SALVAGE OPERATIONS ON THE SMITH RIVER BURN

by

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Introduction

At eight thirty-three on the morning of July 8, 1938, lookouts on the Siuslaw National Forest discovered a fire burning in the roadless upper Smith River country in Douglas County, Oregon. Seventeen days later this blaze had covered twenty-seven thousand acres of forest land and had killed six hundred million board feet of merchantable Douglas fir timber. (1)

Weather at the time of origin of the fire was not dangerous, as there had been light showers shortly before. Due to the extreme inaccessibility of the country, however, the first man did not reach the fire until six hours after its discovery. When reached it was four acres in size and spreading under a brisk north-east wind. Cause of the fire was determined as lightning.

The reason for the large area covered was a combination of the following two factors: first, rapidly falling fuel moisture content and humidity, coupled with east winds; second, the difficulty of getting crews and supplies to the fire, caused by the roadless and virtually trail-less condition of the country. When the fire was at its height, 2,800 fire-fighters were employed.

The burned area is roughly circular in shape, and extends from Smith River on the north to within a half mile of the Umpqua River on the south. Approximately one-third of the burn lies in the watershed of the Umpqua River, the other two-thirds being in Smith River drainage.

This section of the Coast Range is characterized by dense stands of almost pure Douglas fir. Draining as it does a large segment of the

country to the east of Reedsport, the Smith River country comprises a natural forest unit, having as its focal point lumber mills at Reedsport, Gardiner, and Coos Bay. As the source of supply of these plants and their dependent communities, it has a very real connection with the economy of the mid-Oregon coast.

The prompt utilization of fire-killed timber is important to the region, as by such action the remaining supply of old-growth timber available will be prolonged. Also, by the mechanical process of removing dead timber, space will be cleared for the start of productive young growth.

The removal of such a large concentration of dead timber will go far toward abating the fire hazard, insuring the coming reproduction crop against destructive reburns.

In a study of problems concerned with salvage of fire-killed timber, experience gained on other salvage operations, when adjusted to local conditions, can be of very great value. Observations on the Tillamook and other burns, recorded in various articles, have been drawn upon in the preparation of this paper. Salvage operations now under way on the Smith River burn corroborate evidence gained in other parts of the Douglas fir region.

Factual data concerning the fire were obtained from the O. & C. Revested Lands Administration, the office of the State Forester, and the United States Forest Service, Siuslaw National Forest.

SALVAGE

Deterioration

Studies made in other large burns in the Douglas fir region show that speed of deterioration is affected by several factors, most important of which are size of timber and amount of sapwood. Beal, Kimmey, and Rapraeger show that the sapwood is unfit for use by the end of the third year following the fire, and that the heartwood begins to be attacked by the fourth year. As a result of their investigation, the following maximum salvage periods are recommended for Douglas fir: trees two feet and less in diameter should be logged first year following the fire; trees between two and three feet in diameter by the fifth year; trees over five feet in diameter by the seventh year. Isolated cases of salvage operations in burns much older are recorded, but seem to be limited to stands of large, high-quality timber. Timber on the area under discussion is neither of exceptional size nor quality and it is felt that the above maxima will be found to apply to salvage operations in the area. (2)

Insects and fungi are the chief agents causing loss in fire-killed timber. Insects can be classified into bark feeders, sapwood feeders, and heartwood feeders. Chief among bark feeders are the Douglas fir bark beetle (Dendroctonus pseudotsuga) and the fir flat-headed borer (Melanophila drummondi). Considerable loss of residual green timber has been caused on the Tillamook burn by attacks of the Douglas fir bark beetle. On fire-killed timber its chief damage is to speed entry of other insects and fungi by loosening the bark. (3)

Insects riddling the sapwood do not as a rule enter the heartwood. They are represented by the ambrosia beetles and other sapwood borers. As a result of their work, sapwood of fire-killed Douglas fir is unusable after the third year. By ruining the most valuable part of the tree, they raise the cost of logging and milling fire-killed timber.

