

22ND
MEETING

Fire Management Study Group

North American Forestry Commission



**XXII Reunión
del Grupo de Estudio Sobre
Manejo de Incendios Forestales
Comisión Forestal de America del Norte**



Lake Tahoe, California, USA
October 31—November 3, 1988



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ATTENDANCE

Canada

Mr. Brian Stocks Head - Fire research Unit
Great Lakes Forestry Centre
Sault Ste. Marie
Canadian Forestry Service

Mr. Dennis Dube Fire Research Coordinator
CFS Headquarters, Ottawa

Mr. Regis Proulx Chief Fire Protection,
Charlesbourg, Quebec

Mr. Allan Jeffrey Director
Canadian Interagency Forest
Fire Centre, Winnipeg,
Manitoba

Mr. Bob Bailey Director, Fire Operations
Dept. of Renewable Resources
Northwest Territories

Mexico

Mr. Jesus Cardeña R. Director General, Norma-
tividad Forestal
SARH - Mexico City

Mr. Oscar Cedeño S. Director de Apoyo a la Ac-
tividad Forestal
SARH - Mexico City

United States

L. A. "Mic"
Amicarella Director, Fire and Aviation
Management, Forest Service,
Washington, DC

Dr. William Sommers Director, Forest Fire and At-
mospheric Science Research
Forest Service, Washington

Mr. Jack Wilson Director, Boise Interagency
Fire Center, Idaho

Mr. Harry Layman State Forester
North Carolina

Mr. Jerry Monesmith Safety & Training Specialist
Forest Service
Washington, DC

Mr. Lee Barkow Director, Fire and Aviation
Management
Bureau of Land Management
Washington, DC

Mr. Gary Tokle National Fire Protection
Association
Quincy, Massachusetts

Other Attendees

Mr. Paul Weeden Defense & Emergency Opera-
tions Specialist
Forest Service, Washington,
DC

Mr. Alejandro Barbajosa Interpreter, Washington, DC

Ms. Salomé Abud Interpreter, Washington, DC

Mr. Dick Ernest Chief Deputy Director
California Division of Forestry
& Fire Protection

Mr. John Swanson Fire Management Officer
Lake Tahoe Basin Manage-
ment Unit

Introductory Remarks

The twenty-second meeting of the Fire Management Study Group of the North American Forestry Commission was opened by L. A. "Mic" Amicarella. The delegates from each country introduced themselves. After the introductions, Mic noted that this Study Group is the most active and best regarded working group within the North American Forestry Commission.

Mic introduced Bob Harris, Forest Supervisor, Lake Tahoe Basin Management Unit, who welcomed the visitors to the Lake Tahoe area. Bob presented a very interesting and timely recounting of Mark Twain's visit to the Lake Tahoe area about 130 years ago. On that occasion, Mark Twain started a campfire, which escaped and caused a major wildfire. Bob noted that the same fuel and moisture conditions which existed 130 years ago are still present today, but are now compounded by the Wildland/Urban Interface problem. Bob informed the group that Lake Tahoe is the third deepest lake in North America being 1,650 feet deep, that it is 22 miles in length and 12 miles wide. The biggest management concern and challenge is to prevent the degradation of the lake's water quality. In order to achieve this objective, the Forest Service began acquiring land within the Lake Basin about

eight years ago, and now manages approximately 80% of the land within the drainage.

Mic then introduced Dick Ernest, Chief Deputy Director, California Division of Forestry. Dick emphasized the need of cooperative relationships in all areas of fire management and cited the recent "49"er Fire" in California, as the prototype of the Fires of the 1990's. This fire consumed more than 30,000 acres and destroyed 149 homes in a day and a half. This type of fire will be common, except in high elevation areas.

Gary Togle, National Fire Protection Association (NFPA), was introduced by Mic, who noted that the NFPA was assisting in co-hosting the 22nd meeting of the Fire Management Study Group. Gary cited the joint effort presently under-way to plan the International Wildfire Conference in Boston, July 1989, "Meeting Global Wildland Fire Challenges, The People, The Land, The Resources." Gary stated that one of the objectives of the International Conference was to increase the public awareness of the "49"er" type fires, with the goal of preventing these types of disasters.

Review and Discussion of Recommendations and Fire Management Study Group Action Items

Item 1: International symbol for forest fire prevention.

After reviewing the proposals submitted by each delegation, two fire prevention symbols were adopted. Mic will have the two symbols printed and available in time for the July 1989 International Wildfire Conference.

Item 2: Publication of Forest Fire News.

It was recommended that articles for Forest Fire News receive technical review, prior to publication. Dennis Dube indicated to the group that Forest Fire News is the line of communication between them and the various fire management organizations around the world. It was decided that more and better articles were needed and that publication of Forest Fires News would continue.

Item 3: Recognizing outstanding dedication to wildland fire suppression.

Mic presented the completed certificates in French, English, and Spanish to the delegations. Each delegation signed several copies of the certificate, in each of the three languages. Each delegation will determine the number of recipients for their respective country.

Item 4: Coordination of forest fire management among the 3 countries.

Each country is to bring to the 1989 meeting a list of their respective 1990 training programs. It was unanimously resolved that this action item would continue and become a permanent, on-going activity. It was also resolved that this action item would be expanded to include informing the Group of key meetings and a list of new publications.

Item 5: Canadian and Mexican Memorandum of Understanding

Dennis Dube reported to the group that lack of Canadian funding continues to impede activation of a fire project. Currently only the Forest Productivity Project has been activated. However, now that the Canadian Forestry Service is Cabinet level, perhaps funding will be available to undertake a cooperative program. Funding from

Mexico may also be limited. Dennis promised to keep the Fire Management Study Group informed of any developing initiatives or changes.

Item 6: Review of Mexican/United States 1985 Memorandum of Understanding

Both Mexico and the United States are enjoying a mutually beneficial relationship in many forestry and fire management programs. Presently there are three areas of cooperation between the Normatividad Forestal and the Forest Service. Three specific programs of cooperation which were highlighted are:

Forest Service Region 8, Atlanta, Georgia, assisted Mexico in acquiring 3 helicopter buckets, loaned to the Normatividad Forestal by the Georgia Forestry Commission.

An agreement was developed and implemented, permitting Mexico and the USA to jointly suppress fires along the International Border, common to the Coronado National Forest and the Mexican State of Sonora. Each year, representatives from both countries will meet together to plan joint fire management activities, in: training, fire prevention, fire suppression, technology exchange, and cooperation in prescribed fire.

Region 6, Portland, Oregon, hosted two Mexican fire management experts for 2 weeks. The two observed the urban-interface conditions and cooperative fire prevention activities. At Mexico's request, R-6 sent two fire prevention experts to the Yucatan area to assist in developing a fire prevention program for the area damaged by hurricane Gilbert. Jesus Cardena presented a four part prevention program to the Group for consideration, as part of his appeal for assistance in mitigating the damage done by hurricane Gilbert.

Item 7: Report on Fire Management Policy.

The United States will present the findings of the USA National Fire Policy Review at the 1989 meeting.

Item 8: International Fire Prevention Day or Week.

It was proposed by Mexico, and unanimously endorsed

by the Group, that each country bring an International Day or Week proposal to the 1989 meeting. The objective is to increase the public awareness of the need to prevent forest fires. Each country has a day or week set aside for fire prevention, but it is proposed that there be a day or week, common to Canada, Mexico, and the US emphasizing fire prevention.

Item 9: Other Fire Management Study Group Activities.

Dennis Dube and the Canadian delegation will identify other fire management study groups and their activities, within the FAO framework and report this information at the 1989 meeting.

Item 10: Glossary of Terms.

Each country is to bring to the 1989 meeting any information it has concerning Glossary of Terms which are being published by the various forestry organizations, within each respective country and throughout the world.

Item 11: Destruction caused by Hurricane Gilbert.

Jesus Cardena described the environmental disaster caused by Hurricane Gilbert. Bill Sommers worded a resolution, that the North American Forestry Commission Fire Management Study Group support an active program to mitigate the anticipated environmental impacts. Mic presented the resolution to the Group, with a second by Brian Stocks. The resolution was unanimously endorsed by all members. The proposal is included on page 6.

The Group also agreed immediate action was necessary on the following:

- A. To send a contingency to Mexico within the next few weeks to assess the damage;
- B. Develop a resolution with recommended actions to be presented to the Committee of Alternates at their next meeting;
- C. Develop an awareness program to educate interested relief agencies and organizations of the disaster.

Item 12: Composition of the Fire Management Study Group.

Because all of the issues to be discussed at the meetings cannot be fully anticipated, the group discussed the concept that each country's participation in the Fire Management Study Group should include, as a mini-

mum: a designated chairman; a co-chairman; and two or three (2-3) other fire experts in the fields of suppression, prevention and technology (research/equipment). The representatives on the Fire Management Study Group should be those who could speak for and make commitments for the agency they represent and be present on a recurring basis to maintain continuity in the many on-going programs. A formal proposal was made and unanimously approved.

Item 13: Location of the next Fire Management Study Group meeting.

Mexico is to host the 1989 Fire Management Study Group meeting, at a site to be determined by them. It was proposed that during the next meeting the accomplishments of mitigating the effects of hurricane Gilbert on the tropical rain forest be reviewed.

Item 14: Participation in the International Wildfire Conference, Boston, MA.

Jerry Monesmith informed the Fire Management Study Group that he has received an invitation from the International Conference Steering Committee to present an Educational Display, or Poster Session at the Conference. All Fire Management Study Group members endorsed the Group's participation in the poster session.

The Fire Management Study Group also received and accepted an invitation from the International Wildfire Conference Steering Committee to present a 20 minute program, highlighting the history of the group, its accomplishments, and their goals and vision of the future. A speaker is to be named later.

Item 15: Distribution of Fire Management Study Group Materials.

It was agreed that Jerry Monesmith would distribute the training information provided by representatives of the three countries and the report of the 11/1-3/88 meeting.

Resolution Hurricane Gilbert Disaster

The North American Forestry Commission Fire Management Study Group, recognizing the unprecedented natural disaster caused by hurricane Gilbert and its destruction of thousands of hectares of jungle on the Yucatan Peninsula, and recognizing the importance of this global ecological tropical forest resource, and recognizing that the high probability of forest fires in the next five (5) years will greatly magnify this disaster manifold if strong action is not immediately initiated, hereby recommends the following actions:

A. A public information campaign, using every available resource, including radio, television and print advertising, to educate the local residents of the

dangers and potential catastrophic consequences if a wildfire were to be started in the dead and down debris.

- B. Develop and implement a program of fuel breaks, to reduce the risk of large, damaging fires.
- C. Develop and implement a program to remove the tropical wood, thereby reducing the amount of combustible fuel. This will provide local employment and hopefully reduce the need of local people to depend on agricultural burning.
- D. Develop and implement an intensive reforestation program of the effected area.

Resolution Composition of the Study Group

It is vitally important that each country participate actively in every Fire Management Study Group meeting. All of the issues to be presented and discussed at the Fire Management Study Group meetings cannot be fully anticipated before each meeting.

To ensure that all issues can be promptly dealt with, it is resolved that each country's representation on the Fire Management Study Group include, as a minimum:

- 1) a designated chairman;
- 2) a co-chairman; and
- 3) two or three (2-3) other fire experts in the fields of

suppression, prevention and technology (research/equipment).

Representatives on the Fire Management Study Group should be those who:

- 1) can speak for and make commitments for the agency they represent; and
- 2) be present on a recurring basis to maintain continuity.

This resolution was formally presented by the US Chairman, Mic Amicarella and unanimously approved by all representatives.

Country Reports (General)

Reports on the current fire management activities of Canada, Mexico and the United States were circulated, and discussed. Each report has been reproduced and included in Appendix 1.

Oscar Cedeno made a slide presentation of the Mexican report, outlining their success in fire suppression and prevention and reviewing the 1988 fire season. The

FMSG complimented Oscar for a very informative presentation.

Each of the four Canadians presented a portion of the Canadian Report.

The United States report was presented by Mic Amicarella, Bill Sommers, Paul Weeden, Lee Barkow, Harry Layman, Jack Wilson, and Jerry Monesmith.



Only a few personnel changes have occurred during the past year. Lee Barkow is here replacing Jerry Mauk as Fire Director for the Bureau of Land Management. Dick Bacon is the new Forest Service Fire Director in Region 9, Milwaukee. Dick Adams is the new Regional Fire Manager in Region 5. Dr. Gerald Partain, California State Forester, announced that he will retire in December.

We are happy to announce that the National Fire Protection Association (NFPA) is assisting in hosting this year's meeting. The NFPA is leading the wildland/urban interface initiatives program and is a key cooperater in many other wildland fire protection efforts. A Wildland Fire Management Section has been established by the NFPA to enhance their involvement.

1988 Fire Activity Summary

Exceptional fire activity occurred during the 1988 fire season in July, August, and September as a result of cumulative drought conditions. Mobilization of resources far exceeded previous years to the point of exhausting civilian firefighting resources and necessitated the mobilization of military and Canadian resources.

Significant fire problems began in early March in Texas that resulted in the activation of the Southern Compact and a Federal Emergency Management Agency (FEMA) emergency was declared. By late April fire activity had spread into the southern Appalachians and required the support of resources from the West and Northeast including: two airtankers, 20 crews, and one Type II Incident Management Team.

Fire activity continued into April east of the Mississippi, with an additional 11 Western crews mobilized for activity in the Northeast. Due to drought conditions and the lack of precipitation, normal green-up did not occur in most of the eastern U.S. and fire activity continued into

May. During May an additional six crews were moved to the Northeast, and six to the Southeast.

In June fire activity was beginning in the Southwest and 23 crews were mobilized from other geographic areas for support. Ten percent of the airtanker fleet remained east of the Mississippi where fire activity was continuing much later than is normally expected, and 11 additional Western crews were sent to the East. Canada was also experiencing severe fire problems in June and requested support from the U.S. Seven Type I Crews, two Type II Crews, one Type I Incident Management Team, 195 pump kits, 3,200 lengths of hose, radio equipment, three large air transport flights to move crews, and four large air transport flights to move equipment were provided. Southeastern Montana and northwest South Dakota showed evidence of the drought's effect with a run of fire activity that resulted in the mobilization of two Type I Teams. This activity carried into July with two additional Type I Teams mobilized to this area.

July saw a significant increase in activity. In addition to local crews, 246 crews were mobilized through the Boise Interagency Fire Center to fires in Alaska, Colorado, Idaho, Nevada, Montana, South Dakota, Tennessee, Utah, Wisconsin, and Wyoming. Seventeen Type I Teams were assigned to fires in the western U.S. Fires in Alaska that had been in limited suppression were burning actively and some moved into modified and full suppression areas requiring more aggressive suppression action. Of the fires in Alaska, 52 became large fires and consumed over 2.2 million acres. In addition to local resources, equipment and supplies, eight crews and 73 smokejumpers were sent to Alaska. Most of the activity during the month was in the area from southeast Idaho east to the Continental Divide and then north along the Rocky Mountains into Montana. Ignitions that occurred in late June and early July in and around Yellowstone National Park that were initially managed as wildfires under a contain/confine or

as prescribed natural fires were exhibiting unusual fire behavior necessitating the need for aggressive suppression action.

