

Postulates of the Prescribed Burning Program of the Bureau of Indian Affairs

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THE SPECIFIC objectives of the prescribed burning projects of the Bureau of Indian Affairs range from vegetative type conversion to hazard reduction of forest fuels. The quality of burn necessary to achieve these objectives ranges from intense in the case of type conversion to moderate or cool where hazard reduction is the objective.

Although the specific objectives and the techniques necessary to achieve them are extremely varied, the use of prescribed fire to realize them has a common genesis in economics.

Prescribed fire in the Bureau of Indian Affairs is not an end in itself, we are not a research organization. It is an instrumentality to achieve certain predetermined objectives when it appears that the use of fire will be the most effective way to secure them.

Effectiveness in this sense is measured on a cost-benefit basis i.e. as the ratio of return to be expected on the investment. This standard of measure must be clearly differentiated from effectiveness in terms of the degree of achievement of the defined objectives.

This conceptual differentiation is important because the Bureau

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has management and protection responsibilities for millions of acres and limited operating funds. The investment return rather than the objectives wholly achieved is thus the basic consideration. Although there are certain ancillary benefits, the prescribed burning program for hazard reduction of fuels is primarily an investment in fire protection. As with any investment in fire protection it is basically a negative investment. It does not appreciate resource values, but hopefully precludes or limits loss. This does not take away from its importance, but places or should place an upper limit on the investment that can be rationally justified in this or any other aspect of fire protection. In economic terms, disregarding for the moment the fiduciary relationship of the Bureau to Indian lands, the investment in fire protection should not exceed the value of the resource discounted by the statistical probability of loss. Unfortunately, we do not have the actuarial data to make this calculation of probability and must base our management decision on estimates of tangible resource values, funds available for protection and professional judgment.

The lack of this actuarial data creates real limitations in precise value measure and planning of hazard reduction by prescribed burning. For example, no fire larger than 10 acres in size has ever occurred on the Fort Apache Indian Reservation in Arizona within 7 years following initial or subsequent treatment of an area by prescribed fire. We conservatively plan our treatments to reburn every 5 years, but we may actually have 7 years of protection and should go after more acres within the same budgetary limitations. Another example is the Hualapai Indian Reservation Forest which is also located in Arizona. In the 3-year period preceding the first treatment (1957-59), the average suppression cost per acre was \$58.16. The 30,000 acre forest was prescribed burned during 1960-61. In the 3-year post-initial burn period (1962-64) the average suppression cost per acre was only \$3.43. In 1965 when the suppression costs per acre climbed to \$8.29, it was decided to reburn. In 1966, during the summer fire season and prior to the fall reburn, average acre suppression costs had climbed to \$9.00. During the 2-year period since the reburn, there have been no fires that have occurred on this forest for which action was necessary and costs accrued. The costs per acre to prescribe burn a forest such as the Hualapai are about \$0.10 per

