Fig. 1. The Middle Fork of the Salmon River is 6,200 feet in elevation below the picture foreground. Forty-four years have passed since the last burn in 1910. Fire-killed snags are abundant throughout the area.

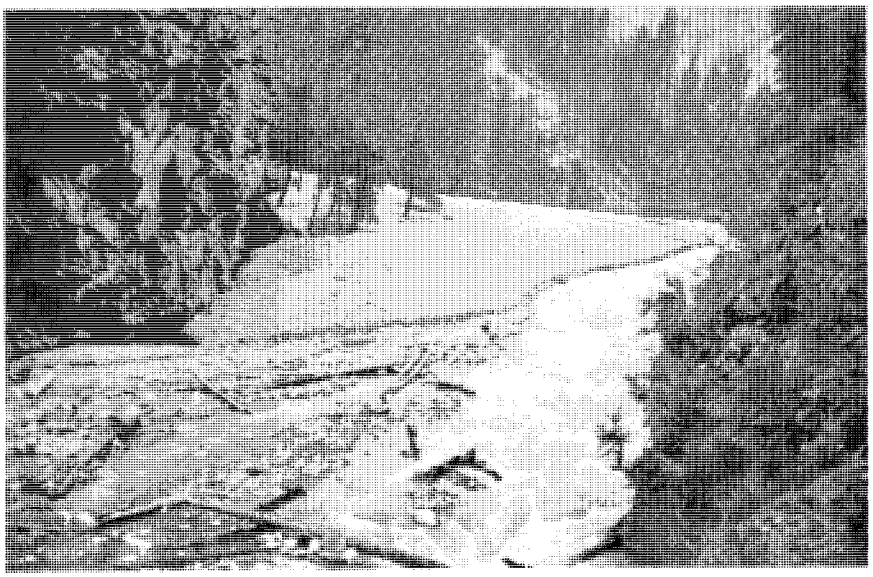

Fig. 2. Typical mud, rock flow from rain following fire in upper part of small watershed. From three mile long Rattlesnake Creek fire in 1935, 200,000 yards of debris was deposited. Previous burn in 1910.

Fires in Wilderness Areas

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STATEMENTS in this paper do not necessarily represent current official policies or practices of the U. S. Forest Service. It is rather my personal evaluation of experiences as an inhabitant of, and later as an employee of, the Forest Service in wilderness areas. Any statistics used here have been previously published in various forms.

The subject title immediately involves many absorbing factors, the depth and breadth of which would fill volumes. For this discussion, we will stay close to the subject title, mainly—What is the fire situation in these natural condition areas, and what are the minimum and maximum tolerances of burn and why?

To further consolidate the scope, I am using for reference two of the largest roadless areas in the United States, the Idaho Primitive and the Selway Wilderness Areas, as I know them. They contain over 2,250,000 acres of the rugged Rocky Mountains. Although annual fire occurrence and area burned is greater here than in the average wilderness, they serve this purpose well.

Now, what is the fire situation? First, they will burn as nature obviously intended they should. For nature ignites fire primarily by lightning, many by sparks from rolling boulders, and a few by flint reflected sun rays and hot meteor ash.

The number of fires ignited here per year varies from 40 to 3,000. The cause varies from 90 to 98 percent lightning. The greatest concentration was 2,000 fires in three days in 1940. All were lightning-caused. I, personally, observed one storm during this period when

there were 110 strikes from one dry cloud in less than 30 minutes. Within the hour, 60 fires resulted. Less than 15,000 acres burned in these fires, whereas in 1931, five fires (two lightning and three man-caused) burned over 250,000 acres. There is no predictable pattern between fire occurrence and dryness of the season. Generally, though, fewer fires can be expected in drought years, largely because of less lightning storm activity. An exceptionally wet season in 1938 yielded 42 fires and 38 acres burned.

However, to study nature's fire activity, we need to go back into history prior to man's organized fire protection. This has been my favorite study. From my Indian friends and fur trapper journals, plus evidence on the ground, it is conclusive that the most disastrous fire occurred in 1833. The timber type on over 1,000,000 acres was changed. Wildlife and fur bearers were many years in reinhabiting the central part of the burn. Ironically, one 30,000 acre canyon, north exposure, did not burn nor could we, while constructing a pack trail through it, find any evidence ever of fire—a fact that could be determined back over 200 years. In this ancient habitat lived a small herd of caribou. They should still be there unless elk and/or elk hunters have over-run them.

