resources. Consequently, the Northeastern State Foresters approved the program for another 5 years.

The work that was done to modify and utilize excess military property acquired by the individual States in cooperation with the USDA Forest Service and General Services Administration was particularly successful. Under two of the projects —one of which was for designing a jeep tanker and the other for designing a 1,000-gallon 6 x 6 tanker— plans were developed that were requested from fire organizations throughout the United States.

Another report showed six ways to convert or change the military 24-volt electrical system. The advantages, disadvantages, comparative costs, and detailed plans of each conversion system were included.

The benefits of this program have reached not only the original participants but other fire management agencies throughout the country.

Additional details concerning the total program or the individual projects are available from the Forest Fire Management Experiment Station, Roscommon, Mich. 48653 or the USDA Forest Service, S&PF, Cooperative Fire Management, 6816 Market St., Upper Darby, Pa. 19082.



Excess property military jeep modified for firefighting use.

A New Name — Cooperative Fire Protection

On March 11, 1911, President Taft signed H.R. 11798—The Weeks Bill. It became Public Law No. 435 (36 Stat. 961) and has since been called the Weeks Law.

Laws Encourage Cooperation

This became the Act which first established the objective of "encouraging the States to control forest fires." Thus began a new national policy of cooperation between the Forest Service and the States to control forest fires on non-federally owned lands. In 1924, passage of the Clarke-McNary Act further extended cooperation in protecting non-federally owned forest lands against fire. Since the beginning, the program had been called either Cooperative Forest Protection or Cooperative Forest Fire Control.

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Telemetering Infrared Imagery from Aircraft to Fire Camp

John R. Warren

Introduction

On September 21, 1974, infrared imagery was successfully telemetered for the first time from a fire-mapping aircraft to a remote fire camp. This event occurred during the Prospect Fire on the Angeles National Forest, California. The equipment and procedures were integrated, tested, and verified only 3 weeks earlier in Montana.

The need for a technique of telemetering imagery has long been recognized. As Hirsch and Madden pointed out in 1971: "We have no satisfactory way to get the imagery from the fire-mapping aircraft to remote fire camps where tactical decisions are made. We badly need a system for telemetering the information from the patrolling or mapping aircraft to centralized fire dispatching headquarters and/or to camps established at the location of large forest fires." (1)

Methods now used require the physical transfer of the imagery from aircraft to ground. Dropping the imagery is satisfactory in many situations. All three aircraft based at the Boise Interagency Fire Center are equipped with drop tubes. Each aircraft is equipped with an airborne infrared line-scanning system developed at the Intermountain Forest and Range Experiment Station's Northern Forest Fire Laboratory, Missoula, Mont. (2)

A telemetry technique would require only the establishment of a communications link and provide a high degree of freedom in the positioning and flight path of the aircraft. It could be used at night or under adverse or restricted flight or visibility conditions. The receiving equipment would be transportable by a mobile van into areas where a fire camp or command post may be located.

Development of a telemetry technique was assigned to the Pacific Southwest Forest and Range Experiment Station's FIRESCOPE research and development program, at Riverside, Calif. Work was done in collaboration with the Northern Forest Fire Laboratory.

Equipment

The aircraft and infrared equipment flown in the Prospect Fire had been in previous operational use: King Air airplane, airborne infrared scanner, image recorder, and tape recorder. The aircraft and crew were from the Boise Interagency Fire Center. The dry silver image-recorder used on the ground was also operational equipment from the King Air. The encoder and decoder were designed and built by the Laboratory. The encoder combined video, synchronization, roll, target detection mark, and mileage mark signals into one composite video signal suitable for transmitting over a single telemetry channel. The telemetry equipment, S-Band transmitter, S-Band receiver, and associated antennas and cabling equipment were supplied by a contractor.

The ground equipment was housed in a mobile van (fig. 2) on consignment to the Forest Service from the State of California Office of Emergency Services. A crew from the Los Angeles County Fire De-

Figure 1.—This King Air aircraft, based at the Boise Interagency Fire Center in Idaho, maps fires by infrared line-scanning technique.

partment manned the vehicle. The van includes its own auxiliary power supply and communications equipment. The receiving antenna was mounted on a pole atop the van and a horizontal (360°) rotor and controller were added during initial tests.

Testing

The aircraft, van, equipment, and crew were assembled at Missoula, Mont., for installation, checkout, and testing.

After instrumentation was tested in the laboratory, the coder, tape recorder, and transmitter were installed in the aircraft. The receiver, decoder, oscilloscope, and dry silver recorder were installed in the van.

Major objectives of the flight tests were:

- Determine antenna pattern constraints.
- Determine pilot/navigation constraints.
- Determine maximum distances.
- Determine minimum signal levels.
- Develop air and ground crew procedures and terminology.

A number of flights were made within the next week. All the objectives were accomplished during the Montana tests. The van and aircraft were then returned to southern California.

Demonstration

Telemetering infrared imagery was successfully demonstrated for the FIRESCOPE technical team on September 18, 1974—3 days before the technique was used in a wildfire. The aircraft flew a vee pattern, and transmitted imagery that had been recorded minutes earlier to the van. Imagery was also transmitted direct (in real-time) as it was being scanned and without short-time storage on tape.

After the demonstration, the van and aircraft were returned to their normal standby locations to await fire season duties. The van was stationed at Los Angeles County Fire Department headquarters, and the aircraft at Ontario International Airport. The standby was short-lived.

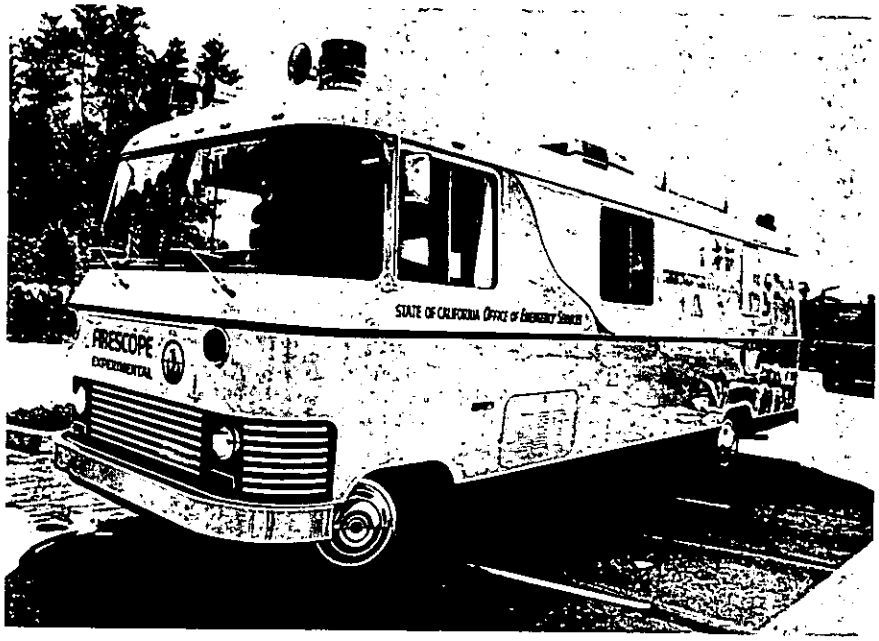

Figure 2.—Ground equipment was housed in a communications van manned by the Los Angeles County Fire Department.