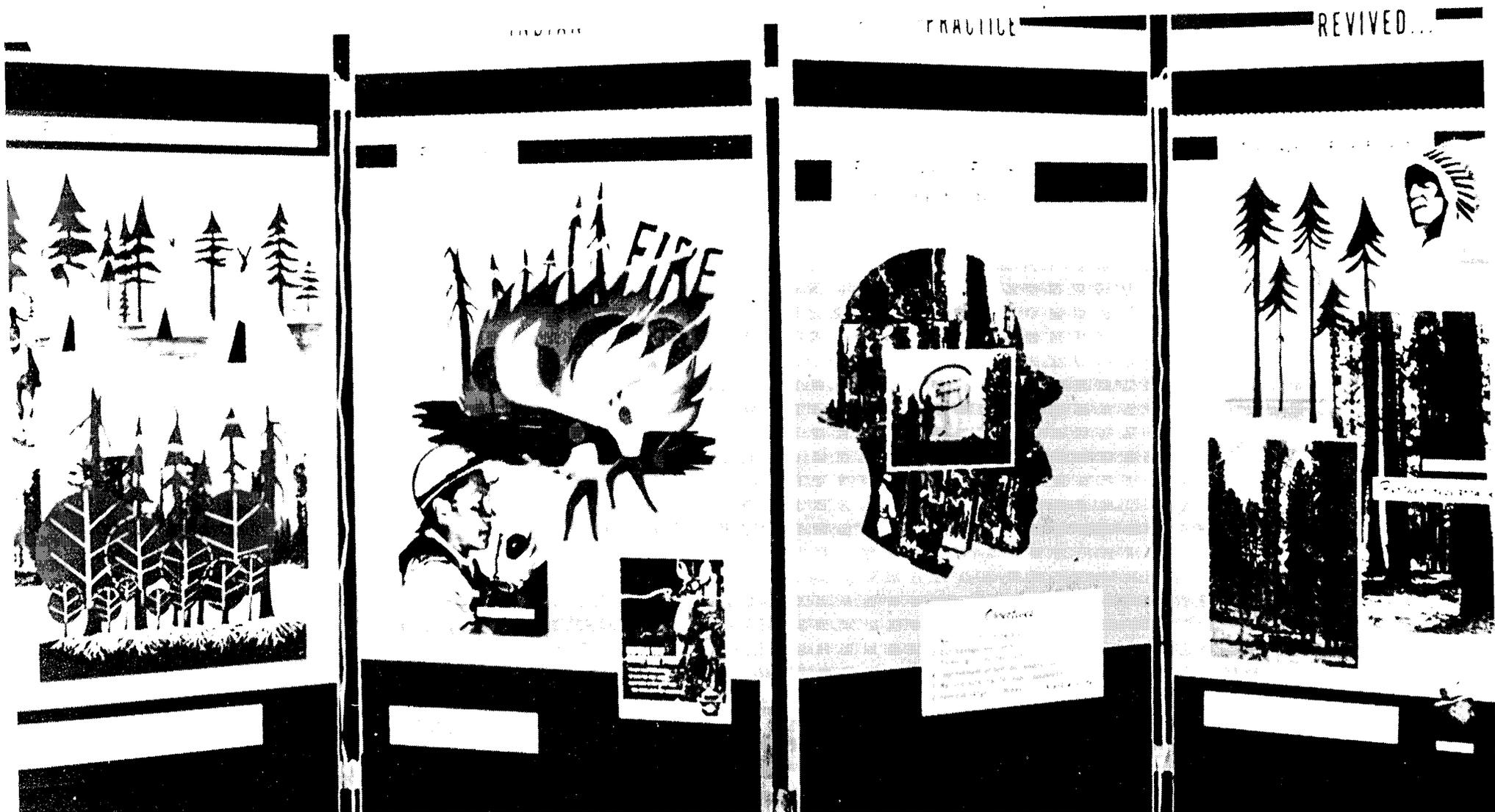


FIG. 1. Bureau of Indian Affairs exhibit displayed at the 1966 Society of American Foresters meeting. Titled "An Indian Practice Revived," it illustrates the restoration, by the Bureau's forestry program, of a traditional practice of the American Indian who appreciated the beneficial, as well as the harmful effects of fire.

acre or \$0.02 per acre/year if the investment is amortized over a 5-year period.

The same investment in fire guards (\$3,000) would buy approximately six-man months of surveillance and no lessening of the hazard. The decision to burn was quite obviously correct from the standpoint of protection investment, but little is known of the damage probabilities had the area not been treated.

Range improvement through prescribed burning of standing pinon-juniper is somewhat easier to evaluate on a cost/benefit basis as pre-treatment—posttreatment measures of range values are possible. The principal weakness is that measurement is actually being made of the success of the reseeding program following treatment, the success or failure of which may have no correlation with the successful execution of the burn itself. This aspect i.e., the achievement of the project objectives of a cleared and seeded range should not be the standard upon which the practice is measured. The practice should be measured on the basis of its per acre cost in achieving a satisfactory seedbed as contrasted with the cost of an alternative practice. In passing though, it should be emphasized that the seeding program has been very successful.

