

FORESTRY

Autumn's Red and Gold: Fire

Forest fire fighters face two major problems: controlling and extinguishing existing fires and learning more about the basic science of fire.

By BENITA TALL

► A BOLT of lightning can turn the red and gold of autumn leaves into searing flames, destroying timber, land and wildlife.

A bolt of lightning or human carelessness in the shape of an untended brush fire or a smoldering campfire is the nemesis of a group of workers in the U.S. Forest Service. Rangers, researchers, smoke jumpers, fire fighters are all devoted to solving the problem of the forest fire.

A problem it is in every sense of the word. In the Atomic Age, with nuclear energy flowing into the nation's power supply and rockets being hurled into space, we still do not know how forest fires burn nor how they can be controlled.

Through the years forest fires have taken a toll in human lives and natural resources destroyed that is all but impossible to imagine. Billions of acres of trees either have been destroyed outright by fire or so weakened by the flames that they cannot withstand bad weather conditions or attacks by insects. Valuable watersheds have been lost when fire burned over the land leaving charred ruins where there had been green plants. Forest fire fatalities from 1948 through 1957, from national forests, interior lands, and state and private lands, totalled 188 persons.

A-Bomb vs. Fire

When you realize that the energy released in burning just 40 acres of medium density brush is about equal to the energy released by the first atomic bomb exploded at Hiroshima, you have some idea of the power unleashed in a forest fire.

There are two aspects to the problem of these fires. One has to do with the basic chemistry and physics of fire and fuels, and with meteorology; the other is concerned with controlling and extinguishing fire.

Taking the second part of the problem first—about which the most is known—it is possible to point to many advances.

Until recently, forest fire fighters had only water, shovels and more fire as weapons against flames sweeping through the woods. They could smother the fire with water and dirt, dig trenches to bar its spread, or build controlled fire walls to burn off potential fuel for the approaching flames. Today the fire fighters have airplanes, aerial tankers, fire retardants and smoke jumpers. Air support of the ground workers trying to control a fire is now an extremely important phase of fire fighting.

It is difficult to say when the air attack on forest fires began. As early as the 1920's

serious thought was given to fighting fires by dropping water from aircraft. Actual "firsts" were made in 1936 when the Forest Service used planes to supply hard-to-get-to fire camps and in 1939 when smoke jumping began. Helicopters were first used in forest fire fighting in 1947 in California, a year after their introduction in Canadian forest fire fighting.

Air tanks, chemical air attack and "helitack" are the three main parts of the Forest Service's airborne attack on fire.

Airplanes equipped with one or more tanks with large gates to "cascade" thousands of gallons of uncontained liquid (both water and retardants have been used) are credited with controlling several serious fires in their first trials.

Chemicals are an especially promising part of air attack on fire. Sodium calcium borate, mixed about four pounds per gallon of water until it has a pancake batter consistency, is currently considered as the most suitable of the chemical fire retardants. It gives good coverage of the land and vegetation. In addition to making potential fuels, bushes, leaves, etc., virtually impervious to fire, the white borate covering is

helpful since the airplane pilot can readily see where previous applications of retardant have been made.

Chemical fire retardants act in such a way as to interfere with the chemical processes essential to combustion. Experimental work at Stanford Research Institute, California, indicates that the halogen compounds, especially those containing bromine and iodine, may be particularly useful as fire fighters.

These halogen compounds break down at the high temperatures found in flames and release free iodine or bromine atoms. These atoms then combine with highly reactive chemical fragments—radicals—in the flame that are needed if combustion is to take place. By interfering with the radicals, the flame is inhibited and eventually extinguished.

The use of helicopters in tactical support of ground forces in forest fires is what "helitack" means. The 'copter is an excellent tool for scouting and finding fires, for quick transportation of men and supplies, and for laying hose. In one test, a helicopter took 53 seconds to lay 1,500 feet of hose up a steep hill, a job that took eight men 30 minutes.

Two new fire research laboratories may soon be providing the Forest Service some answers to the basic science of fire.

One laboratory is already being built at Macon, Ga.; the second, at Missoula,



FIRE FIGHTER'S FERRY—A helicopter takes off for a distant fire, in Bichota Canyon, Angeles National Forest, California, ferrying a fire fighter to the scene of action and thus saving precious time and timber.

Mont, where there is a smoke jumping school, the Missoula Smokejumper Center, is going up soon. These laboratories will have wind tunnels, controlled temperature and humidity rooms, electric ovens and other facilities for physical and chemical research.

Scientists hope to identify the separate fuel types in which fires perform in characteristic ways. They also hope to learn what natural laws affect fire in the woods and why fire responds in certain ways to weather. The flammability of different types of vegetation under various atmospheric conditions will receive considerable attention in the new laboratories.

As one of their main projects, researchers at the Macon laboratory, headed by K. W. McNasser, chief of fire research at the Southeastern Forest Experiment Station, will study what makes some fires "blow up" without warning. With information on this, foresters could predict fire behavior and plan their control strategy better.

Controlled Burning

With all the work toward forest fire prevention and control continuing there remains some evidence to support the theory that a little controlled burning may be good.

In primitive times, lightning fires were free to burn. Also, Prof. H. H. Biswell of the University of California recently pointed out, the Indian sometimes used fire as a tool for shaping his landscape, hunting game and driving away the enemy. As a result, the pine forests in the Sierra Nevada, for example, were open and park-like. The modern policy of fire suppression results in a gradual build up of fuel on the forest floor and a constant danger of destructive wildfire, the California ecologist believes.

Today, however, with man's carelessness one of the chief factors in causing forest fires, we probably have a long way to go before we can plan on using extensive controlled burning to help prevent fires. Fire is not yet, and not always, the useful tool it should be. It still holds secrets for scientists to learn.

Science News Letter, November 1, 1958

METEOROLOGY

Lowest Temperature Found Above South Pole

► A TEMPERATURE OF 135.4 degrees below zero Fahrenheit, believed to be a world's record low at any height anywhere, was recorded 13 miles high in the air above the South Pole on July 16, the U.S. Weather Bureau has reported.

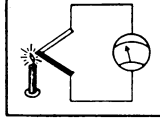
The record low is about three degrees below the previous low, which was also established by a balloon-carried instrument in the Antarctic stratosphere.

The world's lowest temperature for a ground station is claimed by Russians in Antarctica, who recorded 124.1 degrees below zero Fahrenheit on Aug. 9 at Soviet-skaya, at a height of 12,000 feet above sea level.

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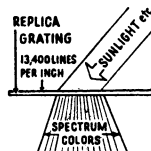
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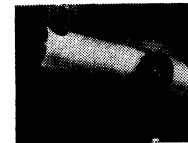
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