CHAPTER 2

METHODS OF CONTROL

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Introduction

Some of the major vegetation problems faced by the EBRPD have been spotlighted in the previous papers of this report. This section will deal with the advantages and disadvantages of the controls that the District could use for these vegetation problems, and the present District policies concerning them. Two such controls will be discussed, fire and grazing.

Presently, grazing is the most frequently used method of control, but this does not necessarily mean it is the best type of control for all situations. In certain circumstances, fire can be a better control. The purpose of this report is not to determine the best overall type of control, but rather to indicate that a certain type of control should be used when its advantages make it more appealing than the other types.

Fire

Use of man-set fires in vegetation control has been referred to as prescribed burning, control burning, or light burning. Prescribed burns depend on three main factors: weather, fuel and season.

One of the most important aspects of weather is humidity. Humidity of 30-60% is needed for a good burn.[7] Lower humidity will cause the burn to spread dangerously fast, and higher humidity may cause the burn not to move at all. Other important weather variables are wind and temperature. Both of these should not be too high, otherwise the burn can get too hot and spread out of control. Fuel size, arrangement, and condition influence how well a fire will burn. About a ton of fuel per acre is needed for a successful burn.[7] There are two seasons in which to burn. First is a summer or hot weather burn in which a high temperature fire is preferred.[7] The second is a spring burn in which a more easily controlled burn is sought.[19]

Advantages

The main advantages to prescribed burning are the subsequent environmental effects. First is the effect on soil nutrients. Until the 1930's, investigators of the effects of burning were concerned with the nutrients in the litter and not the soil.[10] Recent studies have shown positive effects on soil nutrients. Ahlgren found that in the top level of the soil, nitrogen, phosphates, magnesium, potash and calcium increased following prescribed burning.[1] Biswell concluded that although nitrogen increases in the soil after a fire, it decreases on the forest floor (litter) due to volatilization of the nitrogen during the fire, and wind and water movement of the ash.[5]

In the EBRPD sources of nitrogen loss are insignificant. First, the park district is using prescribed burning to create or maintain grasslands by burning brush or reburning grassland. Brush can leave a significant amount of ash that can be lost from the area. This decrease in nutrients on the floor is insignificant if grass is desired, because grass needs less nutrients than brush.[20] Decrease in nutrients favors the development of grass rather than most species of brush.

Soil stability does not necessarily decrease following a prescribed burn. The main factors affecting erosion are slope, precipitation, and the amount of ash, debris, and duff left after a fire.[5] The greater the slope and precipitation, the greater the erosion; the greater the ash, debris, and duff, the more stable the soil. Biswell showed that the ash, debris, and duff were able to counteract erosion and increase the soil stability in a prescribed burn in Northern California.[5]

Another effect on the environment is the change in temperature. With respect to temperature there are two temporal effects of burning. The first is at the time of the burning and the second is after the burning.

Experiments by Ahlgren demonstrated the following temperature profile at the time of the burn:[1]

AREA	TEMPERATURE ^{o}F	(^{o}C)
between humus and mineral soil	400	(204)
on the soil surface	1400	(760)
at one meter above the surface	1500	(816)

These temperatures in the humus are high enough to kill seeds of many species. But in some cases they help the scarification of the seeds (e.g. Acacia and Yellow Star Thistle) and the sprouting of others (e.g. *Baccharis pilularis*).[13] After the burn the temperature of the soil is lower at night and higher in the day because of the blackened condition of the soil and the lack of insulating vegetation.[16]

The blackened soil and the lack of insulating vegetation are major determinants of which species will recolonize the area. They cause greater diurnal temperature fluctuations, which favor the introduction of grass. Grass is a good colonizer of open habitats and before Man arrived with his fire suppression, grasslands were maintained by natural wildfires. Grasslands are the first to succeed into a burned area, but after a year (without subsequent burning), the soil temperatures return to normal and plant succession begins.[1]

A final advantage to prescribed burning is that it reduces the hazard of fire. Although the District is legally responsible for any damage resulting from a control burn, there are also moral responsibilities for not burning. When one undertakes prescribed burning, one reduces the chances of a fire and the speed at which it travels (because of the reduced fuel and the staggered vegetation structures). Without prescribed burning there is a build-up of fuel, and when a fire strikes, it is much more devastating Managers must then consider and accept such a moral responsibility for not burning, which may cause a greater loss of private property and lives.

