

BRUSH SPECIES

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Introduction

The Vegetation Management Principles and Policies for the East Bay Regional Park District (November 7, 1976) states:

"Encroachment is defined as the rapid spread of non-grassland species into grassland areas, primarily by coyote brush, broom, and thistles, and generally as a result of changes in ecological dynamics caused by man.

"Encroachment is common throughout the coastal areas of northern California; in the East Bay hills heavy encroachment is observed in Tilden, Redwood and Anthony Chabot Parks, and to a lesser degree in Wildcat Canyon and Briones Parks, where the introduction of domestic livestock has, in part, counteracted man's other influence" (p. 35).¹⁴

The following section will attempt to deal with the background, characteristics, means of control, and implications of encroachment of coyote brush (*Baccharis pilularis* var. *consanguinea*) and the brooms (*Cytisus* spp.). Also included in this section is a review of the poison oak (*Rhus diversiloba*) problem within the District. The encroachment of poison oak is a problem not only because of reduced recreation area, but also a health hazard since human contact with the plant can cause mild to serious skin irritation.

Baccharis pilularis (Coyote Brush)

Baccharis pilularis is a perennial evergreen shrub native to California. It thrives mainly along the cismontane regions from Monterey County north to southern Oregon, and can be found up to elevations of about 450 meters. Distribution of *Baccharis* is very spotty other than in this region, except for stands on the Mt. Hamilton Range and several coastal islands off the southern California shore. Sometimes referred to as coyote brush, *Baccharis pilularis* is a dioecious (each plant is either male or female) member of the *Compositae* family.

Along the coastal sand dune areas of extreme exposure to the elements, the species exists in a low semi-prostrate form. In the upper elevations of its range, such as the Sierra foothills, the shrub assumes an upright morphology, often reaching heights of 3.5 to 5 meters. This tall form is considered a subspecies and has been named *Baccharis pilularis* var. *consanguinea*. The majority of *Baccharis* colonies in the East Bay and East Bay Regional Park District are believed to be various intermediate hybrids of the coastal and inland types, although they are almost exclusively upright.¹² In the interest of simplicity, the plant will be referred to as *Baccharis* or *Baccharis pilularis* in this section.

The plant is adapted for areas having wet winters and dry summers. The leaves are small, about 2.5 cm. long, leathery and cutinized. These characteristics are positive indicators of the xerophytic (able to endure periods of drought) nature of the species.

Sites which receive direct sunlight for at least half of the day are required by *Baccharis pilularis*. Therefore, it can be found most extensively on western and southern exposures and almost never as an understory growth. It favors hillside habitats, but interestingly cannot usually be observed on hilltops. It has been suggested that the higher evaporative stress of hilltop exposures is the reason for the inability of *Baccharis* to colonize there.²³

Most of the plant growth occurs during the moist months between October and May. Flowering usually begins in August and continues into October. The *Baccharis* flowers, which are small (.65 cm. in diameter), whitish and papery, occur in bracts. The achenes which harbor one seed each are very small and have a little bristly tuft on one end. These two characteristics facilitate wind dispersal of the seeds.

Problem

Baccharis has been considered a problem species in many of the East Bay Regional Parks because of its ability to spread and colonize grassland areas, thereby effectively reducing areas previously used for recreation.

Illustrative of this brush species' aggressiveness are the data gathered by U.C. Professor Joe R. McBride in a study of *Baccharis* invasion in the East Bay Parks.¹² He found that between 1927 and 1963 *Baccharis pilularis* brushland increased from 137 acres to 674 acres in Tilden Regional Park. Brush expansion from 132 acres to 480 acres took place in Redwood Regional Park in the period 1932 to 1963. In addition, between 1942 and 1963 Grass Valley Regional Park (since renamed Anthony Chabot Regional Park) had an incredible brushland boom of 476 acres.

