



FIG. 1. Fuel break used first on area to left and the following year on the right side. Fireline has revegetated and wildlife cover and pine tree retained. Four Peaks in the background.

Chaparral Conversion on the Tonto National Forest

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CHAPARRAL vegetative types on the Tonto National Forest range from 3,000 to 5,000 feet in elevation. In this elevation range, annual precipitation amounts to 15 to 25 inches. Temperatures during summer months are over 100°F during daylight hours, and relative humidity is frequently under 10 percent. The volumes of this chaparral fuel range from 30 to 50 tons per acre in heavy stands.

Wildfires in this chaparral type are frequent, and they often burn with explosive intensity. Costs of suppression of these fires may easily exceed \$30 per acre.

Grazing capacity in chaparral is low for both wildlife and livestock because of the impenetrable cover and limited herbaceous growth. Livestock management is difficult because cattle cannot be handled in the dense brush. Local livestock operators often must resort to cattle traps around the limited watering areas to capture their animals for marketing or branding.

On watersheds in dense chaparral, water production is low because of plant transpiration and the high evaporation loss incurred when rainfall is intercepted by dense vegetative cover. Soil erosion and off-site soil movement is common under the brush cover.

Following experimental burns in 1961 and 1962, and in keeping

with Forest Service fuel hazard reduction policy, the decision was made to use fire as a management tool in large chaparral areas.

About 5,000 acres in Brushy Basin, 50 miles northeast of Phoenix, Arizona, in the Tonto National Forest, were selected for the first major prescribed fire treatment of chaparral in the Southwestern Region.

Burning plans included coordination of all land uses. The objective of this project was to burn off the dense chaparral and convert the area to open savanna-type grassland, retaining islands of chaparral for wildlife cover. Riparian vegetative types were also to be protected for their wildlife values and for use by recreationists.

Plans were made so as to control burn limited segments, completing the entire Brushy Basin area in 3 years. A study of fire weather was initiated prior to actual burning in order to establish criteria for safe burning conditions. Late September and October were chosen as having the most favorable weather conditions. The period of favorable burning weather varied from 1 to 8 days in duration during the study period. In later years, by applying new and special safety precautions, these limits on burning have been extended.

Early in 1963 fuel breaks for permanent retention were selected and constructed in the most strategic locations. Where possible, construction was accomplished with bulldozers to widths varying from 75 to over 200 feet. When topography limited use of bulldozers, lines were built by hand and widened just prior to the major burn by burning out on the side toward the area of the controlled burn.

Experiments were carried on and are continuing with plant desiccant chemicals (2,4,D and 2,4,5-T mixed) to aid burning.

Burning crews were assembled when weather conditions met established criteria. Except for key people, crews were selected that were not experienced in fire control or fire behavior. All new personnel coming to the Forest were introduced to prescribed burning as a training measure during their first year on the Tonto. Because of this training, we believe these men are now better prepared to cope with fire situations they may encounter throughout their careers.

Since the early stages of the program, news reporters on the

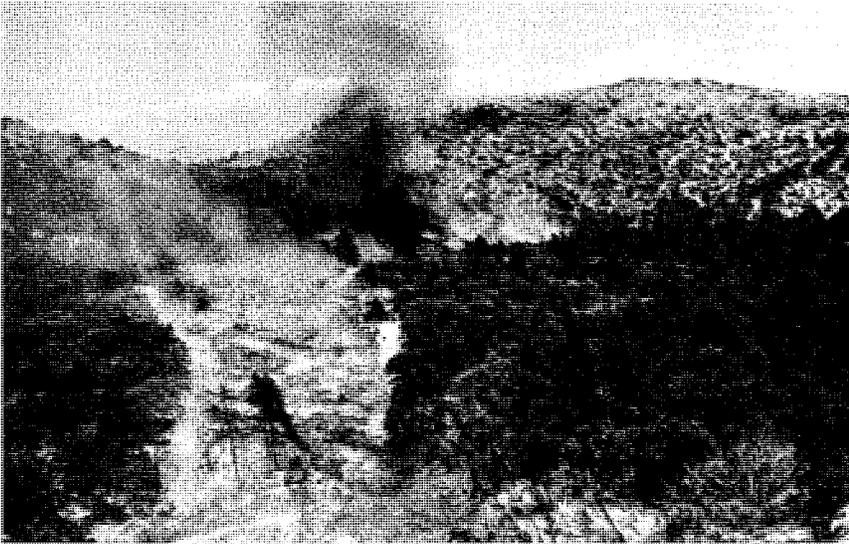


FIG. 2. Fuel break around recreation area being burned. Area to left is a part of top control of Brushy Basin Project burned and converted to grass. Note pine trees retained in fuel break.

ground have provided public information. This has increased public understanding and acceptance of the projects.

