



INTERNATIONAL FOREST FIRE NEWS

No. 4 - December 1990



United Nations
Economic Commission
for Europe (ECE)

CONTENTS

	Page
Editorial	1
Country Notes	3
News from ECE/FAO	15
International Cooperation	15
Meetings held in 1990	18
Meetings planned for 1991	20
Recent Publications	25



Food and Agriculture
Organization of the
United Nations

International Forest Fire News is prepared on behalf of the ECE/FAO Agriculture and Timber Division. Copies are distributed by and available on request from:

ECE/FAO Agriculture and Timber Division
Palais des Nations
CH - 1211 GENEVA 10

The publication is edited by:

Johann G. Goldammer
Fire Ecology & Biomass Burning
Research Group (Max-Planck-Institute
of Chemistry), Freiburg University
Bertoldstrasse 17
D-W - 7800 FREIBURG

Fax 49-761-203 3731
Phone 49-761-203 3757
Telex 77 27 40 50 uf d

Written contributions are welcome (see inside cover page).

Call for contributions: Readers of the International Forest Fire News are warmly invited to send written contributions to the editor (address on front cover). These may be in the form of concise reports on activities on wildland fire management, research, public relations campaigns, recent national legislation related to wildfire, reports from national organizations involved in fire management, publications, personal opinions (letters to editor). Photographs (black and white) and graphs, figures and drawings (originals, not photocopies, also black and white) are also welcome.

The deadline for submitting contributions to the biannual issues are: **15 May and 15 November.**

EDITORIAL ESSAY

Forest and Wildland Fire Science and Management in Europe: International Perspectives

Last November an International Conference on Forest Fire Research was held in Portugal. Among the group of wildland fire scientists which gathered at the University of Coimbra, one of the oldest European universities, a remarkable number of participants came from North America, Australia and Africa. In Europe, international exchanges of scientific and management information on wildland fire issues are a relatively recent development. It seems to be a timely opportunity to reflect and to comment both on the development of European wildland fire expertise and on the role of transatlantic bridges for the flow of knowledge in wildland fire science, management and policies between the Old World and the New World, especially North America.

The mutual influence on forest and wildland fire matters between Europe and North America has been through various phases, the period of a one-way indoctrination, then a phase of isolation and finally the period of innovative feed-back.

The first phase was the occupation of the New World by settlers from Europe. With the colonialists came the foresters and the forest scientists of the European school. Under the influence of limited natural resources and space at home, they had been educated in sustainable forestry and had almost forgotten the old fire heritage of Europe. Consequently they tried to apply their idealized scheme of nature conservation and forest protection on North America's forests. The consequent suppression of all wildfires was part of the romantic perception of nature. With the ignorance of the ecological and cultural conditions of the pre-settlement period of the New World, the European foresters had a strong influence on the change of forests and even of complex landscape patterns. By attempting to exclude natural and indigenous anthropogenic fires, a hazardous build-up of flammability and conflagration risk occurred in many North American forests. Among other ecological consequences of fire conservancy, a dramatic reduction of the prairie grasslands by encroachment of trees and brush was observed.

North American forestry began to emancipate from the fundamental influence of European forestry only around the early 20th Century. While the dogmatic exclusion or defense of any biotic and abiotic disturbance factor remained unchanged in the traditional European protection and conservation practices, the North Americans went their own way. Alongside a controversial dispute between the technologists and the ecologists, both fundamental directions evolved dramatically. The technocrats developed sophisticated hard- and software for fire suppression, while the ecologists were able to prove that natural fire as well as the controlled component of wildland fire, fire by prescription or "prescribed burning", ought to be integrated into vegetation management systems. While North America's wildland fire science developed progressively in splendid isolation, the standstill in Europe's fire research and development continued. However, the changes in rural land-use and forest utilization of post-Second World War Europe brought dramatic changes in vulnerability by wildfires. The abandonment of traditional vegetation treatment in Southern Europe and the replacement of fuelwood burning by cheap and convenient energy sources led to an accumulating fire risk, which went unnoticed by the land managers and foresters.

The 1970s brought an increasing number of forest and other wildland fires all over Europe between the southern tip of Spain and the north of Germany. At that time the first contacts in wildland fire research were created between North America and Europe, thus breaking the isolation between the two continents. The Tall Timbers Fire Ecology Conference of 1973, held in Tallahassee (Florida), for the first time invited Europeans to share common knowledge in wildland fire science. The "Fire by Prescription Symposium", organized in 1976 by the US Forest Service in Atlanta, Georgia, a milestone in the further development of fire management policies, was attended by German scientists and gave valuable insight into the state of knowledge in wildland fire management. Europeans also participated at the symposium on the "Environmental Consequences of Fire and Fuel Management in Mediterranean Ecosystems", held in 1977 in Palo Alto, California.

In Europe the series of International Symposia on Fire Ecology at the University of Freiburg (Federal Republic of Germany) was initiated in the same year of 1977. These symposia were established to create a communication platform for European wildland fire scientists on which, from the very beginning, a strong participation from North America was effective.

In 1981 the ECE/FAO Agriculture and Timber Division started its activities in organizing meetings on forest fire prevention and control. These activities were aimed to provide a communication bridge between the fire scientists, the forest managers, those responsible for fire suppression as well as the policy makers. In the 1981 seminar in Warsaw (Poland) and in the 1986 seminar in Valencia (Spain) again a strong participation from North America ensured the contemporary flow of expertise to Europe.

Now, at the beginning 1990s, the innovative feed-back in wildland fire science, management and policies is becoming more intensive. Within the past ten years new fire research groups were set up in the Mediterranean region and other European countries. They all profit from the tremendous amount of work achieved in the New World. On the other hand, European wildland fire scientists and forest services had to go their own way and to build up their own, original expertise based on the special demographic and economic situation in that part of the world.

The political, socio-economic and ecological diversity of the European fire landscape is extremely high. Thus it seems imperative that European fire specialists have chosen the way of highly intensive cooperation between the countries, institutions and individual scientists. The series of pan-European fire conferences with international participation, such as the Fire Ecology Symposia in Freiburg (1977, 1983, 1989, the next planned for 1993), the Prescribed Burning Workshop in Avignon (1988), the Prescribed Fire Research Workshop in Vila Real, Portugal (1989), the Forest Fire Research Conference in Portugal (1990, the next planned for 1994), the planned Mediterranean Fire Ecology Workshop (1992), reflect not only a high standard but also enormous progress in this cooperative approach.

Such cooperative endeavours can also be noted on the political and the administration level. Besides the international ECE/FAO activities, steered from Geneva, various attempts have been made by the European Community to coordinate, harmonize and thus to strengthen common efforts in wildfire suppression. The multinational forest fire fighting exercise of the EC (FLEURAC) in France was followed by various supranational "hot" tasks of fire fighting airplanes in Europe, such as the rescue of the fire-engulfed holy forests of Mount Athos (Greece) by German fire suppression helicopters in the 1990 fire season (see report inside). Meanwhile the possibility is even discussed of creating a multinational European aerial fire fighting force on a private basis (see discussion in the last issue of the "L'Entente en Direct").

Looking back to the last decade it becomes clear that international cooperation within Europe and via the transatlantic bridge has greatly improved. The community of European and other international fire specialists is developing in a highly cooperative and task-sharing way. One of the most striking recent examples is a trinational series of experiments on prescribed burning methodology between Portugal, Spain and France.

However, efficient cooperation with the Eastern European countries and the Soviet Union is still not yet appropriately developed.

A new phase of international cooperation is overdue. Thus let me take the initiative to offer the editor's office of the International Forest Fire News to serve as communication link to build up the bridge between fire scientists and managers of the East and the West.

Johann G. Goldammer

COUNTRY NOTES

AUSTRALIA

Public Land Fire Management Statement

Recently a "Public Land Fire Management" Statement has been prepared by the Standing Committee Forestry Council.

The objective of the Statement is to provide the community with information about the use of fire in the management of Australian Public Lands. A complementary set of guidelines to fire managers of public lands is annexed to the Statement. In the preparation of this Statement public comment was sought and taken into account in its finalisation so as to achieve a balanced policy document.

The Statement provides valuable insight into Australian fire management techniques and will be interesting for wildland fire managers and researchers from Australia and other regions of the world as well. The statement is published in a 13-page brochure (ISBN 0 644 12306 0) and may be obtained:

From: The Australian Forestry Council
Address: c/o Public Relations, Department of Primary Industries & Energy
GPO Box 858
Canberra, ACT 2601

AUSTRIA

The 1989 forest fire season

The Federal Forest Research Station of Austria recently finalized the 1989 fire report. A total number of 88 fires affected an area of 52.3 ha of forest land. Half of all fires burned during the spring season. While ca. 50 % of all fires nationwide were caused by negligence, the State of Vorarlberg showed a relatively high proportion of lightning fires, accounting for ca. 10 % of fire causes all over the country.

From: Forstliche Bundesversuchsanstalt
Address: Seckendorff-Gudent-Weg 8
A - 1131 Wien

BRAZIL

Burning activity in the Amazon decreases

A change in government policy regarding land occupation in the Amazon region followed by the enforcement of existing legislation have considerably decreased burning activity in the Amazon forest.

Last year, the Brazilian government decided that no further fiscal incentives or official loans would be granted for agriculture or pasture projects in the Amazon region. This policy change was a fundamental step for decreasing the rate of forest devastation and, consequently, forest and slash burning.

The other important action toward the reduction of slash burning in that region was law enforcement. In August 1988 the Brazilian government enacted a law establishing that no slash or other controlled burning in the country would be allowed unless a permit from an official agency was issued. Based on that law, the IBAMA (Brazilian Agency for Forestry and Environment Affairs), launched in 1989 a large-scale operation in the region, named PEAL (Emergency Program for the Amazon), in order to enforce the legislation. Several crews using helicopters, boats and cars were sent to the Amazon region in order to check the burning activities. If the landowners who were caught burning did not have a permit, they were fined and/or prosecuted.

