

Controlled Burning on the Public Domain in California

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IN 1951, the Bureau of Land Management became actively interested in controlled burning on the Public Domain. A group of ranchers representing the Central California Brush Range Improvement Association met with the Bureau of Land Management's staff in San Francisco requesting authority to include Public Domain in their controlled burns. State law had made it possible for ranchers to obtain permits for burning brush on privately owned lands. Often Public Domain was located within the boundary of a burn planned by a local Range Improvement Association. Without permission from the BLM, a permit could not be issued by the California Division of Forestry. To exclude Public Domain by construction of firelines would prove too costly so burning could not proceed.

As a result of the meeting with ranchers in San Francisco, BLM established a procedure for issuing permits to ranchers for including Public Domain in controlled burns. This procedure has changed very little since 1951.

I will summarize the Procedure Concerning Planned Brush Burn-

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ing on Vacant Public Lands in the State of California in Accordance with Established Policies of the Bureau of Land Management signed by our present State Director, Mr. J. R. Penny.

The Bureau of Land Management recognizes that fire, whether in forest, brushland, or range areas can be and usually is an agent of destruction. However, under proper management and control, fire can be a useful and economical tool of resource management. Its use is to be resorted to only when there is a reasonable prospect of successfully replacing the existing brush by grasses or other desirable plants and where the fire can be controlled. Justification for prescribed burning includes reduction of soil erosion, more effective and less costly wildfire control, better habitat and forage for wildlife and livestock, improved access for hunting and recreation, reduced sedimentation of streams and reservoirs, and increased water yield. Planned burning must be integrated with BLM fire control policy which is to make every effort to detect and suppress in its initial stages any unauthorized fire occurring on or threatening the public domain.

The following general rules will govern any program of planned burning of brush on vacant Public Domain in the State of California.

1. Planned burning on Public Domain is authorized only by permit issued by BLM. Permittee assumes full liability for any damage caused by escape of fire.
2. Burning shall be confined to brush areas having a minimum risk of erosion damage and good prospects for increase in desirable forage or timber species. Slash burning after logging is exempt from this restriction.
3. The area burned must be seeded immediately with desirable species if natural sources of seed are lacking. Specification on species and method of seeding are included in the permit to the cooperators.
4. Precautionary measures before, during and after the burn shall meet minimum California Division of Forestry standards.
5. Burning shall be done at time of year favorable to fire control and establishment of vegetation.
6. Burning shall not be conducted in areas where important wildlife habitat will be impaired or where recreational or watershed values will be damaged instead of improved.

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7. Areas proposed for planned burning shall be examined by a qualified BLM official in advance of issuance of permit.
8. While undergoing revegetation burned grazing areas shall be protected and carefully managed to prevent over-grazing and to insure maximum growth of perennial grasses.
9. Controlled burning shall begin with the smallest practical area until the effectiveness of burning has been demonstrated on the particular soil and cover type.

The prescribed form must be used for controlled burn applications and filed at the local office of the California Division of Forestry.

Application and Permit for Range Improvement of Public Domain through controlled burning is filed in triplicate. Page one (1) of the form gives the description of the land with a diagram showing the ownership pattern and location of firelines. On page two (2) appears the description of the vegetative cover, soil type, topography, proposed date of burn and precautions to prevent spread of fire. Page three (3) contains plans for managing the area following burning; standard conditions which are (1) precautionary measures in advance of burn; (2) agreement to management plan with BLM; (3) agreement to abide by State and Federal fire laws; signature of applicant; signature of California Division of Forestry official regarding approval or disapproval of applicant's fire plan.

The permit on page four (4) is signed by the District Manager, BLM. It also lists special conditions, and states that (1) no liability is assumed by BLM or its employees as a result of burning; (2) permit is issued subject to vested rights; (3) it has a specified expiration date.

During the past five years approximately 22,000 acres of public domain has been included in controlled burns, mostly in Central California. The number of burns and acreage is now less than in earlier years beginning with 1952. This reduction coincides with the reduced activity on privately owned lands.

It has been estimated that some ten million acres (Sampson and Burcham, 1954) of California range covered with unpalatable brush can be converted to grass. On Public Domain, there are about 300,000 acres in the Folsom District, in Central California. Topography is moderate to very steep; elevations are between 1,000 and 5,000 feet.

