

# Exotic Plant Considerations in the Wake of a Wildland Fire

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Biologists and resource managers have long recognized the role fire plays in maintaining natural ecosystems of California and the effects of humans on natural fire regimes. However, the general public has not fully understood or appreciated the essential role of fire. Over the last several years, large fires, which resulted in devastating personal and financial losses to Californians, prompted public debate over issues surrounding wildland fires. At the center of this debate are discussions of the role of fire as an ecological process, the ecological and financial implications of fire management practices, the effects of urban development in fire-prone wildlands, and the need to combine ecosystem management with protection of human lives and property.

## Department of Fish and Game Involvement

Recent fires, particularly those in southern California in Fall 1993, revealed the need for better coordination between natural resource management and fire suppression. The Department of Fish and Game (DFG), whose mission it is to protect and manage California's diverse fish, plant, and wildlife resources, increased its involvement in wildland fire issues in 1993. The primary impetus was that fires were occurring in coastal sage-scrub habitat in Los Angeles and Orange Counties. This habitat is targeted for protection under Natural Communities Conservation Planning and is home to the California gnatcatcher, a federally listed threatened species.

Prior to 1993, agencies responsible for protecting lives and property too often seeded burned wildlands with large quantities of nonnative grass to prevent erosion. Italian ryegrass (*Lolium multiflorum*) was most commonly used because it was the least costly and most easily obtained; however seeding mixes with other nonnative and native grasses were also commonly used.

During the post-fire rehabilitation of the Laguna and other southern California fires in 1993, DFG and other agencies debated whether particular areas should be seeded, to what extent, and with what seeding mixes. An outcome of these debates was the formation of an informal group of interested biologists from multiple agencies. In December 1993, this group began meeting to discuss post-fire management activities. Much of the discussion centered on how much of the burned wildland was to be seeded. They took into account natural resource values, scientific research, and property concerns and helped initiate change in seeding practices and policies at the state level.

The public was very concerned about the state's plans for postfire follow-up, and because of native plant and habitat concerns, the California Native Plant Society became involved, asking DFG to state its opinion on postfire seeding and other postfire management techniques the California Department of Forestry and Fire Protection (CDF) used in post-fire rehabilitation.

The DFG's Director, Boyd Gibbons, requested that seeding in wildlands be minimized, and the Resources Agency, the umbrella agency over both DFG and CDF, called for the least amount of seeding possible in wildland areas. As a result of these discussions, only 3,700 acres out of 14,700 acres that burned in the Laguna fire were seeded, mostly in areas near the urban interface. In fact, of approximately 200,000 acres that burned in the 1993 wildland fires, only approximately 19,500 acres were seeded.

## **The Board of Forestry's and the Fish and Game Commission's Joint Policy on Wildland Fires**

In the Spring of 1994, the Board of Forestry (BOF) and the Fish and Game Commission (FGC), the governor-appointed entities that establish policy for CDF and DFG respectively, adopted an *Interim Joint Policy on Pre-Fire, During-Fire, and Post-Fire Activities in Wildland Habitat*. In May 1995, this policy was formally adopted by both BOF and FGC. This policy guides coordination between the two departments for all fire management and fire response. In September 1995, DFG adopted its *Policies and Procedures for Response to Fires in Wildlands* (Policy), a document which guides DFG employees involved in wildland fire issues, including vegetation management and pre-fire coordination with CDF, fire incident response, technical input on biological resources, and post-fire rehabilitation and recovery. Portions of DFG's Policy are highlighted below.

### **Pre-Fire Planning - Preparation and Education:**

The DFG's policy is to maximize its involvement prior to the fire season, by working with local, county, state, and federal agencies, especially CDF, to conserve and manage wildland ecosystems and minimize impacts from DFG will meet annually with CDF to review fire response plans and develop strategies for the upcoming fire season, supporting practices which either eliminate or minimize adverse biological impacts or have beneficial effects on habitat. Maps of DFG lands, critical habitats, watersheds, plant communities, and sensitive and listed species will be provided to CDE. Additionally, DFG will review and provide input into CDF prescribed burn plans.

When requested, DFG will assist other agencies (i.e. U.S. Forest Service, California Department of Parks and Recreation, etc.) in conducting ecologically appropriate vegetation management practices for the purposes of reducing fuel load, benefitting wildlife habitat, and restoring natural fire regimes. Vegetation management practices include prescribed burning, creating fire breaks, mechanically removing and manipulating vegetation, and grazing.