The use of bulldozers and anchor chains to clear woodland costs from \$3.00 to \$5.00 per acre. Prescribed burning costs \$0.50 per acre and does a generally cleaner job in the comparable areas treated. The two methods complement each other. Burning is used where an excess of 300 trees per acre with a suitable composition of pinon pine in admixture with juniper is present and the terrain is less suited to machine clearing. Chaining is used where the trees are more scattered and the physical factors necessary for a satisfactory burn are lacking.

The sites where burning is the practice generally possess the highest productive potential of the woodland types suitable for conversion to range. The mean annual rainfall is 14–17 inches as compared to the average of 12–14 inches and there is less inhibiting effect from the prior vegetation than where juniper stocking is practically exclusive.

Preparation of a site to be treated consists of clearing a windrow 100–125 feet wide on the windward side of the project area for ignition purposes and such other lines as may be necessary for control purposes. This material is allowed to cure for 60–90 days in prepara-

tion for a June burn when burning conditions are at their peak. Desired burning conditions are temperatures in excess of 95°F, winds in excess of 8 mph, and relative humidity less than 8 percent. The normal rainfall is only 0.6 inches in May and 0.4 inches in June and ideally should not occur within 12–14 days of the planned ignition. Although the precise compensating effect of these various factors is not known, variances from the desired conditions will permit a successful treatment if other factors exceed the minimum tolerances.

It is interesting to compare the desired burning conditions for pinon-juniper with those of a very successful hazard treatment of a stand of ponderosa pine saplings: Fuel moisture was 6 percent, temperature 50°F, average relative humidity during burn 45 percent, 0.25 inches of precipitation approximately 10 days before the burn and a wind speed averaging 4 mph. Ignition was from the top of a slope creating a backing fire whereas the pinon-juniper type requires a head-fire ignition pattern. The pinon-juniper type is a sweeping crownfire designed to be lethal whereas the hazard reduction type is a creeping ground fire designed to sweep the forest floor of debris.

Another application of prescribed fire that is under study is the broadcast burning of slash. The traditional method of piling and burning involves an investment of \$6.00–\$9.00 per acre which may amount to 10 percent of the gross timber stumpage receipts. The pre-burning of an area to be cut, the lopping and scattering of the slash and a post-burn perhaps 2 years later could reduce this expenditure 50 percent and result in a greater return to the Indian owners where this practice would be feasible. Again, the rationale of this program would be economic.

In addition to the postulate of the Bureau's prescribed burning program which is founded on economics, there is the postulate of management control or direction. Obviously where hazard control programs are instituted, there are significant protection problems present. Fire will occur. It will occur in spite of adequate staffing, planning and programming. In fact, the more effective a fire control program becomes the greater may be the latent hazard that is created. This is an unfortunate anomaly that none-the-less exists. Another consideration is that the exceptional fire that escapes from such an organization will generally occur under such extraordinary conditions

that it is beyond the capabilities of any fire organization designed to meet the usual fire situation. In the ponderosa pine type, the only known method capable of preventing this type of fire from occurring is through the application of prescribed fire.

The resource manager knows or should know where the eventual fire will occur. He knows or should know the types of fuels that he will have to contend with. By deciding when and under what conditions the fire will be fought he achieves a tactical advantage that should enable him to master his adversary.

A third postulate of the prescribed fire program involves developing an appreciation by the Indian land-owner of the basic theory of prescribed fire and an understanding of the risks and benefits that may be expected from a specific project. This is achieved through technical briefings, joint planning of specific projects and the requirement that proposed projects be approved through formal resolution of the tribal governing bodies. In conclusion, I would like to state that there was an appreciation of the beneficial, as well as the harmful effects of fire, by the American Indian several centuries before acceptance of the practice by the various resource managing disciplines. The present program is restoring this tradition.