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Precipitation as rain and snow ranges from 10 to 40 inches, occurring during the winter from October to April. Soils are shallow to deep, often low in fertility; they vary from sandy loam to heavy red clay. Brush species include chamise (*Adenostoma fasciculatum*), buckbrush (*Ceanothus cuneatus*), scrub oak (*Quercus dumosa*), manzanita (*Arctostaphylos* sp.), Toyon (*Photinia arbutifolia*), and yerba santa (*Eriodictyon californicum*).

In converting brush to grass in Central California, the Bureau of Land Management takes the following steps: Site selection, brush removal, seeding, spraying and management. Procedures and techniques practiced by the Bureau of Land Management are based to a great extent on results of research carried out by the California Division of Forestry, University of California, U.S. Forest Service, and Agriculture Research Service, and on BLM's own experience.

Site Selection

In selecting the site, consideration is given to slope, precipitation, and soils. Slopes of more than 50% are too steep for use of equipment, and any disturbed soil may be subject to severe erosion (Sampson and Jespersen, 1963).

In the Mediterranean type of climate, areas of precipitation of less than 15 inches are more easily vegetated to annual grasses rather than perennials. Perennials or a combination of annuals and perennials are usually seeded on higher rainfall sites.

The most important consideration in selecting a site is type of soil. Data on soils are available from soil surveys of the Soil Conservation Service or soil-vegetation surveys completed by the California Division of Forestry and the University of California. Better sites are selected first, since chances of success and returns are greater. However, on brush or timbered areas burned by wildfire, immediate steps are taken to effect rehabilitation.

Brush conversion projects are carried on under cooperative agreement with the lessee. He assumes responsibility for the controlled burn. In this he receives help from his neighbors through the local Range Improvement Association.

Brush Removal

On slopes less than 30%, brush is crushed by dozer blade, dragging a log, or with anchor chains (Dodge and Pierce, 1962). Results are: better burns because fuel is concentrated on the ground; cleaner burns because most of the wood burns and no blackened stems are left standing; safer burns because dried brush burns during less hazardous weather.

Brush, either standing or crushed, is removed by controlled burning (Love, *et al.*, 1952). Late spring burning is preferable to fall burning as it results in less sprouting.

Seeding

Fall seeding only, which takes advantage of winter rains, has been successful. Slopes less than 30% may be seeded by rangeland drill. Using a drill, fertilizer may be added at time of seeding resulting in better stands, especially of perennials. Slopes over 30%, on which standing brush has been burned, are seeded by aircraft. Mixtures of Harding grass (*Phalaris tuberosa*), smilo (*Oryzopsis miliacea*), blando brome (*Bromus mollis*), and wimmera ryegrass (*Lolium subulatum*) are seeded at six pounds an acre.

Spraying

The spring after seeding, brush seedlings and sprouts are sprayed with herbicides. Two pounds of 2,4-D, one pound of 2,4,5-T, and two quarts of diesel fuel are mixed with water to make five gallons of solution. This mixture is applied at five gallons an acre, by helicopter. Clearance for use of herbicide spray material is obtained from the Federal Committee on Pest Control prior to application. This insures compliance with state and federal regulations as to type of materials, quantities, and precaution of damage to other susceptible values in the area.

Management

Newly-seeded areas of annuals can be grazed the first year if seed is allowed to mature. Perennial seedings should not be grazed until

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FIG. 1. Brush area of chamise, manzanita, buckbrush and toyon. Brush is crushed by 280 feet of anchor chain pulled by two large crawler tractors. Chain weighs 90 pounds per foot. Hunter Valley, Mariposa County, California, August, 1966.