These two actions, change in the land occupation policy and law enforcement, were decisive for reducing the use of fire in the Amazon forest in the last two years.

It is hoped that the law enforcement can be extended to the whole country, in order to reduce the number of wildfires in other vegetation types, like the "cerrado", the broadleaf forests of the coastal mountains and the forestry plantations. Since over one third of the wildfires in Brazil are caused by misuse of fire in debris burning activities, enforcement of the 1988 enacted legislation will certainly help to prevent fires and reduce the damage they have caused to different ecosystems.

From: Ronaldo Viana Soares
Forest Fire Prevention and Suppression
National Commission

Address: Federal University of Paraná
Curso de Engenharia Florestal
Rua Bom Jesus, 650
BR - 80 030 Curitiba-Paraná

GERMANY

Reorganization of wildland fire research: linking wildland fire science with biogeochemistry and atmospheric sciences

The Fire Ecology Research Unit at the Institute of Forest Zoology, Department of Forestry, at the University of Freiburg, has been reorganized. This research branch had been supported by the University of Freiburg and the Volkswagen Foundation for more than 10 years. Besides its function as an academic institution, the unit had carried out a series of fire research and management projects around the globe. Main research emphasis was the exploration and definition of wildland fire ecology and management in the tropics of South America and Southern Asia, but also in northern Asia. The unit was the organizer of the International Symposia on Fire Ecology at the University of Freiburg between 1978 and 1989 (see under Recent Publications) and also served as editing office of this **International Forest Fire News**.

Although its offices remain at the same place at the University of Freiburg, the unit is now reorganized as the "Fire Ecology and Biomass Burning Research Group", a subdivision of the Max-Planck Institute of Chemistry, Biogeochemistry Department (Mainz). The aim of this marriage between terrestrial fire research and atmospheric sciences is to link both disciplines in order to understand better the global issues on wildland fires.

The correspondence address is the same as before.

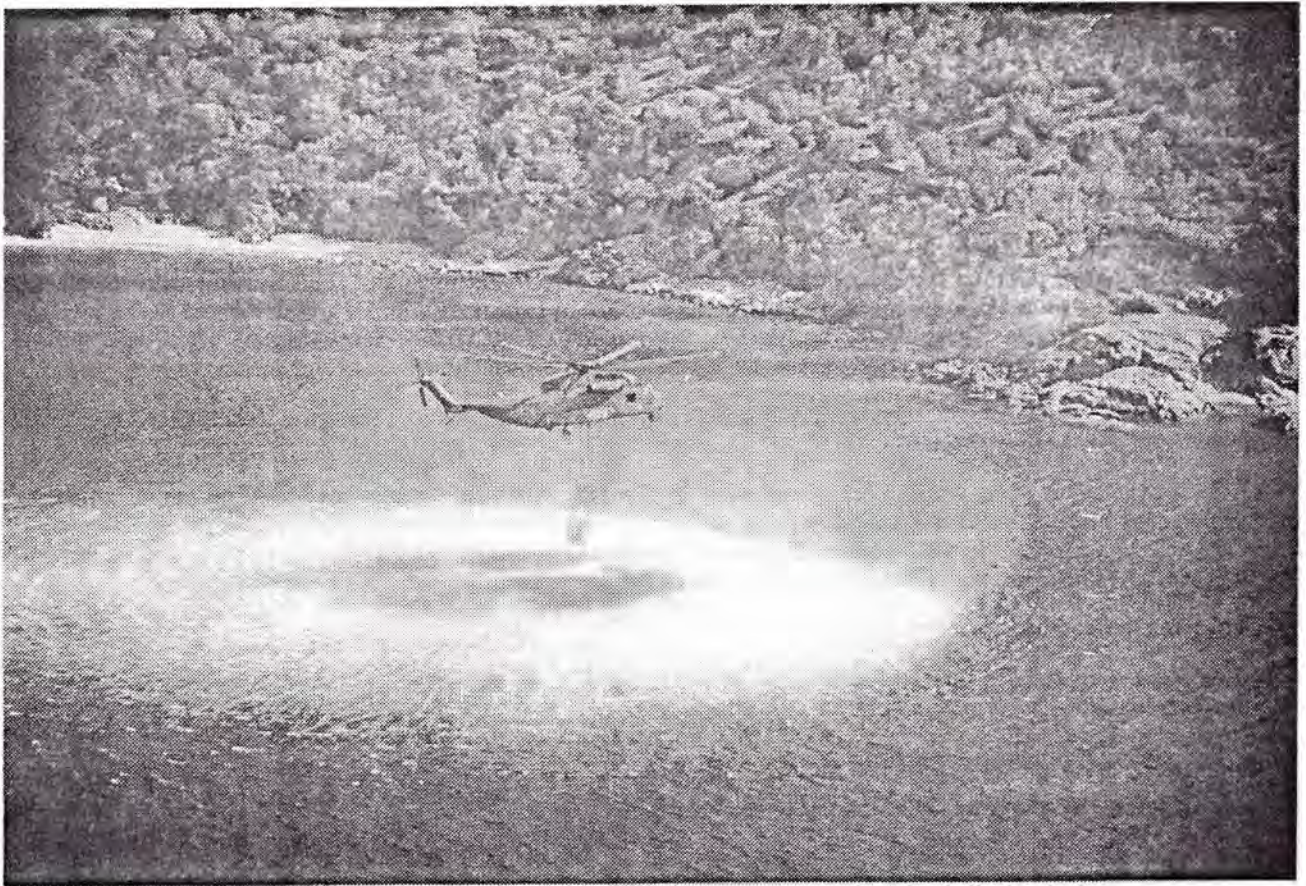
Johann G. Goldammer
Fire Ecology and Biomass
Burning Research Group
(Address on cover page)

The Mount Athos Conflagration (Greece) of 1990: aerial fire fighting support with German helicopters

At the end of August 1990 a disastrous wildfire struck the autonomous monastic district of Athos which occupies the easternmost prong of the Chalcidice peninsula (Northeast Greece). For more than one week the monks, forest workers, fire brigades and military tried to suppress the fire. Due to the extended drought conditions and the difficult terrain it was a hopeless effort. Since the CANADAIR scooping airplanes were not able to join the fire battle continuously, mainly because of rough seas and the steepness of terrain, the Government of Greece asked the Federal Republic of Germany for aerial forest fire suppression support.

This request was made on the morning of 24 August. The next day a German C 160 Transall military transport plane took off for Greece. The plane carried the aerial fire fighting coordinator and four helibuckets (capacity 5,000 l). The first two CH 53 G helicopters followed shortly afterwards. On the way to Greece the helicopters had to fly over Austria and Yugoslavia and arrived at Thessaloniki the evening of 26 August. On 27 August, in coordination with the scooping planes, the first helicopter-borne fire suppression tasks started. Three additional CH 53 G, the heaviest helicopter available in the German Armed Forces, arrived on the scene on 28 August. They became operational when the scooping planes were not able to operate anymore due to the adverse weather conditions.

The aerial fire suppression was successfully terminated in the evening of 30 August. However, the helicopters were kept on stand-by until 1 September. Altogether the German military personnel (totaling 45 persons) was able to fly 344 fire suppression tasks (45 flying hours) and deliver 1.72 million litres of water on the fire scene.



Hovering GH 53 G helicopter: filling the 5,000 l. helibucket during fire suppression operations near Xeropotomos monastery, Mount Athos (Greece)

The Mount Athos fire destroyed very valuable forest resources. A recent report from the site revealed that severe erosion has also occurred, even leading to the formation of a new sand bank along the shore. However, things could have been much worse if the fire fighting capabilities had not been enhanced by the helicopters requested from Germany. There are many lessons to learn from that fire. One lesson is that difficult terrain such as on Mount Athos requires a variety of fire extinguishing means among which the helicopters are very efficient, especially in situations in which fixed wing fire planes and scoopers are not operational any longer.

Another lesson is that such international efforts in fire disaster control may become mandatory in order to protect the common heritage of our natural and cultural resources. However, in order to be prepared better for unforeseen events, such as the Mount Athos fire, bilateral and multinational agreements could ensure that European forest fire fighting capabilities be used in a more efficient way.

From: Lt.Col. Klaus Zernia
Aerial Coordination Officer of the German Helicopter
Group at the Mount Athos Fire

Address: Fliegende Abteilung 151
Schittdorfer Damm 1 e
D-W - 4400 Rheine

FRANCE

The 1990 forest fire season in France

Following the extraordinarily dry year of 1989, an extended drought occurred in the first half of 1990 and greatly aggravated the fire danger. Despite all the fire prevention and control efforts which were launched, the fire season of 1990 was similar to 1989 and comparable with the year 1976 concerning the number of incidents and the extent of destruction.

The provisional data for 1990 amount to a total of ca. 80,000 ha of forest and sub-forest formations affected by fire. Some of the most beautiful forest sites in the Mediterranean zone were affected and destroyed again, totalling 55,000 ha in Calanques de Cassis, Forêt des Maures, and the area of the lake of Saint-Cassien. A couple of days of strong Mistral in the desiccated vegetation were responsible for almost the whole of the surface burned.

In the Landes of Gascogne the spring fires and the dry lightning storms of 12 August 1990 ravaged ca. 10,000 ha of maritime pine (*Pinus pinaster*).