Operational Fire Use

On September 20, 1974, the King Air was en route to a routine fire-detection mission in the Monterey area when the pilot, John Holsman, spotted a fire just getting under way in the Castaic area on the Angeles National Forest. He reported the fire to the dispatcher who instructed him to assist the crews being sent to this fire. The van was then dispatched and arrived at the fire camp. It was also used as the fire base communications center. Direct transmission was tried but was of little use because of line-of-sight limitations.

The next day, September 21, 1974, successful mapping, recording, and transmission to the van in the fire camp were performed during the afternoon (fig. 3). The next day the aircraft was released, but was recalled after the Dry Fire broke out about 7 miles south of the Prospect Fire. Again, mapping and transmission of imagery by telemetry were successfully accomplished.

Summary

What occurred at the Prospect Fire, and later at the Dry Fire,

Continued on next page

John R. Warren is an electronic engineer, Pacific Southwest Forest and Range Experiment Station, USDA Forest Service, Berkeley, Calif., stationed at Riverside, Calif.

Figure 3.—Telemetered imagery of the Prospect Fire shows terrain characteristics, burned area, and hot spots. Imagery was recorded on September 21, 1974.

proved the feasibility of transmitting infrared imagery by telemetry to the fire camp in near real-time. The transmission used consigned equipment in an experimental S-Band allocation. Plans are underway to shift to a permanent operational frequency band (902-928 MHz). The installation of a location-finder radio beacon on the van would be highly useful in reducing time and difficulty spent in locating the van from the aircraft. Skilled infrared image interpreters will be needed at the fire camp to quickly and accurately interpret the information and transpose it to maps for use of the fire boss and his staff. Telemetry offers an effective means of providing the "missing link" of quick access to the fire camp of the airborne imagery.

Literature Cited

(1) HIRSCH, STANLEY N., and FORREST H. MADDEN.
1969. Airborne infrared fire scanners for forest fire surveillance. Proc. SPIE Fourteenth Tech. Symp. Proc. 2:51-57.

(2) HIRSCH, S. N., R. F. KRUCKEBERG, and F. H. MADDEN.
1971. The bispectral forest fire detection system. Proc. Seventh Int. Symps. on Remote Sensing of the Environment. 20 p.

Engineering Publications Relate to Fire and Aviation Management

Each year the USDA Forest Service Engineering Staff in Washington, D.C., publishes a progress report of the National Equipment Development and Test Program. This publication is of particular importance to fire and aviation management personnel in that it provides an up-to-date report of many of the on-going ED&T projects. In addition, it lists the publications which are available. These publications include Equip Tips, ED&T reports, project record films which are available on loan, specifications, standards, and other related miscellaneous reports.

Following is a partial listing of Equip Tips which are free and available upon request from Chief, Forest Service, U.S. Department of Agriculture, Washington, D.C. 20250. Equip Tips are short accounts of tests or developments. The author of each is listed as either MEDC for Missoula Equipment Development Center or SDEDC for San Dimas Equipment Development Center. You should include the four-digit numerical code when requesting an Equip Tip.

Lighter Forest Fire Shelter	5100 September 75	MEDC
Firefighters Equipment Pack	5100 September 75	MEDC
Two New Fire Camp Kits	5100 September 75	MEDC
Tractor Light Kit	5100 May 75	MEDC
GSA Hardhats	6170 September 74	MEDC
Aids for Battery Selection	7100 September 74	MEDC
Hearing Protection for Off-Road Vehicle Operators	7100 March 74	SDEDC
New Look in 2- and 4-Quart Canteens	5700 March 74	MEDC
Firefighter Trousers	5100 June 74	MEDC
Protect Your Hearing!	7100 July 74	SDEDC
Nomex Fabric Firefighters Shirt	5100 July 73	MEDC
Improved Emergency Ration	5100 June 73	MEDC
Gloves for Forest Workers	6170 March 73	MEDC
Compact Forest Fire Simulator	5100 October 72	MEDC
Improved Disposable Sleeping Bag	5100 May 72	MEDC
Reflective Materials for Night Firefighters	5100 March 72	MEDC
Protective Chaps for Chain Saw Operators	6170 February 72	MEDC
Field First-Aid Station	6170 October 71	MEDC
Axes and Pulaskis, Improved	5100 July 71	MEDC
A Mobile Mixing Base of Phos-Chek Fire Retardants	5100 March 71	SDEDC
Flame Resistant Cotton Shirt and Plastic Tent Fly	5100 March 71	MEDC
Fire Plows Adaptable to the Vertical Lift Hitch	5160 October 70	SDEDC
Collapsible Fabric Tanks (Revised)	5100 May 70	MEDC
Plastic Fire Nozzle Evaluation	5160 October 70	SDEDC
Multi-Hitch Trailer Coupling	7100 May 70	MEDC
Direct Reading Humidity-Temperature Indicator	5100 March 70	MEDC
The SPAR Aerospace Hotspotter	5100 March 70	MEDC
Portable Lighting Unit for Firefighting	5100 January 70	MEDC
Compact Cargo Carrier	5100 November 69	MEDC
Air-to-Ground Warning Device	5170 July 69	SDEDC
Bracket for Light Helicopter Cargo Hooks	5170 July 69	SDEDC
Crawler-Tractor Lubricating Kit	5100 May 69	MEDC

Research Publications

Following is a list of fire publications that were published during the period of January 1 to June 30, 1975.

• Available from the North Central Forest Experiment Station, USDA Forest Service, Folwell Avenue, St. Paul, Minn. 55101:

DONOGHUE, LINDA R., and VON J. JOHNSON.
1975. Prescribed burning in the North Central States. USDA For. Serv. Res. Pap. NC-111, 8 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.

HAINES, DONALD A., VON J. JOHNSON, and WILLIAM A. MAIN.
1975. Wildfire atlas of the Northeastern and north central states. USDA For. Serv. Gen. Tech. Rep. NC-16, 25 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.

ROUSSOPOULOS, PETER J. and VON J. JOHNSON.
1975. Help in making fuel management decisions. USDA For. Serv. Res. Pap. NC-112, 16 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.

• Available from the Pacific Southwest Forest and Range Experiment Station, USDA Forest Service, P.O. Box 245, Berkeley, Calif. 94701:

GREULICH, FRANCIS E., and WILLIAM G. O'REGAN.
1975. Allocation model for air tanker initial attack in firefighting. USDA For. Serv. Res. Note PSW-301, 8 p., illus. Pacific Southwest For. and Range Exp. Stn., Berkeley, Calif.

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The Role of the Corporate Meteorologist in Fire Control

Warren B. Price

The big effort of the day for the contract meteorologist is the formal weather briefing which is held each morning. Here the Celesco Industries Program Manager prepares display material just prior to opening the morning briefing at the Forecast Center in Fort Wainwright, Alaska.