In August problem fires occurred in the western third of Wyoming, the western third of Montana, Idaho, Oregon, and Washington. The primary area of concern at this time was in and around Yellowstone National Park and north into Montana. Mobilization of resources increased dramatically. In addition to local resources 576 of the 679 crews mobilized during August were sent to fires in the Greater Yellowstone Area and Montana. Fire activity continued to increase with many of the fires in the Greater Yellowstone Area burning together. With the heavy commitment of resources that was taking place civilian firefighting resources were soon depleted. The Sixth Army was tasked for support on the 19th of August. Military support included eight battalions (six Army, two Marine) to be used as handcrews, 23 Type I and 22 Type II helicopters for personnel transport, and two infrared aircraft for a total of 5,595 personnel. Eight military C-130s equipped with Modular Airborne Firefighting Systems were mobilized through the National Guard for suppression assignments in Montana. From August 20th to September 14th these units flew a total of 646 missions (541 flight hours) delivering 1,917,000 gallons of retardant on fires in Montana, Oregon, and Washington. On the 26th, the Forest Service issued a request for hiring and training Emergency Firefighting crews to supplement existing firefighting personnel.

Fire activity continued into September in the Greater Yellowstone Area. The need for firefighting resources continued, and on the 8th, Canadian resources were mobilized. This included 125 helicopter support personnel, 12 airtankers, eight leadplanes, four five-person water handling teams, 200 Mark III pumps, and 3,895 pulaskis. On September 9th, the total number of personnel on project fire assignments peaked at 24,188. During the month some precipitation was received and temperatures as well as winds decreased allowing many of the fires to be contained.

By September 30, 1988, 71,278 fires for 4,295,988 acres had been reported to the National Interagency Fire Coordination Center at Boise, Idaho.

Aviation

The 1988 fire season gave us the opportunity to continue the use of large call-when-needed helicopters (e.g. Boeing Chinook). The primary use was for water, foam, and

retardant delivery to the fireline using sling loaded buckets with a capacity of 400 to 2000 gallons. The USDA Forest Service has used small helicopters (e.g. Bell 206) with 50 to 150 gallon buckets for many years with fair results. So far, the large helicopters are proving to be much more cost effective than previous methods.

Four years of study have been completed in the Operational Retardant Evaluation (ORE) program. Emphasis of the study will change from the evaluation of fixed wing long-term applications to the application of foams and retardants from helicopters and foams from fixed wing aircraft.

1988 Major Accidents and Near-Misses

Serious accidents and life-threatening "near miss" incidents occurring in fire suppression operations continue to be a problem. Of major concern are the number of entrapments and accidents associated with aircraft operations. During the 1988 fire season 73 firefighters were entrapped, 19 received burns. Six persons lost their lives in aircraft accidents, two were Canadian helicopter pilots assisting Washington State. A summary of our major accidents is included in the report.

Weather Information Management System (WIMS)

The WIMS project will produce a new weather data collection, processing and delivery system that will replace the current AFFIRM system, and also accommodate the use of weather data by a broader spectrum of the natural resource community. The USDA Forest Service has contracted with The Analytical Sciences Corporation (TASC) to complete the first phase of the project, which consists of an information needs assessment and conceptual system design. The goal is to have WIMS developed, tested and fully operational by 1991.

The comprehensive user needs assessment was performed in early fall of 1987 by interviewing, in person or by telephone, 157 actual or prospective users of forestry weather information. In addition, written surveys were solicited from the 50 cooperating state forestry agencies. In August of this year, the Forest Service received alternative conceptual system designs and is in the process of selecting the preferred system. Once selected, a contract for design and development of the system will be executed. After a period of parallel testing, the new system will be ready for operational use before expiration of the current AFFIRMS contract period.

National Wildland/Urban Fire Protection Initiative

The need for the Wildland/Urban Fire Protection Initiative continues to be reinforced. In 1988 over 350 homes have been burned, thousands more threatened, in a fire season that will total over 5 million acres burned nationwide by year's end.

Plans for the "Meeting Global Wildland Fire Challenges: The People, The Land, The Resources" international conference on wildland fire are well underway. Over 400 people from over 70 countries have indicated interest in

attending. The program will include the top wildland fire managers from the international wildland fire community.

National Initiative accomplishments in 1988 included the production and satellite broadcast of three new videos; a 1987 fire season documentary, a training video with support text on building interagency cooperation and a program targeted at the individual home owner also supported by a publication on home owner safety in the interface.

1988 Major Accidents and Near-Misses

Entrapments

Date	Fire	Place	Persons	Shelters Deployed	Injury
4/7	Sanderson	Florida	2(St)	no	1-burns
6/20	Wampee Bay	Florida	2(St)	yes	none
6/23	Brewer	Custer N.F.	18(FS)	yes	4-burns
7/1	Stockyard	Hiawatha N.F.	1(St)	no	1-burns
7/5	Flatfish	Bridger-T N.F.	2(Vol)	no	1-burns
7/15	Clover Mist	Yellowstone N.P.	3(NPS)	yes	none
7/20	Camp	Los Padres N.F.	2(FS)	no	2-burns
8/26	Eagle Bar	Payette N.F.	23(FS)	yes	1-burns
9/9	Canyon Cr.	Lewis & Clk N.F.	20(FS)	yes	9-burns

Other Fire Associated Incidents

Date	Fire	Place	Persons	Type	Injury
7/14	Misc	John Day	1(FS)	Twin Ott	Fatal
8/8	Paulina	Deschutes N.F.	1(con)	Helicopt	Major
8/10	Brush Coulee	Crow Reserv.	1(BIA)	Vehicle	Fatal
8/12	Havilah	Sequia N.F.	1(FS)	B. Baron	Fatal
8/19	Lost	Big Horn N.F.	1(con)	Helicopt	1 major 2 minor
				1(FS)	
				2(BLM)	1 Fatal
8/29	S.17 mile	Colville Res.	16(BIA)	Vehicle	5 major 4 minor
9/9	Red Bench	Flathead N.F.	5(BIA)	Tree fell	1 Fatal 1 major 3 minor
9/9	Dinkelman	WN,DNR/WEN.N.F.	2(CAN)	Helicopt	2 Fatal
9/11	Misc.	Jackson, WY	1(con)	King 200	Fatal
9/12	Red Ranch	Flathead N.F.	1	Tree Fell	Major
10/11	Clover Mist	Shoshone N.F.	1(BLM)	Tree Fell	Fatal

Also, five editions of the Wildfire Strikes Home newsletter were published and distributed to a mailing list of over 25,000.

The inaugural meeting of the Wildland Fire Management Section of the National Fire Protection Association was held in May 1988 and the second meeting is scheduled for November 1988.

The 1989 work plan for the National Initiative has been completed and will continue to create national and international awareness of the problem.

International Cooperation

China

The Government of China, through the World Bank, requested assistance in preparing and financing a forest fire protection and rehabilitation project in the Heilongjiang province. Fred Fuchs was a member of a five person team which traveled to China to review the proposal.

Mr. Fuchs was responsible for identifying the need for an aerial fire prevention and suppression system and whether the system could be efficiently operated taking into account local conditions in Heilongjiang. If installation of such a system is justified, determine the equipment requirements, including airplanes or helicopters, airfields, and ground facilities. Identify the skills necessary to operate and maintain such a system and the availability of any training facilities in China or elsewhere.

John Warren was in China from May 29 to June 20 and lectured to about 50 scientists at the Heilongjiang Forest Protection Research Institute, of the Heilongjiang Academy of Forest Sciences, Harbin, China concerning electronics research and applications. The subjects covered included: forestry protection organization in the U.S.; functions of BIFC; research and development; detection, prediction, and forecast of forest fires; NFDRS; AF-FIRMS; IAMS; suppression, attack, and control of large fires; present state and future of forest fire protection work in the U.S.; present and future equipment; communications systems; RAWS; visible, TV, microwave, IR detection; telemetry transmission; Image processing; lightning detection; remote sensing and fire mapping.

Argentina

Doug Turner (R-4) was sent to Argentina at that country's request (travel and per diem funded by OFDA) to assist

in preparing a cooperative agreement between IFONA (Argentina's Forest Service), Federal Police, Civil Defence, National Park Service, and four Provinces which would allow the construction of a centralized fire dispatch and coordination center. Substantial progress was achieved in fulfilling this objective. The need to include a research center was foreseen and was created and staffed with a pilot research forester.

Doug reviewed previous OFDA-funded fire management recommendations and noted that impressive progress had been made by IFONA in implementing the various phases, including upgrading communications capabilities and establishing fire crews. Doug also assisted with four fires, two near Bariloche and two in Chubut Province, 150 miles to the south.

Bob Partido, Region 3, and Tom Rios, BIFC, spent 4 weeks assisting IFONA (Instituto Forestal Nacional) of Argentina from 2/22/88-3/23/88. Their fire related assignment in Argentina assisted Argentina in developing a National fire danger rating system, Regional mobilization and dispatch center, developing cooperative agreements between the Federal government and the provinces and the various agencies within each of 4 different fire prone provinces, and assisted with Argentina's training needs.

This assistance essentially closes out the 3 year cooperative assessment effort by USAID/OFDA, the Forest Service, and IFONA. The team was impressed with Argentina's accomplishments and feels that the objectives of this trip were accomplished.

Locust Outbreaks in North Africa

The American Ambassador in Tunisia declared a disaster in that country due to a very serious outbreak of desert locusts, perhaps the worst outbreak since the 1950's. At the request of OFDA the Forest Service mobilized Herb Corn, Air Operations Coordinator, Boise National Forest, R-4; Dick Stiliha, Logistics and Operations Coordinator, Shasta-Trinity National Forest, R-5; and Jim Walker, Communications Specialist, BLM, Boise Interagency Fire Center. Additional personnel were dispatched to the Sudan, and it is anticipated that Forest Service personnel will be dispatched to Africa during 1988 and 1989 to help combat the worst outbreak of locusts on that continent during the past 25 years.

Indonesia

The Office of U.S. Foreign Disaster Assistance (OFDA) requested that International Forestry and Fire and Aviation Management provide a 2-week fire training course for 40 professional foresters. The course was taught in English, in Indonesia, in August. Preparatory to the training, Chuck Mills and two others with fire management training skills spent a week in Indonesia and evaluated the fire management situation, vegetation, fuels, etc., and formulated the overall direction of the course. All travel and per diem expenses for both the May and August trips were paid by OFDA. The training was completed in August and was very successful. We anticipate an expanding and on-going relationship with Indonesia in the area of fire management.

Mexico

Fourth International Fire Fighting Course

The Fourth International Wildfire Suppression Course was very successfully hosted by the Mexican Government in Mexico City from January 25 to February 12. It was jointly sponsored by the Office of Foreign Disaster Assistance, the Normatividad Forestal (Mexican Forest Service) and the Forest Service. The course was a resounding success and continues to be a positive experience for all those who have taken it. It has also been a very positive experience by broadening horizons and enhancing relations within and between countries in regards to wildfire suppression and conservation of natural resources. It has provided an avenue to explore new technologies or firm up those that already existed.

Students and instructors came from Mexico, Central America, South America, North America and Europe.

Students came from: Instructors came from:

- | | |
|--------------|-----------------|
| 1 Argentina | 4 Spain |
| 3 Ecuador | 5 United States |
| 3 Honduras | 1 Chile |
| 3 Nicaragua | 1 Costa Rica |
| 8 Guatemala | 12 Mexico |
| 9 Costa Rica | |
| 24 Mexico | |

A significant accomplishment of the course was to include women for the first time, one as a steering committee member and instructor and three students (1 from Guatemala and 2 from Costa Rica).

Under our existing Memorandum of Understanding, Forest Service Region 8, Atlanta, Georgia, expanded its involvement by assisting Mexico acquire 3 helicopter buckets, loaned by the Georgia Forestry Commission. This was done as part of the Rural Fire Suppression cooperative program between R-8 and Mexico. This is a very positive and effective program.

Another very significant accomplishment under the Memorandum of Understanding between La Normatividad Forestal and the Forest Service was the development and signing of an agreement which permits both the United States of Mexico and the USA to jointly suppress fires along the International Border, common to the Coronado National Forest and the Mexican State of Sonora. Each year, representatives from both countries will meet together to plan joint activities, in: Training, Fire Prevention, Fire Suppression, Technology Exchange, and cooperation in prescribed fire.

Israel

A team of three Forest Service experts (Kimberly Brandel, Mike Rogers, and Gordon Reinhart) spent two weeks in Israel reviewing the Israeli Forest Department's wildfire management program. The team made recommendations for improving the program which include developing a fire planning process, studying the effects of prescribed burning in Israeli forests and developing a fuels management program.

The Forest Service hosted two Israeli officials for two weeks. The tour included stops in: North Carolina to review the use of small air tankers for initial attack; South Carolina to review the effects of prescribed fire on soil properties, wildlife, and vegetation; and Southern California to view the broad spectrum of fire management activities (detection, prevention, mutual cooperation, research, initial attack, and fuels management).

The Forest Service and the Israeli Forest Department have entered into an agreement for continuing assistance. Four exchanges of managers and scientists are planned for the coming year. An Israeli forester will be attending a Forest Service training session on the National Fire Management Analysis System this fall.

Foreign Firefighter Assistance Legislation

A legislative bill that provides for reimbursing foreign nations for forest firefighting assistance has been pro-

posed by the U.S. Department of Agriculture for several years. As of this date, 10/18/88, a House Subcommittee was attempting to schedule the Bill to come for a vote. Also, we have learned that the Senate Agriculture Committee may try to move on Bill S. 2826, which would

repeal the December 31 expiration date on the Temporary Emergency Wildfire Suppression Act (P.L. 100-428).

The language for the proposed House Bill is included in this report.

Overview of the Legislative Bill Proposed to Congress

SEC 2 DEFINITIONS

As used in this act:

(a) The term "qualified agency head" means the head of any executive department, agency, or independent establishment in the executive branch of the Government responsible for protecting Federal lands and resources from damage by wildfires

(b) The term "fire organization" means any governmental entity or public or private corporation or association having fire protection capabilities.

(c) The term "wildfire protection" includes personnel, supplies and equipment required for wildfire suppression and suppression activities

(d) The term "wildfire" means an unwanted natural or person-caused forest or range fire on, or threatening Federal lands

SEC 3. IMPLEMENTATION.

(a) Each "qualified agency head" is authorized to enter into a reciprocal agreement with any foreign fire organization for mutual aid in furnishing wildfire protection assistance for such lands and resources and for other Properties for which such agency or organization normally provides wildfire protection. Each such agreement shall include a waiver by each party of all claims against every other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of such agreement. Any such agreement may provide for the reimbursement of

any party for all or any part of the cost incurred by such party in furnishing fire protection for, or on behalf of, any other party.

