

Prescribed Burning and Brush Type Conversion in California National Forests

EVERETT R. DOMAN, CHIEF

*Division of Range & Wildlife, California Region
U. S. Forest Service*

“TO BURN or not to burn”—has been a much debated question by laymen in relation to management, development, and protection of National Forest lands in California. The question has been debated possibly more in this state than any other section of the West. Only in the Southeast has this question been cussed and discussed at greater length. Much heat has been generated. Few people that have anything to do with use or management of natural resources are neutral regarding use of fire. Individual philosophies vary all the way from indiscriminate use of fire and much reduced fire protection and suppression activities to complete banning of any and all use of fire in management.

During the 60 odd years of Forest Service existence, philosophies regarding fire protection and fire use have also varied greatly, and continue to vary to this day, among Forest Service administrators. However, the general attitude has changed rather drastically and most managers of National Forest lands now recognize fire to be a useful tool when used with discrimination and proper precautions.

The efficacy of fire used in management of national forest lands cannot be intelligently discussed in general terms. A prescription suitable for a particular piece of National Forest land may be entirely

EVERETT R. DOMAN

unsuitable at another location possibly only a few miles away. This danger of generalizing with regard to use of fire in National Forest programs exists because of the wide variations that occur over even short distances in topography, soil type, elevation, vegetative type, climatic or weather factors and human occupancy or use of the land. Burning prescriptions, therefore, must be tailored to fit the particular site and prevailing burning conditions.

To get up-to-date data regarding the scope of Forest Service prescribed burning operations in California, a questionnaire was sent to each National Forest. The resulting data is shown in the following table under 8 categories or types of burning programs.

This acreage is possibly ten times the area that was prescribed burned within the National Forests in California 10 years ago. Changed attitudes, increased program funds and new skills account for the stepped up program.

TABLE I
Prescribed Burning within National Forests in California (U.S.F.S.,
Region 5) during F.Y. 1967.

<i>Type of Burn or Program</i>	<i>Acres</i>
1. Broadcast burning of logging slash	4,044
2. Broadcast burning of treated brush	2,120
3. Bunching & burning of logging slash	7,753
4. Bunching & burning of debris from wildfire salvage areas	1,120
5. Burning of bunched or windrowed brush	6,276
6. Burning in fire or fuel break construction	1,414
7. Burning in road construction	3,231
8. Other burning	1,686
	<hr/>
*Total acres burned	27,644

* 12 Forests reported 1967 to be a typical year for prescribed burning; the other 5 estimated that they were under a typical year by a combined total of about 5,000 acres.

These controlled burning statistics include acreage in both timber and brush types. However, they do not include all the acreage of brush that is being converted to other vegetative types in California National Forests. For example, advantage is taken of wildfire burns in the conversion program. Wherever possible, either with special burn rehabilitation funds or through shifting of regular type con-

PRESCRIBED BURNING AND BRUSH TYPE CONVERSION

version, reforestation, or other monies, we take positive steps to convert parts of the brush types burned by wildfire to more useful and less hazardous vegetation.

There is also other brush type conversion work where brush is disposed of by such means as mulching, chipping or burying, that is not included in the above table.

It has been estimated that California's wild lands include about 24 million acres of land classed as brush or woodland type that have little value for commercial purposes (California Division of Forestry, 1960). About 20% of this acreage is within the National Forest boundaries. These millions of acres of highly flammable brush types present wildland administrators with one of their most perplexing and worrisome problems. In addition to presenting an explosive wildfire threat, these lands, densely covered with almost impenetrable brush, are producing only a fraction of their potential in multiple use benefits.

Not all of these brushlands are suitable for conversion or modification. The concept of "worthless brush" that is often indiscriminately applied to this woody cover is both fallacious and dangerous, particularly in relation to wildlife habitat, watershed protection, and environmental control. Many steep slopes with fragile or shallow soils, especially in Southern California, can best be protected by the existing brush cover.

An estimated 1½ million acres of this National Forest brushland outside the commercial timber zone is considered suitable for conversion to grass and other herbaceous plants. It is also roughly estimated that an additional 950,000 acres of brush within National Forest commercial timber zones are suitable and economically feasible for conversion to timber types.

The remainder of my talk will be spent in detailing the methods that are currently in use by the Forest Service in modifying the brush types that occur outside the commercial timber zone. The methods and techniques were jointly developed with the Pacific Southwest Forest & Range Experiment Station. They include five positive steps to realize successful conversion.

Brush manipulation activities are classed broadly as permanent or temporary. Premanent conversion is the replacement of brush with

EVERETT R. DOMAN

introduced herbaceous cover. It is confined to areas where surveys indicate that soil is of sufficient depth and character to support a suitable herbaceous cover and on which equipment can be readily used (slopes up to 30% gradient). Positive measures are taken to prevent brush re-invasion.

Temporary conversion is concerned with reduction of brushy fuels and altering brush plant form. It usually is accomplished along ridge crests to benefit fire control and wildlife habitat. Treatment ordinarily consists of burning in winter or early spring.