The use of meteorological information as an aid to fire control has been a generally accepted principle for several years. The manner of application, however, varies among agencies and locations. Daily weather forecasts are needed by fire control agencies in order to anticipate the broad-scale changes which will materially affect the deployment of men and equipment to areas of critical fire danger. The dissemination of this information to large groups of concerned employees is usually accomplished by means of daily scheduled briefings, using specially prepared charts. Unscheduled weather advisories are useful in alerting the key management personnel to significant weather changes. Spot forecasts of wind, temperature, precipitation, and humidity are required by the fire boss on location in order to aid him in directing the fire control effort. The safety of men and equipment often depends upon the warning of a windshift or an increase in wind speed. There is also an occasional need for aviation weather information by the pilots engaged in detection and logistic support.

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Role of the National Weather Service

The National Weather Service is the original source of most raw meteorological data, but there is considerable variation in the preparation, dissemination, and interpretation of forecasts and advisories. Much of the variation is due to location, communication, and other special briefing problems.

The USDA Forest Service generally follows the plan of co-location with an office of the National Weather Service which is permanently staffed with N.W.S. fire weather personnel. In Alaska, the Bureau of Land Management has tried other plans which involve the seasonal use of meteorologists. Last year the National Weather Service supplied the necessary weather personnel by temporary transfer from other locations.

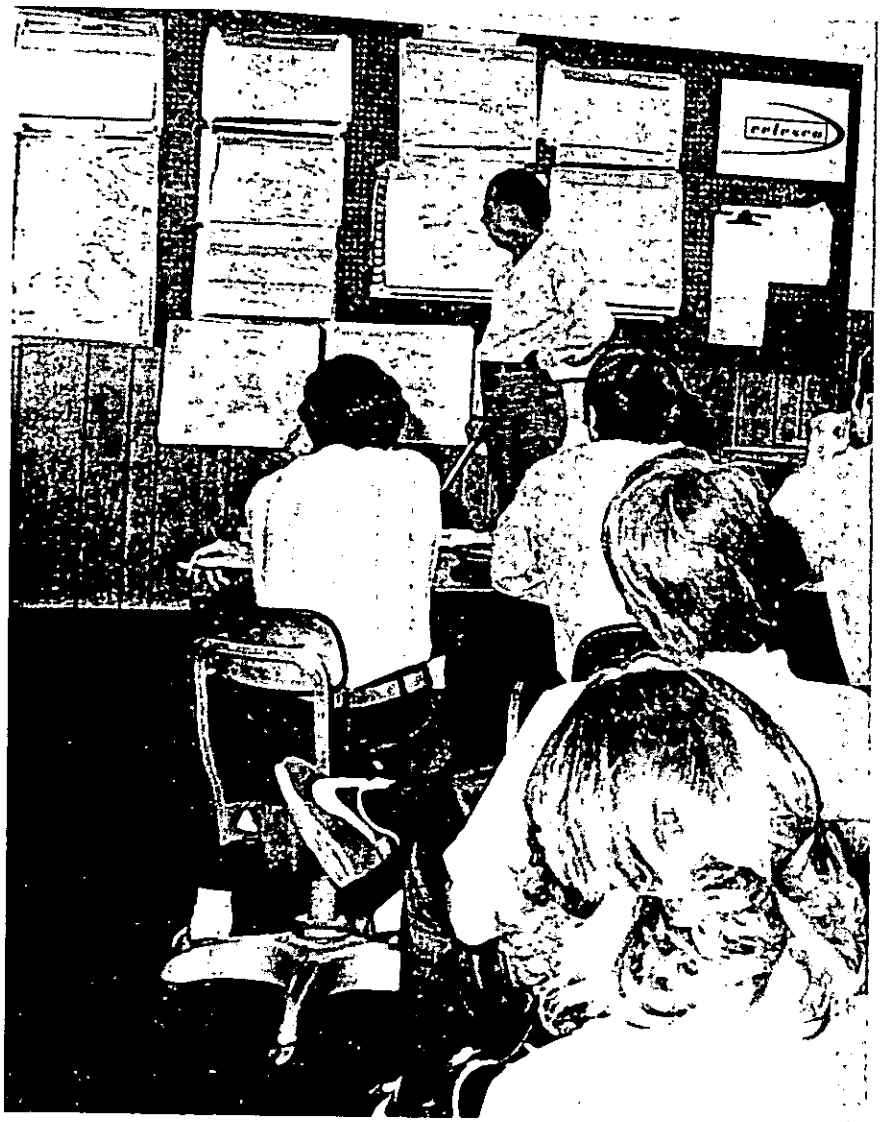
For the 1975 season there was a contract let to provide the weather service, and the job was awarded to Celesco Industries, Inc., a California-based company. The contract service includes radar and radiosonde observers and equipment, an electronic technician, plus four meteorologists.

Role of the Private Meteorologist

At this point the role of the private meteorologists comes under scrutiny because their services are needed by the government contractor. An immediately available pool of such meteorologists is to be

found among the government retirees because they are able to work on a seasonal basis. In addition to many years of experience, these meteorologists are familiar with the government manner of operation and most of them have useful contacts already established.

In the case of Celesco, four retired National Weather Service meteorologists were employed for the 1975 Alaska fire season, and three of these already possessed fire-weather experience. Two were located at Anchorage and two at Fairbanks, because the Bureau of Land Management desired weather services at both locations. This immediately posed a staffing problem because neither of these established BLM offices is co-located with a National Weather Service office from which the necessary weather data could be obtained.



The author explains weather features to BLM employees in the Fort Wainwright Fire Control Headquarters.

Weather - A Never Ending Process

It should be noted that weather is a never-ending process and there is a continuous 24-hour-a-day issuance of both raw and processed data from the teletypes and facsimile machine. Some of this material is not vital to all types of operation and can be rejected by the use of timeclocks. However, the accepted material must be kept posted in an orderly fashion, and experience has shown that the communication machines cannot be left unattended very long before a mishap of some kind results in the loss of data which are considered vital to the operation.

Formal Weather Briefings

The big effort of the day for the contract meteorologists is the formal weather briefing which is held each morning at both the Anchorage and Fairbanks offices. The most detailed, accurate, and shortest range forecast is at that time presented for the purpose of planning that day's fire control activities. The prepositioning of men and equipment is determined by the forecast of fire weather conditions.

At Anchorage the briefing is handled by one man who begins his chart work at 4:00 a.m. and presents his briefing at 8:00 a.m. In Fairbanks the briefing is a joint effort by both meteorologists who begin preparations between 5:00 a.m. and 6:00 a.m. for a briefing which is scheduled at 9:00 a.m. The briefing by the two meteorologists would seem to result in a more comprehensive briefing. This may not always be true because of the differing requirements of the briefing audience.