(b) Any agreement authorized by subsection (a) shall include a provision to allow the termination of such agreement by either party with reasonable notice.

(c) In the absence of any agreement authorized by this Act, wildfire protection assistance to any foreign nation and to accept such assistance from any foreign fire organization when such assistance is determined by the agency head to be in the best interest of the United States.

(d) Any service Performed under this Act by any employee of the United States shall constitute service rendered in the line of duty in such employment. The performance of such service by any other individual shall not make such individual an employee of the United States for the purposes of this Act.

SEC. 4. FUNDS.

Funds available to any qualified agency head for wildfire protection in connection with activities under the jurisdiction of such agency may be used to carry out the purposes of this Act: *Provided*, That no such funds may be expended for wildfire protection provided by a foreign fire organization unless the qualified agency head determines that no fire organization within the United States is reasonably available to provide such wildfire protection capability.

Review of Mexican/United States 1985 Memorandum of Understanding

On Tuesday, October 6, 1987 representatives from La Normatividad Forestal and US Forest Service met in Marana, Arizona to review accomplishments made under the 1985 Memorandum of Understanding and develop an action plan and to bring closure to uncompleted objectives. The areas of discussion were: A) Fire Crew Effectiveness; B) Helitack; C) Joint Prescribed Fire and Fire Equipment Study Tour; D) Fire Loss Prevention; E) Research related activities; and F) where we want the program to go from here.

A tremendous amount of accomplishment was noted and everyone was anxious to continue working together. As a result a very comprehensive six part Action Plan was developed. It has been attached as a part of this report.

In addition to the above meeting and the attached Action Plan, there are three activities which deserve special mention.

The Forest Service Region 8, Atlanta, Georgia, expanded its involvement in the Memorandum of Understanding, by assisting Mexico acquire 3 helicopter buckets, loaned to the Normatividad Forestal by the Georgia Forestry Commission. This was done as part of the Rural Fire Suppression cooperative program between R-8 and Mexico. This is a very positive and effective program.

Another very significant accomplishment under the Memorandum of Understanding between La Normatividad Forestal and the Forest Service was the development and signing of an agreement which permits both the United States of Mexico and the USA to jointly suppress fires along the International Border, common to the Coronado National Forest and the Mexican State of Sonora. Each year, representatives from both countries will meet together to plan joint fire management activities, in: Training, Fire Prevention, Fire Suppression, Technology Exchange, and cooperation in prescribed fire.

Region 6 hosted two fire management experts from Mexico for 2 weeks. The two observed the urban-interface conditions and cooperative fire prevention activities.

Below is the six part Action Plan, jointly developed at the October 6, 1988 meeting. We will pursue the development of this Action Plan to the extent possible considering budgetary restraints.

Secretary of Agriculture and Water Resources Sub-Secretary of Development and Animal Husbandry and Forestry

Mexican Forest Service

Memorandum of Understanding, Mexico - USA, for the Technical and Scientific Cooperation in Forestry Matters

Theme: Aviation and Fire Management

Proposal for Project Development for 1989

Project 1. Improving forest fire fighting crew effectiveness

Objective: To supply basic elements for intermediate training in fire crew organization and the execution of strategies for forest fire control during the Mexican forest fire season.

Proposal: The USA will send a bilingual specialist in training of forest fire suppression crews to assist the personnel of the the Federal District of Mexico (Mexico City area) during the 1989 fire season.

Probable Date and Place:

The southern portion of the Federal District of Mexico, February - March

Project 2. Utilization of helicopters in forest fire suppression

Objective: To train Mexican helicopter pilots to use the "Bambi Buckets" in forest fire suppression.

Proposal: The USA will send one or two pilots training specialists to offer training to helicopter pilots of SARH, to use helibuckets in forest fire suppression.

Probable Date and Place:

State of Valle de Bravo, Mexico, March - May 1989

Project 3. Execution of controlled burns

Objective: Participate in the planning, execution and evaluation of controlled burns with different management objectives and different forest protection objectives.

Proposal: Mexico will send two Mexican technicians to the United States in order to be trained in operations of prescriptions, preparation, execution and evaluation of controlled burns with diverse forest objectives.

Probable Date and Place:

Riverside, USA in April - June

Project 4. Modernization of fire suppression vehicles

Objective: Develop the adaptation of specialized vehicles for fire suppression in forested areas in Mexico.

Proposal: The USA will furnish (lend) a prototype fire suppression vehicle to analyze the possibilities of its usefulness in Mexico and the opportunities to adapt and reproduce with Mexican components.

Probable Date and Place:

Southern Federal District, June - September

Project 5. Development of an Information System

Objective: To learn the methods and systems to capture and analyze statistical information in order to evaluate and plan forest fire prevention and suppression activities.

Proposal: Mexico will send two Mexican technicians to the USA to learn the methods, programs, and system of reporting and capture of this information, as well as using the information to determine its adaptability in Mexico.

Probable Date and Place:

Place did not copy, date July - August

Project 6. Activities related to Research .

Objective: To begin diligent research work in prevention and fire suppression in the forested zone of the Federal District of Mexico (Mexico City area).

Proposal: USA will send researchers to Mexico in the material to establish diligent research projects in: Fire Danger Rating, Fire Effects, Economic Evaluation and Ecology of Fire, and Fire Behavior.

Probable Date and Place:

Southern Federal District, June - October

US FOREST SERVICE Status of Forest Fire Research

Introduction

Fiscal year 1988 witnessed increasing concern over the long term effects of Global Climate change on forest fire occurrence and severity, concern over the effects of forest fire smoke on firefighter health and safety, and the highly publicized fires in the Greater Yellowstone Area (GYA). Fire and Atmospheric Sciences Research (FFASR) welcomed 3 new staff members: Michael A. Fosberg, David L. Radloff, and Gay L. Almquist. Dr. Fosberg provides FFASR leadership in the areas of Global Change and Fire Meteorology, Dr. Radloff in areas concerned with Fire Effects and Ecology, and Ms. Almquist in Fire Management issues—with particular emphasis on problems of the Wildland Urban Interface.

Objectives of Forest Fire Research

To improve the productivity and health of forest and range ecosystems by providing improved knowledge of the impact of forest fires and atmospheric factors on those ecosystems. To develop better methods for preventing, predicting, controlling, and lessening the effects of wildfires; and for using fire in a productive and environmentally sound manner.

Program Descriptions

Forest Service scientists provide Federal, State, and local fire-management agencies with the knowledge and tools needed for safe, efficient, and cost-effective fire management. The program accomplishes this by combining biological, physical, and management sciences expertise with systems and other information management skills in teams that work closely with users to develop needed products.

Forest fire research ensures that information and technology needed to achieve cost-effective fire management are developed and promptly made available. Fire scientists produce information used by managers to lessen the occurrence of fires and to effectively prepare for those fires that do inevitably occur, develop the technology used in the assessment and tactical suppression of fires once they start, and provide information needed to assess the effects of fires on forest ecosystems and air quality.

Fires burn under highly variable terrain, fuel, and weather conditions and result, in turn, in highly variable effects on forest ecosystems and their surrounding environments. Technology for improved management of fires under variable conditions requires advanced knowledge of the complex process of wildland fire combustion. Previous research has shown, for example, that only about 10 percent of the lightning strikes that reach the ground actually start fires. Current research is directed toward a better understanding of the lightning ignition process by simulating lightning discharges in a controlled-combustion laboratory setting.

Once fires do start, we know that their behavior responds to prevailing weather, terrain, and fuel conditions, and we have developed some fire spread prediction models based on our current level of understanding. Improved fire behavior prediction tools could materially improve the cost effectiveness of wildfire management, however, especially during severe fire conditions, such as spot fires, crown fires, fire whirls, and fire storms. Current research is advancing this knowledge through the integration of laboratory and field measurements into mathematical models of the combustion process.

The severity of fire effects on vegetation, soils, watersheds, and air are also closely linked to characteristics of the combustion process, such as fire intensity and duration. To know how much smoke is produced and the chemical makeup of that smoke, for example, we are conducting laboratory and field experiments to document how smoke emissions are related to fire behavior.

Atmospheric sciences research ensures that critical knowledge about atmospheric processes needed to understand forest fires, air pollution effects, watershed production, forest and range ecosystem productivity, and insect and disease patterns is available for managers and scientists alike. The program provides fire managers with technology needed to reduce and control smoke emissions from fires, wilderness managers with the protocols needed to predict the potential effects of air pollutants on wilderness ecosystems as required by the Clean Air Act, and policymakers with the knowledge needed to assess potential forest responses to factors such as acid rain and changes in the global climate.

Forest and range ecosystems respond to forest fires and atmospheric variability in a number of ways, and sometimes the effects on the ecosystems result from complex interactions of several stimuli. Air pollution effects, including atmospheric deposition, and climate change are included under the effects of atmospheric variability. This research seeks to provide forest managers with the information they need to determine the exact role that forest fires play in the relative health and productivity of the ecosystems they manage. The research information allows managers to make cost-effective use of fire as a beneficial tool in their management plans and conveys the best technical approaches to use to ameliorate fires' most damaging effects.

Atmospheric variability usually provides more subtle and gradual effects than forest fires, but in the long run, the sum effects of responses to atmospheric conditions can be much greater than the effects of fires. Climate change, for example, can easily extend or reduce the range of healthy productive forest species by many millions of acres. Debate over the response of forests to atmospheric deposition is a major policy concern that we are addressing with this research component. Early detection of ecosystem responses to atmospheric pollutants is particularly important with more fragile or environmentally pristine ecosystems, such as in many wilderness areas. Our ongoing research program is providing objective protocols and techniques for determining these types of responses.

Forest Management in the Wildland/Urban Interface

With the expansion of our cities and rapid relocation of people into forested areas, homes, schools, and industrial buildings have, in effect, invaded our wildlands. At the same time, agricultural lands have been taken out of production and returned to wildland status. These trends—evident in many locations throughout the world—are likely to hold for the foreseeable future. Where large urban areas are adjacent to State, Federal, and private wildlands, this intermixing creates major opportunities to extend the use of wildlands to greater segments of the population. But it also has created major problems for forest management in fire protection, land-use planning, and outdoor recreation.

Fire protection is a major concern at this wildland/urban interface, where valuable residences and commercial buildings intermingle with flammable forest or brushland vegetation. Local, State, and Federal firefighting capa-

bilities are often overwhelmed when both structures and natural resources are threatened. The potential for fire disasters involving loss of both property and human lives increases every year. Recent fires in the Southern, Southeastern, and Western United States and in Europe, Asia, and Australia attest to the potential magnitude of this threat.

To solve many problems associated with fire management in the wildland/urban interface, managers will have to use approaches unlike those for addressing more traditional wildland fire-management problems. Forest Service fire research programs have begun to address the science and technology needs for developing fire-safety and planning guides, systems to predict fire behavior, and improved fire-suppression tools for these unique, fire-prone areas. New and intensified fire research efforts are required, however, to equip land managers with timely knowledge and information needed to protect the growing wildland/urban interface from wildfire. This research program complements and supports the National Wildland/Urban Fire Protection Initiative being sponsored jointly by the USDA Forest Service, the National Fire Protection Association, the U.S. Fire Administration, and the National Association of State Foresters.

Our priority research program on the wildland/urban interface builds upon the agency's strengths in forest fire and forest recreation research. The research program addresses the concerns of fire managers with research on: fire risk assessment and hazard appraisal, structural aspects of flammability, physical and biological effects of fire, hazard mitigation techniques, effective fire-suppression strategies, relationships of demographic trends to fire activity, retardant chemicals for firefighting, the behavior of fires and severe fires, and fire planning.

Forest Productivity and Health in a Changing Atmospheric Environment

The effect of acid deposition on forests has been a major environmental and policy concern during the present decade. Evidence is mounting that some atmospheric pollutants have altered the species composition of forests. But acid deposition is only one of several atmospheric conditions that affect forest productivity.

Predicted changes in regional precipitation patterns and in the physical and chemical characteristics of the atmosphere will have an undetermined impact on forests. How the productivity and health of forest ecosystems will change in scientific and policy issues in the upcoming

decades. In designing a priority research program on this emerging issue, the Forest Service acknowledges the importance of learning much more about the interactions between the Earth's forests and the atmosphere surrounding them—before our ecosystems are damaged beyond repair.

Historically, forest managers and researchers believed that forest productivity and health could be assured by wise silviculture and protection from disease, insects, and fire. This belief in future forest productivity is now being questioned because of potential impacts of human-caused chemical and physical variations of the atmosphere. Those influences are generally beyond the control of the forest manager or landowner. Many occur at the regional or global level—such as global warming, changing precipitation patterns, and increased variability of climate.

The Forest Service has been a national leader in acid deposition research through the Forest Response Program (in cooperation with the Environmental Protection Agency), where long-term changes in forest conditions are evaluated. We bring an additional special capability to this program through our maintenance of an extensive network of experimental forests, watersheds, and research natural areas. Some of these natural laboratories, which include all major ecosystems in the United States, have over 50 years of continuous monitoring data.

This priority research program, built on the base of our expertise in atmospheric deposition research, broadens the research scope to other interactions between forests and the atmosphere that affect forest productivity. The program will address issues concerned with the future state of our forests. It will support long-term research, fundamental science, addressing multiple pollutants and the effects of atmospheric change on forest ecosystems. Relevant activities and mandates include

- Forest Survey, where the timber supply is assessed in each county every 10 years;
- Forest Pest Management, where forest health surveys and reports are targeted on the impacts of insects, disease, and air pollution;
- The Clean Air Act, in which prevention of significant deterioration permits are evaluated for class 1 (wilderness) areas;
- The Wilderness Act; and

- The National Forest Management Act, where monitoring the effects of land-management activities is required.

“Forest Productivity and Health in a Changing Atmospheric Environment” will address concerns about the future state of our forests in a changing physical and chemical climate. This long-term program will emphasize fundamental science. It will investigate multiple pollutants and the effects of atmospheric change and variability on forest ecosystems. The program consists of four broad areas of research:

1. Processes of atmospheric effects on forests,
2. Effects of forest management on the atmosphere,
3. Long-term monitoring effects, and
4. Development of management options based on the research results obtained in the three previous areas.