Disadvantages

One of the main disadvantages to prescribed burning is public objection to the loss of wildlife. Many of the objections to burning are due to people's having been trained since childhood that fire is "bad." These objections are furthered by anti-forest fire commercials, which show animals trapped by fire. These commercials were usually sponsored by the National Forest Service (NFS), and until recently it was NFS policy to suppress wildfires quickly and disregard any prescribed burning operations. All of these factors have caused the general public to object to prescribed burning.

In general, the species diversity and number of individuals of the returning animal pupulation is inversely related to the size of the burn. Small burns increase the diversity of the habitat and thus the diversity of animal types.[19] The wildlife diversity of the EBRPD would increase with prescribed burning, since most District burning is done over small areas.

Studies have shown that in the year following a burn, animal populations (especially ungulates) increased relative to the populations prior to the fire.[5] This is because the burning produces a preferred type of forage. Studies by Ahlgren showed that rodents and soil organisms also increased the year following a fire.[1]

But such facts are not widely known, and in order to change public opinion regarding controlled burns, education is a necessity. One can already see attempts to educate the general public with new advertisements that are entitled "Smokey Is Dead, Prescribe Burns!"

The final disadvantages to prescribed burning are the public objections raised to the smoke from the fire and the black soil it leaves behind. But according to Chief Aronson of the EBRPD Fire Department, when individuals complain about such observations, they usually drop their complaints once the benefits are explained.[2]

The smoke from burning is not only unaesthetic, it is also a form of air pollution. Burning produces CO_2 and particulates which affect the quality of the air. Thus burning is restricted to certain "burn days," when the surrounding air quality will not be severely affected (due to wind patterns and temperature).

Policies

The EBRPD "Vegetation Management Plan" briefly describes District policy concerning prescribed burning. It states that the main purpose of prescribed burning is fire control and that it can be used as a tool for grassland maintenance and controlling brush. Although the "Vegetation Management Plan" presents prescribed burning as a possible method of controlling vegetation, it highlights prescribed burning's disadvantages (i.e., smog, erosion).

Control burning is restricted under the Bay Area Air Pollution Control District's (BAAPCD) "Regulation 1." The District can burn dangerous materials that present a fire hazard and can burn an area or material which is necessary for public safety. Under no circumstances can the District burn an area just to create open space, prevent brush encroachment, or get rid of vegetational pests (unless they are a fire or safety hazard). This then limits the use of fire management.

Only 16 to 20 acres of parkland are burned each year in the EBRPD. This is due chiefly to a small financial allotment for prescribed burning. With such small amounts of acreage being burned and the way prescribed burning is presented in the EBRPD's "Vegetation Management Plan," the District obviously does not believe prescribed burning is an important form of vegetation management. But according to certain District personnel, at least 20,000 acres of the District should be burned regularly.[2, 14] By burning only 16 to 20 acres, the District is fighting a losing battle for proper vegetation management. A few years after an area is burned, it is being encroached on again by brush. Thus, unless they reburn the area, what they did before will go to waste. Obviously if the District is burning only 16 to 20 acres a year

and 20,000 acres are needed to be burned, it is a waste of time, effort, and money to continue burning. Therefore, either the District should increase the amount of land being burned or it should not be done at all.

Another hinderance to management through fire is the bureaucracy of the EBRPD. The EBRPD Fire Department has only two permanent fire fighters. In order to obtain sufficient manpower to conduct control burns, the chief of the fire district must request assistance from one of the district managers. But the district manager does not have to honor the request. If other maintenance operations are more important, then the prescribed burn will have to wait. Having to go from district to district to come up with the necessary manpower is an inefficient operation. It is also poor planning in that an optimum burn day might pass by in favor of other menial tasks that could be done any other day of the week.

Grazing

Grazing is a livestock practice in which grass and forbs are used as feed. Grazing can be either advantageous or disadvantageous, depending on the grazing intensity, but in either case, the environment undergoes changes.[4] The management practice used will determine whether these changes are for the better or for the worse. In this section, only grazing by cattle will be considered, because this is EBRPD's primary grazer.