However, there is more to temporary conversion than merely striking the match. Positive measures must be taken to insure that fire can be confined to the desired acreage. Also some type of brush pre-treatment, such as spraying with chemical desiccants will insure a cleaner burn and longer interval between treatments. In temporary conversions, periodic reburning is necessary to reduce brush regrowth. Chemicals are used to slow down regrowth and extend the intervals between reburns. Prevention of accelerated erosion and thus lowered site potential and possibility of downstream damage is also important. Measures needed for erosion control depend on soil type and topography. Usually the broadcast seeding of herbaceous plants (grasses and forbs) immediately following the burn will be adequate. Temporary conversions ordinarily receive secondary priority and are used primarily to connect the permanent conversions for continuous fuel breaks.

The first step in permanent brushland conversion is to modify the flammability of the brush in preparation for controlled burning. This can be done by chemical desiccants or by mechanical crushing. Where topography will permit, bulldozer crushing is favored over use of desiccants. The crushing results not only in drying out of fuel but also in its re-arrangement or compaction. This results in more complete consumption by fire. In crushing, the dozer blade is held just above the ground level.

In situations where broadcast burning of crushed brush is not feasible, the brush is often cleared and piled into windrows by means of a tractor with brushrake attachment.

At the time the brush is crushed or windrowed, a fireline is built around the treated area. These measures create a differential in com-

PRESCRIBED BURNING AND BRUSH TYPE CONVERSION

bustability of fuel on the treated and adjacent lands. This allows safe and satisfactory burning of the crushed or uprooted brush at a time when fuels on the adjacent untreated area will not readily ignite.

After crushed or windrowed fuels have had time to dry out the second step in conversion, prescribed burning, is carried out. The brush is burned in late fall (after the first major storm), or in winter or early spring when adjacent untreated areas will not readily burn. Either spring or fall burning has proven satisfactory from a game habitat standpoint. Each has its advantages and disadvantages. Spring burning is usually safest from a fire control standpoint. Timing the burn in relation to brush species composition and objectives is very important. In sprouting species, such as chamise (*Adenostoma fasciculatum*) early spring burning will reduce stand density and crown sprouting will provide feed for game that year. On the other hand, fall burning will cause little mortality and will eliminate browse feed for the winter period. With non-sprouting species, spring burns will result in low seedling survival while fall burns favor seedlings.

In Forest Service brush burning it is always the objective to accomplish the burn under conditions which are most favorable for confining the fire to the desired area. To accomplish this important objective the Mendocino National Forest has established the following guidelines: “—burning is done on a clear day in the winter, at least a week after the last rain, with wind below 8 mph and no weather fronts predicted. In medium density brush, on moderate slopes and north exposures, a relative humidity of 30 to 35% is generally best. Heavier brush, steeper slopes, and south exposures should be burned when the humidity is about 35 to 40%. Any burning is dangerous with humidity under 20 %. Most burning is inadequate with humidity over 45%, unless there are winds (which may make it too dangerous to burn).” (Ely, Unpublished)

Fires through crushed brush ordinarily burn clean—leaving an ideal seed bed and facilitating use of seeding equipment. This leads to the third step in brush type conversion—seeding. Grass and/or legume seeding is often desirable for several reasons. Improved strains of grasses and legumes provide better forage conditions for both livestock and wildlife. They provide soil protection. They

EVERETT R. DOMAN

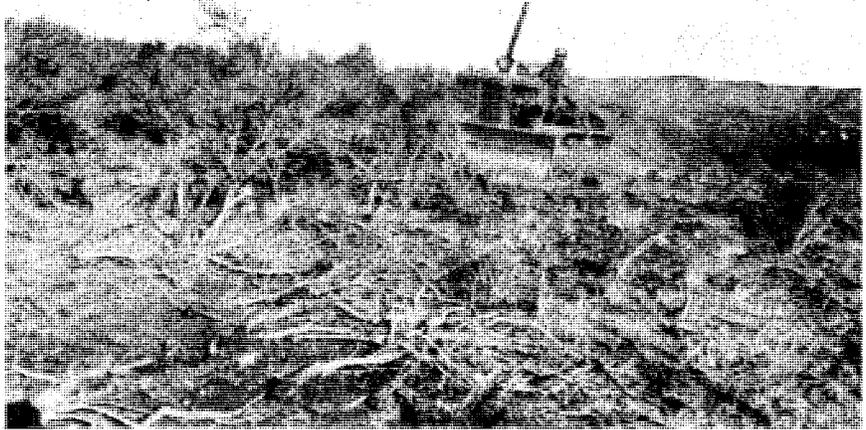


FIG. 1. Brush crushing is done to dry out and compact fuels prior to prescribed burning. This is the first step in conversion of brush to grass types.



FIG. 2. Burning crushed chamise chaparral.