The government plan which became effective in the fall 1989 and which was aimed at accelerating the rehabilitation of burned forests and improving fire prevention (mandatory fuel reduction campaigns, new forest fire brigades) will be continued in 1991. According to a "Conseil des Ministres" of 24 October 1990 in a statement of the Ministry of Agriculture and Forestry four elements of the upcoming campaign were presented:

- More restrictive control of forest conversion
- Modification of urban planning regulations in order to restrict the spread of residential properties scattered in the forest lands
- More precise regulations for fuel reduction
- Strengthening of coordination of the fire control services

From: Cyrille Van Effenterre
Chef du Bureau de la Protection et de la Forêt

Address: Ministère de l'Agriculture et de la Forêt
Direction de l'Espace Rural et de la Forêt
78 Rue de Varenne
F - 75700 Paris

Phone + 33-1-49 55 49 55

GREECE

A synopsis of the Greek wildland fire problem

In 1830, approximately 50 % of Greece's total area was covered by forests while today forest lands have been diminished to less than 18 %. Wildland fires always constituted the most serious threat for the Greek forests. Although the coastal forests of *Pinus halepensis* and *Pinus brutia* and the degraded natural ecosystems of evergreen sclerophyll brush (maquis vegetation) are well adapted to fire, nevertheless, frequent and repeated fires and subsequent overgrazing denude the land of the vegetation cover, thus exposing it to the intense autumn rains which cause soil depletion and erosion, the main impediments to restoration of the prefire vegetation.

During the decade 1960-69, 7,240 fires burned 123,779 ha of forest land. In the next decade (1970-79), although the total number of fires remained the same (7,354), the total area burned was almost doubled (203,790 ha). In the last decade (1980-89) there occurred almost twice as many fires (12,635) and total area burned (524,167 ha) as in the two previous decades. The average fire size increased from 17 ha in the 1960s to 20 ha in the 1970s and to 39 ha in the 1980s. This is particularly disappointing since from 1974 the Greek Forest Service was equipped with the state-of-the-art means of forest firefighting, including firefighting aircraft. Presently, Greece has 13 CL- 215, 24 PZL-M18, and 3 C-130 forest firefighting aircraft, a fleet which is comparable to other European countries' aerial suppression capabilities. Fire suppression expenditures were boosted from 11 million drachmas in 1970 to 4 billion drachmas in 1990 (a ratio of 1:400).

This could be explained by a close look at the fire causes: only 3 % of the total number of fires which occur in Greece are due to natural causes, 29 % of the fires are documented as due to arson, 30 % are caused by negligence, while 38 % are attributed to unknown causes. Considering that a great proportion of the "unknown" fires can be attributed to arson, it is safe to assume that over half the total number of fires that occur in Greece are caused by arsonists. Most of the large fires are identified as arsons (in Greece, only 5 % of the total number of fires are responsible for 70 % of the total area burned). Since Greece lacks nationwide land ownership and utilization maps, many of the burned forest lands are subsequently misappropriated and occupied by the arsonists and converted to agricultural or grazing land or used for housing construction development. It is characteristic that most cases of arson occur in coastal forests in areas of high population density, increased land value, and that are touristically popular during the summer. Revenge, political unrest, and pasture improvement are also causes of arson in Greece. Due to the nature of the arsonists' motives, strict legislation and a series of socio-economic measures (including the creation of land utilization and ownership maps nationwide) could be most efficient in drastically eliminating the forest fire problem in Greece.

From: Alexander P. Dimitrakopoulos
Address: Department of Environmental Sciences
University of the Aegean
GR - Mytilini

Forest fires in Greece, 1990

During the 1990 fire season (1 January - 30 September), 1,091 wildland fires occurred in Greece burning a total of 33,882 ha, of which 18,486 ha were productive forest (mainly coastal forests of *Pinus halepensis* and *Pinus brutia*, 11,062 ha brushlands (maquis-type vegetation) and 4,333 ha grazing lands (pastures). Two fatalities occurred in a fire in the Western Peloponese. Two firefighters were suffocated by smoke due to a sudden drift of the smoke column in the fire front caused by a wind shift. In 1990, the average fire size was 31 ha which compares well with the 34 ha during 1989 and the 63 ha during the 1988 fire seasons. However, the 1987 and 1986 fire seasons which had average fire sizes of 177 and 196 ha, were worse. Although the number of fires increased in 1990 as compared to 1989 (1,091 versus 976 fires per year), the total burned area was slightly reduced (33,882 versus 34,031 ha). This could be interpreted as an indication of improved efficiency of the Greek forest firefighting forces considering the fact that firefighting equipment was the same both years. 1988 was a disastrous year for the Greek forests. It was the driest year ever recorded in Greece during which 1,410 fires occurred with an average fire size of 63 ha, more than double that of 1990.

The worst fire during the 1990 fire season occurred in the Mount Athos peninsula ("Holy Mountain") which is the location and property of many Eastern Orthodox monasteries. It lasted for two weeks and burned 1,500 ha of productive chestnut forest, unique in Greece, and brushlands. Strong winds and almost complete lack of a forest road network severely hampered firefighting efforts. The ecological damage was considered "biblical" since the vegetation and natural ecosystem processes were largely undisturbed from human influence since A.D. 960, due to the exclusion of human activities from the whole peninsula (Mount Athos is considered Holy by the Eastern Orthodox church and administratively is autonomous from the Greek Government). Two specially equipped helicopters sent from the Federal Republic of Germany, kindly assisted the firefighting efforts (see report under GERMANY).

From: A.P. Dimitrakopoulos (same address as above), and
From: Evangelos Sakelaridis
Address: Direction of Forest Protection, Ministry of Agriculture
3-5 Ippokratous Str.
GR - 106 79 Athens

ITALY

Forest fires in Italy in 1989 and 1990

In the late 1980s forest fire was still the worst calamity threatening Italian forests. From 1978 to 1988 the national statistics reported an annual average of about 11,600 fires sweeping an area of 147,000 ha (of which 52,000 are wooded, equalling ca. 6 % of the total Italian forest area of 8,675,000 ha as evaluated by a recent National Forest Inventory). Normally the main forest fire season is summer over the central and southern regions and the islands. A secondary fire season affects the northern regions and high mountains in winter and early spring.

From January to March 1989 a block of atmospheric circulation caused an exceptional drought and favoured the spread of dangerous fires, especially over the northern regions. By way of compensation the following seasons were relatively mild and wet. At the end of the year the total number of fires was 9,669 and the total area burned 95,161 ha (45,933 ha wooded), less than the average of previous years. As regards the areas burned, the regions most affected were Sardinia, Liguria, Lombardy, Piedmont, Tuscany and Calabria.

Unfortunately in 1989 fires killed 32 people (20 of them in Sardinia, mostly tourists), three times as many as the average of previous years. Such casualties have caused great concern and emotion in public opinion and politics.

In 1990 drought was even worse and calamitous: neither rain nor snow for several months and sometimes strong winds. From January to June areas swept by fire exceeded the total losses of the previous year. The summer also turned out to be hot and dry. Despite all efforts of forest fire services, from January 1 to September 30, according to provisional data, the national statistics reported about 11,400 fires sweeping a total area of 174,866 ha (93,058 ha of them wooded, the highest figure in Italian forest fire history). The regions most affected by wildfires were Piedmont, Liguria, Lombardy, Tuscany and Calabria. In August a big fire swept through about 1,300 ha of pinewoods and brushlands close to Livorno (Tuscany), but aircraft and ground forces succeeded in preventing losses to human lives and houses.

On the whole, fire causes are more and more worrying. Natural causes are less than 0,5 %. The incidence on areas burned depends on arson (60 %) or negligence (25 %). The remaining causes are dubious or unknown.

Measures for forest fire prevention and control

Prevention activities have not taken a great step forward because of the crisis in the forest economy and the increase of hazardous fuels and crime and arson as well. Therefore forest protection has to rely mainly on suppression. In 1990 the total expenditures of the State and the Regions in fire prevention and control were about 300,000 million lire.

As regards airborne equipment, in the same year the Ministry for Coordination of Civil Protection disposed of airplanes belonging to the Air Force (one Lockheed C-130 and three Aeritalia G-222), to the Ministry of Agriculture and Forestry (four Canadair CL-215), and of helicopters belonging to the Army (3-4 Chinook CH-47) and to the Navy (two AB 212), as well as of two other rented Canadair CL-215. The State Forest Corps operated with its ten light helicopters NH 500 and with its new five helicopters AB 412 s (carrying a bucket with a capacity of 900-1000 litres). Almost all regions rented more than 30 light planes for detection and 35 helicopters for initial attack. Altogether more than 90 aircraft were used in fire detection or extinction. The total hours flown were close to 20,000.

High technology for forest fire detection

Since 1979 television systems for forest fire detection have been introduced all over the country. At present more than 15 systems with 30 television cameras connected by radio (microwave band) are operational from Piedmont to Apulia. Colour television cameras tend to replace the older black-and-white models.

After the experience carried out by the Ministry of Agriculture and Forestry with the Italian Company Selenia, a national law (Nr. 38 of 28 February 1990) has financed the installation of integrated detection systems with infrared detectors and television cameras over the areas most exposed to fire in Sardinia, Liguria and Sicily, for a total amount of 90,000 million lire in the period 1990-1992.

From: Giancarlo Calabri
Chief, Forest Fire Service

Address: Ministero dell'Agricoltura e delle Foreste
Direzione generale per l'Economia e per le Foreste
Via Carducci 5
I - 00187 Rome

POLAND

Organization of airborne forest fire control in Poland

Since 1983 a system of airborne forest fire suppression has been operational in Poland. This system is financed by the State forests. In 1990 a total of 14 air bases were available. On each base two to four M-18 Dromader survey/extinguishing aircraft and one survey aircraft PZL 104 Wilga, Zlin, Morawa or a MI-2 helicopter are stationed: altogether 54 aircraft nationwide. A total of 11,337 hours of flying were accomplished during survey and fire suppression tasks. In 1990 MI-2 helicopters with "Bambi" helibuckets (capacity 540 l of liquids) were successfully tested. It is now planned to use Sokol (WSK Swidnik) helicopters with a higher payload of up to 1500 l. It is also planned to increase the number of air attack bases. The multi-purpose airplanes and the firefighting squadrons are used in various forestry tasks during the whole year (e.g. silviculture, protection), thus improving their economic efficiency considerably.