Recent Findings

Some examples of recent research findings follow:

- By law, Federal agencies must manage and protect “air-quality-related values” in wilderness areas. But until recently, there was no universally accepted measurement standard for quantifying air pollution and its effects. Rocky Mountain Station scientists joined 25 Federal and university counterparts to develop guidelines for measuring factors that could be indicators of pollutants deposited from the atmosphere. These protocols will help managers establish the current physical, chemical, and biological condition of wilderness resources using the same procedures all over the country.
- Automated weather stations linked to a central computer by satellite are being used to monitor fire weather conditions in remote areas of our forests and wildlands. Scientists at the Pacific Southwest Station have established procedures to locate new weather stations, around and in place of existing ones, to diagnose threatening fire weather conditions effectively. This work complements the Forest Service's efforts in learning to forecast potential fire severity for periods of a week, a month, and—in the not-too-distant future—the next season of the year. The major advantage of long-range weather forecasting lies in pre-positioning crews and equipment where wildfires are likeliest to strike.
- Prescribed burning is an invaluable tool for vegetation management, but we may lose it unless we can

learn to control the smoke it produces. Researchers at the Pacific Northwest Station are assaying the size of particles in smoke and verifying their origins, either from prescribed fires or from sources such as automobiles, power plants, or windblown dust. Newly developed computer models can predict the amount of emissions from a prescribed burn. In Oregon and Washington, using these models to determine when weather favors low-emission burning has already reduced emissions by over 50,000 tons per year. In the South, our Topographic Air Pollution Analysis System (TAPAS) predicts the atmosphere's capacity to disperse forest smoke. TAPAS enables us to pick the best times for using prescribed fire—times when its emitted particles will be most likely to disperse. Since smoke from prescribed burns has already been linked to traffic deaths via inhibiting motorists' vision, the TAPAS methodology will make a direct contribution to the welfare of drivers in the rural South.

Mid-Range Plan for Forest Fire and Atmospheric Sciences Research

Problem-oriented Program Components:

1. Fire Behavior, Physics, and Chemistry
2. Fire Effects and Use
3. Fire Management, Planning, and Economics
4. Fire Prevention and Demographics-related Research
5. Fire Technology, Engineering, and Equipment
6. Fire Meteorology and Fire Danger
7. Air Resource Management - including Smoke Management and Research Related to Air Quality Regulations
8. Ecosystem Response to Fire and Atmospheric Variability including Atmospheric Deposition
9. Forest and Mountain Meteorology and Climatology
10. Wilderness Management Issues - Fire & Air

Core Knowledge Components:

- | | |
|-------------------------|---------------------|
| A. Chemistry | I. Geography |
| B. Computer Science | J. Mathematics |
| C. Ecology | K. Meteorology |
| D. Economics | L. Physics |
| E. Engineering Sciences | M. Plant Physiology |
| F. Fire Sciences | N. Social Sciences |
| G. Fluid Dynamics | O. Soil Science |
| H. Forestry | |

National Wildfire Coordinating Group (NWCG)

Membership

NWCG membership is composed of representatives from the following agencies:

USDA Forest Service - Fire and Aviation Management
USDA Forest Service - Forest Fire and Atmospheric Sciences Research
USDI Fish and Wildlife Service
USDI Bureau of Land Management - Fire and Aviation Management
USDI Bureau of Land Management - BIFC
USDI National Park Service
USDI Bureau of Indian Affairs
National Association of State Foresters (two representatives)

Associate members (non-voting):

National Fire Protection Association (NFPA)
U.S. Fire Administration (USFA)

Bill Sommers took over from past Chairman Mic Amicarella in January. Mike Edrington, Willamette, National Forest, replaced Jim Abbott as Chairman of the ICS Working Team. In addition, State Forester Dr. Gerald Partain will be retiring in December. His replacement has not been selected.

Recent NWCG Activities

1. NWCG has completed a National Crew Needs Analysis Study. Final decisions will be made on the report at the January meeting.
2. The Fireline Handbook is being revised and should be available in 1989.
3. The Fire Equipment Working Team met in Quebec City in October with the Canadian Forest Fire Equipment Sub-Committee of the Canadian Committee on Forest Fire Management. Development of fire foams is the major cooperative project with the joint group. Also, the International Workshop on Foams held in Denver last June, was a product of this cooperation.
4. NWCG approved the development of a design to revise the fire suppression curriculum. The Training Working Team is anticipating a three year project completion period.
5. NWCG has assigned Fireline Safety Committee Chairman, Jerry Monesmith, and Prescribed Fire and Fire Effects Working Team Chairman, Mike Rogers, to a steering committee to coordinate the development of a plan for a nationwide study of the effects of forest fire smoke on firefighters.
6. A National Single-Engine Airtanker Committee was established to develop uniform standards for the use of these aircraft.
7. NWCG is assisting the Environmental Protection Agency in the development of a national policy statement for prescribed fire and smoke management. EPA plans to use this policy statement to provide guidance to EPA regional offices and State air agencies. This policy statement will help better manage local smoke and air quality issues. The policy statement is expected to be completed in late 1988. Interagency cooperative efforts share in the development of smoke management technology, training courses, and technical expertise.

United States Department of the Interior

The Department of the Interior, includes the Bureau of Land Management, the National Park Service, the Bureau of Indian Affairs, and the Fish and Wildlife Service. The Bureau of Land Management provides much of the evaluation and development work for the Department relating to fire suppression and systems design. The following outlines some of the projects that are currently ongoing within the Department.

Initial Attack Management System

The Initial Attack Management System (IAMS) is a computerized remote detection system that was designed by the Bureau of Land Management to provide intelligence to fire managers to more effectively perform fire detection, preposition forces, and dispatch initial attack resources to initiating fires. If fires are attacked at 10 acres or less, the final suppression costs are usually significantly lower and the chances for successful initial attack are significantly higher. The basic IAMS system consists of three sub-systems:

1. The Automated Lightning Detection System (ALDS) is a network of direction finders that locates ground lightning strikes as they occur and sends the information to a central processor so the strikes can be correlated and located on a map base;
2. The Remote Automatic Weather Stations (RAWS) are a network of weather stations that sample the weather hourly and transmit the data through satellites so it can be analyzed by the fire manager;
3. IAMS is the acronym given to the composite of hardware and software which links the Automated Lightning Detection System and the Remote Automatic Weather stations and provides fire fuel data and fire behavior modeling features.

InciNet

InciNet is the term used to describe the prototype automated systems being tested which provide computer and communication support to remote fire sights. In 1986, an interagency group initially analyzed the automation needs at the fire and performed an extensive cost/benefit analysis to determine if it was technically and economically

feasible to automate certain on-sight functions as well as provide data communication both internally and externally. There were already numerous attempts to provide automation at fire, but due to the interagency nature of Incident Management Teams and their geographic mobility, it was imperative that a standardized approach be developed which would have application nationwide. The National Wildfire Coordinating Group (NWCG) chartered a steering committee for this project in late 1987. The committee tested both a mini-computer system and a networked micro-computer system during the 1988 fire season. These results will be analyzed this fall and a recommendation as to the final design will be submitted for consideration. If approved and funded, basic InciNet systems should be available in 1991 with project completion targeted for 1993.

Agricultural Air Tankers

Since the early 1950's, the evolution of aerial retardant aircraft in the federal firefighting inventory has gravitated toward increasingly larger multi-engine aircraft. As a result, today's fleet of large air tankers requires long paved runways, and loading ramps, aprons, and taxiways capable of supporting their weight. This situation created a void in the air attack system because air tanker bases were often long distances from the fire line. Heretofore, this void has been filled by helicopters using a variety of fixed tanks and sling mounted buckets. While helicopter operations have been successful, they are expensive and require considerable support equipment and personnel.

The use of single engine agriculture crop spraying aircraft in fire is certainly not a new concept. However, the last three years the Bureau of Land Management has spent considerable time evaluating and testing various agricultural aircraft, drop characteristics, and retardants. The Bureau believes that these aircraft provide an excellent source for initial attack where larger airtankers are not readily available.

Foam Projects

The Bureau of Land Management, working with the Texas State Forest Service, began experimenting with expanded water/foam in 1978. Since then, the Bureau has continued to develop foam pumping equipment and

ground/aerial tactics. The program has expanded very rapidly as wildland and structural fire personnel see the many advantages of using foam. There have been three International Foam Symposiums and the National Wildfire Coordinating Group has formed an interagency foam working team. The Bureau expects to see the use of foam continue to accelerate throughout the United States and Canada.

Greenstripping

Over the past few years, the Bureau of Land Management has initiated studies that focus on methods to successfully break up the continuity of fuels in the arid and semi-arid northwest United States. One such study is greenstripping a method of changing vegetation types from volatile, fast burning fuels to vegetation types that will slow the spread of a wildfire.

The greenstripping study has two major aspects. The first is the planting of fire-resistant strips of vegetation (remaining fire-resistant for longer periods of time than adjacent vegetation) that would act as a fire break, to reduce the size of fires. The main objective is to slow fire spread and allow fire crews additional time during the initial attack of wildfires. The second aspect is directed toward past, present, and future burned rangeland rehabilitation efforts. To accomplish these rehabilitation objectives, research is directed toward the development of shrub species that are both palatable and have the ability to resprout after a fire. Initial cooperators in the project are the BLM-Idaho State Office, the U.S. Forest Service Shrub Laboratory (Provo, Utah), and the University of Idaho. The research is long term in nature, and is expected to continue at least until 1993.

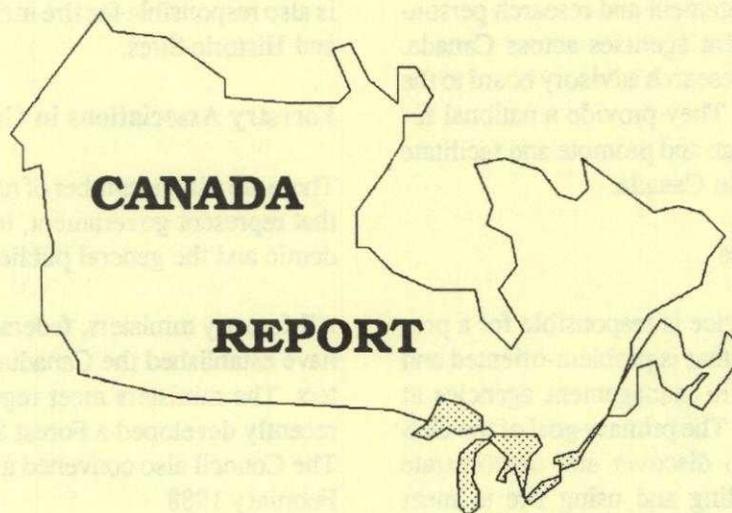
Smoke Management Initiatives

The Department of the Interior, along with the U.S. Forest Service have worked side-by-side with the State forestry agencies under the auspices of the National Wildfire Coordinating Group (NWCG) to foster common interests and promote advancements in the complex area of smoke management.

With the recent promulgation of air quality standards and regulations for particulate matter, protection of visibility, and the growing public concern for highway safety, Federal and state fire management agencies have further increased the emphasis on smoke management and cooperative efforts with the U.S. Environmental Protection Agency and state air quality agencies.

Smoke management initiatives undertaken in the past few years include the following major areas:

1. **Improvement in prescribed fire planning:** Each burn plan is required to include a specific review and consideration of the potential off-site impacts of smoke in regards to air quality standard for protection of public health, highway/transportation safety, and aesthetic values such as visibility in National parks and wilderness areas. Where appropriate, burn plans will include smoke monitoring and other early warning actions that may be necessary to reduce or avoid adverse smoke impacts and assure public safety. This aspect of improved planning and implementation of burns will enable us to lessen the adverse impacts of smoke.
2. **Public outreach:** There is a steadily increasing public awareness and sensitivity to smoke from wildfire and prescribed fire and related effects on air quality, visibility, and most definitely highway safety. A 15 minute video tape is being developed by the National Wildfire Coordinating Group which describes the role of fire in the ecosystem and the use of prescribed fire in natural resource management. This video is expected to be completed by mid-1989.
3. **Smoke Management Technology:**
 - A. **Smoke Modeling:** The Bureau of Land Management has developed a smoke model which is easily used by fire planners and burn bosses to predict the off-site impacts of smoke. The Simple Approach Smoke Estimation Model (SASEM) enables the fire planner to adjust key elements of the burn and thus help assure predicted off-site smoke impacts will be acceptable. Improvements in smoke modeling are needed to enable wider use of the end results. Work is expected to be initiated in 1989.
 - B. **Fire Emission Studies:** Studies of smoke emissions from prescribed fire are underway in cooperation with the Forest Service, BLM, and EPA to determine emission factors for various fuel types and to determine techniques to burn with less smoke. Study results will be available in mid 1989.



Introduction

A considerable number of personnel changes have occurred in the Canadian Forest Fire Community in the last couple of years. Several Directors/Chiefs of Provincial Fire Management agencies have retired or accepted different assignments in their organizations. Some new senior members of the Fire Management Community in Canada are identified below.

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Rolles, Mr. Glen
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Northern Field Services
Dept. of Parks, Recreation and Culture
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Fisher, Mr. Wayne
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Regional Services Branch
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MacAulay, Mr. E.M.
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Several agencies and organizations are involved in forest fire management in Canada. Their respective roles and responsibilities are summarized below.

Canadian Committee on Forest Fire Management (CCFFM)

The CCFFM, an Associate Committee of the National Research Council of Canada was established in 1952 and

consists of senior fire management and research personnel from all fire management agencies across Canada. The Committee serves as a research advisory board to the Canadian Forestry Service. They provide a national forum for information exchange and promote and facilitate fire management practices in Canada.

Canadian Forestry Service

The Canadian Forestry Service is responsible for a program of forest fire research that is problem-oriented and closely coordinated with fire management agencies at regional and national levels. The primary goal of the CFS fire research program is to discover and demonstrate practical means of controlling and using fire to meet resource management objectives. The forest fire research program is carried out at three Regional Centres (Pacific, Northern, Great Lakes) and the Petawawa National Forestry Institute.

Canadian Interagency Forest Fire Centre (CIFFC)

CIFFC was established in 1982 to facilitate more effective interagency cooperation and sharing of fire fighting resources in Canada. The Centre also serves in coordinating fire fighting assistance with the United States, under the terms of a Canada/United States Forest Fire Fighting Assistance Arrangement. The Fire Centre provides daily situation reports on forest fire activity and the availability of fire fighting equipment. The Centre plays a major role in coordinating the sharing and positioning of the National Airtanker Fleet (CL-215's). The Federal government covers one-third of the Centres operating costs.

Maniwaki, Technology Transfer Centre

The Centre was officially opened in June, 1986, and is funded under the provisions of the Canada-Québec Forest Resource Development Agreement. The principle mandate of the Centre is to facilitate and accelerate the transfer of the forest fire technologies developed by the Petawawa National Forestry Institute to the Sociétés de Conservation de Québec and to the Provincial Fire Coordination Centre. It can also offer, through contractual agreements, the same services to other provinces and eventually to other countries.

Provincial/Territorial Fire Management Agencies

Provincial and territorial fire management agencies are responsible for the prevention, detection and suppression of all forest fires within their jurisdiction. Parks Canada

is also responsible for fire management in National Parks and Historic Sites.

Forestry Associations in Canada

There are a large number of national forestry associations that represent government, industry, professionals, academic and the general public in Canada.

All forestry ministers, federal, provincial and territorial, have established the Canadian Council of Forest Ministers. The ministers meet regularly and the Council has recently developed a Forest Sector Strategy for Canada. The Council also convened a forum on forest research in February 1988.