Advantages

One of the advantages of grazing is that it can produce a favorable vegetation cover. According to Biswell, perennial grasses in the forage cover can increase if annuals are moderately grazed to maturity, preventing the annuals from setting seed (perennials are native to the area, and the annuals are introduced species).[4] Following this, the area is kept free of grazing to protect the perennials, which have a later flowering time. There is also a reduction in competition with the annuals, which further favors the introduction of the perennials. Along the California coast where this grazing system is practiced, perennials have increased from 3% to 15% of the forage cover.[4]

Another advantage to grazing is the income it produces. Of the 48,000 acres of parkland, 30,000 acres are suitable for grazing, and presently 25,000 acres are being leased to ranchers for the purpose of grazing. During the drought years the District earned $60,000 per year. But during a normal year they can earn more than $125,000 (the leasing income is $9.50 per animal). This income can always be used and will be increasingly important with the passage of the Jarvis-Gann Initiative (this initiative would severely reduce the funds available for the EBRPD).

The final advantage of grazing is that it is a method of fire control. The cattle keep the grass low, so that there is not enough fuel to carry a fire. This not only deters fires from starting on grasslands, but it also serves as a fuelbreak for the adjacent non-grazing areas. This is because when a fire is moving from a non-grazing area to a grazed area, it is going from an area of varying amounts of fuel to an area of little or no fuel. Such a reduction in fuel will either stop or slow a fire.

Disadvantages

The disadvantages of grazing stem from poor management practices in permitting overgrazing. First of all, trampling by grazing animals on wet ground reduces soil infiltration and vegetation cover, which can cause severe wind and water erosion. This affects not only the landscape, but also the water quality. Water quality is reduced by the build-up of sediments and pollution derived from animal wastes that are brought in by the increased surface and sub-surface run-off.[18]

Overgrazing also affects other forms of life. It exposes the ground surface, making it inhospitable for nesting birds or small surface animals. Aquatic life is severely affected where increased run-off causes turbidity and pollution of the water to increase. This increases the Biological Oxygen Demand (BOD) of the water, and if it reaches high enough levels, it can suffocate most of the naturally occurring aquatic life.[17]

Vegetation is affected differently depending on the time of year. Defoliation is most harmful when the food reserves of a plant are lowest. This usually occurs in spring or early summer when the plant is growing rapidly and has not had a chance to build up its food reserves.[11] Continual spring browsing will deplete the plant's food reserves, decrease its reproductive growth and vigor, and eventually cause the plant to die.[18]

In general, most of the disadvantages of grazing can be avoided by good grazing practices. With proper contour furrowing, culvert systems, prohibition of grazing on slopes of %60 or greater and on erodable soils, and retainment of dense vegetation around water supplies, water quality and soil stability can increase as compared to the time prior to the introduction of grazing.[17]

The final disadvantage of grazing is aesthetic. The visual appearance of cattle and the rangeland, the smell, and the presence of animal wastes are some of the public objections that must be dealt with if grazing is to be considered as a method of vegetation control.

Policies

In 1973 policies regarding grazing in the district were established and approved by the Board of Directors. The purpose of grazing in the District is to provide income and a form of fire control.

The public response to grazing in the EBRPD has been favorable.[15] One of the reasons for this is the prohibition of grazing from populated recreation and picnic areas. The public usually comes in contact with cattle only along trails, and most of these people are indifferent to the presence of cattle.

Some complaints have been directed towards grazing. Some deal with the idea of using cattle as a management practice. But a majority of the complaints come when the cattle leave their range and enter a picnic area. This usually happens when a fence is broken down either from wear or vandalism. The cattle leaving their range presents only two major problems, the nuisance the cattle cause and trying to round them up and bring them back to the range land.

As mentioned in the "Advantages" section, the District's main benefit from grazing is the income it brings in. But another benefit is that the District is not monetarily responsible if the cattle damage anything or die. This is the responsibility of the leasing rancher.

The land management of the rangelands are the responsibility of the District. With assistance from the Soil Conservation Service, the EBRPD inspects the conditions of the soil. According to Reeves, neither agency has found any abnormalities in the District's rangelands.[15] The EBRPD does not overlook the fact that there are specific areas of gully erosion and total surface erosion. The District counteracts these problems by prohibition of grazing, construction of culverts, and contouring.[15] Reeves also indicated that not all of the erosion in the rangelands can be attributed to grazing. He sites examples of the poor quality of some of the fire roads, unavoidable slippage due to soil type, and past land usage.

