4.0 Prescribed Fire Program

The Southern Subregion ecosystem has been shaped by fire for thousands of years. The plants that thrive in this ecosystem are all fire adapted to the point that many of them require fire for their continued presence in this fire adapted ecosystem. The wildlife that inhabit these ecosystems are indirectly dependent upon fire to provide the habitats that these species require for continued survival. Therefore, any strategy for the management of the vegetation in the Southern Subregion must address the extent to which fire suppression and prescribed fire would be used on a planned and controlled basis.

4.1 Prescribed Fire

Prescribed fire is defined as: *"the skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc., that will allow confinement of the fire to a predetermined area and at the same time will produce the intensity of heat and rate of spread required to accomplish certain planned benefits to one or more objectives of silviculture, wildlife management, grazing, hazard reduction, etc."* (Chandler et al. 1983).

Prescribed fires fall into two categories, natural (unplanned) fires and managed (planned) ignitions as defined below:

4.1.1 Natural (Unplanned) Fire

Lightning-caused fires are an uncommon but a very possible event in the Southern Subregion. These unplanned types of fires usually do not occur under acceptable Orange County fire weather parameters conducive to wildland wildfire containment. The native vegetation is either too wet during a lighting storm or too dry to successfully plan for use of naturally ignited fires as a viable factor in shaping the ecosystem. Therefore, ignitions caused by lightning will not be utilized in the Southern Subregion.

Furthermore, any objective that could possibly be met by letting natural fires burn under a prescribed set of conditions can also be more safely accomplished in a controlled environment using prescribed fire as natural fires do not allow for the assemblage of monitoring and holding forces in a pre-planned manner.

4.1.2 Managed (Planned) Ignitions

Fires started by managed or planned ignition would be the primary source of prescribed fire in the Southern Subregion. OCFA and CDF, in order to meet the legal requirements of the State of California, have established the following guidelines. All prescribed burns must have written prescriptions and burn plans covering each specific burn unit.

4.2 Prescribed Fire Program Structure

All prescribed burning will be conducted with the aid of California's Vegetation Management Program (VMP). OCFA will provide resources and an overhead team for each planned burn. The RMVLC Reserve Manager and RMV staff will aid with individual plan completion and fire related monitoring for the proposed RMV Habitat Reserve lands within the Southern Subregion. It will be the responsibility of the RMVLC Reserve Manager staff to review monitoring results and make adaptations in the continued use of controlled fire based on the monitoring results. For the other non-RMV lands within the Southern Subregion, participating landowners and jurisdictions, as applicable, will aid in plan completion and fire related monitoring. (Please note that this plan, funded by Rancho Mission Viejo, provides OCFA a basic framework document for the Southern Subregion). While more specific to the Rancho Mission Viejo property, many details will need to be addressed for the remainder of the Southern Subregion property owners and managers.

The lands within the Southern Subregion are currently classified into one of five (5) prescribed fire management categories: 1) coastal sage scrub Management Sites, 2) Native Grassland Management Sites, 3) Chaparral/Shrub Restoration Sites, 4) Oak Woodland Sites, and 5) Protection of Life and Property Sites. Each of the prescribed fire management categories has objectives and prescriptions specific to that category.

4.2.1 Coastal Sage Scrub Management (A) Sites: These sites are identified as areas unoccupied by gnatcatchers in which low-density shrubs exist with a significant component of non-native grass cover. These sites would be burned selectively utilizing experimental research plots for the purpose of reducing the cover of non-native grasses and increasing the density of native coastal sage scrub species through scarification of existing seeds in the seed bank on sites with low density shrub cover and on sites formally occupied by coastal sage scrub species and now occupied by invasive non-native grasses.

Coastal sage scrub management sites are to be burned selectively within an experimental design aimed at defining seasonal and frequency effects. Post fire

grazing must be excluded from these sites in order to accurately monitor plant response to fire.

Initially, coastal sage scrub units could be burned as part of an experimental design addressing specific hypothesis. This effort would be aimed at determining if fire could be used to improve composition and structure of this community. These experimental treatments would focus on fire variables within the control of management. Selected units would be burned in different seasons and at varied fire intensities. Once germination of preferred coastal sage scrub plants occurs it is equally important to keep fire out of these sites for as long as it takes to replenish the seed bank.

Please refer back to Section 1.4 and Section 1.6.1 for a discussion of the adaptation of coastal sage scrub species to fire. This plant community is resilient to a wide range of fire intervals but probably not less than 12 years (2 El Nino cycles?). The coastal sage scrub plant community is comprised of a mix of seeders and sprouters. Post-fire seeding can be prolific. Many newly germinated seedlings will die due to fierce competition for available water from exotic grasses. Fire is a tool that has reduced such competition while promoting regeneration of desired species and nutrient cycling.

Regarding a coastal sage scrub experimental design looking at seasonal and interval effects.