There are a large number of national and provincial forest industrial associations. Most prominent nationally are the Canadian Pulp and Paper Association and the Canadian Lumbermen Association. A Council of Forest Industries has been established and is comprised of representatives of the various industrial associations.

The Canadian Institute of Forestry (CIF) is the national association of forestry professionals. In five provinces - New Brunswick, Québec, Ontario, Alberta and British Columbia have established associations of registered professional foresters. In 1982 the CIF joined with these provincial associations to create the Canadian Federation of Professional Foresters Associations (CFPPFA). The federation speaks on behalf of about 6,000 foresters. It is currently involved with the universities in establishing a National Forestry Accreditation system.

Seven universities across Canada have faculties or schools of forestry. The forestry heads have established an Association of University Forestry Schools of Canada to provide a forum for communications.

The Canadian Forestry Association with nine provincial forestry associations, promotes public awareness of forest resources. Membership in the federation is available to any person interested in forestry.

The Forestry Constituency is an ad hoc group convened by the Canadian Forestry Association and the Canadian Institute of Forestry that meets twice a year to identify and discuss forestry matters of current and widespread concern. It consists of membership from a wide range of organizations in the forest sector including government, industry, academia and labour.

Inside the Canadian Forestry Service

Creation of forestry department

On September 15, 1988, the Prime Minister announced the creation of a Federal Department of Forestry. Legislation is now being drafted. Orders-in-Council have been approved providing the Minister with direct authority over the Forestry Development and Research Act of 1966-67. Legislation establishing a full department will be tabled in the next few months, following a general national election on November 21, 1988.

The new Minister of State (Forestry) is the Honorable Frank Oberle.

Functions of the CFS

The Canadian Forestry Service is the principal source of federal expertise in forestry and has been designated as the government's lead agency for forestry matters. Its general objective is to promote the wise management and use of Canada's forest resources for the economic, social, and environmental benefit of Canadians.

The following are the main functions of the CFS:

1. Coordination of federal policies for the promotion of better resource management and forest industry development.
2. Provision of scientific and technological leadership in forestry through research and development.
3. Provision and analysis of national and international statistics and information as a basis for policy formulation.
4. Development and certification of codes and standards for wood product performance.
5. Protection of Canada's forests from foreign pests.
6. Fostering the potential use of the forest resource for energy.
7. Contributing to the environmental objectives of the Government of Canada.

Canadian Forestry Service programs are coordinated with those of other forestry agencies through a variety of mechanisms, including the Canadian Council of Forestry

Ministers, the Forest Sector Strategy Committee, management committees for Federal-Provincial Forestry Development programs, national and regional Research Advisory Committees, and various technical committees for specific program areas.

The Canadian Forestry Service comprises a headquarters unit, six forestry centres, and two national institutes. The forestry centres are responsive to regional priorities and maintain close liaison with the respective provincial government forestry departments and other clients. They also participate in, and frequently lead, national programs. The national institutes provide the focus for programs of national scope.

CFS Personnel Changes:

Mr. Thomas E. Lee has been appointed Assistant Deputy Minister, Forestry Operations, Canadian Forestry Service. Mr. Lee was formerly Assistant Deputy Minister of Timber and Land Marketing with the British Columbia Ministry of Forests and Lands.

Dr. Carl Winget is the new Regional Director General at the Great Lakes Forestry Centre, Canadian Forestry Service, Sault Ste. Marie, Ontario. For the past six years, Dr. Winget has served as Director General of Forestry Sciences at CFS headquarters.

Dr. Fred Pollett is the new Director General of Forest Sciences in CFS headquarters, Ottawa, Ontario. Dr. Pollett was the Director of the Petawawa National Forestry Institute.

Mr. C. Van Wagner, a senior fire research scientist of the Canadian Forestry Service has formally retired. He will continue to conduct some research under a recently established federal program that allows retiring scientists to work on a part-time basis.

Two CFS fire researchers have recently returned from Educational Leave. Mr. R. McAlpine completed his M.Sc. at the University of Montana and returned to the Northern Forestry Centre in Edmonton. Subsequently, he has accepted a position at the Petawawa National Forestry Institute in forest fire research and will assume his M.Sc. new duties early in 1989. Mr. Bryan Lee is currently completing his thesis at the Northern Forestry Centre after completing course work at the University of Washington.

Two CFS fire researchers are expected to return to Uni-

versity in 1989 to obtain Ph.D's in fire science, pending approval by the Federal Government.

Dr. R. Barney has completed a three year appointment (under an International Assignment Agreement) as Project Leader of the Fire Research Project at the Northern Forestry Centre and has returned to the U.S.

Dr. S. Pickford has completed a one-year term appointment under STEP (Science and Technology Exchange Program) at the Northern Forestry Centre and has returned to his duties at the University of Washington.

Focus on Research: An outline of the CFS Strategic Plan for Research

The document "Focus on Research" outlines research and technology programs "to enhance the economic, social and environmental benefits derived from forests and forest-based industries in Canada..." to 1992. It addresses forest renewal; wood supply; protection; utilization; environmental quality; use of results; and national research competence.

The Service will focus on core priorities, but will maintain the range of expertise needed for the lead federal forestry agency. Mission-oriented programs will link fundamental research with technology transfer and application. The CFS will foster national competence in research involving provinces, universities and industry. Identified priorities are:

- i) *Forest Economics* - economically available wood supplies; forest crop replacement costs; Forest Economics and Policy Analysis Project.
- ii) *Major Forest Pests* - population dynamics and impacts; integrated pest management; biotechnological tools; pests of plantations and intensively managed forests.
- iii) *Forest Insect and Disease Survey* - survey activities; integration of survey data with forestry statistics; sharing of survey responsibilities with provinces.
- iv) *Forest Fire Management* - fire danger rating system; fire occurrence and behavior models; transfer of fire management technology [see below for expanded statement].
- v) *Acid Rain and Other Pollutants* - early symptoms; deposition and fate of pollutants; ecosystem im-

pacts; hardwood declines.

- vi) *Vegetation Management* - weed control for the new forest.
- vii) *Tree Improvement and Genetics* - genetic and biotechnological techniques for second generation renewal; shift of semi-operational to provinces and industry.
- viii) *Ecological Basis of Forest Management* - environmental effects of forestry practices; silvicultural systems responsive to ecological and site factors.
- ix) *Forest Productivity and Production Systems* - growth and yield research and forestry statistics, especially for intensive management; integrated forest management systems.
- x) *Harvesting and Utilization* - support for FERIC and FORINTEK in silvicultural mechanization, harvesting, and wood products.
- xi) *Special Strategic Concerns* - biotechnology; climate change; woodlot management, and urban forestry.

The plan incorporates measures to enhance relationships with clients and cooperators regarding technology transfer, Science and Technology Exchange Program; publications policy; public awareness; research progress reporting. Rationalization of research advisory structures will continue. Research planning and research management expertise will be upgraded. Funding commensurate with the Service's role and the magnitude of forestry needs and opportunities will be sought.

Forest Fire Management: Losses from forest fires continue to be a serious drain on Canada's forest resources. The major CFS thrust in fire research over the next several years will centre on continued development of the Forest Fire Danger Rating System and of the fire occurrence and behavior models on which it is based, refinement and transfer to other fire control agencies of the highly successful Fire Management Systems technology, and extensive investigations of prescribed fire as a forest management tool. Support for the Canadian Inter-Agency Forest Fire centre will continue.

CFS Research Working Groups

One way to facilitate close cooperation and collaboration

between CFS research scientists located at eight widely scattered establishments across Canada is through formally established Research Working Groups. Currently, ten working groups operate in the Canadian Forestry Service as follows (Chairperson in brackets):

- 1) Remote Sensing (J. Lee, Pacific Forestry Centre);
- 2) Modelling (B. Payandeh, Great Lakes Forestry Centre);
- 3) Site Classification (W. Meades, Newfoundland Forestry Centre);
- 4) Vegetation Management (E.T. Oswald, Pacific Forestry Centre);
- 5) Seedling Production (J. Scarratt, Great Lakes Forestry Centre);
- 6) Research Management (T. Ennis, Great Lakes Forestry Centre);
- 7) Fire Danger Rating (B. Stocks, Great Lakes Forestry Centre);
- 8) Prescribed Fire (D. McRae, Great Lakes Forestry centre);
- 9) Biological Control (Vacant Chair);
- 10) Forest Pathology (Vacant Chair).

The Fire Danger Rating Working Group functioned informally for several years and is the oldest most successful and well-established working group. Indeed, the success of the Fire Danger Working Group gave rise to the overall concept of Working Groups finally resulting in the management sanctioned working groups noted above.

Both Fire Research Working Groups (Danger Rating and Prescribed Fire) have prepared Strategic and Operational Plans. The Danger Rating S. & O. Plan has been formally accepted and approved by a senior CFS Management Committee. The Prescribed Fire S. & O. Plan is pending approval by the same Committee, early in 1989.

Synopsis of a strategic and operational plan for forest fire danger rating research in Canada. 1987-1992

A well-funded fire protection program is fundamental to insuring that investments in intensive forest management reach fruition. The primary purpose of a fire danger rating system is to properly evaluate the various factors influencing ignition potential and probable fire behavior in order to enable fire managers to systematically judge the level of preparedness needed and the corresponding suppression resources required. The Canadian Forest Fire Danger Rating System (CFFDRS), as developed by

the Canadian Forestry Service, is the national system of rating fire danger used in Canada. The S. & O. outlines the proposed research and development activities associated with the continuing improvements and additions to the CFFDRS in order to meet the present and future demands of Canadian Fire Management Agencies. Four broad objectives have been formulated on the basis of several identified problems and opportunities:

- To complete the first full edition of the quantitative fire behavior prediction sub-system of the CFFDRS.
- To provide adequate technological and information transfer materials and activities to support national implementation of the present version of the CFFDRS.
- To initiate development of a national scheme for fire occurrence prediction, within the framework of the CFFDRS.
- To continue research into the fundamentals of fire occurrence and behavior in support of improvements to the CFFDRS.

A series of short (< 1 yr.) and mid- to long-term (1 to 5 years) goals linked to each of these general objectives have in turn been established for the period 1987 to 1992.

The prescribed fire working group has established the following research priorities

1. National research project on ignition patterns, techniques, interactive rate of spread and intensity, column dynamics, vortices, and how these factors influence fire behavior, control and impact.
2. Conduct fire effects research in the area of site productivity impacts on a regional basis. The area of wildlife and range ecological effects should also receive attention because of the increased use of habitat improvement burning. Agencies outside CFS will have to do the bulk of this work.
3. The effect of atmospheric conditions on fire behavior.
4. Cooperate, review and foster research on smoke properties, health effects, atmospheric effects (emissions and visibility), and management techniques. Research on smoke properties and health effects will have to be done by agencies outside CFS

and perhaps rely on work in the United States.

fire behavior. This is a field requiring close cooperation with the danger rating working group.

5. Topographic influence on fuel moisture, wind and

Fire Conferences/Symposium/Meeting and Workshops

1. Southwest Fire Council: Oct 17-19, 1988. Lake Havasu, Arizona.
2. Interior West Fire Council: Oct. 24-27, 1988; Kananaskis, Alberta.
Theme: The Art and Science of Fire Management
3. Cal.-Nev.-Hawaii Fire Council: Oct. 26-27, 1988. Nevada. Reno.
Theme: Fire Fighters Health and Safety: A Concern for the Future.
4. Northwest Fire Council: Nov. 14-15, 1988. Victoria, British Columbia.
Theme: Fire Management In A Climate of Change.
5. NFPA Wildland Fire Management Section: Nov. 14-16, 1988, Nashville, Tennessee.
Presentations include: Effective Wildland Arson Strategies and Use of Wildland Fire Suppressant Foams in the Wildland/Urban Interface.
6. Western Fire Committee of Western Forestry and Conservation Association: Dec. 4-7, 1988. Seattle, Washington.
Theme: Informed Decision-Making.
7. International Exhibition of Equipment for Forest Fire Control and Technology Exchange '88: Dec. 4-10, 1988. Beijing, Peoples Republic of China.
Exhibits include: Vehicles, Fire suppression equipment, Aerial fire control, Communications systems, Detection, etc.
8. Air Attack Symposium - The Future: Jan. 10-12, 1989. Winnipeg, Manitoba.
Agenda Items: Air Attack Officer qualifications, training, terminology, standardization, retardants/suppressants.
9. Tenth Conference on Fire and Forest Meteorology: Apr. 17-21, 1989, Ottawa Ontario
Theme: Fire and Forest Meteorology in a Changing Environment: New Technologies and Concerns.
10. Third International Symposium on Fire Ecology: May 16-18, 1989, Freiburg, Germany.
Theme: Part I. Fire-Wildland Interactions in the Mediterranean, temperate and boreal biota of Europe. Part II. Fire in Tropical Biota.
11. Meeting Global Wildland Fire Challenge: The People, the Land, the Resources: July 23-26, 1989. Boston Massachusetts.
Purpose: To bring together leaders of public and private organizations from around the world to discuss issues, programs and strategies to reduce serious wildfire loss and to promote international cooperation.
12. IUFRO XIXth World Congress: Aug. 5-11, 1990, Montréal, Québec.
Theme: Science in Forestry - IUFRO's Second Century.

Fire Newsletters

1. **Bushfire Bulletin**
Published Quarterly by the Bush Fire Council of New South Wales, 121 Macquarie Street, Sydney 2000. Editor: Robyn Turner.
2. **Fire Management Notes**
An international quarterly periodical devoted to Forest Fire Management. Published by the United States Department of Agriculture Forest Service. Francis R. Russ, General Manager, P.O. Box 96090, U.S.D.A., Washington, D.C. 20090-6090.
3. **Fire Research Update**
Published by the Research Committee of the Northeast Forest Fire Supervisors. Editor: Donna M. Paananen, 1407 S. Harrison Road, Room 220, East Lansing, MI. U.S.A.
4. **Firebird**
Published quarterly by the Ontario Ministry of Natural Resources, Aviation and Fire Management Centre, P.O. Box 310, 747 Queen Street East, Sault Ste. Marie, On-

tario, P6A 5L8. Editor: Bob Thomas.

5. Fire Mac

Published six times per year by Books on Fire Inc. P.O. Box 65, Norfolk, Massachusetts 02056. Editor and Publisher: Jerry W. Laughlin.

6. Forest Fire News

Published once a year on behalf of the Fire Management Study Group of the North American Forestry Commission. Editor: Mr. Dave Williams (c/o Dennis Dubé, Canadian Forestry Service, Place Vincent Massey, 19th Floor, 351 St-Joseph Boulevard, Hull, Québec, Canada, K1A 1G5).