Initial burning was completed in 1965, and a grass cover was established by 1967. By now it is readily apparent to the average viewer that converting chaparral to a grass is practical.

Actual burning procedures changed as commercial ignition devices became available for this type of work. The drip type and pressurized diesel torches were replaced by grenades and electrically detonated pre-placed "squibs." Our main tools now include napalm grenades, grenade launchers, Very pistols, fusees, hand-held butane torches, large butane weed burners, and electrically detonated grenades. Electrically fired devices are gaining in popularity because they give greater flexibility in ignition and increased safety for the firemen.

To get proper consumption of chaparral fuels, a crown fire is required. Burning conditions must thus be on the "high" or "danger-

ous" side to get the desired results. Wildlife islands and stream-side vegetation are saved by skillful application of fire preceding the main burn. This is usually done during the afternoon and night before the main burn by firing away from and through these desirable areas.

Firing for the main burn is begun from the tops of ridges, using a backing fire. This allows for a pre-prepared and widened control line. Firing then progresses downhill along the sides of the area to be burned. Once the margins have burned to a sufficient width, the entire bottom of the slope is ignited for an uphill sweep. All jobs must be in sequence and properly timed. Crews doing this work must be in constant communication.

A favorable 5-day weather forecast is desirable prior to any burns which will last for more than 1 day. During all burns, weather must be observed continuously and reported, and forecasts must be interpreted so the fireman may be kept fully informed on the possible effects of weather. Decisions to proceed or to halt the burn depend on these forecasts.

When the burn is completed, the area is ready for seeding to grass. Seeding has been successful both immediately following the burn in the fall and in July of the following year, just prior to summer rains. Regardless of seeding dates, germination does not occur until after August rains have fallen. July appears to be the best time to seed an area burned over the previous fall. Livestock grazing must be deferred during grass establishment, and the area properly managed following establishment of the grass.

Within 18 months after the burn is completed, it must be sprayed with herbicides to prevent resprouting of the brush. Spraying is repeated annually for at least 3 years to get a successful sprout-kill and to maintain the open savanna-like type of some 20 species of brush involved. All but three species are prolific sprouters. Three other species readily produce new plants from the seed left on the ground after burning.

Studies on the Brushy Basin and adjacent areas indicate that we can expect water production to increase about 1½ area inches per acre. Permanent water of good quality is now flowing in the area. During years of heavier precipitation, water yields increase from



FIG. 3. Grass establishment following prescribed burning in Brushy Basin.

1½ area inches per year to as much as 6 area inches per year.

After observing the results of burning and subsequent treatment from 1961 through 1963, the Salt River Valley Water Users Association believes there are enough benefits to be obtained so that they are now contributing financially to chaparral conversion projects using prescribed fire as the initial treatment.

Prior to treatment, grazing use in Brushy Basin amounted to approximately 20 head of wild cattle on a yearlong basis. Beginning in 1967, 200 head of cattle were placed on the area under a rotation system of range management. Observations now indicate that more cattle could be grazed if we are to fully use the forage being produced. It is too early to say just how much grazing capacity will have been increased.

White-tailed and mule deer use the area. It appears that the burn-and-spray treatment has improved the deer habitat, but further study will be needed to fully evaluate the total wildlife habitat improvement. Increases in the quail population after treatment have

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been noted; in addition, a notable increase in songbird population was observed this spring.

Economically, over a 10-year period, the project has been successful. With increased water production, additional beef production, and reduction of fire suppression costs, a \$3.00 return for each \$1.00 spent is being realized. This analysis does not place an economic value on increased wildlife use, or use by recreationists for camping, picnicking, and general outdoor enjoyment. Another intangible benefit is the training we are able to give all personnel who have worked on the Tonto since the conversion program became a reality.