Restoration and enhancement of habitats historically affected by fires will be promoted by DFG when such efforts will have positive effects on the ecosystem's viability and native wildlife. And in coordination with CDF, DFG will inform and educate the public on appropriate ways to protect life, property, and wildlife.

### **During-Fire Response - Assistance and Resource Protection:**

DFG will have minimal involvement during actual fire events, especially where pre-fire and post-fire planning have been successful. DFG will participate in during-fire activities when it or CDF believe there are heightened natural resource concerns.

DFG and CDF have signed a Memorandum of Understanding that directs the departments' coordination on wildland fire response. Through CDF's Incident Command System (ICS)<sup>1</sup>, DFG staff will (1) act as technical specialists for biological issues and will provide CDF with needed information on wildlife, fisheries, sensitive plants, and their habitats, and (2) using DFG staff recommendations, DFG and CDF will explore alternative fire suppression methods to minimize adverse impacts. This can be as simple as providing guidance on where vehicles should be driven or which areas should not be cleared for fire lines.

### **Post-Fire Efforts - Rehabilitation and Restoration:**

Post-fire response occurs during or just after a fire event, and involves watershed and vegetation recovery and restoration. DFG's response goals are to (1) make every reasonable effort to ensure the protection and natural recovery of natural communities, and (2) protect rare and sensitive animals, plants, and habitats in fire zones during rehabilitation efforts.

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<sup>1</sup> Incident Command System (or ICS) is California's formal emergency-response protocol. For wildland fire incidents, CDF is in command of the state's response, and DFG staff responding to the fire incident work under CDF's supervision.

Its policy is to allow natural reestablishment of vegetation, and only secondarily to use mechanical methods, seeding, or a combination of these techniques to reduce erosion in selected areas.

After a fire event, how do we decide what rehabilitation strategies to use? Should the area be left alone to recover naturally? Should seeding or various mechanical erosion-control methods be employed? Considerations for any site should take into account (1) fire intensity and timing, (2) past fire frequency and its affect on the vegetation of the site, (3) effects of fire suppression activities on the vegetation, (4) potential for natural recovery of the vegetation, (5) potential for expansion and establishment of exotic plants, and (6) available information on sensitive species and habitats in the area.

In addition to rehabilitation recommendations and efforts, DFG policy encourages staff to monitor natural recovery of plant communities and success of rehabilitation treatments and integrate the results into future management plans. At present, an informal group, including staff from CDF and DFG, are working on statewide guidelines on post-fire monitoring.

### **DFG's Seeding Policy**

As part of DFG's effort to improve the fire management in California, we developed and adopted the following policy on seeding following a fire to reduce erosion control.

*Seeding is appropriate only if the following criteria are met: there is clear, scientific evidence that a given seeding mix will more effectively establish ground cover than the remaining viable seeds in the natural seedbank, and seeding has been demonstrated to be an effective restoration technique in relation to that specific incident's conditions (slope, soil-type, soil and duff damage, etc.). DFG believes that seeding may be appropriate in areas where fire suppression activity has removed or destroyed the natural seedbank (i.e. bulldozing). DFG acknowledges that when human safety is an issue downstream and seeding would protect human safety by better stabilizing the watershed, seeding is appropriate.*

During or following a fire event, ICS establishes an Emergency Watershed Protection (EWP) Team to make recommendations for post-fire rehabilitation. DFG policy suggests that if seeding is recommended by the EWP Team and then approved, the availability of seed mixes and the site-specific appropriateness of available seed should be evaluated. If no appropriate seed is available, nonvegetative erosion techniques should be employed.

By creating this new policy, DFG has taken an important step in influencing decisions by agencies responsible for post-fire rehabilitation. Although DFG does not dictate actions by other agencies, this policy has begun to affect once-automatic decisions to seed wildlands following fire.

### **The Seeding Debate**

Controversy over seeding wildlands following fire has grown with heightened environmental awareness in recent decades and increased fear of loss of life and property due to landslides, and has become a topic for debate in California.