PRESCRIBED BURNING AND BRUSH TYPE CONVERSION

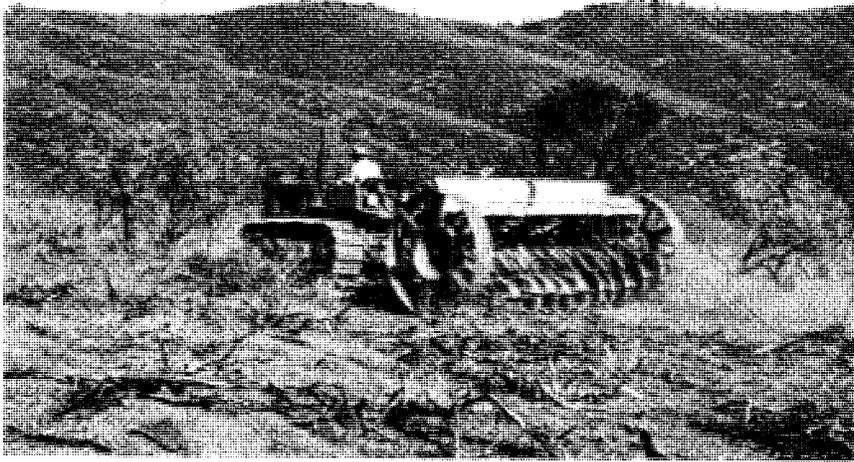


FIG. 3. Seeding burned brush area with rangeland drill.



FIG. 4. Spraying brush sprouts with 2,4-D herbicide.

EVERETT R. DOMAN

may also prolong the benefits by slowing down brush re-invasion.

In seeding it has been found that drilling is the best method to insure uniform distribution of the desired quantity of seed at a depth that will insure best success. Special drills have been developed for use in seeding mountain rangelands. The "Rangeland Drill" especially developed by the Forest Service, under direction of the Interagency Range Seeding Equipment Committee is a rugged piece of equipment that can be safely used on slopes up to 35%.

Many improved strains of grasses and legumes have been developed that are suitable for use in brush type conversion seeding. The amounts of seed and suitable seeding mixtures will, of course, vary with the variable soil, weather, exposure, and other site conditions.

The fourth step in the brush conversion process is control of brush sprouts and seedlings. Where grass seeding is successful, the good grass stand will, through competition, often eliminate as much as 60% of the brush seedling population. Sprouts, on the other hand, originating from plants with well-established root systems, present a more difficult problem. Many of the more common California brush species sprout profusely. Where animal pressures are not sufficient to hold them back, these bushes would, in a very few years, return to their original, almost impenetrable density.

Chemical herbicides are used to slow down reinvasion of sprouts and seedlings and also to control them completely where it is desirable to make complete conversions from brush to grass. Since chemical control of shrubs is a dynamic subject, I will not attempt to list all the various chemical formulations that are currently in use; 2,4-D and/or 2,4,5-T are presently the most common herbicides employed. Timing of treatment and method of application are also important factors in success or failure of the effort. To achieve successful chemical control with the currently used hormone spray mixtures, the plants must be actively growing with sufficient soil moisture available for continued plant activity.

The chemicals have been successfully applied by fixed wing airplane, helicopters, and ground spraying equipment. The latter was developed first and is still the most practical means for applying herbicide in many situations. Generally, two applications on successive years are needed to achieve an adequate degree of sprout control.

PRESCRIBED BURNING AND BRUSH TYPE CONVERSION

The fifth step in brush type conversion is management. Project areas must be managed for maximum sustained benefits to all uses. Treated areas must not be used by domestic livestock until the desired herbaceous cover is firmly established. Ordinarily, this requires two growing seasons. When used by livestock, the season of use must be regulated to prevent grazing before the plants and soil have reached the proper stage of "range-readiness" in the spring. Use by domestic livestock must not be of such extent that serious conflicts develop with wildlife. Combined use by livestock and wildlife must be on a sustained yield basis or the converted herbaceous cover will quickly deteriorate, leaving excessive bare soil and unsatisfactory watershed conditions. Proper use of the grasses prevents development of large, unpalatable "wolf plants" and at the same time removes enough of the current growth to prevent a build up of flashy fuels.

I have briefly outlined the processes that the Forest Service is currently using to modify brush types. There are undoubtedly other successful ways for treating brush. In fact, our procedures are continually changing as research comes up with improved techniques, equipment and materials. The brush conversion treatment I have outlined is costly. Permanent conversion costs are ranging from 40 to as high as 70 dollars an acre. However, we believe that the resultant benefits to fire control, wildlife habitat, domestic livestock grazing, and watershed management are well worth the expense and effort. Where the positive measures that I have outlined have been taken, there is good indication that a relatively stable herbaceous cover can be maintained indefinitely under good management with little or no maintenance effort. To our way of thinking, this form of brush to grass conversion is definitely superior to other methods that require periodic or more frequent reburning.

LITERATURE CITED

- California Division of Forestry, 1960. The Brush Problem on California's Livestock Ranges.
Ely, Joseph B. Jr. Unpublished. Brush Burning Guidelines. Mendocino National Forest.