Polish M-18 "Dromader" dropping its water load on forest fire

The 1990 forest fire season in Poland

The meteorological conditions of 1990 contributed significantly to an increase of the forest fire hazard in Poland. By the end of October a total of 5976 fires had burned on ca. 7500 ha of forest lands. The snowless 1989-90 winter season created ideal conditions for spring fires, totalling 3401. During the summer fire season 2332 fires were recorded, in autumn only 243. Most fires were recorded in April (1390) and least fires in September (40). The largest fire occurred near Olkusz (Regional Board of State Forests in Katowice) where 248 ha of forest was burned. Most fires were due to carelessness, and a considerable number of incidents were due to arson. There has been an increase in the number of fires. In comparison to the period 1961-80 the average number of fires per year during the past decade increased by 960 cases, and the average area annually affected by fire increased by 1210 ha.

From: Ryszard Szczygiel

Address: Forest Fire Control Section
Forest Research Institute
ul. Bitwy Warszawskiej 1920 roku nr.3
PL - 00-973 Warsaw

SPAIN

The 1990 forest fire season in Spain

In an advance information of the National Institute for Nature Conservation (ICONA, Ministry of Agriculture) of October 1990 the forest fire season between 1 January and 15 October 1990 is analyzed. The following table gives the most important statistical data in comparison with previous years:

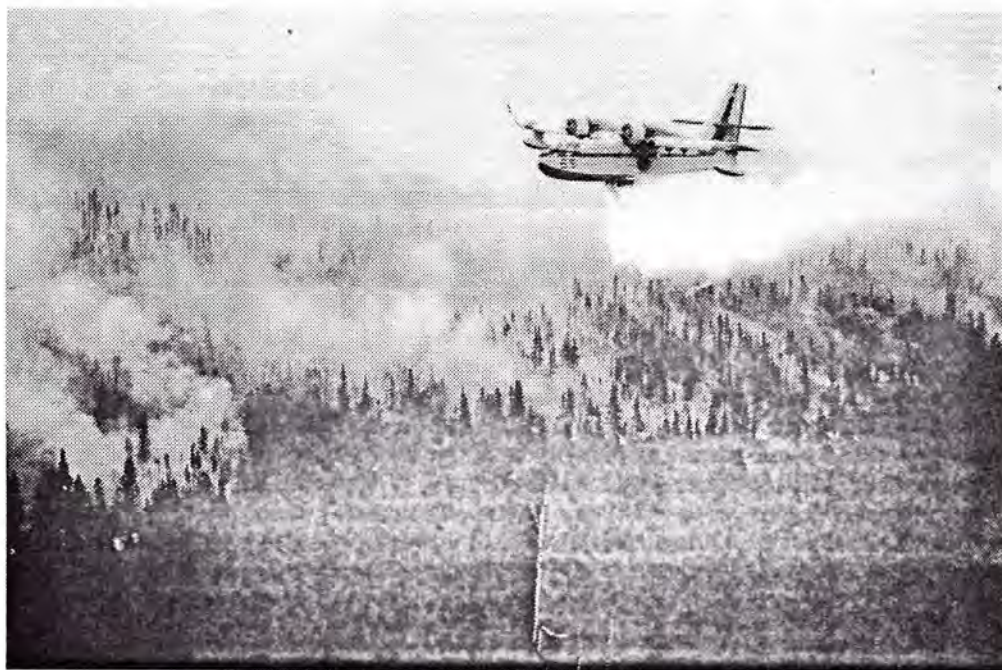
	1988	1989	1990
Number of fires	9,262	19,405	14,984
Area burned (wooded land, ha)	40,484	152,162	66,517
Area burned (non-wooded land, ha)	83,484	228,999	132,275
Total area burned (ha)	126,968	381,161	198,792
Product losses (millions of pesetas)	5,400	16,000	8,000

Spain starts the full renewal of its amphibious aircraft fleet

In 1989 the Ministry of Agriculture approved a project for the full renewal of the state-owned fire bomber fleet. This fleet is composed of Canadair CL-215 aircraft, of which Spain has purchased a total of twenty between 1971 and 1987.

Several accidents had reduced its number to thirteen. This fleet has to perform fire suppression missions for the whole country (more than 500,000 km² of which 50 % are classified as wildlands).

The age of most aircraft and the expected difficulties in obtaining spare parts were some of the factors leading to the decision of renewal.



A GL-125 water bomber on a forest fire suppression task

The renovation program consists of the substitution of the old piston engines by turboprops, incorporating some improvements in the dropping system (e.g. the use of foam, air navigation instruments and the air conditioning of the cockpit).

By the termination of the renewal program (1992) the fleet will be composed of ten new aircraft and five other rebuilt planes of the present fleet with modernized turboprop engines.

The CL-215 T with turboprop engines flew over fire for the first time last summer in Spain performing test flights. The final delivery of the first two CL-215 T is scheduled for January 1991 after incorporating some modifications which are on the way in the Spanish Air Force Maintenance Center.

ICONA, the state agency responsible for forest fire management, has received financial support for this program from the European Bank Investment (EBI) and from the Banco de Crédito Agrícola (a state-owned bank in Spain).

Two of the old aircraft have been sold by ICONA to the Italian firm SISAM, the official contractor operating the CL-215 for the Italian Government.

Fuel model key published

The characteristics of fuels are a basic input for the prediction of fire behaviour. In the United States thirteen standard fuel models are used. Starting in 1987 ICONA has been studying the adoption of this methodology by collecting information in several Spanish regions.

A first photo key is being used on an experimental basis by ICONA. It consists of 400 colour pictures of the fuel models identified in seven forest regions covering three quarters of the Spanish territory.

The pictures are arranged in 82 plates and include the fuel description and the fire behaviour expected in every model.

Development of an expert system for forest fire control

In the past few years ICONA has been developing an expert system for forest firefighting in order to improve decision making on the use of personnel and equipment and to minimize costs.

The high number of fires and the frequent simultaneity in most regions call for an objective method for deciding priorities.

The system uses the BEHAVE program which was developed by the U.S. Forest Service. Inputs are fuel models, topography and weather data. The program forecasts rate of spread, fire intensity and flame height.

Using this information the dispatch officer can appraise the forces to be sent to the fire.

The BEHAVE outputs are the basis for the simulation program named CARDIN, created by the Madrid Polytechnical University under a contract with ICONA.

CARDIN shows on the computer screen the most probable evolution of the fire. A digitization program named DIGICAR has also been developed to supply one of the inputs needed, that is the fuel maps. These maps are being created for the most sensitive areas. Digitization can be made by every field service by using the DIGICAR. It can also be used to digitize the topographic maps when they are not available from another agency.

A third program, named GFUEGO, is on development for the personnel and equipment to be dispatched. A data base has been created to collect information about performances, rates of speed to create firelines and travel speeds. All these programs run on PC computers.

International training courses

2nd Course on Protection against Forest Fires

The CIHEAM (International Center for Advanced Mediterranean Agronomic Studies) and ICONA organized the second course of three weeks in May-June 1990. The first two weeks of the course were held in the Mediterranean Agronomical Institute of Saragossa.

The third week was devoted to field exercises including the operation of equipment, ground tankers, radio communications and a helicopter. Training in the use of prescribed fire was preceded by the opening of firelines by the participants.

A total of 25 foresters from Algeria, Morocco, Portugal, Tunisia, Uruguay and Yugoslavia, together with several Spaniards, followed the lessons and exercises.

6th Latin American Course on Protection against Forest Fires

For the second time this Course has been organized in Spain by ICONA with the financial help of the Spanish Agency for International Cooperation (AECI). The three weeks course took place in the ICONA facilities at Valsain (Sierra de Guadarrama), 80 km from Madrid in one of the best *Pinus silvestris* forests in the country.

Several trips were arranged to visit air bases, ICONA's Operations Center and the Forest Fire Laboratory. The teaching focussed on fire behaviour and fire management programs.

A total of 28 foresters from Mexico, Guatemala, Honduras, Costa Rica, Panama, Venezuela, Ecuador, Peru, Brasil, Paraguay, Chile and Argentina followed the lessons and the exercises.

From: Ricardo Velez
Area de Defensa contra Incendios Forestales

Address: ICONA-Subdireccion General
de Proteccion de la Naturaleza
Gran Via de San Francisco, 35
E - 28005 Madrid

UNITED STATES OF AMERICA

1990 fire activity

The potential for the 1990 fire season was apparent early in the year. Extreme drought prevailed over much of the West. Southern California recorded the driest winter in 133 years on top of its fifth year of drought. The mountains of the Southwest were devoid of winter snow pack. The debris on the ground resulting from Hurricane Hugo made a million acres in the Carolina's a matter of real concern. Late rainstorms caused a large amount of fine fuels to flourish in the Great Basin.

Even with this potential, the season was slow to start. An abnormally wet climate developed over the eastern part of the country, and aside from a few fires in Southern Florida, there was a quiet season in the Southeast. In late June a rash of fires broke out in Texas, Western New Mexico, and Arizona as record heat brought on numerous dry lightning storms. On the afternoon of 26 June a fire fighting crew from Arizona Prison System was overrun on the Dude Fire, Tonto National Forest, and six fatalities occurred. One day later, two firefighters lost their lives in another fire entrapment situation on the California Fire near Riverside, California.