#### **Should Nonnative Grasses Be Used?**

Evidence exists to suggest that reseeding should not be an routine or automatic erosion-control treatment (Keeler-Wolf 1995; Keeley 1995). Seeded grasses, especially nonnative, have been found to (1) negatively influence diversity of native flora (Zedler et al. 1983; Florence 1986; Taskey et al. 1989; Stone 1993; Barro and Conard 1987; Keeler-Wolf 1995; Keeley 1995), (2) be ineffective in erosion control (Beyers et al. 1995; Booker et al. 1995; Conard et al. 1995; Spittler 1995), and (3) exacerbate erosion due to community typeconversion (Keeley and Keeley 1986).

### **Negative Influence on Biodiversity**

Seeding has been shown to reduce growth and survival of native species following a fire, and can increase susceptibility of a plant community to invasion by weedy plants (Keeley and Keeley 1986; Barro and Conard 1987; Stone 1993). In addition, some nonnative grasses may persist for several years after seeding, and where there is a short duration between fires or other disturbance, nonnative plants can replace native shrubs (Zedler et al. 1983; Keeler-Wolf 1995). Nonnative grasses may become flash fuel because they dry earlier than native plants in the spring and create a more continuous cover (Taskey et al. 1989). Native obligate seeding shrubs, such as *Ceanothus* species, can be eliminated in areas that have reburned before the native shrubs become reproductive (Zedler et al. 1983; Keeler-Wolf 1995; Zedler 1995).

### **Ineffectiveness in Erosion Control**

Because of California's unpredictable climate, germination of seeded grasses is unpredictable (Conard et al. 1995). Italian ryegrass germination has been shown to be most successful where early, gentle rains are followed by heavier rains (Beyers et al. 1995; Conard et al. 1995). If heavy rains occur before the seedlings become established, seed may be washed downslope in sheeting erosion. This may become especially pronounced on steep slopes or where intense fires have created hydrophobic soils which inhibit root growth and establishment. In addition, seeded grasses do not appear to reduce the primary causes of erosion in southern California, dry ravel and stream channel scouring (Spittler 1995).

### **Exacerbation of Erosion**

Additional evidence suggests that, in some cases, seeding may actually increase erosion (Taskey et al. 1989). Because of their leaf structure, grasses, as opposed to other herbs or shrubs, can actually channel water into the substrate, supersaturating the soil, leading to slope instability and even shallow slope failures in some areas. Seeded grasses may also increase pocket gopher activity which may exacerbate erosion rates (Taskey et al. 1989).

### **Should Native Grasses Be Used?**

Little information is available on the effectiveness of using native grasses or effects of seeded native grasses on natural biodiversity. Defining the term "native" is especially important, as species native to California may not be suitable to the site being seeded. For example, seeding a southern California ecosystem with northern California natives may not be appropriate. Further, in general, grasses were not important features of pre-European California chaparral or sage scrub natural communities, and to include them in "native" seeding mixes may be ecologically inappropriate (Keeler-Wolf, pers. comm.). The appropriateness of using shrubs and annual forbs native to these ecosystems should be considered.

Where there is an introduction of native grass seed to a site following fire, several key issues need to be explored. Do the seeded grasses (1) replace native species that were dominant or important members of the pre-fire flora, (2) competitively displace the local endemics, (3) alter the long-term ecosystem balance by changing wildlife cover, nesting, or breeding habitat, or (4) genetically dilute or swamp out the locally adapted genetic strain of the same native species?

Until more information is available on the ramifications of seeding with native grasses, a conservative approach may be the best course of action.

## **A Positive Outcome - The Highway 41 Fire**

In August 1994, an arson-caused fire burned 48,531 acres of San Luis Obispo County. This fire, which burned at a rate of two acres per second and was very hot in some areas, cost \$6.2 million to suppress. Numerous homes, buildings, and vehicles were destroyed, and large areas of wildland were blackened.

CDF and DFG worked together during and immediately following the fire. DFG involvement likely influenced seeding decisions in wildland areas, especially the decision not to seed Cuesta Ridge, a U.S. Forest

Service Botanic Area, where serpentine soils harbor Sargeant cypress and a number of sensitive plant species, including the State-listed Cuesta Pass checkerbloom (*Sidalcea hickmand ssp. anomala*).

Natural recovery of the native seedlings following this fire has been successful. In fact, many more rare plant seedlings were found following the fire than had been found in the previous two years<sup>2</sup>.