Of particular interest to forecasters is the degree of freedom

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USA - USSR Cooperation in Forest Fire Protection

Lynn R. Biddison

During President Nixon's May 1972 visit to the Soviet Union, the Governments of the United States and the USSR signed an Agreement to Cooperate in the Fields of Science and Technology. This led to the establishment of a Joint Working Group on Forestry under the leadership of the USDA Forest Service in the United States and the USSR State Committee on Forestry in the Soviet Union.

During the period August 26-September 7, 1973, a six-man United States forestry delegation, headed by Chief John McGuire of the USDA Forest Service, visited the Soviet Union. The purpose of this trip was to meet with our forestry counterparts in the Soviet Union to develop specific cooperative forestry programs that would be beneficial to both countries.

Fire Is Area of Mutual Concern

The meetings with the Soviet foresters were fruitful. Fire was the first obvious area of mutual concern.

In the Soviet Union the State Forestry Committee is responsible for protection and management of all forest lands. (The USSR has the world's largest forest reserves.)

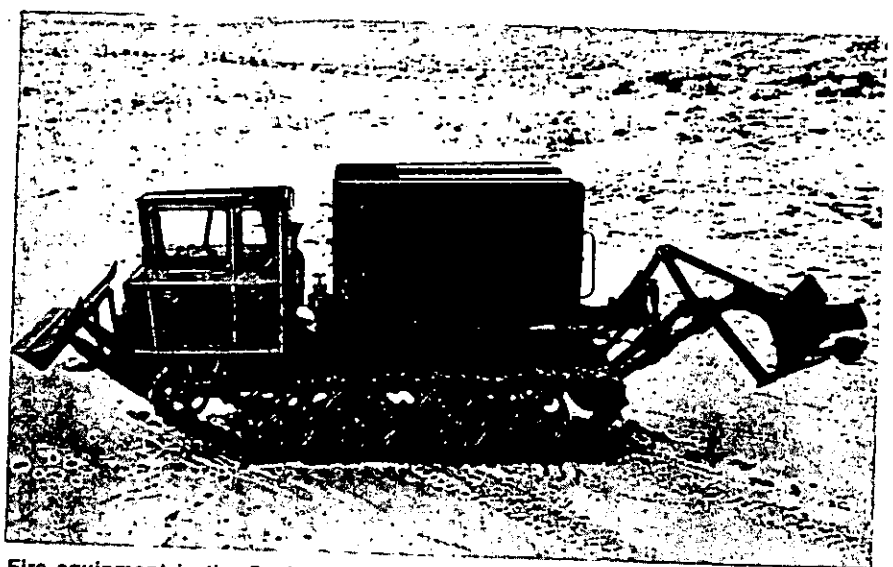
The most serious fire problems are apparently in the Leningrad Region (averages 2,000 fires per year), the Irkutsk Region (1,250 to 2,000 fires per year), and the Karelean Republic (750 to 1,600 fires per year).

The responsibility for protection and management of the forests in the USSR is shared by the Republics and the Government in Moscow. The Republics each have a forestry division. The division is responsible to both the Republic and to the USSR State Committee on Forestry. The Republics are divided into forestry regions, which are further divided into what are called districts and enterprises. Each region is headed by a forestry officer and each district or enterprise by a forest ranger.

The Leningrad Region is one of the heavier fire load areas of the USSR. This region contains 6,000,000 hectares (14,820,000 acres) of forest land. For fire protection the region has 150 fire trucks and tractors, 5 aircraft, 102 fire detection towers, and several thousand forest workers. Forest workers include smokejumpers and helitack crewmen who are yearlong employees. When they are not doing fire work, they are involved in other areas of forest management, such as planting trees, working in mills, making fire prevention contacts, etc.

Aircraft Support Fire Control

The USSR has a strong, aggressive detection and initial attack program. A majority of the detection is done from fixed-wing aircraft. The detection aircraft usually carry six or more smokejumpers who are dropped on the fires as they are located.



Fire equipment in the Soviet Union is modern and appears to be very functional. Many of the fire trucks were track vehicles rather than the conventional trucks with wheels.

The State Forestry Committee Central Air Base at Pushkino is responsible for the leasing, allocation, and maintenance of approximately 500 aircraft used in fire control work. (Of 500, 300 are helicopters.) These aircraft are leased from the national airline, "Aeroflot." The aircraft and crews are controlled from Pushkino. However, they are assigned to regions and districts but are moved to areas of greater problems as the need arises.

There are 14 regional air bases in the USSR. The regional bases report to Pushkino. The smokejumpers and helitack personnel for each region are trained at these bases. The fire activity of the district is reported to the regional headquarters. Aircraft are assigned from the region to each district where they are used for detection and suppression.

Fire equipment in the Soviet Union is modern and appears to be very functional. Many of the fire trucks were track vehicles rather than the conventional trucks with wheels.

The Soviet Union has approximately 2,400 smokejumpers and 4,500 helitack crew members (called smokechasers in the USSR). The smokejumpers carry a variety of tools. One of their main line building tools is an explosive. They use a material, like cordite, that is 20 meters long and makes firelines approximately 40 centimeters wide and 10-15 centimeters deep. Nearly 1,800 of the 2,400 smokejumpers are experts in the use of explosives to build firelines.

Rappelling by helitack crews is a long-established practice. The rappelling line is approximately 250 feet long and is contained in a chestpack drum worn by each man.

A water dropping bucket (approximately 100 gallons) has been developed for K-26 helicopters. This is used in conjunction with the helitack crews once they have been delivered to the fire.

Rappelling by helitack crews is a long-established practice. The rappelling line is approximately 250 feet long and is contained in a chestpack drum worn by each man.

Air tankers are not currently in use in the USSR. Water-scooping air tankers were tried a number of years ago but were unsuccessful.

The use of fire retardants is very different than in the United States. The only retardant in use in the USSR is a freon emulsion which is applied by small pumps and back pumps. The emulsion is mixed at the rate of 10 percent freon to 90 percent water and is said to be 4 to 5 times as effective as plain water. The use of long-term retardants is under consideration.

The Soviet Union has a well-organized fire prevention program. They use numerous roadside fire prevention posters, radio and TV programs, and work with children in school.

USA-USSR Cooperation

The 1973 trip to the USSR resulted in a cooperative agreement between the USA and USSR for specific areas of forestry. The first item of agreement was on fire control work. Other items included pest and disease control, improved mechanization and harvesting, reforestation and aforestation, and shelterbelts.

In October 1974 a Russian delegation headed by Professor G. I. Vorobyov visited the United States. The purpose of their visit was to update the agreement between the two nations and to study American forestry.

The 1973 agreement was renewed. Again, fire control was the number one item in the agreement. Specific areas of cooperation planned are:

1. Development of effective methods, techniques and tactics of detection, prevention and control of fires particularly with the use of aircraft and chemicals.

(a) Development of fire control techniques with the application of chemicals on the ground and from the air.

(b) Development and coordination of the exchange program and methods of conducting experiments.

(c) Conduct of comparative tests of the most effective chemicals on the air and ground and development of recommendations for their use.

