



A PROJECT OF THE SONOMA-MARIN COASTAL PRAIRIE WORKING GROUP



## FIRE

*“Without recurring fires, all [California] grasslands would eventually be taken over by woody species”*

*(Biswell 1989:195).*

Although fire is a physical disturbance of the landscape that occurs in almost all natural terrestrial ecosystems, modern ecologists only began to consider fire an important factor in plant community composition after 1947 (Whelan 1995:1).

Fire is an important part of the prairie ecosystem. It clears thatch, recycles nutrients, creates openings for seedlings, destroys colonizing shrubs and trees, and destroys bacterial and fungal pathogens. The direct (e.g. flames, heat) and the indirect effects (e.g. nutrients, changes in soil chemistry) of fire can have both negative and positive consequences for different species and communities,

Interestingly, fire is unlike other physical disturbances, such as drought and flooding, for the nature of the fire itself is influenced by the composition of the plant community (Daubenmire 1968). For example, the low stature fine fuels (grasses and forbs) in grassland fires usually burn more rapidly and more completely than the dense woody trees in (Biswell 1989).

The pattern, frequency and intensity of fire in a community is called the fire regime. The four main factors used to describe the fire regime in grasslands are (Keeley 2002):

- ▶ Fire intensity
- ▶ Fire frequency or fire interval (time between fires)
- ▶ Size and pattern of fire
- ▶ Seasonal timing of fire

## STRATEGIES FOR SURVIVING FIRE IN COASTAL PRAIRIE

### CUE FOR GERMINATION

- ▶ Many rare plants found in grasslands depend on fire to stimulate germination and to create openings in the existing vegetation. These plants, usually forbs, are called “fire followers” or “fire annuals” because they germinate in abundance from soil-stored seeds in the burned areas after a fire, but are seldom seen in unburned areas (Keeley, et al. 1981).
- ▶ Fire can increase the seed set of some grass species. Even if fire has been excluded from the ecosystem for some time, resumption of burning can result in the germination of native grasses that remain dormant in the seed bank (Walsh 1995).
- ▶ Soil-stored seeds of tufted hairgrass (*Deschampsia cespitosa*) germinate after fires (Walsh 1995).

### FLOWERING AND MAST SEEDING

- ▶ “Pyrogenic flowering resprouters” flower profusely the first spring after a fire and disperse seeds that germinate the following winter.
- ▶ Geophytes, such as soaproot (*Chlorogalum pomeridianum*), *Calochortus* spp., *Brodiaea* spp., Fremont’s death camas (*Zigadenous fremontii*) tend to flower profusely after fires and release abundant seeds that germinate the following spring (Tyler and Borchert 2003).

### RESPROUTING

Many herbaceous perennial plants have an advantage over most woody plants because their growing buds and storage organs (e.g. rhizomes, tap roots, tubers, bulbs, corms) are insulated from killing heat beneath the soil surface (Russell, et al. 1999). When the top portion of the plant is destroyed by fire, the plant retains the ability and resources to re-sprout and grow. Underground structures store the energy needed to grow when the fire has passed and rains begin.

- ▶ Tufted hairgrass (*Deschampsia cespitosa*), survives fire by re-sprouting from basal buds located in the root crown; the tufted leaves protect the root crown from heat and fire damage (Biswell 1989).

### AVOIDANCE

Herbaceous perennial plants have an advantage over woody plants because their growing buds are insulated from killing heat beneath the soil surface (Biswell 1989).

Species that can escape or otherwise survive the fires may thrive in post-fire landscapes. Forage (grasses, sedge, rushes, forbs, and browse from shrubs) on burned areas is often more palatable, more nutritious, and more available to grazing and browsing animals than the forage on unburned areas (Reiner 2007).

- ▶ Buried seeds often survive fires because soil's insulating properties keep the embryo safe from high temperatures reached at or above the soil surface.
- ▶ Geophytes: Contractile roots pull bulbs down under the soil as they grow protecting them from the heat of surface fires.
- ▶ Animals using burrows can survive fires:
  - Badgers are rarely threatened by fire, as they are deep underground in their burrows during the daytime when fires would burn the hottest in grasslands (Sullivan 1996).
  - Small mammals usually survive fire by moving into their underground burrows (FEIS). However, the loss of essential food and cover can be devastating. Meadow voles and other rodents usually leave burned areas, probably because of lack of protective cover rather than food availability (FEIS).
  - Snakes and lizards usually survive fire by seeking refuge under rocks and in underground rodent burrows or by fleeing to unburned areas (Tardiff and Stanford 1998).
- ▶ Evacuation: it is uncommon for mule deer and elk to be trapped and killed by fires (FEIS).