7. Forest Fire Newsletter

Prepared on behalf of the ECE/FAO Agriculture and Timber Division, Palais des Nations CH-1211, Geneva 10. Edited by Johann G. Goldammer, Department of Forestry, Freiburg University, Bertoldstrasse 17, D-7800 Freiburg

8. Foam Applications for Wildland and Urban Fire Management

A Publication of the National Wildfire Coordinating Group. Sponsored by United States Department of Agriculture, United States Department of Interior, National Association of State Foresters, In Cooperation with Petawawa National Forestry Institute of the Canadian Forestry Service. Prepared by: NWCG Fire Equipment Working Team's Task Group for International/Inter-agency Foams and Applications Systems.

9. Wildfire Strikes Home Newsletter

Published by the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. Editor: Gary Togle.

10. Wildland Fire Management Briefings

Published by NFPA Wildland Fire Management Section, Batterymarch Park, Quincy, Ma. 02269. Executive Editor: Mr. Dan Bailey.

11. Smoke Signals

Published by National Research Council of Canada, Canadian Committee on Forest Fire Management. Prepared by Forest Fire Equipment Subcommittee.

Others of Interest

1. International Journal

Wildland Fire Science (International Journal of) Pub-

lished by the Fire Research Institute, 1129 Western Drive, Santa Cruz, California 95060, U.S.A. Editors: Guy Gettle, Jason Greenlee, Carol Rice.

2. IUFRO News

International Union of Forestry Research Organizations. President: Professor Robert E. Buckman, College of Forestry, Corvallis, Oregon 97331, U.S.A.

3. IUSF Newsletter

International Union of Societies of Foresters. Editor: Richard Barry, IUSF Newsletter, école des sciences forestières, Université de Moncton, Centre universitaire, Sainte-Louise-Maillet, 165 boul. Hébert, Edmunston, N.B. E3V 2S8.

Recent CFS Fire Research Publications

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Alexander, M.E., De Groot, V.J. 1988. Fire behavior in jack pine stands related to the Canadian Forest Fire Weather Index (FWI) System. *Can. For. Serv. North. For. Cent., Edmonton, Alberta. Poster (with text).*

Alexander, M.E., B.J. Stocks, B.D. Lawson and C.E. Van Wagner. 1988. Fire behavior in black spruce-lichen woodland: the Porter Lake Project. *Can. For. Serv., Northern Forestry Centre, Edmonton, Ab., Info. Rep. ___ (in press).*

Ballard, T.M., and B.C. Hawkes. 1988. Effects of burning and mechanical site preparation on nutrition of planted white spruce. *Canadian Forestry Service, Pacific Forestry Centre, Info. Rep. BCX - (in press).*

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CFS Fire Research Progress 1987-88 B.J. Stocks

The movement toward cooperative national CFS fire research projects continued over the past year, with fire researchers from four CFS establishments working collectively to address priority problems. The CFS Fire Danger Working Group continued a series of working meetings to revise and expand the Canadian Forest Fire Danger Rating System (CFFDRS), putting the final stages of a Fire Behavior Prediction System together, issuing a CFFDRS User's Guide, and preparing an updated strategic plan for CFS management approval. The CFS Prescribed Fire Working Group met to discuss cooperative research possibilities and developed a strategic plan for the next five years. The joint CFS/Alberta Forest Service experimental burning project in the black spruce-Labrador tea-Cladonia fuel complex of northern Alberta continued in 1988, although continuously poor weather permitted the conducting of only one burn. The joint Canada/US cooperative investigation into the behavior and environmental impact of large-scale, mass-ignition prescribed fires continued in 1988 with over 40 research

staff from the CFS, the USFS, the National Aeronautics and Space Administration (NASA), and the Atmospheric Environment Service (AES) monitoring two prescribed fires in northeastern Ontario.

The following is a summary of additional fire research activity within CFS research establishments during the past year.

Pacific Forestry Centre (PFC)

The Project Leader, B.D. Lawson, represented Canada on a five-week Fire Management Study Tour of Australia, Jan.-Mar. '88. This was the seventh in a series of study tours to exchange operational and research information on forest fire management between Canada, the United States and Australia. The Tour visited all six states and two territories of Australia, providing the visitors an excellent insight into fire management problems and approaches to fire research in Australia. The use of Cana-

dian innovations in aerial ignition systems and aerial and ground fire suppression techniques was seen in many parts of the country. Urban interface fire problems are serious in Australia and receiving much attention, particularly from the prevention side, in terms of legal and regulatory control over subdivision design and building materials. Early steps are being taken toward development of a national system of fire danger rating, as we have in Canada. The tour is expected to result in closer cooperation in fire behavior research between all three countries, and Memos of Understanding among all three countries in the area of fire research and management are being discussed.

The Project Leader is 1988 Chairman, Northwest Fire Council, responsible for organizing the November Annual Meeting in Victoria, B.C. A program has been developed that emphasizes how fire management in Western Canada and the Pacific Northwest United States is currently adapting to many changes, in areas such as public policy, public attitudes toward fire in the urban interface and prescribed fire as a forest management tool. Responses of fire management to climate change and new opportunities created by technological change are also examined.

Fire research at PFC continues in the areas of prescribed fire uses in silviculture and in the development of the Canadian Forest Fire Danger Rating System (CFFDRS). The PFC Fire Research Unit cooperated with GLFC and PNFI on the Canada/U.S. Mass Fire Behavior and Emissions Project, with 1988 field study prescribed burns located in Northern Ontario. The possibility of extending this study to British Columbia is currently under review. Work continued on the Fire Behavior Prediction (FBP) System of the CFFDRS, as publication of the completed System is planned for 1989. Work in B.C. continued as well on the testing and development of fuel moisture codes for woody slash fuels, as a second and hopefully final field season of data collection was completed near Prince George. A publication on this work is planned for 1989, and the inclusion of fuel moisture models for medium and possibly large diameter slash fuels in the Accessory Fuel Moisture System of the CFFDRS is under discussion.

The major milestone study under the Canada-B.C. Forest Resource Development Agreement (FRDA) mentioned in the 1987 report has now been planted to white spruce and lodgepole pine in May, 1988 with first year post-treatment measurements completed on the planted seedlings and vegetation. Post treatment soil sampling and

nutrient analyses have also been completed. Site climate monitoring is continuing. An establishment report on the study will be available by Dec. 1988 which will describe the site conditions, treatments, treatment impacts, and sampling methodology. Steve Taylor is now Study Leader of this study.

Brad Hawkes continued to chair the new CFS Working Group on prescribed fire and organized and chaired the 1988 annual meeting in Victoria. Minutes of the 1988 annual meeting and a progress report on the working group activities for 87/88 are available. The strategic and operational plan has been submitted to CFS management for comment and approval. Doug McRae is the new chairman of the working group. Second year seedling measurements of CFS micro-plots on the cooperative MacMillan Bloedel and CFS study have had preliminary analysis of tree growth and fire impact completed. Results were presented to the Jan. 1988 Peer Review of the PFC fire research project. No significant relationships between tree growth and fire impact were found to date.

Discussions were initiated with R. Ottmar, PNW research station in Seattle, Wash. on exchange of coastal fuel type prescribed fire impact data for model development at PFC. Model development will continue over the winter with some preliminary prescription models available by the spring of 1989.

Northern Forestry Centre (NoFC)

The Intelligent Fire Management Information System (IFMIS), a decision support system for dispatching fire suppression resources to wildfires is under development at NoFC. IFMIS uses logic programming to integrate relational data bases, mathematical models, computer graphics, geographic displays, and expert system technology. The program is written primarily in PROLOG and runs on 80386 based microcomputers. The mathematical modeling and screen graphics routines are implemented in C, while the integrated data base manager uses structured query language (SQL) syntax.

The surface wind prediction model WNDCOM, developed by the USFS, is being evaluated to determine its suitability for application in western Canada. Data from paired sites in Alberta and the Northwest Territories is being used for this validation study. An interactive computer program and information report on the application of WNDCOM are currently in preparation.

A project to evaluate the application of Geographic Infor-

mation System (GIS) technology to fire danger and fire behavior modeling has been initiated. This study will develop approaches and user applications guidelines to apply this technology operationally.

A laboratory study on the acceleration of fire to equilibrium spread has been completed as a M. Sc. thesis. The relationships observed and equations produced are now being evaluated and adjusted to reflect observed patterns of fire acceleration in forest stands.

Additional burns were completed in association with the Big Fish Lake experimental burning project in the lowland black spruce fuel type. An 18 minute audio-video on the project was produced and is available.

Project staff have been heavily involved with the planning and organization of the first annual meeting and workshop of the Interior West Fire Council which is to be held Oct. 24-27, 1988, at Kananaskin Village, Alberta (theme: The Art and Science of Fire Management).

A highly successful wall poster entitled "Fire Behavior in Jack Pine Stands Related to the Canadian Forest Fire Weather Index (FWI) System" was produced. Another poster dealing with fire behavior prediction in the black spruce-lichen woodland forest of the Northwest Territories is nearing completion.

Field work to investigate the feasibility of using real time infrared imagery to direct air attack operations, was tested on fires in Ontario.

Ongoing development of a system to monitor fire behavior continues

- system couples a high quality IR camera and a radar altimeter to a computer that is capable of area and distance calculations, density slicing and image recording on disc.

- system has been used from a light helicopter on prescribed burns and has potential for mapping wildfires.

Participated in air tanker and retardant evaluation as part of the Operational Retardant Effectiveness (ORE) team working out of Redding, California and headed by C. George, U.S.F.S.

A fire behavior and fireline productivity study was undertaken by the University of Alberta and Forest Technology School, Hinton fire research staff under FRDA funding.

Ten test fires were burned this summer, with 4 in the extreme fire danger range. An associated bulldozer productivity report is in preparation.

Fire management activities in Saskatchewan during the past year were centered on technology transfer. One CFS position was seconded to the provincial Forest Fire Management branch for a six month period, starting in March, 1988. The primary duty was to transfer new research information in fire danger rating and fire behavior prediction to the field level. This included working with fire managers in planning pre-suppression strategy, and actively participating as fire behavior officer on wildfires. The information and experience exchanged during the secondment period proved beneficial to both parties. As a result, the secondment was extended another six months on a half time basis.

A total of 6 workshops on fire weather, fire behavior and the Canadian Forest Fire Behavior Prediction (FBP) System were conducted for Manitoba fire management staff and the Canadian Parks Service. Assistance was provided to the Province regarding prescribed burning. Two pbs were planned for this year in the Lake St. George and Child's Lake areas. Wildfire behavior information on three large spring wildfires in southeastern Manitoba and northwestern Ontario was collected. This information will be published in a report to be presented at the 10th Conference on Forest and Fire Meteorology in April 1989. A case study of the 1988 Wallace Lake fire was completed. Three formal presentations were made on the fire weather and fire behavior of this fire.

Petawawa National Forestry Institute (PNFI)

(a) Forest Fire Behavior, Ecology, & Impact

Results from the aspen (*Populus tremuloides*) study (comparing the effects of cutting and burning before and after flushing) were written up and submitted for review. Monitoring of soil respiration on the cutting and burning treatments indicated that ecosystem processes recovered remarkably fast after disturbance, a finding consistent with results from other fire-adapted species complexes such as jack pine.

Research into jack pine ecosystem structure and function, carried out at PNFI since 1969 was summarized and presented at an international symposium in Utrecht, The Netherlands.

The cooperative research, carried out with PFC staff near Prince George, B.C., continued with field work at the

Stony Lake installation and chemical analyses of substrate sampled prior to and after treatment application. The treatments consisted of chemical, mechanical and prescribed fire site preparation techniques and combinations thereof. The objective of the experiment was to develop recommendations, under FRDA, for the rehabilitation of NSR lands in the sub boreal spruce biogeoclimatic zone of interior British Columbia. The contribution of PNFI is in the area of seedling nutrient use and nutrient uptake efficiency in relation to treatments applied.

A study of the relation of meteorological variables to monthly Provincial area burned by wildfire in Canada (1953-1980) was published. Results showed that the key factor affecting area burned was frequency of precipitation rather than monthly precipitation amount.

The use of datalogger systems for monitoring of environmental variables in forest research was described in an Information Report together with a case study carried out by Dave Brand at PNFI. Other ongoing meteorology investigations include interpolation of Fire Weather Indices; continuing research into firewhirls observed during large scale prescribed burns in Ontario; evaluation of methods and instrumentation for relative humidity determinations; and a careful examination of a blowdown event in Northwestern Ontario, the latter in cooperation with OMNR and CFS personnel from Sault Ste. Marie.

Data is being gathered for a lightning fire occurrence prediction study as well as for an assessment of the potential impact of climate change on wildfire frequency and severity.

Charlie Van Wagner retired after 28 years of highly productive service - with no signs of slowing down. He has returned on a part-time basis and is continuing to turn out high-quality products.

The past year has been devoted to completing various components of the forthcoming new version of the Canadian Forest Fire Behavior Reduction (FBP) System. The ultimate goal is the prediction of fire behavior in any forest or fuel type in any weather at any time. The primary outputs are spread rate, fuel consumption, fire intensity, and kind of fire. In form the System will be a set of equations based on empirical fire data linked together with physical theory or mathematical schemes designed to represent nature as well as possible.

Some of these components are:

1) A scheme to represent the effect of increasing fuel

consumption on a fire's spread rate.

- 2) A method of computing the foliar moisture content of a conifer forest as it varies throughout the season according to date, latitude, longitude, and elevation.
- 3) A routine for deciding whether a fire in a conifer stand will crown or remain on the surface.
- 4) A model for estimating crown fire spread rate and intensity based on foliar moisture content, crown base height, and crown fuel load.

(b) Forest Fire Suppression and Fire Management Systems
CL-215 Foam Injector: The performance of the existing Canadair injection system was evaluated and calibration tables and curves were prepared. Developmental work on the new injection probes was carried out and deficiencies in the system proposed for the CL-215T were identified. Recommendations were made to Canadair concerning the new injectors and replacements for those currently in use. The new design should correct the concentrate dispersion inadequacy.

In preparation for field form evaluation trials in cooperation with GLFC at their research burn sites, various inductors and nozzle systems were calibrated and the quality of the foam produced by these systems was determined. Two burns were executed, some foam was applied, and problems were identified. The main difficulty encountered with using outside fire crews was their resistance to applying only a thin layer of foam. The practice is to apply copious volumes of water and this same practice spilled over when they applied foam. The result was an overkill situation.

A cooperative field activity was carried out with NoFC in Saskatchewan. C. Ogilvy did the I.R. scanning and E. Stechishen flew out to the appropriate fires with the Initial Attack crew to examine the sites where aerial applications of foam were made to contain fires. The end result should have been some productivity estimates, however overkill was standard practice i.e. excessive foam application to ensure fires did not rekindle or escape.

A presentation on the use of foam in fire suppression and the impact of its characteristics on the quality of the foam that was generated was made in Gander, Newfoundland. Demonstrations in the lecture hall and at field sites reinforced the spoken words. Comparisons of foam generated by fire pump, helitanker and the CL-215 were

made using two different products. Those who participated realized that fire suppression people of all levels should be exposed to such a session to enable them to understand foam and use it effectively to suppress forest fires. A request to participate in a two day session in spring has been made.