A lot of new fires occurred during this period, the most notable being the Paint Fire near Santa Barbara, California which burned 280 homes in one three-hour run. The Bedford Fire near Corona, California also burned homes. Over 120 new fires were occurring each day, and although most of the firefighting organizations were short-staffed, they made excellent efforts in initial attack which were generally successful.

On 2 July, Alaska had a significant lightning storm resulting in 40 new fires. Firefighting resources began to flow northward. Though the fires in the Southwest were beginning to receive some rain, they still had a lot of fire and needed the Nation's firefighting assets. In need for more resources, our partners in Canada were called on for assistance, and they responded with two air tankers.

Twenty-two new fires started in Alaska including one that threatened Tok Junction and closed the ALCAN Highway. A Yukon high pressure system became established, and Alaska was in trouble by 10 July when over 100 large fires spread from west of Galena into Canada. At the same time, a 1,200 ha fire on the Okefenokee Refuge in Georgia required a Type I team and lightning fires were beginning in the Pacific Northwest. The weather in the West was extremely hot and dry with an average of 26,000 lightning strikes per day, but tough, effective initial attack continued to hold any fires from growing very large.

On 8 August the Awbrey Hills Fires on the outskirts of Bend, Oregon, destroyed 28 homes. It became necessary to move some resources from Alaska southward as there were about 350 fires occurring each day from widespread, dry lightning storms in California, Oregon, Nevada, Utah, and Idaho. Fires erupting in Yosemite Park and the adjacent Stanislaus National Forest required closure of the Park.

At this point, four battalions of military troops were ordered out; two into Oregon and two into California. Troops came from Fort Lewis, Washington, and Fort Carson, Colorado. By mid month the weather patterns began to change, bringing much cooler temperatures and showers into the Pacific Northwest. Demobilization began by 15 August. On 27 August, rains finally came to Alaska, and the crews began to gain control over the large fires they had been fighting. Nearly 1.2 million ha burned in Alaska this year in a very bad season.

By late August the weather over the West again became very hot and dry. Another killer fire in the Wasatch State Park, southwest of Salt Lake City, killed two firefighters and destroyed 18 homes. The Paint Fire in San Diego County burned 28 homes and threatened 175 more. Record high temperatures over most of the country kept initial attack crews busy and another fire in the Okefenokee National Wildlife Refuge required considerable effort to hold it under 1,200 ha.

1990 was as terrifying and devastating as we thought it would be. Extreme fire behavior cost 14 firefighters their lives, and many injuries were sustained. There were four serious aircraft incidents but fortunately, no deaths. By 30 September 1990, a total of 60,875 fires had burned 4,575,117 acres (c. 1.85 million ha).

From: Denny Truesdale
Defense and Emergency Operations Specialist

Address: Fire and Aviation Management, USDA Forest Service
P.O. Box 96060
Washington, D.C. 20090-6090

Fire prevention ride-along program for Southeast Asian children

A unique fire prevention program in the Sierra National Forest teams up bilingual children of Southeast Asian descent with fire prevention personnel to help communicate with the large number of Southeast Asians expected to visit the forest, especially for the opening of tree squirrel season.

Because many adults of Southeast Asian heritage are not yet proficient in English, they often are not aware of fire restrictions in effect. The students in the program serve as interpreters for forest personnel who must ensure the restrictions are understood and followed, especially in light of the dry conditions in the Sierra.

About 20 seventh- and eighth-graders from Yosemite Middle School and Fresno United School District participated last year. For three days they rode along with U.S. Forest Service, Southern California Edison, and California Fish and Game personnel on their regular patrols through the national forest. The Ride-Along program includes a two-night camp-out at Clearwater Ranger Station, where students will receive other outdoor education.



Special handouts were prepared in Hmong and Laotian languages to reach those immigrants not yet proficient in English

The children were Hmong, Laotian, Cambodian and Vietnamese. Since the end of America's involvement in the Viet Nam war, approximately 600,000 Southeast Asian refugees have come to California. In their homelands education, when available, was often limited to the third-grade level. Most were self-employed in slash-and-burn agriculture or crafts. In California, many use hunting to complement their subsistence, which has resulted in an increase in person-caused wildfires on National Forest lands.

Demographic projections indicate that 75 % of the California population growth into the next century will be Hispanic and Asian. Program organizers believed that a fire prevention program which was not responsive to the projected influx of this non-traditional forest user was destined to failure. The first effort to communicate the prevention message was through handouts translated into Laotian and Hmong (see page 13).

Much planning went into the Ride-Along program. Among the considerations were: transportation logistics for the students; sleeping arrangements; security; meals; media contact and news releases; and school district coordination. The long range goals of the program are:

- To provide an educational program to the Southeast Asia community on fire prevention and fish and game regulations;
- To instill in students a love for land stewardship, so it may be shared with families and become a life-long pursuit;
- To provide an opportunity and experience for students and land stewards to strengthen social skills, clarify values and develop self-confidence and positive self-esteem.

This information was taken from "Wildfire News and Notes", Vol. 4, No. 3 (May/June 1990), published by:

National Fire Protection Association

Address: 1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101

NEWS FROM ECE/FAO

ECE/FAO Seminar on Forest Fires, Land Use and People, Greece, 28 October-1 November 1991

The upcoming ECE/FAO fire seminar will be held in Greece (see MEETINGS PLANNED FOR 1991 (Greece)).

INTERNATIONAL COOPERATION

Mediterranean Agronomic Institute of Chania: Short Courses on "Prevention of Forest Fires in the Mediterranean Region"

An intensive short course on the "Prevention of Forest Fires in the Mediterranean Region" was held at the Mediterranean Agronomic Institute of Chania (Crete, Greece), 26 November to 14 December 1990. In addition to four hours a day of lectures, two field trips were organized for demonstrating concepts and methods of fire prevention and suppression in the Mediterranean region.

The course focused on three main subjects:

- Ecological considerations for forest fire prevention;
- Economic and technical analysis of forest fire prevention;
- Fire prevention methods and presuppression planning.

Fire prevention measures applied to human and natural resources, fire hazard assessment, fire behaviour prediction, fuel inventory techniques, fuel modification techniques (fuel breaks, fire breaks, vegetation manipulation and removal, prescribed fire), and the use of computerized programs in wildland fire prevention were emphasized and analyzed in detail during the course.

A panel of professors from various academic institutions and from government agencies lectured under the scientific coordination of G.Lyrintzis (Mediterranean Agronomic Institute of Chania) and A.P.Dimitrakopoulos (University of Thessaloniki). The course was attended by participants from Algeria, Cyprus, Greece, Lebanon, Tunisia and Yugoslavia.

The course will be offered again in November 1991. The location will be again the Mediterranean Agronomic Institute in Chania, Crete. Interested candidates with a university degree in any field of biological sciences (forestry, agriculture, biology, horticulture, etc.) may request more information through the organizer:

Mediterranean Agronomic Institute of Chania
attn. Mr. G. Lyrintzis
P.O. Box 85
GR - 73100 Chania

Phone + 30-821-89511 or 81152, 81153
Fax + 30-821-81154
Telex 29 12 70 iam gr

This report was submitted by:

Alexandros P. Dimitrakopoulos

Address: Department of Environmental Sciences
University of the Aegean
GR - Mytilini

Forestry Training Programme (FTP) of Finland: Seminar on Forest Fire Control for Africa

The Forestry Training Programme (FTP) is part of Finland's official development cooperation financed by the Finnish International Development Agency (FINNIDA). FTP belongs administratively to the National Board of Vocational Education. FTP strives to assist developing countries to solve their problems in forestry by organizing training for foresters. Among various programmes FTP provides special training in forest fire control.

The last seminar on forest fire control, financed by FINNIDA, was organized jointly by FTP and the Zimbabwe Forestry Commission. The seminar was held in Mutare (Zimbabwe) between 15 October and 2 November 1990. The 20 participants came from Indonesia, Kenya, Lesotho, Malawi, Mozambique, Nigeria, Sudan, Thailand, Tanzania, Zambia and Zimbabwe. Besides Finnish teachers the participating resource persons came from the Philippines, Tanzania, Thailand and Zimbabwe.



A manual on forest fire control in English will be prepared in 1991 and will be made available in Portuguese and Kiswahili later (ca. 1992-94). The next seminar is scheduled for Indonesia in 1992 (for Asian countries).

From: Mike Jurvelius
Coordinator, Forest Fire Control Training Project

Address: Forestry Training Programme
Asemamiehenkatu 2 B
SF - 00520 Helsinki

Phone + 358-0-7062936

Fax + 358-0-147881

Telex 12 55 48 ftp sf

International activities of the U.S. Forest Service

Mexico

The very successful Wildland Fire Suppression Course for the Mexican State of Quintana Roo, the Mexican State devastated by Hurricane Gilbert, was held in Cancun in January 1990. During this course approximately 60 students from all walks of life, including professional foresters, the military, fire crew leaders, the local structural fire department and volunteers were taught the basics of wildland fire organization and suppression. The inauguration of the course was attended by the State Governor, the recently appointed Sub-secretaria Forestal and both of his assistants, and the Mayor of Cancun.

Based on the success of the State level fire training course for Quintana Roo, officials from the Secretaria de Agricultura y Recursos Hidraulicos considered that a series of Regional level fire management courses involving the professional foresters of their organization and professional foresters from privately owned timber companies, would benefit from a training program similar to the one in Cancun. The Forest Service agreed to help organize and develop the courses and will provide some specialized equipment not currently available in Mexico, several instructors, and the lesson plans for each Regional Course. The first Regional Course was held in the Mexican State of Jalisco in December 1990.