Professor McBride suggests a number of theories to explain the ability of *Baccharis* to encroach upon grassland areas with such relative speed. A point essential to much of his argument is that the *Baccharis* achenes are wind dispersed. He says that, "it is assumed that they could be readily carried several hundred yards or even miles by strong winds" (p. 43).¹²

The timing of *Baccharis* seed dispersal is also a factor. During the fall and winter small landslides are common throughout the parks. During this same period *Baccharis* achenes are being dispersed. Consequently, on areas of mineral soil exposed by these slides, *Baccharis* achenes may be the only seeds present, save for the seeds of a few forb species, at the onset of the growing season. Thus they gain the advantage of a growing season in advance of the dispersal of grass caryopsis onto the areas exposed by winter slides.¹²

Baccharis has also invaded grassland by means of a uniform addition of seedlings along *Baccharis*-grassland borders. Following the establishment of a *Baccharis* stand the combined effects of shading and wild animal activity lead to the elimination of annual grass at the edge of a stand, exposure of mineral soil and seedling establishment. Unless checked by grazing, fire, or other means, this continuous process results in the gradual enlargement of *Baccharis* areas.¹²

Cattle and deer are known to browse on and kill *Baccharis* seedlings even when grass is available. Cattle grazing was terminated in the parklands studied by McBride in 1955. The elimination of cattle may well have accelerated *Baccharis* encroachment. The presence of deer alone has not kept *Baccharis* from spreading.

Wildfires kill isolated small *Baccharis* plants and also border plants of thick stands and the seedlings on their fringes. The incidence of natural fire has been effectively curtailed within the parks, and therefore contributes to the problem of *Baccharis* control.

Controls

Grazing by cattle and deer is an effective means of keeping *Baccharis* stands in check, but will not eradicate them.

Cutting and hand grubbing is not an effective or practical means of control because of *Baccharis*' extremely deep root system and ability to resprout if its root system is left even partially intact. Cost of such control is excessive because of the labor involved.

Normal wildfire is not usually sufficient to kill the larger (2.5 cm. or more diameter at ground level) plants, but will destroy seedlings. *Baccharis pilularis* is capable of sprouting from its basal portions and roots following a burn. However, extremely intense heat, such as can be provided by hand-held brush burners, has been effective in killing average size bushes when the heat was directed at their basal areas.¹³

Herbicides which are effective in killing *Baccharis* are 2,4-D, 2,4,5-T, and Toradon K.

The Future

If left unchecked, *Baccharis pilularis* is capable of succeeding vast expanses of grassland areas in the East Bay Regional parklands. What must be decided in this situation are the priorities for use of parkland. If open grassland for recreation is a top priority, then the *Baccharis* encroachment must be stopped.

I recommend that a carefully planned and supervised program of herbicide application be instigated in order to keep the existing *Baccharis* stands in check. Total eradication of large numbers of the bush is financially infeasible and unnecessary. However, if some small areas of intermediate size plants need to be cleared, basal burning by hand-held brush burners would be appropriate.

Rhus diversiloba (Poison Oak)

Rhus diversiloba is a western member of the *Anacardiaceae* family which also includes poison ivy and poison sumac. Most often referred to as poison oak, it is among the most widely distributed and numerous shrubs occurring California. It is found west of the coastal ranges from British Columbia, down the Pacific Coast to the northern parts of Baja California, and at elevations up to 1,550 meters in some places.

The name "poison oak" is a misnomer which originated because of the resemblance the plant's sometimes have to certain types of oak leaves. The Latin word "*diversiloba*" actually refers to the irregularity of the leaves of this species. In fact, the leaf structure is so irregular that on the same leaflet of one of its trifoliate leaves, one side is often quite different from the other. These 2.5-10 cm. long leaflets are not only unpredictably lobed, but they are sometimes also devoid of any lobing. The smooth edged, symmetrical leaflets resemble oak leaves and are the basis for the commonly used name.

Leaf surfaces are usually glossy and uneven, providing a thick, leathery appearance. A deep red coloration transforms the plant into a stunningly bright spectacle during the fall. Poison oak becomes deciduous in the fall after turning color.