From five to seven years after the fire, heartwood borers make their appearance. After these attacks reach a certain concentration, usefulness of the timber is destroyed for lumber purposes. The period required to reach this concentration depends on size of timber and number of growth rings per inch. Slower growing trees are more resistant to attack. Of most importance to the salvage logger is the Ergates beetle (Ergates spiculatus), a heartwood borer, that completes the ruin of the bulk of the tree.

From the standpoint of loss through disease, the most important fungus is Fomes pinicola. By the tenth year, up to four inches of heartwood is damaged and salvage is no longer practical. Another important fungus in fire-killed timber is Polystictus abietinus, which attacks the sapwood during the first few years. (2)

Logging

In general, it may be said that breakage in fire-killed timber is twice that in green timber. This increased breakage plus the greatly increased deterioration results in a lighter volume of loggable timber per acre and causes higher logging costs per thousand board feet.

Because of this it is considered advisable on extensive burns to concentrate on the larger, higher quality trees, and thus cover the entire area in the shortest possible time. This policy would indicate employing a highly flexible logging system, such as the use of tractors,

to facilitate the individual tree-selection to be used.

The country covered by the Smith River fire of 1938 is rugged and broken, typical of the Coast Range. Tractor and arch logging can be used to advantage on perhaps one-half of the area. Steeper slopes will require the use of a spar-tree system of logging.

The scarcity of roads will require a heavy initial investment in construction. At present there are two roads into the interior of the burn. A forest service road leads from tidewater, below Smith River Falls, up Vincent Creek, and into the northwestern half. Up Weatherly Creek, from the Umpqua River side, a recently constructed road leads north from the highway to the Smith River divide. The only operation at present engaged in salvage logging is using this road. The operator plans to extend it to the northeast, down Big Creek, and log as much territory as possible up this adverse grade. Paradise Creek road skirts the eastern edge of the fire and would be available for use in logging this sector.

Before large-scale salvage operations can be initiated, it will be necessary to obtain more adequate maps and cruises of the area, in order to plan intelligently the amount of money to be invested in roads and logging equipment. Present maps are very general, showing drainage and trails, and are based on Land Office surveys made in the 1890's. Adequate topographic maps and cruises are badly needed as a first step in salvage logging. It is believed that the large amount of timber to be salvaged will justify the cost of such a survey.

Present salvage operations are confined to Weatherly Creek, on the south side of the burn. The operator in this area has a capacity of 180 thousand board feet per day, using both cat-arches and highlead.

Logs are trucked to Scottsburg on the Umpqua River, where they are dumped and then towed to mills at Gardiner and Reedsport. (4)

Salvage of timber in the northern part can at present make use of the Vincent Creek road. Logs can be trucked to tidewater on Smith River and thence towed to Reedsport and Gardiner. Additional roads in this area will have to tap timber in upper Vincent Creek, Scare Creek, and Beaver Creek. Lending weight to practicability of salvage in this part of the burn is the large amount of old-growth timber adjacent to the burned area. The vast amount of green timber in the upper Smith River country is as yet untouched. Any roads built primarily for salvage of fire-killed timber can be used subsequently for logging green timber, as the natural outlet is down stream to tidewater. A large initial investment in roads can thus be charged off against both green and fire-killed timber, making the operation more attractive for private enterprises.

On the basis of 350 million board feet, which will be salvageable within five years, the annual capacity of logging operations should be 80 million board feet. As present operations are around 20 million board feet per year, it will be necessary, in order to salvage the above amount of timber, to increase logging operations fourfold. Suitable sawmill capacity already exists within economical hauling distance of the burn. The O. & C. Lands Administration, being the principal landowner affected, is endeavoring to secure as rapidly as is practicable adequate salvage sales.