The U.S. Forest Service sent a large shipment of used fire suppression tools, Nomex fire shirts and pants, and other equipment for use in wildland fire suppression in Mexico. The Forest Service and the Agency for International Development (AID), and the Office of Foreign Disaster Assistance have all worked together to make this project successful. There is a limited supply of these tools available and the Forest Service is developing procedures to determine when they can be sent to cooperators.

Costa Rica

Recently the Servicio de Parques Nacionales and the Fire and Aviation Staff of the U.S. Forest Service have agreed to increase their cooperation in all aspects of fire management. Luisa Alfaro, Director of Fire Management for the Costa Rican National Park Service, is quickly building a very efficient and effective fire management organization in the Costa Rican National Park service. The Forest Service will assist them by providing used, surplus firefighting tools and helping them organize and carry out advanced fire training courses.

Chile

During 1990 the U.S. Forest Service was able to continue its very successful program of providing training and on-the-ground experience to professional wildland firefighters from Chile. This year four Chileans were in the United States from May to September. They were assigned to the Santa Fe Hot Shot Crew, Santa Fe, New Mexico, in Region 3.

Brazil

During 1989, the U.S. Forest Service hosted several members of the Brazilian military which had recently been given the responsibility for wildland fire suppression. (Prior to being assigned the wildland fire suppression responsibilities, the military group was responsible for structural fire suppression.) At the request of the Brazilian military and the American Embassy in Brazil, a team of four Forest Service fire management experts visited Brazil in October 1990, to assess the current situation, and provide input on how to develop a comprehensive wildland fire management program. The Forest Service is developing an agreement with Brazil that will include additional fire management programs and exchanges.

Israel

Our program of cooperation with Israel began in 1987 when the U.S. Forest Service sent three fire management experts to Israel to evaluate their wildland fire problems and issues. The team spent two weeks reviewing the situation and talking with professional land managers and developed a comprehensive plan to help reduce the number of fires and the acreage burned. During 1991 the Forest Service will send two prescribed fire specialists to Israel to assist with the development of prescribed burn plans. There will also be an exchange of fire weather forecasters.

From: Denny Truesdale (same address as on page 13)

MEETINGS HELD IN 1990

AUSTRALIA

Meeting of the Research Working Group on Forest Fire Management, Victor Harbour (South Australia), July 1990

The Australian Forestry Council maintains a number of Research Working Groups (RWG's) to bring together researchers from state forestry agencies, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), universities, forest industry and other relevant organizations. Working groups, 2 in each field:

- review the present state of knowledge;
- define gaps in knowledge and identify topics where new work is needed;
- indicate priorities; and
- where necessary rationalise and co-ordinate the work of the organizations concerned.

The working groups also provide a forum for interchange of information between researchers and for initiation of collaborative projects. Meetings are generally held every 2 years and are rotated between the various states and territories to focus on issues of regional importance.

Management of fire in exotic pine plantations provided the focus for a workshop session at the 11th meeting of the Research Working Group on Fire Management (RWG 6) held at Victor Harbour in South Australia during July 1990.

Topics reviewed during the one-day session included wind profiles in and around pine plantations, current status of fuel reduction burning techniques, specifications for protection buffer strips and the relative importance of fuel load and structure in determining fire behaviour.

Marty Alexander, a visiting fire researcher from Forestry Canada presented a paper outlining the Canadian experience with crown fires in pine forest types and discussed the relevance of existing fire behaviour prediction systems in the Australian context.

Several important gaps in the current knowledge of pine plantation fires were highlighted during discussions including:

- behaviour of surface fires at higher levels of fire danger;
- initiation of crown fires and the influence of stand characteristics and silvicultural treatment on crowning;
- the effectiveness of fuel modified buffer strips in limiting the spread and intensity of wildfires.

A postgraduate study program currently being undertaken by Marty Alexander through the Forestry Department at the Australian National University will address the question of crown fire initiation using both theoretical and practical approaches. Preparations are underway in several states for experimental burning during the coming fire season.

In addition to plantation fire research the working group also considered a number of other items related to fire research at the national level including:

- the recently published Register of Australian Fire Research (see International Forest Fire News No.3, July 1990);
- registration of important long term research and reference sites;
- progress with the current review of Fire Danger Rating in Australia;
- development of a database of plant species' response to fire.

A number of recommendations from the meeting were forwarded for consideration by a committee comprised of the Directors of Forestry Research.

Further information can be obtained from:

Phil Cheney, RWG 6 Chairman
Bushfire Research Unit, C.S.I.R.O.
P.O. Box 4008
Canberra, ACT 2600 - or

Lachlan McCaw, RWG 6 Secretary
Department of Conservation and Land Management Research Centre
Manjimup, Western Australia, 6258

MEETINGS PLANNED FOR 1991

AUSTRALIA

Australian Bushfire Conference 1991, Canberra, Australia, 30 September-2 October 1991

The theme of the Australian Bushfire Conference 1991 is "Bushfire Behaviour". The meeting is sponsored by the Department of Mathematics, University College (UNSW), Australian Defence Force Academy, the Bushfire Research Unit, CSIRO Division of Forestry and Forest Products, and the New South National Parks and Wildlife Service, Southeast Region.

Papers on the conference theme or related subjects and expressions of interest are now being solicited. Abstracts should be submitted no later than 30 June 1991. A second circular with a conference programme will be distributed in July 1991. Please bring this notice to the attention of any colleagues you think may be interested. For more information write to:

Rodney Weber or Neil Viney
Mathematics Department, ADFA
Campbell, ACT 2600

Phone + 61-62-688897

FRANCE

"Forest Fires: Before and After", University of Nice, France, 23-25 September 1991

The importance and gravity of forest fires justify the hosting of this symposium which should serve as a forum for co-ordinating research, help bring together the various, rather dispersed efforts, and assess the social and economic costs of fires. Three main topics are proposed:

1. **Fires: A Phenomenon of Society** (history, perception of fires, economic and social consequences).
2. **Anti-fire strategies** (from prevention to firefighting).
3. **The Future of Burned Spaces** (reforestation, rehabilitation of affected sites, planning and management policies).

The symposium will commence with a plenary session addressing the main issues. A day's field excursion is being organized to affected sites in the Esterel and Tanneron massifs, in France.

The symposium is being organized by Jean-Pierre Paulet, Pierre Carrega and Andrée Dagorne of the University of Nice-Sophia-Antipolis. The deadline for registration was 1 January 1991. However, those wishing to attend the meeting or to give a contribution (abstract due on 1 March 1991) should write to the organizing committee:

Secrétariat du Laboratoire d'Analyse Spatiale
à l'attention de Melle V. Andrée
98, Boulevard E. Herriot - B.P. 369
F - 06007 Nice Cedex

Phone + 33-93 37 54 64
Fax + 33-93 37 53 58

GREECE

ECE/FAO Seminar on Forest Fires, Land Use and People, 28 October-1 November 1991

As previously announced in the IFFN (No.3, July 1990, p.14) the program of the seminar (sponsored by the Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training, the FAO Committee on Mediterranean Forestry Questions (Silva Mediterranea) and the Union of Forestry Research Organizations (IUFRO, Subject Group S.1-09 Forest Fire Research) embraces the following topics:

1. **Land use and fire risk**
 - 1.1 Interface of forest, agricultural land, wildlands and residential areas (description of landscape patterns, ecology, climate and fire risk)
 - 1.2 Social, economic and cultural aspects of forest and wildland fires (description of fire causes)
2. **Reducing the forest fire hazard**
 - 2.1 Fuel management (methods, e.g. mechanical, chemical, prescribed burning, prescribed grazing)
 - 2.2 Silvicultural methods (including restoration/reforestation planning of burned lands)
 - 2.3 Policies and legislation (financial aid, regulations, extension, public information)

In addition to the invited basic papers, voluntary papers will be accepted. Those wishing to give a voluntary contribution should write to the organizers of the meeting (address below). The location of the seminar has not yet been fixed, but it will either be in Athens or on the island of Crete. More information on the seminar will be published in the next IFFN (July 1991). The organizers are:

George Sakkas and Vasilios Frangos
Ministry of Agriculture
Department of Forest Fire Prevention & Control
3-5 Ippokratous Str.
GR - 106 79 Athens

ITALY

First European Symposium on Terrestrial Ecosystems: Forests and Woodlands, Florence (Italy), 20-24 May 1991

The Commission of the European Communities, together with the European Science Foundation (ESF) and the National Research Council (Italy), is organising a symposium to review available knowledge concerning patterns and processes in European terrestrial ecosystems. Reviews will focus on basic knowledge of forest and woodland. They will also consider the successional development of forest ecosystems from non-forest precursors. Each topic listed in the preliminary program will consider the following points:

- Fundamental knowledge of processes and patterns
- Natural influences on processes and patterns (climate, geology, soils)
- Man-induced changes (management, pollution, fire, fertilizers, etc.)
- Methods and approaches
- Modelling and data bases
- Use of basic knowledge for management and protection
- Gaps in knowledge - research priorities.

The symposium will consist of a series of plenary sessions with invited speakers only. Experience and expertise from outside Europe will be an important component of the reviews. Poster presentation will provide an opportunity for European scientists to contribute their own work to the themes of the symposium.

Sessions devoted to case studies will follow plenary sessions. In these case studies, the most significant patterns and processes of European ecosystems will be described. Finally, key questions, raised in plenary sessions and case studies will be extensively discussed in four workshop sessions. **Workshop III is entitled: "Forest Response to Fires and Implications in Ecosystem Functioning and Management"**. For more information write to the organising secretariat:

ICARIA
Via Zannoni, 45
I - 40134 Bologna

Phone + 39-51-416690/410773
Fax + 39-51-421526

MOROCCO

Workshop on Meteorological Information for Forest Fire Management in the Western Mediterranean Region, Morocco, 25-30 November 1991

A workshop on meteorological information for forest fire management in the western Mediterranean region is being organized by the World Meteorological Organization (WMO) and the Food and Agriculture Organization of the United Nations (FAO). The purpose of this workshop is to bring together people from the meteorological services and forest fire management organizations of this region, promote exchange of information on techniques used, and to demonstrate these techniques.

