FOREST RESEARCH NOTES

Issued by the

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

No. 14 Portland, Oregon. August 21, 1934

FOREST INSURANCE NUMBER

NOTE: Though fire insurance agencies offer insurance for almost every kind of property, the insuring of standing timber is almost unknown in the United States. This failure to give forests the financial security that other kinds of combustible property enjoy is considered to be one of the deterrents to continuous forest management under private ownership. Accordingly, the Clarke-McNary Act of the 68th Congress directed, among other things, that the Secretary of Agriculture "investigate and promote practical methods of insuring standing timber on growing forests from losses by fire and other causes". Accordingly, the Forest Service initiated in 1930 a nation-wide study of the possibilities for and the technic of forest insurance. Mr. H. B. Shepard, a professional forester with some years of practical experience in the fire insurance business, was employed to conduct the study. It was commenced on the Pacific Coast under the direction of the Pacific Northwest and the California Forest Experiment Stations. An exhaustive report covering the investigative phase of this study has now been completed by Mr. Shepard. It divides the territory under consideration into four regions--the Douglas fir region of western Oregon and Washington; the northern ponderosa pine region of eastern Oregon, eastern Washington, northeastern California, and central Idaho; the sugar pine-ponderosa pine region of the west side of the Sierra Nevada in California; the redwood region of the northern California coast. The following article summarizes for the information of Pacific Coast foresters, timberland owners and others the high lights of Mr. Shepard's findings and conclusions.

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FOREST FIRE INSURANCE IN THE PACIFIC COAST STATES

by H. B. Shepard, Senior Forest Economist

This inquiry, originally conceived as an effort to determine definitely whether the existing lack of adequate and practical forest fire insurance facilities is in truth unavoidable and, if possible, to suggest means whereby the condition might be remedied, finds no apparent reason why successful forest fire insurance should not be possible as far as the loss situation is concerned. There do not, furthermore, appear to be any serious deterrents from the underwriting or administrative point of view. Technical

difficulties are no greater than those that have successfully been met in many lines of endeavor. On the basis of the conclusions of the study it is safe to say that the forest owners of the territory studied can have forest fire insurance whenever they really want it, at a cost comparing very favorably with the cost of fire insurance on other forms of property. It is evident, also, that the Pacific Coast territory can, in itself, support a forest insurance project. This is due to the region's great area and to the presence within it of approximately two thirds of the privately-owned, merchantable-sized timber in the whole country. The territory offers an opportunity for operation of the law of great numbers sufficient for sound underwriting practice.

Obviously, as greater aggregate property values could be actually insured, lower premium rates could be offered, better policy terms could be granted, and the prospects of success improved. In the absence of any real indication, particularly under existing economic conditions affecting timber ownership and the lumber business, as to the amount of forest fire insurance business that might be done, certain recommendations have been made on the assumption that a certain amount of business might be obtained. The rates suggested assume a premium income of from $150,000 to $300,000 per year.

The prospects of obtaining this volume of business with adequate spread of liability could not be determined short of actually launching an insurance project or conducting an extremely detailed inquiry partaking of the character of an extension phase of the study. It has not been believed that such an inquiry would be opportune until general conditions have become more stable.

As an indication that loss conditions do not preclude an insurance practice on a basis economically favorable to the property owners, the following determinations of the study are cited. The average annual loss expectation for the Douglas fir region as a whole, from ordinary fires, is 0.055 percent, that is, assuming a value of unity, five and one half cents per $100 of value per year. The corresponding figure for the northern ponderosa pine region is 0.134 percent, and for the sugar pine region, 0.133 percent. These figures are adjusted figures based on intensive analysis of a ten-year experience, supplemented by extensive study of the data for the previous decade. In an entirely proper sense they express the average of a twenty-year experience.

The pine regions disclose no evidence of any hazard from major conflagrations. The figures quoted above can, with the exception of proper allowance for indeterminate contingencies, be taken as representative of the total of hazard. The Douglas fir region, however, is definitely known to suffer heavy major conflagration losses that do not necessarily fall within the experience of a twenty-year period. The great Tillamook conflagration of 1933 is illustrative of what is meant here. It demonstrates definitely that the hazard still exists, but it was 31 years since the region had had such a fire. Introducing allowance for this factor into the figures brings the annual loss expectation for the fir region up to approximately the same as the figure indicated for the pine regions, that is, to 0.140 percent.

The figures quoted above are average for all sizes of trees, merchantable and unmerchantable. Hazards are greater, though, in the younger stands, so loss expectations of stands of merchantable size are somewhat lower. Unit values of smaller sized stands are moreover lower so aggregate value loss expectations, on a true weighted basis, are somewhat less than the above figures indicate. They are, in fact, from ordinary fires, for the Douglas fir region, 0.047 percent; for the northern ponderosa pine region, 0.119 percent; and for the sugar pine region, 0.133 percent, the relative amount of young growth in private ownership in this latter region being so small as not to affect the result when true values are assigned.

The redwood region is, to all intents and purposes for the insurance study, analogous to the Douglas fir region. However, it is necessary to allow for the lower susceptibility of the mature redwood to fire damage.