Land ownership within the burn is distributed as follows:

O. & C. Lands	44%
National Forest Lands	5%
Douglas County	6%
Lumber Companies	20%
Small owners	25%
	100%

For orderly liquidation of fire-killed timber, it will be necessary that suitable agreements be reached between landowners. Future establishment of a sustained-yield unit will require more permanent contracts between landowners concerned.

SILVICULTURAL CONSIDERATIONS

In the rebuilding of burned timberlands, salvaging of merchantable material is only half the job. The other half, and the more neglected one, is securing adequate reproduction and protection of this crop.

Experience has proved that, on Douglas fir burns in virgin timber, adequate reproduction frequently follows the fire. Seed comes from several sources. Unburned islands exist in any extensive burn. These form an important seed source, but their efficiency depends upon size and position. It is materially reduced when such islands are surrounded by a thick screen of standing dead timber. Where ground fire kills the timber, many thick-barked veterans throughout the stand survive and serve as seed-trees.

Distance to which seed is carried from the parent tree depends on a number of factors, chief of which are position of parent tree, direction and intensity of prevailing winds, presence or absence of snag screen about seed trees.

Where seeding-in is delayed for as long as three years following the fire, establishment of reproduction may be severely handicapped by the dense crop of weeds and brush that comes in.

Artifical reforestation need be resorted to only where crown fire has killed all trees over a large area. On the Smith River fire, burns of this intensity were confined to the central portion in the heads of Scare Creek, Big Creek, and Mosetown Creek. If natural reproduction fails to enter this area it will be necessary as a last resort to replant all or part of it. As the Federal Government, through the O. & C. Administration, owns alternate sections, obtaining funds for this work should be facilitated. Failure to achieve adequate restocking, even if planting has to be resorted to, will result in the conversion of these lands to brush, or what is worse, no cover at all.

It is axiomatic that the original fire in Douglas fir timber does less damage than the reburns. The first of these, following five years or so after the initial fire, kills all reproduction on the area and delays by at least 100 years the establishment of a new stand. Subsequent fires further impoverish the land and set plant succession still farther back.

Regardless of how reproduction is achieved, adequate protection must be given the area until the new crop matures. The fire hazard for three to ten years after the initial fire is enormous. This is caused by heavy concentration of fuels -- slipping bark, fallen limbs, and standing snags. Additional protection on the Smith River burn is taking three forms. First, the area is being opened up by roads as rapidly as possible, and additional patrol is furnished during extreme fire danger. Second, the area is closed to unregulated public entry through-

out the fire season. And last, the progress of logging fire-killed timber is doing much toward abating the hazard.

SUMMARY AND CONCLUSIONS

Original loss of volume caused by fires in old-growth Douglas fir is from three to four per cent. The bulk of loss in fire-killed timber is the result of damage by insects and disease, which in all but the largest timber makes salvage operations impracticable after about the tenth year following the fire.

Salvage of fire-killed timber is of course important to prevent its waste. But a more important reason for its utilization is to relieve pressure on remaining old-growth stands in the area and thus lengthen the time required for their liquidation. In the aggregate, intelligently planned salvage operations on the larger burns in the Douglas fir region can have an immense effect in prolonging the life of virgin stands and thus bridging the gap between these stands and the second-growth stands of the future.

Logging methods should aim toward covering the entire Smith River Burn area in as short a time as possible, removing the higher values and forgetting the rest. This would indicate a highly flexible logging system, combining trucks, cat-arches and highlead. Tidewater located on the two rivers concerned furnishes a cheap means of secondary transportation to the mills. Railroad connection at Reedsport gives access to greater mill capacity. Any improvements constructed to tap the Smith River side of the burn could well be used in the logging of adjacent extensive stands of virgin timber.

Providing subsequent fires are kept out, much of the area will re-seed satisfactorily. Source of seed will be from unburned islands of timber and from scattered green trees throughout the burn. In areas denuded by crown-fires, planting may have to be resorted to.