Replacing cattle with native grazers (i.e., deer and elk) has several disadvantages. First and foremost is that with native grazers the District loses the income from cattle grazing. Secondly, there are no native grazers that can take the place of cattle in brush and fire control. Deer would be an alternative to cattle but according to Reeves, the deer's main food source is not the same as that of cattle, and the District is already overpopulated with deer. Another possibility of a native grazer is elk. Regulations of the California Department of Fish and Game (DF&G) make the introduction of elk difficult. In order to meet the DF&G requirements, the District has to have either an eight foot mesh fence around the range or the agreement of all the adjacent land owners. Unless the DF&G eases its regulations or the District receives private funding for a fence project, the likelihood of elk in the EBRPD is slim.[15]

Summary and Recommendations

The EBRPD's "Vegetation Management Plan" discusses equally both fire and grazing as potential vegetation management practices. But it should now be obvious that the District strongly emphasizes grazing over fire.

This situation is unreasonable for several reasons. First, historically fire has been part of East Bay ecosystems much longer than cattle grazing. The vegetation and wildlife have had a longer time to adapt to the disruptive effects of fire. This is why in the past the region was characterized by grasslands. These grasslands were maintained by naturally occurring wildfires and not grazing. Thus, the emphasis in the "Vegetation Management Plan" on the disruptive effects of prescribed burning is misplaced. The grasslands have long ago adapted to these "disruptive effects," and until the arrival of the white man, the region had no difficulties in maintaining the grasslands. But due to fire suppression and the de-emphasis of prescribed burning, the District is having difficulties maintaining its grasslands without new disruptive methods such as cattle grazing. The disruptive effects of cattle grazing are completely foreign to the area. Thus, these effects are much more devastating and long lasting. This is because the vegetation has not yet been able to adapt to cattle grazing (this is the reason perennials of the area are disappearing). The time needed for adaptation is significant in determing the vegetation recovery time. With prescribed burning an area will return to normal within a couple of years, whereas the effects of grazing can become permanent.

Secondly, although prescribed burning is regulated by the BAAPCD, the regulations are not so restrictive that they would prevent a good burning program. Any area of the District can be burned to create a fuelbreak or reduce fuel.

Finally, the disadvantages due to public opinion seems to be minor. Due to the fact that advertisements are changing in favor of prescribed burning and that public complaints are usually dropped, it can be seen

that the region is ready for vegetation management through prescribed burning.

This report is not suggesting that grazing should be entirely replaced by fire. Grazing has a few advantages over fire. First is the substantial income cattle grazing brings into the District. Secondly, it is a silent form of vegetation management. This means that the general public does not notice grazing as much as prescribed burning (it is hard to miss the smoke produced by a fire). It also means that one can graze closer to residential areas. With the legal responsibilities of prescribed burning, prescribed burns will have to be done some distance from residential areas.

It should be apparent that this report is recommending not one type of vegetation control, but rather a better balance between the two. In order to achieve such a balance, the first thing that has to be done is that the amount of land burned should be increased from 16 acres. At present, the 20,000 acres park personnel suggested be burned, is too great an increase. What the District should do is designate 5,000 acres in the parklands that can be maintained by fire. Then these areas should be burned at a rate of 1,000 acres a year over a five year period. A five year period is suggested because in this length of time the original area will again be encroached upon by brush and will be ready to be burned. The 5,000 acres should be continually burned on a five year rotation system. This will prevent the loss of time and money that is being experienced today when an area is once burned and is not reburned due to lack of funds and manpower. In order for such a plan to work, the District should increase the financial allotment for prescribed burning and have a more efficient procedure for obtaining the necessary manpower (i.e., hire more permanent fire fighters). The amount of area grazed should be reduced to coincide with the increase in the prescribed burns.

A final aspect to consider is the future types of vegetation management. If population projections are correct, the East Bay parklands will soon be surrounded by suburbia. With such close proximity of residential areas and the increased use of the parks, both fire and grazing will become unacceptable forms of vegetation control. (Who wants a prescribed burn or cattle near one's backyard!) Thus, the District should make contingency plans for alternative forms of vegetation control for the future. Forms that should be considered are mowing, cutting, herbicides, and even elk (elk are far less offensive than cattle).

The District should develop an overall vegetation plan and a scheme for vegetation manipulation. Once they know what type of vegetation they want, using the disadvantages and advantages for vegetation control methods, or no control at all, they can decide which scheme is best for that area (with consideration of future changes). This will prevent a loss of time, energy, and money, and provide a more efficient form of vegetation management.

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