These loss figures indicate the practical possibility of conducting a successful forest fire insurance undertaking at an average annual premium rate of close to one quarter of one percent if all, or nearly all, of the private forest property in the territory could be insured. This is with allowance for the ordinary fire insurance business expense ratio at the present time. Obviously, the less business is done, the less opportunity is afforded the law of great numbers for effective operation and the greater the need for factors of safety against unknown and indeterminate contingencies.

The method adopted by the study for getting around, for the present, the uncertainty as to how much business could be done was to construct a proposed schedule of premium rates that it was believed would fulfill the requirements on the basis of the accomplishment of the volume of business suggested above. These rates, averaging fifty cents per $100 of value (one half of 1 percent) for the Douglas fir region, forty cents for the northern ponderosa pine region, and thirty-five cents for the sugar pine region, give an average for the whole territory of forty-five cents. These are 100 percent coinsurance rates.

Unquestionably a few years of favorable experience, with a showing on the part of the owners of a desire to support insurance on a large scale, would justify a material reduction of this proposed rate level. How soon it might be possible to reduce it to the pure level of the aggregate average can not be predicted. A large volume of well-distributed business would be an indispensable requirement.

The problem of making proper provision for differential premium collection in practical proportion to variable hazard is one toward which the major activity of the inquiry was directed. Forests, like other forms of property, exhibit wide variations in net fire hazard, due to the influences of a large number of hazard factors. This work involved an extremely complex problem in multiple correlation, so complex in fact and involving such a large number of independents that no method of solution was practicable but to study each separately, making rational interpretation where available statistical data were inadequate and then rebuilding

the component scale, factor by factor, expressed in terms of the perfect fire risk, in which hazards are irreducible. The practical rate schedule was then evolved, giving consideration to practical requirements not expressed in an impartial measurement of hazard variation. The scale of variation of hazard, for example, is much too wide for practical use. The scale of premium rates must run through a considerably narrower range if it is to serve a truly practical purpose.

To illustrate the wide range of hazard itself, as disclosed by the statistical studies, a property in the Douglas fir region fully exposed to unburned slash hazard is, other things being equal, sixty-five times more likely to suffer fire loss than a property not so exposed. In the northern ponderosa pine region, a property within one mile of the edge of the desert incurs an increase of hazard of ten times as compared to an exactly similar property well back in the timber. Theoretically, rates in the Douglas fir region can vary all the way from two and one half cents per $100 per year, the arbitrarily adopted basis rate, to $62.82. It is extremely unlikely that any properties actually exist in the field that are on the one hand such ideal risks as to take a two-and-one-half-cent rate or that are actually so practically certain to burn almost every year that they would be rated at $62.82. These extremities of range are none the less essential to the rating method, which must provide for all recognizable contingent variables. Adverse factors are never entirely absent. Neither are they ever 100 percent present in a given area.

The variable factors of hazard that were used are, in principle, similar in all the regions studied, though not all factors carry significant influence in all regions. If a factor operates to only a minor extent or its range of variation is very low, no differentiation is made with respect to it in recognition of practical requirements of simplicity. No overcomplicated schedule could succeed in a true sense.

Broadly speaking, all variable hazard factors fall into one of two major classes, causative hazards which start fires, and contributive hazards which influence their spread or the extent of their damage. To avoid undue length, only a few of the more important hazards that were identified by the study and incorporated into the schedules will be mentioned. Among the causative hazards are lightning, railroads, recreation, and logging. The study of causative hazards is a map study, location being the essential medium of correlation. Contributive hazards divide logically into three main classes, physical hazards, climatic hazard, and protection. Protection is essentially a negative hazard in that it decreases the likelihood of loss. The adoption of the customary insurance practice, however, of establishing a standard (the best) and providing for measurement of deficiencies below the standard turns the effect around. Deficient protection is a positive hazard.

Among the physical contributive hazards that were identified and made use of are composition and density of the stand, slope of the terrain, snags, and unburned logging slash. With the exception of the study of climatic hazard, which is inevitably a map study, and the development of provision for allowance for variation in protection, which is largely a matter

of practical experience, the study of contributive hazards is essentially statistical analysis. The statistics used specifically for this part of the study were, in part, collected by the study itself in the field through a field analysis phase embracing upwards of 70,000 acres of insurable fire-damaged forest property, and in part contributed for this special purpose by state and association fire wardens who furnished detailed information on upwards of 1,500 individual fires over a period of five years.

It was recognized early in the development of the study that the factor of loss was not the only one of importance to the possible introduction of the insurance principle to forest properties. Even though the loss situation might prove encouraging there was possibility that the prospects of successful operation might be diminished by the influence of other factors. Study was accordingly made of the apparent requirements of forest valuation for insurance purposes, of the special principles of loss adjustment, policy contract requirements, and other administrative features. No difficulties greater than some others that have proven surmountable in both the insurance and timber business, were disclosed. The progress report gives full discussion of these features. It also discusses the possible forms of insurance carriers, stock, mutual, reciprocal, and government, in their apparent relationships to possible forest insurance.

It is believed that the study has been able to analyze all of the significant factors possibly affecting a forest fire insurance undertaking with the exception of the all-important one of the possible amount of business. What will be done about this it is not possible now to say. There can be no question but that the most pleasing and satisfactory result of the study would be the development of an actual practice based on its findings. This may, possibly, take place of itself. More likely some extension work will be required. In any event the outcome is mainly in the hands of the owners of the forest properties. They can, if they really desire, produce a condition under which forest fire insurance will become an established institution.