Curiously, this species of *Rhus* can grow as a vine, an upright shrub entirely devoid of support, or a trailing shrub. As a vine, it is capable of climbing over fences, on telephone poles, or up trees by means of adventitious rootlets. The upright form may grow to 2 meters or more in height. The most common form is the low shrub which spreads along the ground by rooting at the nodes. *Rhus diversiloba* grows in the shade of deep woods or in direct sunlight and at all degrees of light exposure in between

The flowers appear in early spring with the new foliage. Blossoming in panicles from the leaf axis; they are small and greenish white, .3 to .65 cm. across.

The fruit is a greenish or creamy white drupe or stone fruit approximately .65 cm. in diameter with a glossy surface. Fruit appears in mid-October and persists on the stems after the leaves have fallen. The presence of this fruit indicates a high likelihood of bird and terrestrial animal dispersal.

Problem

Park district land covered with poison oak is estimated at roughly 2,000 acres total.⁸ *Rhus diversiloba* is similar to *Baccharis* in that it is deeply rooted, and in fact, it grows in mixed stands with *Baccharis* quite often. However, the District's problem with poison oak is different from its problem with *Baccharis* because poison oak is a health hazard.

All parts of the poison oak plant contain the phenolic compound, urushiol, which is also present in poison ivy. It is this substance which causes the itching and severe dermatitis commonly experienced following contact with poison oak. There is no known quick cure for the symptoms of urushiol exposure, and no one is completely immune to poison oak. In spring and summer cell sap production is high and the danger of poisoning is greatest. The smoke emanating from the plant when burned is extremely harmful if inhaled.

Poison oak is a potential pest anywhere in areas where people spend time, such as the parks. Lack of knowledge of the appearance of the plant and the fact that the irritant substance can be transmitted by pets or on clothes contributes greatly to the problem.

Controls

Deer are known to graze on poison oak, but the presence of deer in the parks has not effectively controlled the species. More specifically, even though deer may graze on *Rhus*, the areas where they feed are probably not near the places where human activity is centered. So human contact with poison oak is not reduced by the extent of deer grazing now existing in the parks.

Cutting and grubbing techniques have proven a relatively effective means of eradication if done in early spring or late fall when the soil is moist and roots are most easily removed. But, the disadvantages of having to wear protective clothing and the large cost of labor are prohibitive.

Burning of poison oak releases urushiol into the air with the smoke from the flames. Inhalation of this smoke has proven to be a severe health hazard. Therefore, fire is not an acceptable means of control

for poison oak.

Numerous chemicals are relatively efficient killers of poison oak. Ammonium thiocyanate, borax, diesel fuel and a few less frequently used sprays can kill this stubborn plant if applied repeatedly. (Borax is spread on the ground, not sprayed). June and July are the best months to apply herbicides to poison oak.

The Future

The problem of the existence of poison oak in the East Bay parklands is not unlike the problem people encounter with it in so many places in the western states. Quite simply, people should avoid contact with the plant! However, the big difference is that within the District, the chances of people's coming into contact with poison oak can be greatly reduced with intelligent management. Areas such as picnic grounds, play fields, and trails, are places where *Rhus diversiloba* should be eradicated. It is impractical to attempt to eradicate poison oak completely, as it is too widespread.

My recommendation is that one of the chemicals effective in extermination of poison oak (probably ammonium thiocyanate) be applied to the areas designated for eradication as part of well supervised yearly or bi-yearly programs. Poison oak is very difficult to get rid of and may regenerate from roots which do not have any growth for a year or more. This persistent quality makes continued treatment over an extended span of time necessary.

Cytissus spp. (Broom)

Cytissus monspessulanus, also referred to as Montpellier broom, and most commonly as French broom, is an erect, much branched, leafy shrub. It reaches heights of 2 to 3.5 meters under certain conditions. The French broom has trifoliolate leaves with leaflets only 1.3 to 2.0 cm. in length, smooth on top and hairy beneath.

This member of the *Leguminosae* family is a native of southern Europe and can be found in France, Portugal, Dalmatia, and Greece. North Africa and Syria also are homes for this "broom." Although not a tender species, it has been successfully cultivated since 1735. The French broom can withstand temperatures as low as -11°C before succumbing to frost damage.