Other extreme drought years occurred here in 1885, 1910, 1919, 1931, 1934, and 1949. Fires in 1910, 1919, and 1934, together burned over 3,500 square miles. High elk population built up in the extensive shrub areas which developed after these fires, a 10 times over increase from 1926 to 1954.

To continue on the fire situation, a word about fire behavior. It is highly erratic and unpredictable. Its spread and persistence in these steep rugged canyons, with elevations varying as much as 7,500 feet in six miles horizontal distance, is the basis for the troublesome factors.

These elevation differences and temperature ranges produce conflicting wind currents. Generally, they blow down canyon in the day and up canyon during the early night. This pattern is often influenced by high velocity, prevailing cross winds which produce cyclonic wind storms down in the canyons, and a vicious fire storm if live fire is present.

The wide variety of fuel, including trees, adds to the complexity. The highly flammable grass-pine types at the lower elevations carry fire 24 hours of the day in drought seasons. The sharp side canyons

have pine, Douglas-fir, white fir, with mixed brush and hardwood species. Near the upper slope plains and basins, lodgepole pine, spruce and white fir form the dense forest, with alpine fir, larch, and juniper in the sub-alpine zone. All these types in mixture will ignite and burn when dry, except that pure stands of lodgepole pine have never been known to support the origin of a blowup fire, except when a majority of stems are in red top condition from forest insect attacks as existed in 1931.

The spread pattern is complex. If fire starts in the grass-pine areas, even in average dry years, its course is definite—that is, a leeward wind will lateral spread until the fire reaches the mouth of a side drainage, then up it goes as in a flue. In drought years, these blows in heavy timbered canyons expend more energy than does the explosion of a 20 megaton hydrogen bomb. In the absence of strong prevailing winds, smoke columns from these fire blowups measure over 40,000 feet in height.

The fire spread causes are numerous. Most common is the rolling log or snag, either with or without fire, also, wind-born sparks from

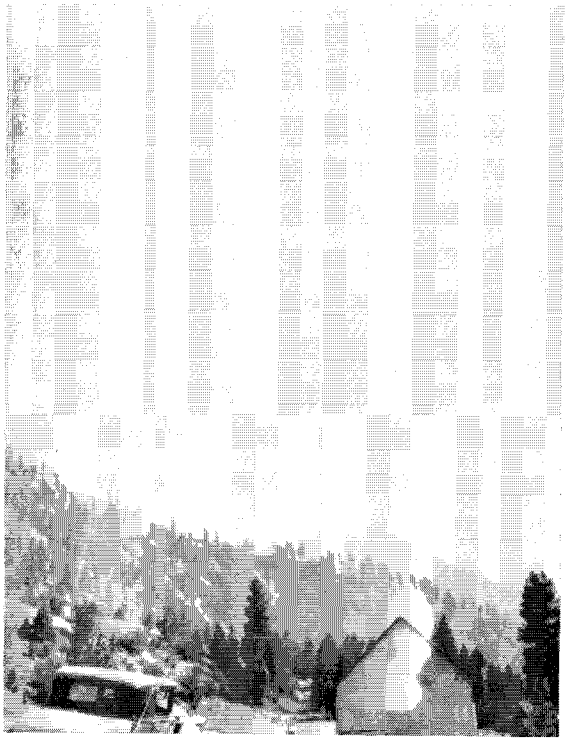

Fig. 2. The Sheep Creek fire (August, 1934) thirty miles distant. Smoke columns rose over 40,000 feet and 32,000 acres of heavy, middle-aged timber was burned in one afternoon.

pine, fir, or spruce snags. These, either rolling or by sparks, commonly carry fire up to three miles. Next, is from rolling rocks dislodged when the supporting down tree burns out or the uprooted pitch roots holding the uplifted rocks burn away. These hot rocks will carry fire the length of the slope, known cases of 2 miles.

The persistence of fire is very frustrating to both the controlled burner and the wildfire fighter. Here, again, rocks are trouble, either in the talus slopes or in crevices of the bluffs. Moss, litter, and humus, intermixed with rock, is most persistent, even in rain or snow. Deep organic soil in the mountain meadows and around lakes will burn for months. The roots of dead pine trees have carried fire under and beyond fire trenches unknown to the fire control people and escaped 40 days after the original fire was controlled. Not common, but typical of fire persistence, is the length of time the large ponderosa pine trees will hold fire. I, personally, know of one large live pine that was ignited in its top by lightning on August 15, 1931. Its fire gave off smoke periodically throughout the fall and winter until June 26, 1932. Although it was harmless within a burned over area, we put it out on the latter date to stop the confusion in lookout reports. The size and height of the bole remaining was evidence of another three months burning time. These types of hold-out fires plague protection people as pre-season lightning storms are common and severe. Often, this heartwood-charring type of fire emits no smoke and only escapes to the ground when burned-out limbs fall on dry needles or grass.