The stand and fire history need to be characterized well in advance of any burn in order to provide good baseline data for the experiment. What are the dominant species by stand? Which stands are more diverse than others in overstory, understory, and gap-dependent species? Which stands harbor gnatcatchers and which do not? Are we managing for a self-sustaining, resilient, biodiverse community? Should adaptive management favor gnatcatchers and other closed-canopy species? In addition to gnatcatchers, should we be managing for some stands with a diverse forb and other herbaceous component in combination with wildlife that depend on this type of plant community structure? The gnatcatcher prefers a closed canopy condition with a predominance of California sagebrush or sagebrush and California buckwheat but this is only one of a number of conditions for coastal sage scrub that are within its range of resilience and that benefit diversity.

Focal species selection is stressor-based, that is, fire sensitive species selected would be the ones most at risk from altered fire regimes or large fires or no fires, etc., especially in combination with drought and invasives. For example, ceanothus and other obligate seeders, species that depend on an intermediate regime; canopy-dependent birds, etc. Most at risk are short-lived, relatively sedentary, and plant

dependent species that could be adversely affected by exotic competition, such as butterflies. Species such as the California thrasher and wrentits may be less resilient than the gnatcatcher to fires. The gnatcatcher is probably most vulnerable due to low numbers overall. The main objective is to not lose all of the available habitat all at once, and insure that all burns stay patchy.

Experiments regarding the control of exotic grasses, especially in the matrix or periphery of coastal sage scrub should involve experiments with season. Early spring burns are expected to have the maximum negative impact on exotic grasses. Spring burns just prior to seed dispersal are best for eliminating exotic grasses. This should depress the competition for the coastal sage forbs by opening up the grass canopy, reducing mulch, and fostering growth of perennial grasses. This may also adversely impact native forbs if they are co-existing with the grasses, but their seed is generally less vulnerable to fire.

The alternative is a fall burn, which can help reduce the crop of live seed that is already on the ground and reduce the accumulation of thatch, but much of the seed may already be buried. This situation may require a follow-up burn to control the exotics. In some locations, the downside risk is creating conditions that foster dominance by filaree *(Erodium* sp.).

Very limited experimental stand thinning could be tried to improve forb understory or habitat quality and improve populations of target wildlife species, such as insects/butterflies. Very limited experimental stand thinning could also focus on native small mammals (Spencer, Wayne D. 2000. Planning for Biodiversity: Bringing Research and Management Together), but the effect is less direct. Mammals are looking mostly at structure, in some cases availability of seed. In contrast, insects are more likely to have host plant dependencies.

Another experimental management objective would be to reduce the number of laurel sumac plants in coastal sage scrub stands, since sumac seems to act as an impediment to occupation by the gnatcatcher based on data collected at Camp Pendleton and the Fallbrook Naval Weapons Station. Because this is an obligate sprouter, repeated fire only encourages the spread of sumac. Laurel sumac is often the first post fire plant observed on burned over areas. This species should be spot sprayed to reduce its presence in coastal sage scrub habitats unoccupied by gnatcatchers.

4.2.2 Native Grassland Management (B) Sites: These sites are proposed to be managed by moderate intensity, high frequency fire events. Native Grassland sites will

focus on maintenance of open grassland communities, providing habitat for grassland-dependent species.

Again, before any large landscape scale burns are initiated, a series of experimental plots will be utilized for the purpose of determining plant response, control of non-native invasives and restoration and/or perpetuation of native grasses. Fall burning will be favored for most grassland within Southern Subregion areas. The initial fire intervals will be annually for three (3) years or less. The initial period of burning may be thought of as a restoration phase. As the site is treated with fire and species composition targets are neared, a fire regime more closely resembling the historic pattern of fire may be implemented.

During this period of burning both the season and frequency of fire events will be variable, based on the objectives for that particular site. Though weighted towards the fall, spring and winter burns may also occur when the larger seeds of exotic grasses are more vulnerable. After the initial 3 year burn cycle a mean fire rotation of 10 years is recommended during which units may burn multiple times or not at all during any 10 year period.

4.2.3 Chaparral/Shrub Management (C) Sites: Due to the wildland wildfire frequency, the VMP burns executed in the late 1980's and the early 1990's and the Ranch's cattle grazing program it is doubtful that any Chaparral/Shrub Management sites exist on the Rancho Mission Viejo property. However, other higher elevation portions of the Southern Subregion may very well support Chaparral/Shrub sites. The objective would be to target Chaparral/Shrub habitats, while avoiding oak woodlands and riparian habitats. The goal would be a patchy burn (50-70% fuel volume consumption) with varying low to moderate fire intensities on a thirty (30) year rotation. The State Vegetative Management Program (VMP) conducted by the OCFA is the most likely vehicle for accomplishing Rx burns on Chaparral/Shrub sites. The VMP provides protection against liability for the cooperating landowner.

Whether to burn in chaparral areas should be determined by the following questions in the context of the AMP:

- Does fuel condition reflect a natural range of variation in terms of patch size and intervals (probably no less than 25 years to ensure obligate seeder build up sufficient seed bank to replace themselves)?
- Are obligate seeders present or is the stand dominated by post-fire sprouters?
- How does their presence in stands relate to fire history?
- Does the composition and structure of the various stands reflect known fire history?