The region surrounding Coos Bay and the lower Umpqua River is predominantly a timber-producing country. The forest resource of this territory will become increasingly important in the economy of Oregon. The Smith River watershed, located in the center of the region, has great promise as a sustained-yield unit for the production of timber. Any measures that can be taken to insure the continued productivity of the land for forests will serve the public good.

LITERATURE CITED

1. Fire Reports. Siuslaw National Forest, Corvallis, Oregon.

2. Timberman. December 1935.
"Deterioration of Fire-Killed Douglas Fir." J. A. Beal, J. W. Kimmey, E. F. Rapraeger.

3. Timberman. December 1937.
"Salvage on Tillamook Burn as Affected by Insect Activity." Robert L. Furniss.

4. Timberman. July 1940.
"Salvage Logging Smith River Burn." Frederick H. Vogel.

APPENDIX

Table 1. Land Ownership--Smith River Burn.

	Acres	Per cent
O. & C. Lands	12,271	44
National Forest	1,320	5
Douglas County	1,859	6
Gardiner Mill Company	4,286	15
E. K. Wood Lumber Company	1,200	5
Small Ownerships	6,754	25
Totals	27,690	100

Table 2. Area by Forest Resource Survey Types--Smith River Burn

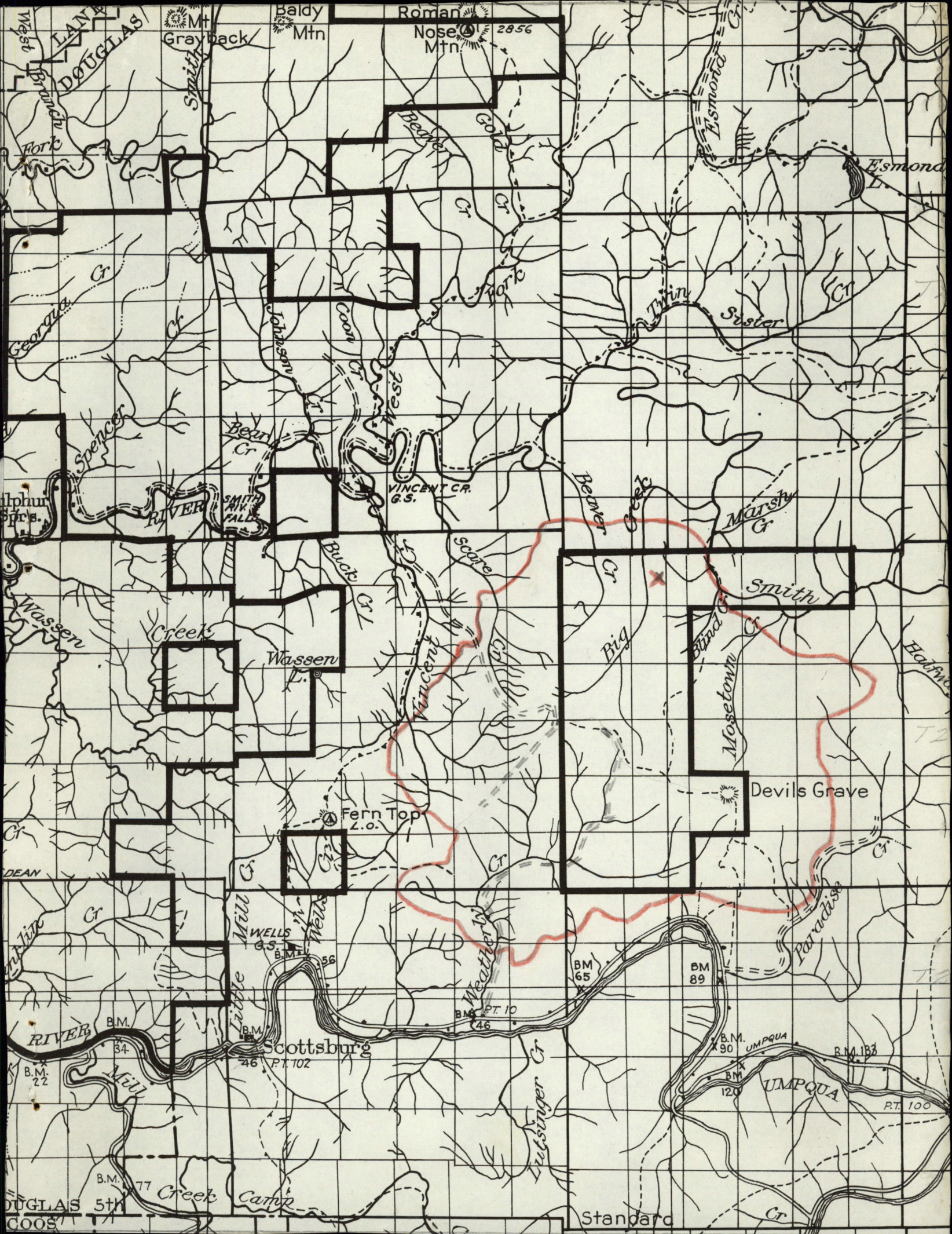
Acres	Type #6 Old-growth Douglas fir, over 40" DBH	Type #7 Old-growth Douglas fir, Under 40" DBH	Type #8 Second-growth Douglas Fir, 20"-40" DBH	Types 9 & 10 Small second-growth Douglas fir; & saplings
Acres	17,152	960	6,140	3,438
Stand per acre in board feet	49,700	43,120	28,700	-----
Total volume in thousand board feet	852,454	41,376	176,218	-----
Per cent of kill	60%	60%	80%	-----
Per cent of cull, end of 5th year	35%	45%	100%	
Net of merchantable fire-killed timber, 5th year (thousand board feet)	333,000	17,000	-----	