Various laboratory tests have been executed but the most extensive one is the test fire series. The objective is to determine the superiority of foam compared to water. This evaluation is currently being expanded to account for foam quality variability. Results will not be made public for several months, that is, not until a thorough analysis is carried out. The results are not black and white but various shades of gray.

The Lightning Location System, of the CFS developed Fire Management System, used radio communications to transmit lightning data instead of the expensive dedicated telephone lines previously used. A precipitation radar network experiment will be continued as results are promising. Progress continues on the development of an "expert system" for human caused fire prediction using artificial intelligence. The development of the fire spread model was enhanced with the addition of missing elevation contours, supplied by the Department of Energy, Mines and Resources, Mapping Branch. Testing was undertaken to fabricate fuel moisture sensors for measuring the conditions of various fuels in relation to their capacity to ignite and support a fire.

Great Lakes Forestry Centre (GLFC)

GLFC is the lead CFS establishment in a cooperative Canada/US investigation into the behavior and atmospheric environmental impact of large-scale, mass-ignition prescribed fires. This international effort was expanded in 1988 as scientists from the CFS (GLFC, PFC, NoFC, and PNFI), the USFS, NASA, and AES gathered for one month in northeastern Ontario to fully document two large prescribed fires. Over 40 fire research personnel used both airborne and ground-based instrumentation to monitor interactive fire spread and acceleration, fuel

and fire dynamics, convection column development and chemistry, and smoke dispersal. Data is being analyzed and further cooperative investigations are planned for 1989 in Ontario.

A cooperative (GLFC/PNFI) study of the development and behavior of fire whirls and vortices on mass-ignition prescribed fires is nearing completion, as is the analysis of data from an experimental burning program to investigate the growth of point-source ignition fires in jack pine slash.

The GLFC experimental burning program in standing timber fuel types continued in 1988 with four fires being carried out in 1948 origin jack pine. A journal article on fire behavior in mature jack pine is in press.

GLFC fire researchers on the National Fire Danger Working Group continued to participate in the development of a quantitative Fire Behavior Prediction System for use throughout Canada. Publication of this work is expected within the next year.

A discussion paper was prepared on the various fire occurrence prediction schemes in use throughout Canada, and GLFC took a lead role (in conjunction with the Ontario Ministry of Natural Resources and forest industry) in developing a set of Woods Operations Modification Guidelines for Ontario.

In cooperation with a Chinese fire researcher, a study of the fire behavior and associated weather on the large (1.3 million hectare) Chinese forest fire of May 1987 is nearing completion.

Two contracts under the Canada Ontario Forest Resource Development Agreement, on which GLFC fire researchers are the scientific authorities, are progressing well. One involves the sampling of 300 forest stands in order to develop a photo-series/fuel inventory handbook, while the second deals the effect of fire on timber supply in Ontario.

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CANADA REPORT

Canada entered the 1988 fire season with the national fire hazard roughly divided in half with areas west of Thunder Bay, Ontario being hot and dry and east of Thunder Bay being cool and damp. Low over winter snowfalls and warm, dry spring weather resulted in another early start of fire season, with problem fires occurring early in almost all provinces from Ontario west. The urban rural interface fire problem came to the fore front early in 88 again with the Brereton Lake fire in Manitoba and the Kenora 14 fire in Northwestern Ontario which resulted in the loss of some private structures but the successful protection of numerous others.

The continuing drought throughout the summer in Saskatchewan, Manitoba, Ontario resulted in above average fire occurrence and a near record breaking 3253 fires in Ontario. This heavy fire load resulted in an all time record of 168 resource orders being processed through the Canada Interagency Forest Fire Centre. This compares to 81 orders in 1987. This would seem to indicate that the member agencies are becoming more and more reliant upon other agencies resources and are much more nationally oriented in sharing resources.

CIFFC responded to many first time requests such as, additional air radio frequencies, cargo chutes, radio batteries and a CL-215 engine as well as the usual airtankers, manpower and fire pump kits. As the fire fighting resources became stretched in Canada it again became apparent that we would have to go to the United States to procure additional resources.

On May 4, the high level infrared scanner was brought in for the Kenora 14 fire in NW Ontario. In response to numerous fires across Northern Ontario during June and July Ontario received from the United States a total of 195 power pump kits complete with hose, a 26 man overhead team, 180 men (9-20 man crews) and a complete communications system. These transactions necessitated CIFFC interfacing with Customs and Immigration officials at various points of entry across Ontario. Thanks to the complete cooperation of all those regulatory officials all the crossing were handled quickly and efficiently regardless of time or location.

Canada was able to reciprocate this help by responding to a request direct from the State of Oregon which resulted in Alberta being able to supply 75 men plus Liaison Officer. Also a request from the Boise Interagency Fire Center in response to the critical fire situation and re-

source shortages in the Northwestern States resulted in 200 pump units from Ontario with pulaskis from Ontario, Manitoba, Saskatchewan, Alberta and British Columbia being shipped to Boise on September 7.

With the signing of the United States "Temporary Emergency Wildfire Suppression Act: on September 9, 1988 which enabled Canadians to be reimbursed for goods and services on loan to the United States Federal agencies, CIFFC was able to fulfill many requests which were pending. This resulted in 10 land based retardant airtankers and 2 skimmer airtankers being dispatched through BC and AB Forestry agencies and 143 personnel from the YT, NWT, BC, AB and SK fire agencies.

The relatively quiet fire year for the Yukon, Northwest Territories and Newfoundland enabled them to share their airtanker fleet with other agencies but primarily their CL-215 fleet with Ontario for the bulk of June and July.

Beginning June 20 and extending into July the medium lift helicopter industry was totally committed in Canada necessitating the importation of United States registered rotary wing to fill the outstanding requests in Alberta and Ontario. These rotary wing were utilized until Canadian machines became available. Also during this time eight Canadian Military medium lift helicopters were supplied to Ontario from Military bases in Ontario and New Brunswick.

In comparison to last year on October 28/87 Canada had experienced 10,678 fires on the way to the all time record of 11,291 fires on December 31/87. As the numbers in Table I indicate, Canada may not exceed last year's to date total, but it will certainly be close to.

Even though our fire numbers are up, Canada has lost approximately one half of the nine year average as shown on Table II. As last year this would seem to indicate once again that the increase in pre-suppression funding and aggressive initial attack by all fire control agencies is paying off with the continued reduction of forested land lost due to wildfire.

A request direct to CIFFC on August 16, from the Canadian Embassy in Peru for fire expertise information resulted in CIFFC's interfacing with the "Canadian International Development Association" (CIDA) which enabled two BC fire personnel to travel to Peru and assess the fire and give advice to the Peruvian fire personnel on suppression options.

On September 14 a request for available resources came to CIFFC from CIDA for Brazil, for the availability and applicability of CL-215's use on a large fire in Brazil. This resulted in CIDA contacting QC and 2 personnel traveling to Brazil to evaluate the situation.

The CL-215 delivery program has been completed with the receipt of the 14 aircraft in 1988 bringing the Canadian total to 49 CL-215's. The CL-215 has become the most requested resource in Canada, and those which are

foam equipped seemed to be the preferred type bridging between the long term retardant delivery tactics and straight water delivery tactics.

A total of three fire related fatalities occurred to date in 1988. Two occurred in the Province of Alberta with the death of a Birddog Officer and Birddog Pilot when the aircraft crashed and one occurred in British Columbia with the death of an airtanker pilot when his Firecat crashed. This is compared to three in 1987, six in 1986 and nine in 1985.

1988 STATISTICS (as of October 28/88) TABLE I

	FIRES			HECTARAGE		
	FAZ	OBZ	TOTAL	FAZ	OBZ	TOTAL
BC	1,916		1,916	9,814		9,814
YT	88	27	115	454	5,837	6,291
AB	800		800	13,218		13,218
NT	105	85	190	1,890	64,190	66,080
SK	984	71	1,055	54,206	22,403	76,609
MB	975		975	400,110		400,110
ON	3,253		3,253	390,921		390,921
QC	1,266	1,330	7,094	272,617		279,711
NF	98		98	1,765		1,765
NB	434		434	2,186		2,186
NS	319		319	327		327
PE	18		18	14		14
PC	66	8	74	169	1,715	1,884
TOT	10,322	255	10,577	882,168	366,762	1,248,930

PROVINCE	1979	1980	1981	1982	1983	1984	1985	1986	1987	AVERAGE	1988
BC	29,307	65,559	106,568	348,695	67,363	19,908	234,647	17,261	36,177	102,831.70	9,814
YT	7,348	130,781	35,158	254,891	43,006	19,895	15,131	90,568	88,326	76,122.70	6,291
AB	160,182	632,308	1,305,165	675,674	2,832	80,731	12,840	2,280	36,248	323,139.00	13,218
NT	1,989,133	1,214,396	984,932	302,150	226,841	41,074	204,745	321,710	399,076	631,561.90	66,080
SK	225,702	1,325,782	659,189	6,060	52,172	321,235	110,128	13,159	226,558	326,665.00	76,609
MB	90,460	603,334	421,000	14,777	99,153	130,011	6,306	10,314	214,163	176,613.10	400,110
ON	62,978	550,544	177,389	3,847	443,655	120,424	1,007	146,561	75,582	175,776.30	390,921
QC	3,199	13,176	2,480	7,970	242,222	3,081	2,679	167,551	36,836	53,243.80	279,711
NF	39,076	954	13,087	4,392	16,792	7,743	159,744	108,831	17,128	40,860.80	1,765
NB	1,406	2,815	419	6,198	1,673	645	2,593	39,103	1,199	6,227.90	2,186
NS	755	979	370	617	448	594	1,077	816	564	691.10	327
PE	N/A	N/A	146	131	321	202	181	512	113	178.40	14
PC	70,672	275,002	680,173	9,113	5,210	14,207	5,646	2,663	140	118,101.80	1,884
TOTAL	2,680,308	4,815,630	4,386,076	1,634,515	1,201,679	759,750	756,724	921,329	1,132,110	2,032,013.40	1,248,930

TOTALS AS OF OCTOBER 28, 1988

FAZ HECTARAGE	882,168
OBZ HECTARAGE	366,762
TOTAL	1,248,930



Para Mexico, 1988, ha resultado un año especialmente crítico en lo que toca a los incendios forestales. La difícil situación de sequía que registró la mayor parte del país entre los meses de enero y mayo, aunado a la mayor demanda de superficie para cultivos agrícolas y pastoreo por parte de los campesinos "temporaleros" para soportar la crisis económica que desde 1985 vive nuestro país, nos obligaron a todos los miembros del servicio forestal mexicano a dar mucho de nuestros mayores esfuerzos, así como a poner en práctica mucho de lo aprendido en este grupo de trabajo de la COFAN a lo largo de estos años.

Para los trabajos de la Campaña Nacional de Prevención y Combate de Incendios Forestales, en el presente año, dispusimos de un presupuesto federal del orden de 3,740 millones de pesos, superior en un 42 % a lo otorgado en 1987, mismo que aunado a un apoyo económico de magnitud similar que canalizaron para el combate de incendios los Gobiernos Estatales y los productores industriales de la madera, nos permitió una mejor preparación para los trabajos, tanto en infraestructura, como en personal y equipos.

Con ello, en esta temporada pudimos desplegar 136 brigadas con 2,040 combatientes, así como fortalecer el soporte logístico para su operación, lo que permitió junto con la más amplia movilización de combatientes voluntarios, aminorar el impacto que pudimos haber causado los incendios en este año, sobre todo de algunos siniestros que por su magnitud en determinados momentos rebasaron nuestra acción combativa en los meses más críticos.

De gran relevancia fue la contribución activa que tuvi-

eron los Gobiernos Estatales, así como nuestros tradicionales e importantes colaboradores que son la Secretaría de la Defensa Nacional, la Procuraduría General de la República, la Secretaría de Comunicaciones y Transportes y la invaluable cooperación de la Radio Nacional de Emergencia que a través de 4,470 radioaficionados se ha constituido en un puente de comunicación que ha mejorado nuestra oportunidad en la lucha contra los incendios.

I. - ACTIVIDADES DE PREVENCIÓN Y DIVULGACION

En lo relativo a las labores de prevención de los incendios forestales, dado el alto grado de prioridad que le hemos asignado en base a que la principal causa de nuestros incendios es de naturaleza social, durante este año logramos ampliar la intensidad y cobertura de la campaña nacional divulgativa con 4 spots televisivos que a través de los canales nacionales y regionales nos permitieron el acceso a la población en los medios rural y urbano, siendo reforzados por más de 247,000 mensajes radiofónicos transmitidos, en 164 estaciones del país.

Lo anterior se complementó con la distribución de 120,000 carteles, con la leyenda "El Bosque es Nuestro Amigo y el Fuego su Enemigo", misma que ya se ha constituido en la base de nuestra campaña divulgativa nacional desde 1986.

Asimismo destaca la intensa labor divulgativa realizada en los Ambitos regional y local, por los Gobiernos de los Estados en coordinación con nuestras Delegaciones y

oficinas operativas; mismas que nos han arrojado importantes y satisfactorias experiencias.

De estas experiencias cabe subrayar, por sus alcances, lo realizado mediante un apropiado empleo de medios de comunicación no convencionales, tales como mensajes radiofónicos en lenguas nativas (Purépecha en Michoacán, Tzotzil en Chiapas), la producción de diversos juegos de mesa con eminente orientación infantil (Chiapas, Jalisco, Tabasco), representaciones de teatro guiñol (Jalisco) así como variada folletería y el establecimiento de carteles panorámicos empleando personajes e ilustraciones correspondientes al entorno ecológico y etnocultural de cada región (Jalisco, Chihuahua, Durango y Chiapas).

Dentro de este quehacer divulgativo nos ha merecido especial atención durante el presente año, la organización de niños y jóvenes en los Estados de Querétaro y Puebla mismo que en número creciente se han constituido en brigadas juveniles con el nombre de "Fuerza Forestal", y que tienen como objetivo, realizar labores de divulgación especialmente en centros escolares y de recreo encaminadas al fomento de una cultura y conducta proteccionista entre la población.

Con el mismo fin se aprovechó la celebración de Ferias Estatales y Regionales para participar mediante exposiciones y otras actividades divulgativas siendo relevante lo realizado en Michoacán, San Luis Potosí, Puebla e Hidalgo por el interés despertado en el público concurrente.

Dentro de las acciones encaminadas a ofrecer alternativas a los agricultores y ganaderos temporaleros que, en busca de superficies para la siembra y el pastoreo, presionan destructivamente sobre las áreas arboladas en las regiones montañosas de nuestro país; se ha continuado durante el ciclo 87-88 con la promoción para el cultivo de la leguminosa conocida como "veza de invierno" (Vicia Villosa), la que a pesar de los problemas en cuanto a la obtención de semilla se ha implantado en 1,250 hectáreas de once Estados, con gran aceptación de los ganaderos.