French broom was originally brought to California as an ornamental garden shrub and is still seen in many home plots in the Bay Area. It has been planted alongside freeways for the purpose of erosion control, as it is a deeply rooted species. *Cytissus monspessulanus* is thought to have hybridized with *C. canariensis* and *C. maderensis* since being introduced here.²

An evergreen, the French broom flowers from March to June. The yellow flowers appear on the young shoot tips in short racemes each of which has between 3 and 9 blossoms. The petals are about 1.3 cm. in length. The seeds are contained in small pods which are hairy all over. The seeds themselves are very small (.3 cm.), brown and shiny.

C. monspessulanus grows most frequently on sites where direct sunlight is available, although it will grow in denser environments, in which case it will grow tall and thin, reaching for light exposure. French broom does not require a rich or highly developed soil and will quickly colonize disturbed areas.

Cytissus scoparius has also been mentioned by the District as a problem within the parks, but is found considerably less frequently in parkland than the French broom. Commonly referred to as the Scotch broom, it differs from the French broom in a number of ways. It is deciduous, losing its leaves in the fall, however maintaining an evergreen effect on account of the greenness of its stiff, broom-like branches. The Scotch broom has larger and less abundant flowers than *C. monspessulanus*. They are bright yellow, fragrant and occur singly or in pairs from the leaf axils near tips of stems or branches.

It is also a native of Europe, and was used for medicinal purposes in the past. In California the species has naturalized from Santa Cruz County to Del Norte County along the coast, and in the Sierra Nevada foothill counties of Amador, Eldorado, and Nevada.

Problem

Ever since their escape from the garden, the "brooms" have been invading and colonizing disturbed areas such as roadsides and hills in the East Bay. An estimated one percent of total parkland holdings is inhabited by broom species. This is roughly the equivalent of 400 to 500 acres of land.⁸ This is a perplexing problem from the standpoint of the District's management policies. The plants are not unattractive (as many view *Baccharis*), but rather quite colorful and bright during the spring. However, they are so successful and aggressive at colonizing, and such prolific seed producers, that they are able to overtake and out-compete native flora in a given area.

Controls

There are no known significant grazers of the French or Scotch brooms. Cutting and grubbing have proven of limited value for control of broom species since they are capable of re-sprouting quite vigorously. Fire is also of limited value in eradication because of the base-sprouting properties of the plants.

The herbicides 2,4-D and 2,4,5-T have proven capable of killing the brooms if applied when the plant is in flower. Diesel fuel may also be effective if sprayed in the warmer months of June or July.

The Future

One look at some of the hillsides in the East Bay makes obvious the strength of *Cytissus monspessulanus* as a competitor. Disturbed soil sites such as roadsides are quickly colonized by this species all over the East Bay hills. Additionally, it spreads into areas where native brush species exist and can make a nuisance of itself just by its numbers. If park management wishes to preserve indigenous vegetation in areas adjacent to French broom stands, some form of control is unquestionably called for.

I recommend that the perimeters of existing stands of French broom be treated with herbicides regularly as part of a well supervised and planned program of brush control. Additionally, periodic burns of broom stands would be advisable, considering the fact that as the individuals within a stand grow bigger, more and more seeds will be produced and make control very difficult.

Summary

The East Bay Regional Park District officially views the encroachment of various brush species onto grassland areas as an undesirable phenomenon. However, during the last 5 years no measures have been taken to inhibit the spread of either poison oak or the broom species. There has been a small amount of grassland maintenance experimentation involving *Baccharis* in Chabot and Redwood Regional Parks. Most prominent in this program is a scheme which involves the chopping and burning of the brush and subsequent seeding of grass. The area is then re-burned after 2 years so as to kill the small *Baccharis* sprouts which inevitably reappear. In the opinion of EBRPD Resource Analyst Neil Havlik, this procedure could prove effective because *Baccharis* food reserves are drained by post-burn re-sprouting and a second exposure to fire during this re-sprouting stage catches the young sprouts when they are most vulnerable.⁸

In order to stop grassland encroachment successfully, intelligent and reasonable measures must be taken. These measure should be based on sound knowledge of the circumstances peculiar to each species to be dealt with, and the financial realities present within the District (e.g., only \$8,000 has been spent on the maintenance experimentation in the last 5 years).⁸

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