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Lynn R. Biddison is Director of Fire and Aviation Management, Southwestern Region, USDA Forest Service, Albuquerque, N.M. The author is a member of the U.S. delegation designated to work with USSR foresters.

FIRE MANAGEMENT

When Are Fires In Season?

Donald A. Haines and
Von J. Johnson

We all know when the fire season starts, right? Of course . . .it starts on the first of the month, or the 15th of the month, or some other "round-number" date. It is fixed by legislative decree, or it corresponds to the expected last snowfall, or it depends upon a designated percentage of total fires. Perhaps it could even depend on a lunar phase —if the fire manager were a student of astrology!

Manager Must Decide

Whether by reason or rule-of-thumb, the manager must decide when the unit fire plan will be fully activated. An objective method of defining a fire season would facilitate the decision, especially if it could provide a simple definition of seasonal beginnings and endings. We have devised such a method.

We will assume that a well-documented data base comes from the Foreward Forest, located in the State of Mythology. This forest averages more than 200 fires a year, and we have 10 years of their records. If the average were less than 100 fires a year, we might need a longer period of record, perhaps 15 or 20 years. A meager data base causes an irratic frequency distribution that is difficult to interpret. When in doubt, use a longer period of record if available.

The Procedure

First, put all fire occurrences into weekly groups (or 10-day

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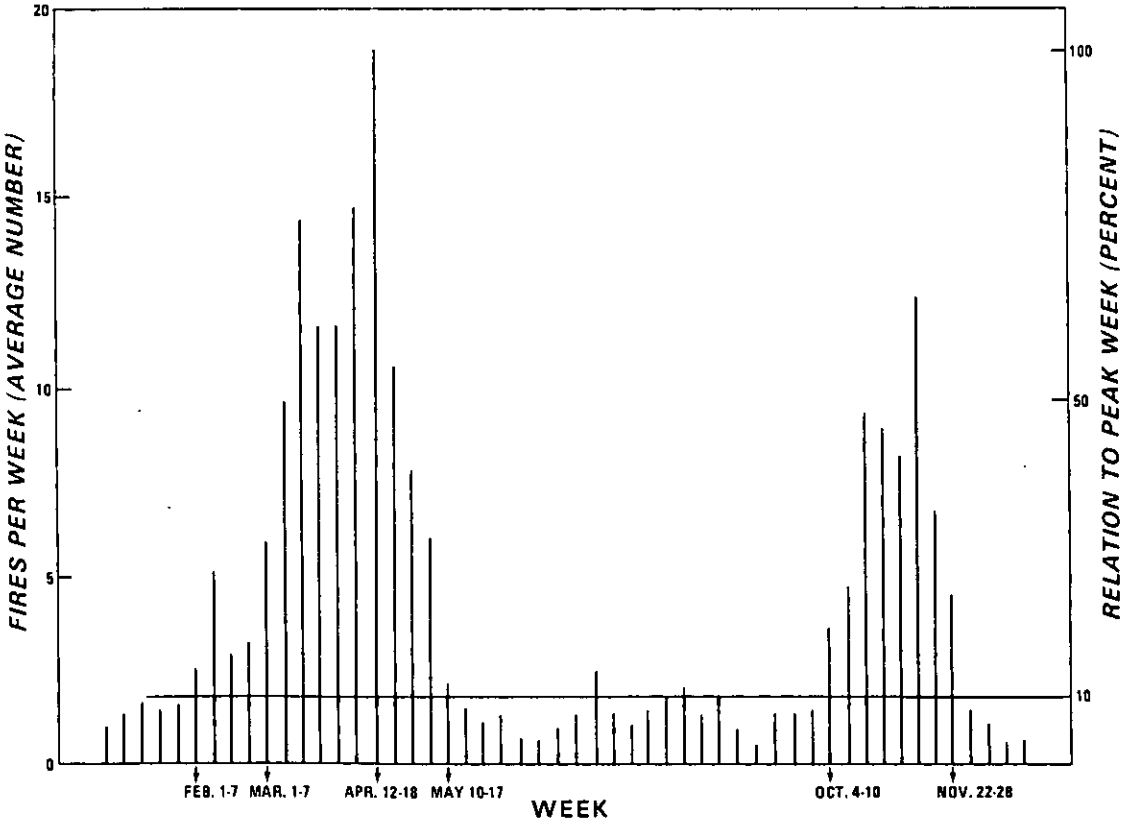

Figure 1.—Weekly average number of fires on the "Foreward Forest." The right-hand, vertical scale converts the data into a percent of peak occurrence.

Semipermanent Fire Retardants —Are They Needed?

Hugh R. McLean

As a fire management specialist, you face the problem of building control lines around a proposed prescribed burn area. You might find, due to fragile soil conditions, excessive damage will result if mechanized clearing equipment is used—or possibly, the planned lines are inaccessible to mechanized vehicles. You consider handlines but realize the cost would be prohibitive. Wouldn't it be great if there were a way to construct effective, environmentally acceptable control lines at reasonable cost?

A semipermanent fire retardant might be an answer if one were available.

Needed Capabilities

To be effective, the proposed retardant should have the capacity to contain a low intensity, generally backing fire under a variety of fuel and weather conditions. Since considerable time might elapse from application to time of need, retardant capability should be retained for at least 6 months under expected weather conditions, including 1 to 2 inches of rain. Retardants currently in use cannot do this. Short-term retardants, such as Gel Guard, lose their effectiveness within a matter of hours, or even minutes, as the water in them evaporates. Long-term retardants, such as Firetrol or Phoschek, do have longer lasting effects; however, these generally will not withstand over an inch of rain.

The product should be biodegradable—break down under natural conditions within a year of application—to avoid any long-lasting unnatural appearance. At the same time, it should not produce adverse effects on vegetation, soil, domestic livestock, wildlife, or air and water quality.

Special equipment should not be required for application. Conventional equipment including ground tankers, helitankers, portable pumps, and hand sprayers should be usable without damage to component parts.

If a semipermanent fire retardant is to be successful, it must be an improvement over present ways of doing the job. An acceptable alternative should result in a reduction of visual impacts and accomplish the job at reasonable cost while meeting management objectives. The retardant must present no health hazard in either use or application.

Needs Identified

To identify the need for a semipermanent retardant, in 1973 the Forest Residues Program at the Pacific Northwest Forest and Range Experiment Station conducted an opinion survey of fire management specialists of the National Forest Regions. Estimates of current need and average line construction costs, plus potential demand and maximum tolerable cost for the following possible uses were requested.

Control line installation is a primary need prior to broadcast slash burning for both clearcut and partial cut harvest areas. A timber contractor could construct these lines during the active logging season with burning planned for a later date. The use of a semipermanent retardant would provide this flexibility.

Piles of debris could be isolated before burning. Even though piled material is generally burned after rain or snowfall, some perimeter control is often necessary to prevent undesirable spread of fire. A suitable retardant line could easily be built at low cost.