Table 3. Stumpage and Log Prices, Umpqua Bay, 1941

	Per thousand bd. ft.
Stumpage, fire-killed timber	$1.00 to $1.75
Logs, in bay at Reedsport	$10.00

Table 4. Lumber Cut of Douglas Fir Mills near Smith River Burn, 1941.

Locality	Cut
	Board feet
North Bend	148,900,000
Marshfield	145,500,000
Reedsport and Gardiner	56,500,000
Total	350,900,000


Mt Grayback
Baldy Mtn
Roman Nose Mtn
2856
Smith
Beaver
Gold
Esmond Cr
Esmond
Fork
Georgia Cr
Johnson Cr
Coon Cr
West
Twin Sister Cr
Spencer
Bear Cr
VINCENT CR. G.S.
SMITH RIV. FALLS
RIVER
Beaver Creek
Marsh Cr
Buck Cr
Scare
Wassen Creek
Wassen L.
Vincent Cr
Big
Blind Cr
Smith
Mosetown Cr
Devils Grave
Fern Top L.O.
Mill Cr
WELLS G.S.
B.M. 56
Little Wells
Weatherly
B.M. 65
B.M. 89
Paradise
B.M. PT. 10
B.M. 46
RIVER
B.M. 34
B.M. 22
Scottsburg
P.T. 102
Mill
B.M. 90
UMPQUA
B.M. 183
B.M. 120
UMPQUA
P.T. 100
Lutsinger Cr
B.M. 77
Creek
Camp
DOUGLAS 5th
COOS
Standard
Cr

R. 8 W.

R. 9 W.

T 21 S

T 22 S

SMITH RIVER FIRE AREA

SHOWING BURN INTENSITY-PROPOSED FIRE PROTECTION AND UTILIZATION IMPROVEMENTS. SCALE 2 IN-1 MILE.

LEGEND

- UNBURNED
- CROWN FIRE
- PART CROWN
- GROUND FIRE
- RIDGE
- PROPOSED C.C.C. ROAD
- EXISTING ROAD
- O.& C. OWNERSHIP LINE

L.G.R. Mch. 1939.