More detailed information will be provided in the next issue of **International Forest Fire News**.

From: D. Rijks

and

From: W.M. Ciesla

Address: Agricultural Meteorology Division
World Meteorological Organization
Case postale 2300
CH - 1211 Geneva 2

Address: Forestry Department
Food and Agriculture Organization
Via delle Terme di Caracalla
I - 00100 Rome

Phone +41-22-7308378
Fax +41-22-7342326

Phone +39-6-5797 3668
Fax +39-6-5797 5137

SPAIN

Conference on Soil Erosion and Degradation as a Consequence of Forest Fires, Barcelona and Valencia, 3-7 September 1991

The European Society for Soil Conservation (E.S.S.C.) is the organizer of this conference in which the state of knowledge associated with soil degradation and conservation related to forest fires will be presented and discussed.

The main themes of the meeting will be:

Fire Prevention. Risks of fire occurrence (meteorological, forest structure and combustibility, land-use practices, etc.)

Soil Degradation. Changes of the soil properties (physical, morphological, chemical, biological, etc.)

Soil Erosion. Changes in the soil water balance (infiltration, subsurface flow, runoff, erosion, etc.)

Soil Conservation. Restoration (post-fire recovery, multipurpose forest structure, land-use control)

The opening ceremony will take place in Barcelona, the closing ceremony in Valencia. In both places there will be one day dedicated to the presentation of papers and one day of field trip. The organizing committee will invite one or two speakers for each of the main topics. Participants intending to give a voluntary paper are requested to submit an abstract by 31 January and the full paper by 31 July 1991. The official language of the seminar is English, both for oral presentation and for printed materials.

Detailed information on the conference and on registration (deadline 31 January 1991; registration fee 15,000 Pts for E.S.S.C. members, 20,000 Pts for non-members) should be directed to one of the organizers:

Maria Sala
Department of Geography
University of Barcelona
E - 08028 Barcelona

or

José L. Rubio
Desertification Research Unit, C.S.I.C.
Jaime Roig 11
E - 460101 Valencia

UNITED STATES OF AMERICA

11th Conference on Fire and Forest Meteorology: Computer Applications in Research and Management, Missoula, Montana, 16-19 April 1991

The Eleventh Conference on Fire and Forest Meteorology is sponsored by the Society of American Foresters, the American Meteorological Society, the USDA Forest Service, Intermountain Research Station, and the University of Montana, School of Forestry. The conference will be held from 16 to 19 April at the Holiday Inn, Missoula, Montana.



The theme of the conference is Computer Applications in Research and Management. Papers are solicited in the areas of remote sensing and GIS, fire and atmospheric interactions, ecosystem modeling and quantitative ecology, climate change and fire severity, and large-scale fire behaviour. Contributions are also solicited on traditional subjects such as fire meteorology and climatology; inventory, modeling, and prediction of fuel properties and fire potential; and effects of fire on air, soil, water and vegetation.

Sessions will be structured to permit both oral and interactive poster presentations. Papers will be published in proceedings without reference to method of presentation. Abstracts were due on 1 September 1990. However, those still wishing to give a contribution or to attend the meeting without giving an active presentation should contact:

Patricia L. Andrews
USDA Forest Service
Intermountain Fire Sciences Laboratory
P.O. Box 8089
Missoula, Montana 59807

Phone + 1-406-329-4827
Fax + 1-406-329-4863

or

Donald F. Potts
School of Forestry
University of Montana
Missoula, MT 59812

Phone + 1-406-243-6622
Fax + 1-406-243-4510

The Power of Politics, the Media and the Public to affect Wildland/ Urban Fire Protection Programs in the 1990s. A National Workshop, to be held in Missoula, Montana, 21-24 April 1991

The University of Montana is organizing this national workshop in which political, media and public leaders of the United States will present their thoughts and ideas on practical philosophies for working with the government at any level, with the media in planned and emergency situations, and with the average citizen to foster good relations and firesafe programs.



The workshop is sponsored by the National Fire Protection Association (Wildland Fire Management Section), the Congressional Fire Services Institute, the National Wildland/Urban Interface Initiative, Western Fire Chiefs Association, the National Wildfire Coordinating Group, and the University of Montana.

For more information or registration, contact the University of Montana's Center for Continuing Education by:

Phone + 1-406-243-4623 or 243-2900

RECENT PUBLICATIONS

In May 1989 the 3rd International Symposium on Fire Ecology was held at the University of Freiburg, Federal Republic of Germany. Two recently published books are the result of that conference:

Fire in Ecosystem Dynamics: Mediterranean and Northern Perspectives

The contributions of the first part of the 3rd International Symposium on Fire Ecology are presented in this volume and focus on Mediterranean vegetation, but are supported by expertise from other vegetation zones in order to portray the global nature of wildfire regimes and wildfire impacts.

Most contributions come from France, Italy, Israel, Portugal and Spain. In addition papers from Canada, Nepal, People's Republic of China, South Africa and the United States are included. The contributions mainly deal with the effects of fire on vegetation (ranging from the individual plant to landscape patterns and forest mosaics) and on soil properties (including the runoff and erosion problems). Emphasis is also given on prescribed burning effects, expert systems for fire ecology research and climate change. The bibliographical information is:

J.G. Goldammer and M.J. Jenkins (eds.), 1990: *Fire in Ecosystem Dynamics. Mediterranean and Northern Perspectives*. SPB Academic Publishing, SPB Academic Publishing, The Hague (VIII + 199 p., 81 figures and 35 tables, ISBN 90-5103-045-2).

Fire in the Tropical Biota. Ecosystem Processes and Global Challenges

This monograph covers the impact and role of fire in tropical ecosystems. It also studies the impact of tropical wildland fires and biomass burning on global ecosystem processes. In the first part, regional contributions cover the origin and the ecological effects of fire in the main tropical vegetation types of Asia, Latin America, Australia and Africa. Both the prehistorical and the historical perspectives are added in order to clarify the role of man in the evolution of tropical wildland fire regimes.

The magnitude and impact of today's escalating tropical vegetation degradation by fire is described by contributions on remote sensing. The quality of emissions from biomass burning highlight their impact on a changing global atmosphere. The final chapter demonstrates that global climate change may itself have considerable effects on vegetation and fire regimes. The bibliographical information is:

Goldammer, J.G. (ed.), 1990: *Fire in the Tropical Biota. Ecosystem Processes and Global Challenges*. Ecological Studies 84, Springer-Verlag, Berlin-Heidelberg-New York (XX + 497 p., 116 figures, 48 tables, ISBN 3-540-52115-1 and ISBN 0-387-52115-1).

Glossary of Wildland Fire Management Terms Used in the United States

This glossary is the culmination of a decade of effort by the Society of American Foresters (B1-Fire Working Group) to provide, at low cost, a standardized vocabulary of wildland fire management terms commonly used in the United States. The group undertook the project in 1975 with Joe Baker and Dave Butts as co-chairmen. A computer printout containing over 3,000 terms from 84 North American glossaries was completed in 1981. Under the direction of Ben Lyon, the printout evolved into the multilingual 1986 FAO Forestry Paper "Wildland Fire Management Terminology" (see IFFN, January 1988).

The 1981 printout also served as the base document for this glossary. It differs from the FAO glossary in that it includes the full ICS (Incident Command System) terminology as well as several hundred additional terms commonly used in the United States. In order to make this glossary relatively inexpensive, all foreign terms were omitted. The definitions of some terms that appear in both glossaries have been slightly revised to more nearly reflect current usage in the United States. The glossary defines terms that do not appear in standard desk dictionaries, or that have specific connotations or nuances in fire management usage. Pertinent terms from allied disciplines such as aviation, chemistry, ecology, forestry, meteorology, physics, and structural fire protection are included. The glossary is intended as an aid for training and educational programs, and to improve communications among individuals involved in all facets of fire management from the field to the laboratory.

Those who are interested in obtaining a copy of the glossary should request:

McPherson, G.R., D.D.Wade and C.B.Phillips (Compilers), 1990: *Glossary of Wildland Fire Management Terms in the United States*. Published by the Society of American Foresters, B1 Fire Working Group, SAF 90-05, 138 p. (US\$ 8.00 per copy)

From: Society of American Foresters
5400 Grosvenor Lane
Washington, D.C. 20014

The Art and Science of Fire Management (Proceedings of the First Interior West Fire Council Annual Meeting and Workshop)

The last joint session of the Intermountain Fire Council and Rocky Mountain Fire Council was held at Jackson, Wyoming, in October 1987. One of the major decisions made by the members of both councils at the business meeting was the consolidation of the two councils into one council to be known as the Interior West Fire Council (IWFC). The principal goal of both these organizations has been the general improvement of wildland fire management practices through participation in a central forum of member agencies. The current council membership consists of (in alphabetical order): Alberta, Colorado, Idaho, Kansas, Montana, Nebraska, North Dakota, Northwest Territories, Saskatchewan, South Utah, and Wyoming.

The first annual meeting and workshop of the IWFC was held October 24-27, 1988, at Kananaskis Village, Alberta, Canada. The theme of the 1988 meeting/workshop was The Art and Science of Fire Management. Over 265 delegates from Canada, the United States, and Australia were in attendance. A total of 36 invited presentations were made, preceded by a keynote address and followed by a workshop summary, involving four technical sessions on the following topics:

- fire management problems and opportunities;
- fire research programs in support of fire management decisions and solutions;
- the role of new technologies, analytical systems, and support services in fire management activities; and
- fire management actions and practices.