The range of fire severity is phenomenal in this rugged topography. It can be sufficiently mild to use controlled fire to adequately thin young stands of Douglas-fir and ponderosa pine, while at the extreme range it seems that even the air is burning. A day to remember, by all who saw it, was the Porphyry Creek Fire explosion on August 8, 1935. A 20,000 acre mountain side was swept by fire in less than two hours, 10,000 acres of which was light fuels of mixed grass, shrubs, and two to three open grown whitebark pine trees per acre. A later damage survey recorded every tree charred to a snag, the shrubs gone but a grass stubble remaining in successive zones up the slope. The deduction is that the extreme air heat ignited the grass and the gale winds had blown the fire out before all of the flammable grass was consumed. This kind of fire teaches us well that we cannot hope

Fig. 4. Favorite elk habitat during early spring and winter. Heavy elk and mountain sheep grazed grass. Last fire was in 1919, 28 years ago.

to escape severe wildfire damage in these types of forested mountains through fuel reduction measures. However, we must isolate fuels by well planned and located belts of reduced fuels to make it possible to control high danger period wildfires. These up-slope belts of quarter-mile width should be burned out each 25 years and located from two to five miles apart in the winter game range canyons to make it possible to prevent extensive loss of game herds.

There is more to the fire situation, but let's get on with burned area tolerances. That is, how much area can we permit to burn and yet have a wilderness condition. Among my knowledgeable friends, this ranges from no burn to let nature take its course. I rather favored the latter thought, contrary to my Indian friends, until the winter of 1931-32. In our home section of the 60-mile burned-out Salmon River canyon, the big game species migrated in for the winter. In this area, about 5% of their total range is available in winter. By Christmas time, it was not uncommon while hiking in the new fallen snow to step on a bony frame still alive but helpless. The mule deer never built back, bighorn sheep moderately, but elk and whitetails came back abundantly within 20 years. Our previously good cattle range came back largely to brush. There are no cattle there now.

Let's learn from our human predecessors why we must control

fire in this type country. Many years ago, before Indians had horses, the Salmon River and adjacent like country was most favored of all. It was controlled by the powerful Sheepeater Tribe. Their descendants, in my young days, told of the natural fortress against enemies, beautiful camping grounds on the sheltered bars along the river banks, big fish of many kinds, yearlong, and six species of big game within dragging distance of camp at anytime. Their ancient rock paintings confirm these tales. Both sources tell of the one great fear—wildfire. A burned-out canyon left a desert except for two seasonal runs of salmon. Their tradition was to fight fire in the winter game ranges.

Research and studies on size and intensity of burn in these steep, 50% slope mountain sides place a maximum size fire at 100 acres. There is no limit to number of these size fires so long as they are not one above the other. The intensity of burn depends on time of year burned. Late winter, just as the snow is receding, is best as regrowth of grass and forbs soon after give protection to the soil. The zone belts can best be burned at this time.

The plague of fires in this type of wilderness area, besides loss of winter game range, is mud rock flows as a result of torrential rains falling on a burned-out drainage. In these cases, deep, steep-sided gorges are scoured out. Some of these could not be crossed by man or beast after 25 years. The deposition of mud, rocks and timber in the main river channels seal salmon and trout spawning gravels for years to come. In this climate it is estimated to require over 100 years to rescour a stable channel and rebuild the fish food habitat.

In summary, I no longer endorse letting nature take its course in wilderness areas because nature's ways are wasteful—one seed in a million makes a tree—10,000 deer alone will die in one 100,000-acre burned area; nature's ways are conflicting; they are dynamic but violent, yet sensitive and highly complex. There are no averages in nature, rarely any duplication. Balances are seemingly by accident and transitory when obtained. Yet nature can level any imbalance in a short time except civilized man. For this latter reason, primarily, wilderness areas must be managed areas. They must be protected against (1) too many people, (2) too much wildlife, and (3) too many acres burned. To do this without timber cutting and road building, we must resort to natural tools. That is, limit people, harvest the excess wildlife, and prescribe burn.