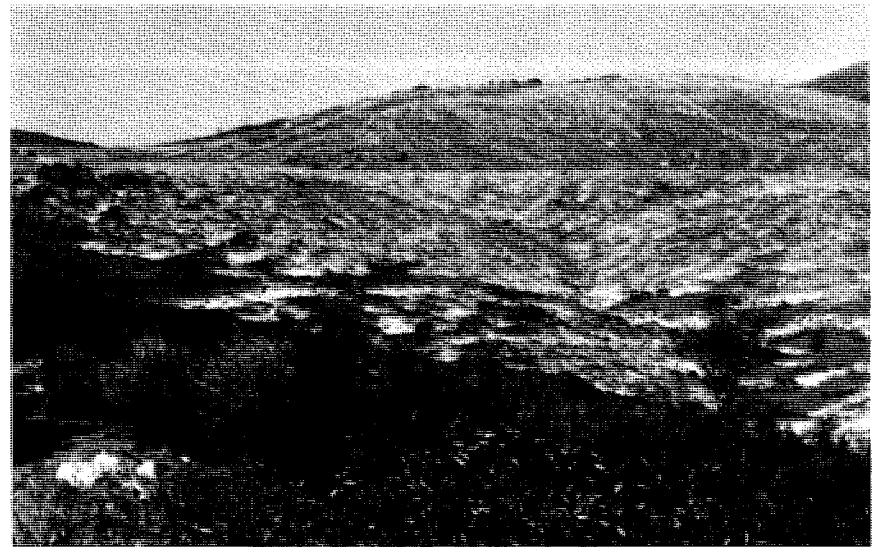


FIG. 2. Area immediately following burn showing white ash which adds fertility to the soil. Hunter Valley, Mariposa County, California, October, 1966.



FIG. 3. Area seeded by rangeland drill during November, 1964 to 2 lbs. Harding Grass, 2 lbs. Smilo Grass, 2 lbs. Blando Brome and 90 lbs. 16-20-0 fertilizer per acre. It was sprayed with 2,4-D in April, 1965. A minimum of 15% of the area is left in brush to furnish browse and cover for deer.

seed maturity the second year. A system of grazing which will maintain or improve the stand is prepared and made a part of the cooperative agreement prior to implementation of the project.

Costs

Rehabilitation costs range from \$25.00 to \$50.00 an acre, varying with the method of conversion and other exigencies. Because of increased production, the cost of converting brush to grass can usually be recovered in four to seven years.

Results

Converting brush to grass reduces soil erosion. Under dense stands of chamise, the ground is quite bare. Heavy rains result in considerable soil erosion. In contrast, there is very little soil movement from a good grass cover.

A mature stand of chamise provides very little forage for livestock.

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Brush fields which have been converted to grass have a carrying capacity of from 3 acres to 1 acre per animal unit month. Studies (unpublished) made in 1963 by Carl M. Rice, Range Rehabilitation Specialist, Bureau of Land Management, Sacramento, California on the Bollinger Ridge Project, Santa Clara County, an annual ryegrass seeding following a wildfire, indicated that 781 pounds of forage dry weight was available to livestock and/or big game. Studies made in 1964 on the Briceburg Project, Mariposa County, a perennial grass seeding following a wildfire indicated that 1720 pounds of forage dry weight was available to livestock and/or big game. The Picture Gallery Gulch project seeded to two pounds each of harding grass, smilgrass and blando brome with 90 pounds of 16-20-0 fertilizer per acre in 1964 produced up to 3,600 pounds of forage from clipped plots the first year. Trials are needed for each soil type and climate condition to demonstrate responses to various fertilizers.

Studies conducted by the University of California and the U.S. Forest Service indicate a considerable increase in yield of water from areas which have been converted from brush to grass. Two-tenths to five-tenths acre foot of water per acre increase has been measured on some experimental watersheds. The deep-rooted ever-green species of brush found in Central California have a much higher rate of transpiration than grass.

The results of a cooperative investigation conducted on the East Fork of Piney Creek, tributary of the Merced River in Mariposa, California has recently been reported by Professor Robert H. Burgy, University of California at Davis. Cooperators in this project included the Merced Irrigation District, University of California at Davis, Bureau of Land Management and private land owners. Data were collected on this watershed for five years prior and for five years after treatment. Throughout the ten years of study, annual precipitation varied from 16 inches to 42 inches averaging 23 inches. The Rainfall-Yield Increase follows a parabolic curve which shows that less than 12 to 15 inches of rainfall produce no increases in yield. Years of average seasonal rainfall will produce 2 to 5 inches of additional runoff after treatment. High years produced as much as 10 to 12 inches yield increase. The average yield increase at Piney

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Creek was 4 to 5 inches (low 0.5 inches; high 16.5 inches) all due to conversion of brush to grass.

Professor Burgy reports that Studies at Hopland Experimental Watershed II, located in Mendocino County, California are showing average yield increases of over four inches additional runoff due to treatment, even during a period of rainfall deficient years.

In preparing for a controlled burn, roads and trails are improved and additional fire breaks are constructed. This increases the speed and ease with which equipment can be moved into the area for control of wildfires. Conversion of brush to grass greatly reduces the amount of fuel and a more easily contained fuel. The result is safer and easier control of wildfires.

Thick stands of brush are almost impenetrable to man and animal life. Conversion to grass makes it much easier to manage livestock. Hunters and recreationists can make greater use of the area.

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