The proceedings have now been published. Registered participants will automatically receive a copy. Others wishing to obtain a copy should request:

Alexander, M.E. and G.F. Bisgrove (Technical Coordinators), 1990: The art and science of fire management. Proceedings of the First Interior West fire Council Annual Meeting and Workshop, Kananaskis Village, Alberta, October 24-27, 1988. For. Can., Northwest Reg., North. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-309.

From: Forestry Canada, Northwest Region

Address: Northern Forestry Centre
5320-122 Street
CD - Edmonton, Alberta T6H 3S5

Fire ! Special Issue of UNASYLVA

The international journal of forestry and forest industries UNASYLVA is a publication of the Food and Agriculture Organization of the United Nations (FAO). The journal which is published quarterly in English, French and Spanish editions, devoted one of its recent issues (Vol.41, 3/1990) to the worldwide problem of forest fires. Six contributions cover critical fire areas and case studies of contemporary fire management approaches:

- Mediterranean forest fires: a regional perspective
- Preventing forest fires through silviculture
- Forest fire control in Honduras
- FAO's role in forest fire protection: an overview of activities 1970-89
- Modern forest fire control: the Indian experience
- Fire as a forest management tool: prescribed burning in the southern United States

This special issue (ISSN 0041-6436) may be obtained:

From: FAO, Sales Section
Via delle Terme di Caracalla
I - 00100 Rome

or through any FAO sales agent.

What to do after the Fire?

This is explained in leaflet no.18 of the chapter on Forest Fire Protection of the Technical Guide for the French Mediterranean Forester. The guide is edited by the Centre National du Machinisme Agricole du Génie rural des Eaux et des Forêts (CEMAGREF) and devoted to the restoration of burned lands.

Fire suppression is the task of the security services. Afterwards, the foresters have to assess the damage and to prepare the rehabilitation plan. The leaflet gives special attention to:

- Short-term measures (for minimizing risks and damage caused by the fire, e.g. erosion, die-back of fire-damaged trees, secondary pest problems)
- Medium- and long-term measures (for planning of restoration of burned areas, taking into account the selection of appropriate species, techniques of reforestation, future fire risks, and other measures to meet the rehabilitation of burned lands).

The **Guide technique du forestier méditerranéen français. Guide pratique: Protection des Forêts contre l'Incendie** can be obtained (100 F TTC) from the Centre de documentation Forêt méditerranéenne et Incendie, CEMAGREF (address on next page).

The proceedings have now been published. Registered participants will automatically receive a copy. Others wishing to obtain a copy should request:

Alexander, M.E. and G.F. Bisgrove (Technical Coordinators), 1990: The art and science of fire management. Proceedings of the First Interior West fire Council Annual Meeting and Workshop, Kananaskis Village, Alberta, October 24-27, 1988. For. Can., Northwest Reg., North. For. Cent., Edmonton, Alberta. Inf. Rep. NOR-X-309.

From: Forestry Canada, Northwest Region

Address: Northern Forestry Centre
5320-122 Street
CD - Edmonton, Alberta T6H 3S5

Fire ! Special Issue of UNASYLVA

The international journal of forestry and forest industries UNASYLVA is a publication of the Food and Agriculture Organization of the United Nations (FAO). The journal which is published quarterly in English, French and Spanish editions, devoted one of its recent issues (Vol.41, 3/1990) to the worldwide problem of forest fires. Six contributions cover critical fire areas and case studies of contemporary fire management approaches:

- Mediterranean forest fires: a regional perspective
- Preventing forest fires through silviculture
- Forest fire control in Honduras
- FAO's role in forest fire protection: an overview of activities 1970-89
- Modern forest fire control: the Indian experience
- Fire as a forest management tool: prescribed burning in the southern United States

This special issue (ISSN 0041-6436) may be obtained:

From: FAO, Sales Section
Via delle Terme di Caracalla
I - 00100 Rome

or through any FAO sales agent.

What to do after the Fire?

This is explained in leaflet no.18 of the chapter on Forest Fire Protection of the Technical Guide for the French Mediterranean Forester. The guide is edited by the Centre National du Machinisme Agricole du Génie rural des Eaux et des Forêts (CEMAGREF) and devoted to the restoration of burned lands.

Fire suppression is the task of the security services. Afterwards, the foresters have to assess the damage and to prepare the rehabilitation plan. The leaflet gives special attention to:

- Short-term measures (for minimizing risks and damage caused by the fire, e.g. erosion, die-back of fire-damaged trees, secondary pest problems)
- Medium- and long-term measures (for planning of restoration of burned areas, taking into account the selection of appropriate species, techniques of reforestation, future fire risks, and other measures to meet the rehabilitation of burned lands).

The **Guide technique du forestier méditerranéen français. Guide pratique: Protection des Forêts contre l'Incendie** can be obtained (100 F TTC) from the Centre de documentation Forêt méditerranéenne et Incendie, CEMAGREF (address on next page).

From: M. Audema
Directeur du Groupement
CEMAGREF

Address: B.P. 31 Le Tholonet
F - 13612 Aix-en-Provence Cedex 01

Phone + 33-42 66 93 10
Fax: + 33-42 66 88 65
Telex 40 19 10 f

The Applied Environmetrics Meteorological Tables

In January 1990 Applied Environmetrics published the Applied Environmetrics Meteorological Tables that are designed to be the definitive reference tables for commonly used meteorological data.

These tables form the second volume in the series of scientific tables. The first volume, the Applied Environmetrics Oceanographic Tables, were published in June 1989.

These tables will be of especial interest to foresters and those with an interest in wildfire, because they were prepared by Tom Beer of the CSIRO Bushfire Unit and include fire weather tables for the McArthur Unit and for the McArthur grassland meter, commonly used in Australia and for the Rothermel model, widely used by the US Forest Service.

The Applied Environmetrics Meteorological Tables comprise hardbound documentation plus a 5.25 inch MSDOS disk (requiring DOS 2.10 or later plus at least 256K of RAM to run). The tables cover:

- Pressure, density, temperature and potential temperature with height.
- Geodetic tables and the reference atmosphere.
- Solar position, times of sunrise and sunset and incident radiation on slopes.
- Blackbody radiation.
- Density, viscosity and fall velocity for particles.
- Saturation pressure and latent heats for pure water and ice.
- Psychometric tables of moisture parameters given dry and wet or ice bulb readings.
- Thermodynamic temperatures for moist air, including equivalent potential and wet bulb potential temperatures.
- Speed of sound, density, molar mass and specific heats of moist air.
- Wind speed conversion, Beaufort scale and the vertical profile of mean wind.
- Diffusion and dispersion in air giving molecular transport coefficients and Gaussian plume calculations.
- Fire weather tables including the Australian grassland fire meters and the Rothermel model of the U.S. Forest Service.
- Normal, chi-squared and Weibull distribution.

This publication provides meteorologists and those who use meteorological information with the definitive data they need in a form consistent with modern technology, yet sufficiently traditional to be easy to use.

The tables (published in January 1990, ISBN 0-9590809-1-0) are available for US\$ 124.95 or AUS\$ 149.95 (payment by check or bank draft, or Visa/Mastercard/American Express (give card and expiry date + signature)

From: Applied Environmetrics
118 Gordon St.
Balwyn, Victoria 3103 (Australia)

Phone + 61-3-817 2571

From: M. Audema
Directeur du Groupement
CEMAGREF

Address: B.P. 31 Le Tholonet
F - 13612 Aix-en-Provence Cedex 01

Phone + 33-42 66 93 10
Fax: + 33-42 66 88 65
Telex 40 19 10 f

The Applied Environmetrics Meteorological Tables

In January 1990 Applied Environmetrics published the Applied Environmetrics Meteorological Tables that are designed to be the definitive reference tables for commonly used meteorological data.

These tables form the second volume in the series of scientific tables. The first volume, the Applied Environmetrics Oceanographic Tables, were published in June 1989.

These tables will be of especial interest to foresters and those with an interest in wildfire, because they were prepared by Tom Beer of the CSIRO Bushfire Unit and include fire weather tables for the McArthur Unit and for the McArthur grassland meter, commonly used in Australia and for the Rothermel model, widely used by the US Forest Service.

The Applied Environmetrics Meteorological Tables comprise hardbound documentation plus a 5.25 inch MSDOS disk (requiring DOS 2.10 or later plus at least 256K of RAM to run). The tables cover:

- Pressure, density, temperature and potential temperature with height.
- Geodetic tables and the reference atmosphere.
- Solar position, times of sunrise and sunset and incident radiation on slopes.
- Blackbody radiation.
- Density, viscosity and fall velocity for particles.
- Saturation pressure and latent heats for pure water and ice.
- Psychrometric tables of moisture parameters given dry and wet or ice bulb readings.
- Thermodynamic temperatures for moist air, including equivalent potential and wet bulb potential temperatures.
- Speed of sound, density, molar mass and specific heats of moist air.
- Wind speed conversion, Beaufort scale and the vertical profile of mean wind.
- Diffusion and dispersion in air giving molecular transport coefficients and Gaussian plume calculations.
- Fire weather tables including the Australian grassland fire meters and the Rothermel model of the U.S. Forest Service.
- Normal, chi-squared and Weibull distribution.

This publication provides meteorologists and those who use meteorological information with the definitive data they need in a form consistent with modern technology, yet sufficiently traditional to be easy to use.

The tables (published in January 1990, ISBN 0-9590809-1-0) are available for US\$ 124.95 or AUS\$ 149.95 (payment by check or bank draft, or Visa/Mastercard/American Express (give card and expiry date + signature)

From: Applied Environmetrics
118 Gordon St.
Balwyn, Victoria 3103 (Australia)

Phone + 61-3-817 2571