### Conclusion

Many changes are occurring in wildland fire policies and practices. The Department of Fish and Game, as well as the California Native Plant Society, now have seeding policies; these did not exist two years ago. Many government agencies and community organizations are working together for the first time through the California Fire Strategies Committee<sup>3</sup>, to find logical and scientifically founded approaches to fire management. Academic research in the discipline of fire ecology is increasing and being used in decision making. However, change does not happen as quickly as we sometimes would like, and there are issues at hand that go beyond the seeding debate.

Programs to reduce fuel loads through vegetation management techniques such as mechanical clearing, prescribed fires, and chemical treatments are being reviewed and amended by the California Department of Forestry and Fire Protection, the U.S. Forest Service, the California Department of Parks and Recreation, and the Bureau of Land Management. Through the California Fire Strategies Committee, agencies, communities, and other interested parties will have input on these programs.

California Exotic Pest Plant Council members can influence local development of these vegetation management programs by sharing their knowledge on exotic plants and appropriate levels of disturbances, by making sure local planning and community groups have appropriate expertise, and by creating ways to get information out to the public and resource management agencies.

Sound scientific information, analysis, and recommendations need to be presented to the public so that government agencies, citizens, and communities may understand and demand appropriate response to wildland fires. There is an inherent interest of most Californians to have protection from wildland fires and eroding slopes while simultaneously having protection for native animals, plants, and natural communities. This can only begin to happen when all interested parties have the proper information and then work together towards common goals. Public opinion ultimately directs decisions in agencies, so an educated and involved public results in wiser agency decisions.

### Literature Cited

- Barro, S.L. and S.G. Conard. 1987. Use of Ryegrass as an Emergency Revegetation Measure in Chaparral Ecosystems. USDA Forest Service. General Technical Report, PSW- 102.
- Beyers, J.L., T.A. Stewart, and C. Sharp. 1995. A Postfire Seeding Experiment at the San Diego Wild Animal Park in *Brushfires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 199-202.
- Conard, S.G., J.L. Beyers, and P.M. Wohlgemuth. 1995. Impacts of Postfire Grass Seeding on Chaparral Systems - What Do We Know and Where Do We Go From Here? in *Brush fires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 149-162.
- Florence, M. 1986. Plant Succession on Prescribed Burn Sites at Pinnacles National Monument. *Fremontia* 14(3):31-33.

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<sup>2</sup> The U.S. Forest Service carried out a monitoring program the two years preceding the fire.

<sup>3</sup> The California Fire Strategies Committee is composed of representatives from State and Federal government, and others from environmental, business, and citizen organizations. The Committee is dedicated to ecosystem-based management of California's fire-prone areas, actions and programs that assist in alleviating the threat of fire, and promotion of information on the ecology and management of wildland fires.

- Keeler-Wolf, T. 1995. Post-Fire Emergency Seeding and Conservation in Southern California Shrublands. in *Brushfires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 127-140.
- Keeler-Wolf, T. Personnel Communication. December 13, 1995.
- Keeley, J.E. and S.C. Keeley. 1986. Chaparral and Wildfires. *Fremontia* 14(3):18-21.
- Keeley, J.E. 1995. Postfire Management: Workshop Summary. in *Brushfires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 215-216.
- Spittler, T.E. 1995. Fire and the Debris Flow Potential of Winter Storms. in *Brushfires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 113-120.
- Stone, J.S. 1993. The Effects of Ryegrass Seeding on Chaparral Recovery and Woody Seedling Regeneration after Wildfire. Master's Thesis. California Polytechnic State University. 80 pages.
- Taskey, R.D., C.L. Curtis, and J. Stone. 1989. Wildfire, Ryegrass Seeding, and Watershed Rehabilitation. USDA Forest Service General Technical Report, PSW-109:115-124.
- Zedler, P.H., C.R. Gautier, and G.S. McMaster. 1983. Vegetation Change in Response to Extreme Events: the Effect of a Short Interval between Fires in California Chaparral and Coastal Scrub. *Ecology* 64(4):809-818.
- Zedler, P.H. 1995. Fire Frequency in Southern California Shrublands: Biological Effects and management Options in *Brushfires in California: Ecology and Resource Management*. Edited by J.E. Keeley and T. Scott. International Association of Wildland Fire. Pages 101-112.2