

FREE

MOUNT DIABLO REVIEW



Summer/Fall 2004 Edition

FIRE!

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All across the West, people are preparing for the worst as the fire season progresses. We had an early spring with unusually warm temperatures therefore there is a moisture deficit in which vegetation is very dry. Fire danger this year, throughout California, ranges from severe to extreme. Visitors are urged to take precautions. Remember that fire restrictions are in effect. Check the fire danger rating upon entrance to the park.

No ground fires are allowed on Mt. Diablo. All fires must be in stoves or the bar-b-cue pits provided at picnic sites and campgrounds. Keep a bucket of water nearby and never leave the stove or bar-b-cue unattended. Firewood gathering is prohibited. Fireworks are prohibited. Never throw a lighted cigarette out the window of a vehicle. Park in designated parking areas only, never on dry grass.

Fire is a Chemical Reaction

Whether it's a small flicker at the end of a birthday candle or a wall of flame hundreds of feet high, all fire is essentially the same. It is due to a chemical reaction called combustion. Fire is the energy released in the form of heat and light when oxygen combines with a combustible material (fuel) at high temperatures.

Fuel, heat (high temperatures) and oxygen are all that is needed. Combined, they are the "fire triangle." Take away one of the sides and the triangle collapses. The same is true of fire. Take away fuel, heat, or oxygen and the fire collapses. It can't burn. Firefighters try to do remove one of three essential components of fire. For example, when they dig a



line around a fire, fuel is removed. When water is dropped on a fire, the temperature is reduced. When fire retardant, a thick, soupy substance is dropped onto vegetation it forms a barrier between the fuel and the air, preventing the oxygen from reaching the fuel.

A fire needs air that contains at least 16% oxygen. The air around us is about 21% oxygen. With this steady supply of oxygen, fuel and temperature are critical to sustaining a fire once it is ignited. Fuel is any material capable of burning. This would include living vegetation, branches, needles, leaves, and human-constructed wooden structures. The general relationship between fuel and temperature is simple: the more fuel, the higher the heat; the more heat, the faster the fire spreads. In fact, large fires can create winds that in turn increase the flow of oxygen. A really large fire can generate hurricane-force winds, up to 120 miles per hour.

The amazing thing about fire is that technically, its not the fuel that burning. The trees and shrubs aren't really on fire. Instead, the fuel is being converted to a gas. What you see burning is the gas produced by a fuel when heat is applied. Take a look at your fireplace the next time you see a log burning in it. If you watch closely, you can actually see a space between the surface of the log and the flame. What is actually burning is the gas being given off from the fuel. There is very little oxygen on the immediate surface of the log. The gases produced by the chemical reaction when heat is applied to the fuel need to rise upward in order to mix with the oxygen in order to burn. That also explains why flames can explode tens of feet above a tree. It is not really the tree that is burning, it's the gases being produced as a result of the chemical process that are on fire.

Eventually, as fuel is reduced, the chemical reaction breaks down. The key to fire is in understanding what it takes to create it. And, more importantly, during a difficult fire season such as this year, what it takes to control or prevent it.

Fire Behavior

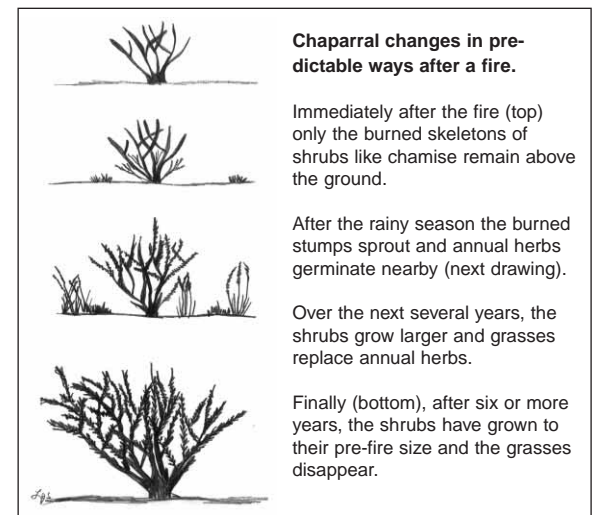
The time of year influences the effects of fire. During some seasons, more moisture is present than in other seasons. In California, the fire season lasts from May through October.

A fuel's composition, including moisture level, chemical makeup and density, determines its degree of flammability. Moisture level is the most important consideration.

Live trees contain a great deal of moisture while dead logs and dry grass contain very little. The moisture content of these fuels determines how quickly a fire can spread and how intense or hot it may become. High moisture content slows the burning process since heat from the fire must first eliminate the moisture. In addition, a fuel's chemical makeup determines how readily it will burn. Some plants, shrubs, and trees contain oils or resins that promote combustion. They burn more easily and more intensely than those without such oils. Finally, density of a fuel influences its flammability. If fuels are close together they will ignite each other.

Weather conditions such as wind, temperature, and humidity, also contribute to fire behavior. Wind is the most important factor because it brings a fresh supply of oxygen to the fire as well as pushing existing fires toward new fuel sources. In general, fuels will ignite more readily at high temperatures than at low temperatures. Humidity, the amount of water vapor in the air, is also important. At low humidity levels, fuels become dry and therefore catch fire more easily. They also burn more quickly than when humidity levels are high.

Soil types also must be considered because fire affects the environment both above and below the surface. Soil moisture content, the amount of organic material, and the duration of the fire determine to what extent soils will be affected by fire.



Chaparral changes in predictable ways after a fire.

Immediately after the fire (top) only the burned skeletons of shrubs like chamise remain above the ground.

After the rainy season the burned stumps sprout and annual herbs germinate nearby (next drawing).

Over the next several years, the shrubs grow larger and grasses replace annual herbs.

Finally (bottom), after six or more years, the shrubs have grown to their pre-fire size and the grasses disappear.

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Chaparral, a Fire Prone Plant Community

Chaparral is a general term that applies to landscapes that contain plants such as manzanita, ceanothus, chamise, and scrub oak along with grasses and forbs. This plant community is the most flammable.

One chaparral plant, ceanothus, has leaves that are coated with flammable resin. Ceanothus seeds require intense heat for germination. The roots are adapted to grow in areas that were previously burned. Other shrubs in the chaparral