La producción de forraje fué de 22 300 toneladas en este ciclo y se aprovechó principalmente para la alimentación de ganado bovino y ovino.

Asimismo, se logró la producción de la semilla suficiente para ampliar este proyecto en los años próximos, y así depender menos de la importación; situación esta que nos ha representado serias dificultades para consolidar este

programa en favor de la creciente demanda que registra entre los productores temporaleros.

II. - ACTIVIDADES DE LUCHA CONTRA EL FUEGO

La lucha contra los incendios forestales, resultó especialmente crítica durante este año, debido como ya se mencionó a la adversa situación de sequía que registró la mayor parte del país y que abarcó los meses de enero a mayo, período para el que los registros de lluvia fueron inferiores en un 30% a la media normal anual.

Es así como en el presente año y a pesar de los significativos incrementos en los recursos financieros, humanos y de infraestructura, registramos la mayor presencia de incendios así como de superficie dañada, habiendo concluido nuestra campaña con 10,942 incendios, es decir, 18 % superior al año de 1987 y aun más crítica resultó la magnitud de la superficie siniestrada, ya que se dañaron 518 mil hectáreas que representan 80% más de lo afectado en el año anterior.

En 1988 se tuvo una mejoría en la distribución de la vegetación afectada, ya que en 1987 se registro del total un 52% de vegetación arbolada y en este año solo el 36% (188,622 Ha.), habiéndose presentado un mayor incremento de vegetación, dañada en los pastos y vegetación arbustiva y secundaria, que significó el 64% del total de la temporada 329,643 Ha.

Asimismo es importante señalar que a pesar de la crítica situación de este año, se mejoró significativamente en los resultados de la Región Central del país en la que tradicionalmente se han tenido los mayores daños. Ahora se tuvo una reducción significativa tanto en el número de incendios como en superficie afectada, es así como hasta 1983 teníamos 36 hectáreas dañadas por cada incendios, siendo las áreas arboladas las más impactadas y para 1988 hemos logrado reducir este indicador a 12 hectáreas por cada incendio concentrándose el daño en los pastizales con un daño mínimo al arbolado adulto.

Esto se ha logrado porque es la región central donde mayor impulso han tenido tanto nuestras tareas preventivas, como la canalización de recursos financieros, humanos y tecnológicos, mostrando su efectividad y generando una experiencia que solo ha tenido como limitante para extenderse al resto del país, la crisis económica por la que atravesamos en México.

Durante el presente año se presentaron unos incendios

que por sus características e impacto nos obligaron a realizar un especial esfuerzo, así como a poner a prueba nuestra labor de concertación y sensibilización ciudadana, como fue el caso de los incendios que se presentaron en Nogales y Bavispe en Sonora y en Sautla, Oaxaca, donde fallecieron 5 - combatientes, también en Sian Kan, Q Roo en Autlan, Jalisco y en el Ajusco, D.F.

Los resultados obtenidos en estos incendios nos confirman el hecho de que para México, dadas sus cambiantes condiciones topográficas, la opción mas apropiada para apoyar y complementar el combate terrestre lo constituye el empleo del equipo aéreo, cuya utilización por cuatro años consecutivos en nuestro país muestra que, deberá ser impostergable la búsqueda y concreción de los mecanismos que nos permitan contar con una flota propia con más y mejores aeronaves para el combate de incendios forestales.

A partir de estas condiciones se ha preparado como paso inicial un proyecto de inversión a fin de que para 1989 se realicen las adecuaciones a 2 helicópteros de la SARH a fin de que con la incorporación de equipo básico, se dediquen al combate de los incendios forestales. Esto debido a que, además de que ya contamos con estos aparatos, el empleo de helicópteros dada su versatilidad, nos han servido tanto para acciones de lucha, como para, lo más importante en nuestro caso, la canalización oportuna de personal, equipo, alimentos y agua a los incendios, durante su combate.

Asimismo iniciaremos las negociaciones con dependencias Gubernamentales que cuenten con aviones susceptibles de ser acondicionados en aeronaves cisterna para utilizarlos durante la época de incendios forestales; esto sin menoscabo de que, en la medida de nuestras posibilidades financieras, continuaremos promoviendo la contratación de aviones cisterna, con cargo a los presupuestos federales y estatales para las regiones donde han probado su utilidad.

Queremos destacar que se continúan con las reuniones anuales de evaluación y concertación de acciones en la materia, iniciada en 1985, que se realizan al final de las campañas, lo que nos ha permitido mediante el intercambio y la evaluación conjunta mejorar en las áreas operativas la organización y calidad de trabajo. Es así como en el presente año hemos realizado las reuniones de trabajo de cada una de las regiones en las que han participado los técnicos de cada Estado que coordinan las campañas contra los incendios.

Cooperación e Intercambio Internacional.

Entre los avances registrados en México en materia de incendios destacan los encuadrados en el memorándum de entendimiento con el gobierno de EE, UU, Así en 1987 se desarrollaron las siguientes actividades:

- 1) "Investigación en los incendios forestales". Se han iniciado gestiones para llevar a cabo los siguientes proyectos.
 - A) "Efecto ecológico el fuego en bosque de coníferas en la Sierra de Durango".
 - B) "Aplicación de quemas controladas en la Sierra de Arteaga, Coahuila".
 - C) "Niveles de riesgo a los incendios forestales en la región de los Altos en Chiapas".
 - D) "Diseño de un Sistema de Manejo de Incendios Forestales para la UAF, No. 6 "El Salto, Dgo.", México.
 - E) "Aplicación de quemas controladas en la Sierra de Tapalps, Jalisco".
 - F) "Efectos ecológicos, prevención, manejo y evaluación de incendios en Michoacan".Con relación a estos dos últimos proyectos durante junio y julio tuvimos la visita de Dave Peterson y Lucy Salazar del Laboratorio del Fuego en Riverside, California para encauzar la ejecución de los mismos.
- 2) Programa de prevención de incendios forestales. Como parte de este programa 2 Técnicos mexicanos visitaron los estados de Washington y Oregón.
- 3) Establecimiento del convenio de ayuda mutua para la prevención y combate de incendios forestales en la zona fronteriza entre Arizona, E.U. y Sonora, México del cual ya se tuvo oportunidad de valorar su gran utilidad durante los recientes incendios registrados en Sonora.
- 4) En lo que respecta a Asistencia Técnica.- Entre Mayo y Junio contamos con la participación de dos expertos del Servicio Forestal de Texas con el fin de proporcionar adiestramiento a Técnicos mexicanos en la operación y mantenimiento del sistema de bombeo expansivo de agua (W.E.R.S.), para fines de este año se nos proporcionará como préstamo indefinido un equipo de mayor potencia el cual complementará al equipo que amablemente nos fue prestado en 1987.

Es igualmente importante señalar que por conducto de la

Comisión Forestal del Estado de Georgia, se nos facilitaron con el carácter de préstamo indefinido tres helibaldes mismos que sin duda nos serán de gran apoyo en la siguiente campaña.

También dentro de la cooperación internacional, es importante mencionar que a partir del Congreso Forestal Mundial de 1985 celebrado en México, se han estrechado relaciones con algunos otros países, entre los que destaca España, en donde a través del instituto Nacional de Conservación de la Naturaleza, apoyo a nuestro país enviando 4 técnicos de reconocido prestigio, a participar como instructores en el IV Curso Internacional de Combate de Incendios Forestales. Como resultado de este acercamiento se recibió una amable invitación para que tres técnicos mexicanos visitaran ese país a fin de conocer los programas de trabajo que llevan a cabo en materia de defensa contra incendios forestales. Dicha visita se efectuó en septiembre de este año y en la cual se pudo constatar los importantes avances que han obtenido en la lucha contra los incendios, además de que existen muchas similitudes con México tanto en los problemas de incendios como en la forma en que los están atendiendo, por lo que esperamos continuar trabajando con ellos en proyectos específicos en las zonas forestales prioritarias de nuestro país.

En cuanto al Memorándum de Entendimiento sobre cooperación en materia forestal entre México y el gobierno de Canadá, y dentro del cual se considera el proyecto "Las Técnicas de Prevención y Combate de Incendios Forestales", este no se ha podido concretar debido a las limitaciones presupuestales del gobierno mexicano. Es nuestro propósito encontrar los mecanismos que nos permitan

fortalecer el intercambio con Canadá en la lucha contra los incendios forestales.

Especial importancia ha tenido para nosotros la realización en nuestro país del IV Curso Internacional de Combate de Incendios Forestales, mismo que, bajo el auspicio y coordinación del Centro Nacional de Tecnología Avanzada para los Recursos (NARTC) de U.S.A., se realizó en la Ciudad de México del 24 de enero al 12 de febrero de este año, y en el cual participaron 12 países con un total de 50 técnicos provenientes de Guatemala, Costa Rica, Nicaragua, Ecuador, Argentina, Honduras y México, contando con 20 instructores de EE. UU., España, Chile, Costa Rica y México.

Para nosotros resulta invaluable la importancia y trascendencia que ha tenido en la formación de nuestros primeros especialistas en incendios, el NARTC.

Para finalizar queremos informar a ustedes que en México tendremos próximamente cambios en el Gobierno Federal, hecho que involucra a la Administración Forestal, es por ello que deseamos aprovechar el momento para manifestar a nombre del Servicio Forestal Mexicano y en particular de los que hemos tenido la oportunidad de participar en este grupo de trabajo, nuestro reconocimiento y gratitud a ustedes colegas norteamericanos y canadienses por su comprensión, apoyo e interés con el que nos han atendido durante estos años de comunicación y convivencia.

Servicio Forestal Mexicano
México, D.F.
Octubre 1988.



1988 Fire Management Study Group

(From left to right) Dennis Dubé, Jack Wilson, Gary Tokle, Brian Stocks, Jerry Monesmith, Lee Barkow, Allan Jeffrey, William Sommers, Paul Weeden, Bob Bailey, Harry Layman, Jesus Cardeña, Regis Proulix, L. A. "Mic" Amicarella, Oscar Cedeño.

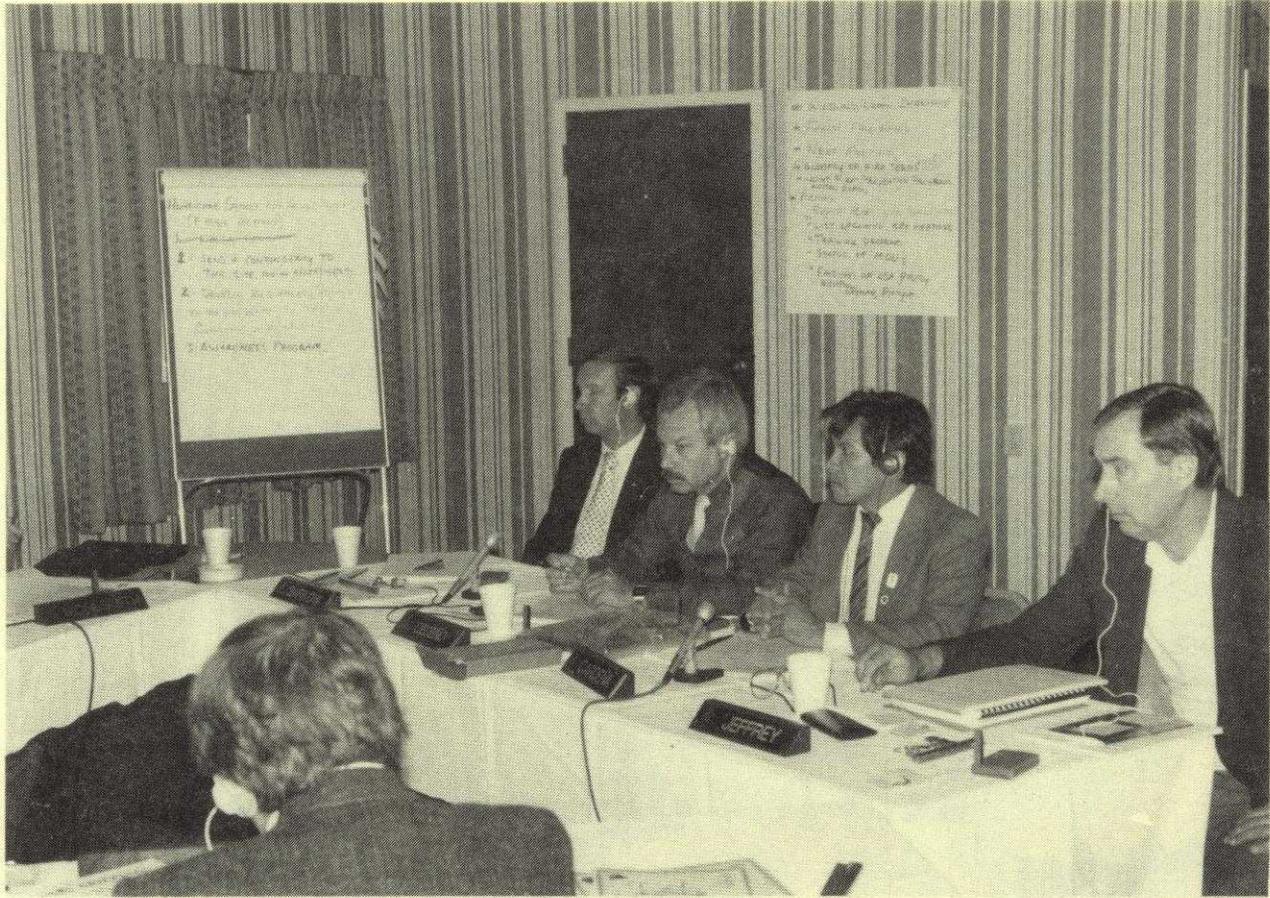


Photo #1: Fire Management Study Group, North American Commission. Seated clockwise around the table, starting in the left corner: Allan Jeffrey, Brian Stocks, Regis Proulx; Jack Wilson, Harry Layman, William Sommers, Mic Amicarella, Jerry Monesmith, Lee Barkow, Oscar Cedeño, and Jesus Cardeña.



Photo #2: Fire Management Study Group discussing the resource damage caused by Hurricane Gilbert. Refer to Action Item #11 on Page 5 and the Formal Resolution on Page 6.



Photo #3: USA Chairman, Mic Amicarella, outlines the criteria for country representation on the Fire Management Study Group. Refer to Action Item 12 on Page 5 and and the Formal Resolution on Page 6.



Photo #4: Many thanks to our interpreters, Alejandro Barbarjosa and Salomé Abud, who provided invaluable assistance throughout the 22nd meeting of the Fire Management Study Group.



Photo #5: Presentation of the fire prevention initiatives sponsored by the local Kiwanis Club and fire protection agencies.



Photo #6: Demonstration of hose lays and use of foaming agents.

FIRE MANAGEMENT STUDY GROUP

North American Forestry Commission

USDA Forest Service

Fire and Aviation Management

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