Fuel breaks are being constructed in many areas. In some locations both construction and followup maintenance could be accomplished through the application of prescribed fire. Retardant line construction for control would be particularly suited for remote, inaccessible areas or environmentally sensitive sites where the use of conventional equipment would result in excessive soil disturbance. Needed treatment is frequently neglected in these restricted areas because of the high cost and difficulty of handline construction.

Hugh R. McLean is a forester with the Forest Residues Program, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland, Oreg.

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SEMIPERMANENT RETARDANTS

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Prefire control lines are often installed adjacent to high-risk areas such as highway and railroad rights-of-way, recreation areas, and debris disposal sites. In some areas a retardant line alone could provide the needed protection. In other locations, particularly where annual growth is a problem, maintenance of constructed lines by periodic application of retardants would keep the firebreaks effective.

Specialists Consulted

Fire management specialists were asked to consider these potential uses and specific characteristics in estimating:

1. Miles of prescribed burning control line needed during the current year (1973).
2. Current average cost per mile.
3. Percentage of current need that must meet special environmental requirements.
4. Maximum cost that could be tolerated to meet these requirements.
5. Miles of control line required by 1985.

According to the field reports, retardant lines could replace 25 to 500 miles of conventionally constructed control lines annually in each region. The wide range of need between regions is due to a variety of resource activities creating the slash disposal requirement. It is important to consider that less than 50 percent of slash areas requiring attention are being treated on National Forest lands. By 1985, the anticipated need will increase as much as 40 percent for some Regions.

Construction costs of conventional control lines range from a low of $40 to a high of $2,000 per mile. One-quarter to one-half of this work is located on sensitive areas requiring special environmental consideration. Regions responding to the survey felt that, when proper environmental protection measures are taken, construction costs of $300 to $1,500 per mile would be acceptable.

Results

Results of this limited survey show that a reasonably priced semipermanent fire retardant would be used if available. Efforts haven't been made to obtain similar data from other agencies and private land managers, but this additional demand can quickly be recognized.

In answer to the original question —yes, a semipermanent fire retardant would be a valuable tool, supplementing conventional fire management techniques. The Forest Service fire laboratories, in cooperation with one or more of the interested fire retardant chemical manufacturing companies, are urged to undertake additional research and development work.

WHEN ARE FIRES IN SEASON?

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groups when working with a small data base) determined by calendar dates. Start with March 1-7 to avoid the problem of leap year. Over the 10-year period there were 609 fires on the Foreward Forest reported between March 1 and 7, an average of six per year. There were 95 fires between March 8 and 14, and so on through the rest of the weeks of the year.

Next, change the numbers of fires in each week into percentages based on the week with the most fires. On the Foreward Forest this is the week of April 12-18 with 190 fires over the 10 years, an average of 19 fires each year. All other weeks are assigned a percent value relative to this week. For example, the week of March 8-14 had half the number of fires (an average of 9.5 per year) that occurred during the peak week So the value for that week is 50 percent (fig. 1).

This being done, we are now ready to establish the fire season by defining the beginning and ending dates. The land manager knows the work load during the worst part of the fire season, i.e., the week of April 12-18 on the Foreward. Now he can set the date of season beginning by asking himself, "Relative to this worst April week, when does the fire occurrence become enough of a problem so that I should begin active preparedness procedures?"

If the answer is at about 10 percent of the worst week, then he can follow along the 10-percent line on the graph until it intersects a fire-occurrence week. In the case of the Foreward Forest, this is the week of February 1-7. This then is the beginning week of the spring fire season, and by the same reasoning, May 10-17 is the last week of that season. The fall season begins the week of October 4-10 and ends November 22-28.

Other Options

Of course, 10 percent is an arbitrary beginning point. Eight, or twelve, or fifteen percent might make more sense, depending on the needs of the land manager. The method is flexible, and there are a

Continued on page 23

Donald A. Haines is principal research meteorologist and Von J. Johnson is principal fire control scientist at the North Central Forest Experiment Station, USDA Forest Service, East Lansing, Mich.

HIGH LEAD SCARIFICATION

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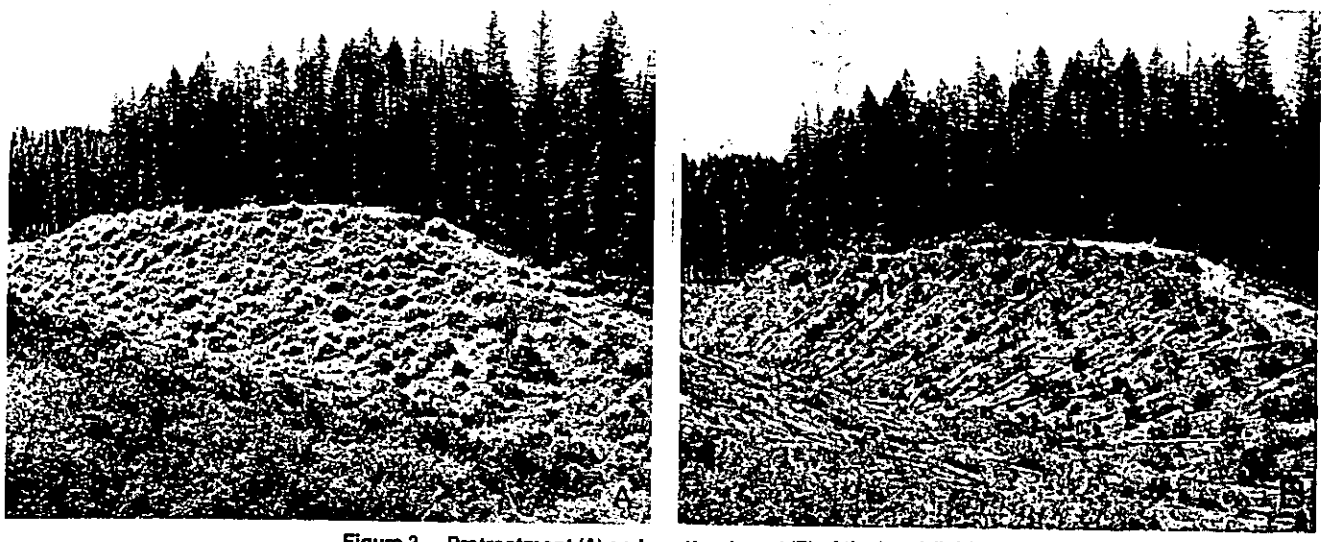

Figure 3.—Pretreatment (A) and posttreatment (B) of the brushfield.

In both units, the tool dug into the ground and the furrows produced were perpendicular to the slope. Also, the production rates were similar, averaging between one-half to two-thirds acre per hour.

Conclusions

This scarification tool is suitable for treating areas containing small diameter logging residue or brush or both. It would be advantageous to first remove large diameter pieces (over 12 inches d.b.h.) and treat the remaining material. The areas treated were adequately prepared for regeneration by planting.

No air pollution episodes occurred as could have if the areas had been broadcast burned. This method could be used when an area is too hazardous or too wet to burn. Also, the fire hazard can be reduced without creating the blackened appearance which could be objectionable in some areas.

However, because the material is only modified and rearranged and not removed, the fire hazard may not be reduced to an acceptable level in all cases. Where the fire hazard is reduced, the areas can be opened during summer months for dispersed recreation opportunities and for access for wildlife and livestock.

Furrows perpendicular to the slope do result. Although these did not create erosion problems in the study areas, problems could occur on more unstable soils.

On areas where site preparation by conventional methods, such as tractor piling or broadcast burning, is not desirable, this cable scarification technique is an alternative.

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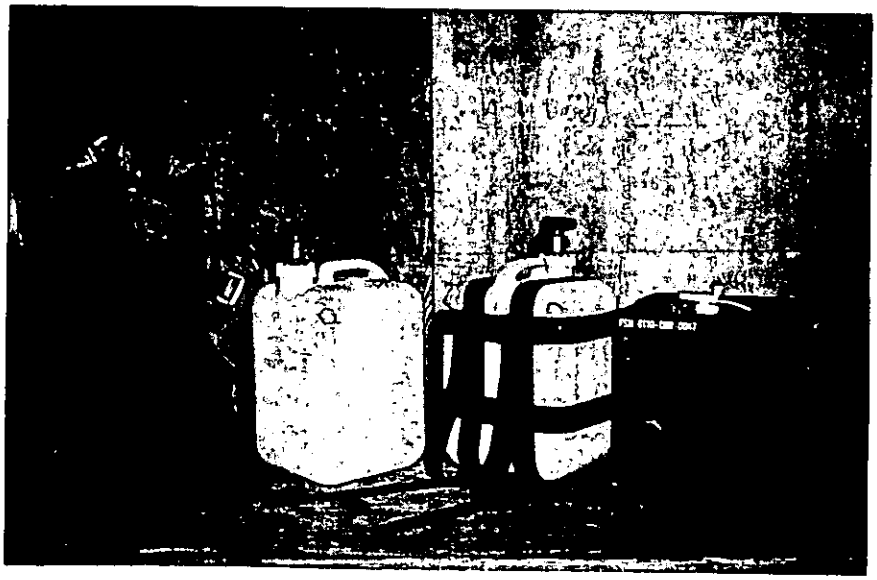
A Harness for Cubitainers

John Hertz



Harnesses were made for both the large and small cubitainers. Faucets were added to conserve water and improve sanitation.

Water Is A Problem

Times have changed. We find it isn't healthy to condition one's self to go long periods without a drink (of water that is), and the old 5-gallon backpack canvas water bags are unsanitary for carrying drinking water.

This presents a dilemma for providing safe drinking water for firefighters. Most crew members carry individual canteens, but this isn't enough to last long on a hot fire. The body requires more water at frequent intervals under high heat conditions. In fact, according to the Navy Department's Bureau of Medicine and Surgery BUMED Instruction No. 6260.2B, some individuals may need as much as 15 quarts during a 24-hour period!

Fire Cache Work Supervisor Charles Golden demonstrates the large cubitainer harness.

Water hauls by helicopter, although helpful, can't always put the water near the crews, and those trips represent a high cost. Why not let the crews carry more water with them when they go on the line? But how? Their hands are full now with tools, lunch, etc. Well, Northern Region Fire Cache Manager John Hertz, Parachute Loft Foreman Hal Samsel, and Smokejumper Phil Difani developed a simple harness that makes 5-gallon polyethylene cubitainers into backpack water cans. Now each crew can backpack as many cubitainers with them as needed.

Backpack Cubitainers May Be Solution

Since cubitainers come in both large and small sizes, two different harnesses had to be made. In addition, faucets were added to the containers to minimize waste when filling canteens and to provide a more sanitary means of dispensing the water. This should help meet water needs of firefighters and eliminate extra trips to helispots or to water sources of unknown quality. Containers can be filled with safe drinking water and kept with the crew regardless of their location.

No matter where the fire is or what type of terrain, the firefighters will need their water. This is another method by which this need can be filled.

John Hertz is the Northern Region Fire Cache Manager, USDA Forest Service, Missoula, Mont.

EDITOR'S NOTE: The cubitainers harnesses described in this article are not available commercially. Anyone wishing additional information or desiring a set of drawings should contact the Director of Fire Management, USDA Forest Service, Federal Building, Missoula, Mont. 59801.

Fire Prevention Information Stations An Effective Prevention Measure

Franklin O. Carroll

A fire prevention station attendant discusses the fire situation with a visitor to the National Forest. Locally prepared handouts explain fire restrictions and area closures and supplement the verbal warnings.

The Forest Service's Southwestern Region initiated a fire prevention program which has had excellent results. The program, which involves the use of public fire prevention information stations, is now being used as fire-danger conditions dictate, and is a regular part of the Manning and Specific Action Guide.

The 1971 fire season was one of the three most critical fire seasons of the century in Region 3. There was so little winter precipitation that the Lincoln National Forest in southeastern New Mexico ordered fire and smoking restrictions in late January. Other National Forests soon followed. In May 1971 the Region recognized that something more needed to be done. The start of this new program arose from that need.

National Forests Establish Stations

The procedure is for the National Forests to establish the stations, manned by two or more persons, at the principal entrances to the forests. They are not used on interstate highways and other high-frequency traffic arteries. The stations are placed on the most frequented or accessible roads leading into popular National Forest areas.

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FIRE PREVENTION STATIONS

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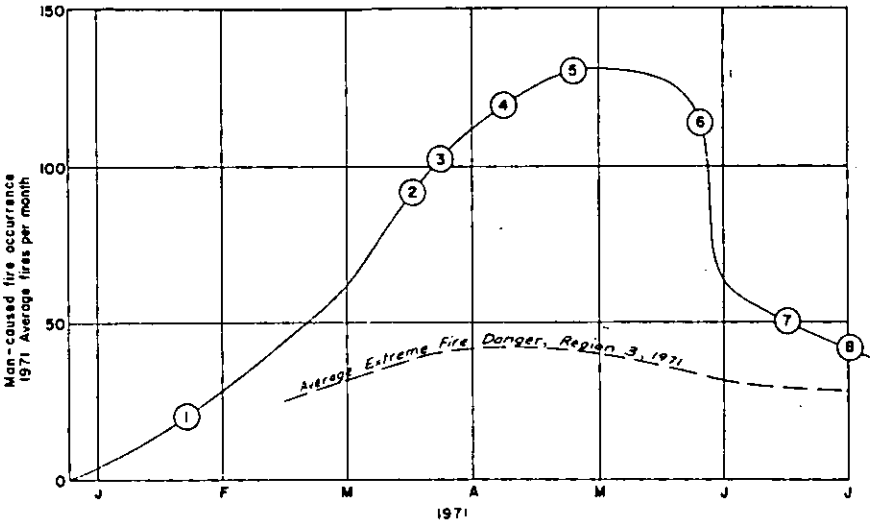
In some instances, such as on the boundary between two National Forests, the stations are placed to insure contact with drivers going in both directions. In one instance, stations were not placed in lower portions of the Tonto National Forest. To have done so would have resulted in the eruption of both drivers and radiators in the blazing 115° summer heat.

The stations are usually established in connection with an order which regulates the use of fire and smoking. In this way a large proportion of those persons going to the forest for recreation can be contacted and made aware of the fire regulations. The stations are also used to advise persons when forest areas are closed to public entry as a fire prevention measure. Overall, Forest Service officials have been quite satisfied with the results, and very few incidents have occurred to mar the otherwise spotless record of pleasant contacts and good public response!

When area residents, businessmen, and permittees must pass the station several times a day, special identification stickers are issued to them allowing free access after an initial contact. This helps to avoid local censure.



1. *First fire and smoking restriction (Lincoln National Forest).*
2. *State of New Mexico fire and smoking restriction.*
3. *Half of the National Forests had fire and smoking restrictions.*
4. *First total closure (Tonto National Forest).*
5. *Fire and smoking restrictions on all National Forests.*
6. *Fire prevention information check stations on all National Forest entrance roads.*
7. *Total closure on all National Forests.*
8. *Beginning of the "Lightning Season."*

THE COMBINATION OF FIRE AND SMOKING RESTRICTIONS AND THE FIRE PREVENTION INFORMATION CHECK STATIONS CAUSED A MAJOR REDUCTION IN MAN-CAUSED FIRES IN MID-JUNE.

Procedure Is Simple

The procedure for operating the stations is simple. First, a safe site is selected with the assistance of the State Police and State Highway Department. Space is needed for vehicles to pull off the road, outside the stream of traffic. Sufficient signs, barricades, and flashing lights are installed to advise drivers. Awnings and tents are provided to protect the station attendants from the elements. All of this is done in cooperation with the State Highway Department under formal agreement.

The selection of persons to man the stations at first appeared to be a problem. However, the region soon discovered that a number of young men and women were quite willing and able to do the job. Each station now has one supervisor, often an experienced regular or seasonal fire prevention specialist, and several short-term seasonal employees.

Franklin O. Carroll is a fire management specialist, Southwestern Region, USDA Forest Service, Albuquerque, N. Mex.

Striking Results

The results of contacts made by the station attendants are striking. They have certainly been far more productive than those made by fire prevention patrolmen in the past. This is not to say that patrolmen do not have an important role in fire prevention. They do—when properly trained and assigned. The stations and follow-up patrols make a good combination.

During the first year of operation in 1971, one National Forest reported the contacts made at these stations, combined with fire and smoking restriction orders, reduced man-caused fires by 75 percent. This was based on a 3-year average for the same 3-month period—April through June. Another forest reported a 68 percent reduction. Some reductions in man-caused fires were as low as 50 percent, while others were in the 60- and 70-percent range. These are not bad results for a relatively small investment. The important part is that the public comes to the prevention stations and time is not spent chasing them over vast forested areas, as was the case with fire prevention patrols.

Special, single-sheet handouts are prepared by the forests. These explain the fire restrictions and area closures and supplement the verbal warnings given the public by station attendants. As a psychological measure, each person entering the forest is asked where he is going. Both his destination and automobile license number are recorded.

Regional instructions have been issued to make the fire prevention information station procedures uniform.

The Southwestern Region is quite pleased with the results they have obtained with this procedure and expect to continue it as an integral part of their annual fire prevention effort.

A NEW NAME

from page 7

Neither of these names fully described the extent of cooperation because the Clarke-McNary Act also authorized cooperation in protection from fire in non-forested watersheds as well as forested ones. The continuing reference to forest fire protection or cooperative forest fire control has required qualifying statements to encompass the true scope of the activity.

A New Name Needed

The most significant result of these years of cooperation has been the organization of responsive fire protection organizations in each of the 50 states. However, with the state fire organizations' experience and ability to provide continuing protection, current efforts are more directed to the prevention of fire starts. Also, the administration of the Cooperative Forest Fire Protection Campaign (Smokey Bear Program) and the Rural Community Fire Protection Program, which includes protection of lives and property, has been assigned to State and Private Forestry. These changes made it obvious that a name which more correctly described the work was urgently needed. A name which conveyed a broader concept than the "control" of forest fires. The term "protection" was decided upon because it was broad enough to include prevention, detection, presuppression, and suppression. It could also include the utilization of fire to enhance protection opportunities with regard to natural resources but with special emphasis on lives and property.

Name Changed

With all of these factors in mind, in particular the lives and property in rural communities, the name Cooperative Fire Protection was selected as the most appropriate to carry on the tradition of fire cooperation which has been so successful in assuring a future for the non-Federal natural resources of America.

CORPORATE METEOROLOGIST

from page 13

which is allowed in the interpretation of weather data and the formulation of a forecast. Last year the support meteorologists were expected to be guided by the National Weather Service forecast office from which they obtained all of their information. This year the contract meteorologists hired by the contractor were allowed to differ from the forecast issued by the National Weather Service.

The Bureau of Land Management is not only interested in obtaining the best forecast, but also desires the constant availability of a professional meteorologist. Early impressions seem to favor this latest plan of operation.

WHEN ARE FIRES IN SEASON?

from page 18

number of options. For example, the manager might also separate the data into wet and dry years. After going through the same analytical procedure for each data base, he may gain further insight into the makeup of extreme fire years versus easy years. Another option would allow the manager to compute the large-fire season using large-fire information instead of number of fires.

The important point is that the method gives a simple, objective way to determine season. Moreover, if we all used the same method to define our fire seasons, we would have the added advantage of using words and concepts that mean the same thing to all fire-management forces.

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USA-USSR COOPERATION

from page 15

The Soviet Union has 2,400 smokejumpers of whom 1,800 are experts in the use of line-building explosives.

(d) Evaluation of methods of fire control with chemicals from the air and development of recommendations for their use.

2. Development and operation of automated systems for forest fire protection.

3. Artificial inducing of precipitation and prevention of lightning in forest fire control.

4. Additional items of mutual interest.

(a) Detection of forest fires with the use of infrared equipment.

(b) Forest fire hazard rating by weather elements.

(c) Development of mathematical model for forest fire behavior.

(d) Ground equipment for forest fire control.

This year a delegation of fire managers and fire researchers visited the USSR as another step in the implementation of the cooperative agreement between the two countries. The group, headed by Forest Service Deputy Chief M. B. Dickerman, observed fire fighting techniques and fire research projects. The participants felt that the trip was very beneficial and would have long-term payoffs for both the USA and the USSR.

New Fire Training Film From North Carolina

"Project Fire" is a 43 minute, 16 mm color, sound film. It shows the fire organization's buildup from initial attack through division to coordinator stage and back through demobilization. The Division of Forest Resources used the procedures outlined in the Southeastern States Forest Fire Compact Commission's Forest Fire Field Manual. Their objective was to produce a film similar to the California Division of Forestry's "Campaign Fire" but reflecting procedures and methods commonly used in the Southeast today.

The film is available for reviewing from the Administrator, North Carolina Division of Forest Resources, Box 27687, Raleigh, NC 27611. He'll also sell you a copy for $350.

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