- Are understory species present and diverse?
- Is chaparral dominated by tall canopy species?
- Are any species dying due to age?
- Is there a variation in composition of the community that can be related to fire history?

The treatment objective would be to break up large continuous stands of even-age chaparral fuels and the resulting accumulation of dead fuels for fuel management purposes. Younger stands of non-continuous chaparral fuels with full crown closure and an absence of ground fuels are much more resilient to stand replacement wildfires.

4.2.4 Oak Woodland Management (D) Sites: Historically low to moderate intensity wildfires burned beneath oak woodland stands, reducing the amount of shrub like vegetation that could lead to crown fires and encouraging the propagation of native grassland species. Prescribed fire would be utilized to continue the presence of fire beneath these oak woodland stands on a controlled basis.

4.2.5 Protection of Life and Property (E) Sites: These sites are a mix of vegetation types in which prescribed burning may provide both fire protection for life and property and natural resource values. Some units close to planned and existing residential areas may require additional pre-fire modifications to the vegetation (e.g. crushing, thinning, and limited mowing). Fire may also be used in combination with herbicides to increase the effectiveness of both fire and herbicides as management tools.

Burn treatments, described below, will be coordinated with activities defined in the Southern Subregion's coastal sage scrub, native grassland, oak woodland and chaparral/shrub restoration and enhancement planning.

4.3 Justification

The Adaptive Management Program in *Part I, Chapter 7* recognizes the role of fire within a Mediterranean ecosystem. As previously stated, past fire events have played a decisive role in the origin and maintenance of the Southern Subregion's current plant and animal communities. This alone does not justify the use of prescribed fire, but it does imply a need to consider fire use as a tool in an overall effort to manage the Southern Subregion ecosystem. Current literature, contemporary knowledge and the Southern Subregion's fire history also supports the consideration and potential use of prescribed fire as an adaptive management measure within the Subregion.

Although some alternatives are available, substituting the natural ecological role of fire with mechanical, chemical, or grazing treatments is not feasible over the long run. The synergistic effects of fire on any given ecosystem are complex. Charring of duff, increased insolation, heating of soils, smoke moving through vegetation layers, injuring and top killing individual plants, immediately available nutrient release and many other impacts occur during a fire event. The complexity of fire regimes is increased by the variability of fire events. Fire intensities, burn severity and fire size will vary with weather, fuel conditions, and ignition patterns. Though there will be many situations in which the use of fire is not the best management practice, it is impossible to duplicate all of the beneficial influences of a long-term pattern of fire on the wildland landscape.

With the terrain and fuel features that exist within the Southern Subregion's boundaries, prescribed fire is also considered the cheapest of all fuel management alternatives. Though cost per acre will vary between units, an average cost range of $150 to $1,500 acre, depending on the complexity of the burn, can be expected for grassland, oak woodland and chaparral prescribed burns.

Prescribed fire may be used both: **(1)** experimentally for research purposes to determine the effects of planned and controlled fire on specific species and habitats; and **(2)** strategically for fuel management purposes to protect a minimum acreage of coastal sage scrub habitat that exhibits desired continuity, diversity, and age structure to avoid catastrophic loss of large acreages of coastal sage scrub vegetation to one or more large Santa Ana wind driven wildfires within the Southern Subregion.

4.4 Prescribed Fire Prescription Matrix

Table 4-1: This Prescribed Fire Prescription Matrix is presented to assist fire agencies and land managers in their planning of prescribed fire use within the various fuel models and fire weather parameters. Table 4-1 depicts a range of weather parameters, which will allow for both low and moderate wildland fire behavior intensities.

Table 4-1

Prescribed Fire Prescription Matrix For Native Grassland Restoration & Maintenance, and Coastal Sage Scrub Restoration & Maintenance[2]			
Fuel Model	1	1	2, 6 & 4
Vegetation	Grasslands	Restoration	Coastal Sage Scrub
Air Temperature (F)	**60-90**	**60-90**	**40-95**
Relative Humidity (%)	60-30	70-20	30-60
Wind Speed (mph @ 20ft)	4-8	4-8	5-8
Wind Speed (mph @ mid-fl)	1-4	2-4	2-5
1 hr Fuel Moisture (%)	**5-9**	**5-9**	**6-16**
10 hr Fuel Moisture (%)	**N/A**	**N/A**	**10-17**
Live Herbaceous Fuel Moisture (%)			100-300

[2] Fuel Models are described in Part II, page 2-23.

Fuel Moistures are described in a footnote in Part I, page 1-50.

Wind speeds are measured at a standard height of 20 feet by an anemometer and are adjusted downward to obtain the mid flame wind speed. The difference in wind speeds at 20 feet and at mid flame are due to the friction or drag of existing surface vegetation and the earths surface, which slows the wind speed.

A head fire is the front or leading edge of the fire, the flanks are the edges of the fire on either side of the advancing head of the fire, lateral spread of the flanks are much less than the head and are the locations where wildland firefighters can be most effective in gaining control of an uncontained wildfire.

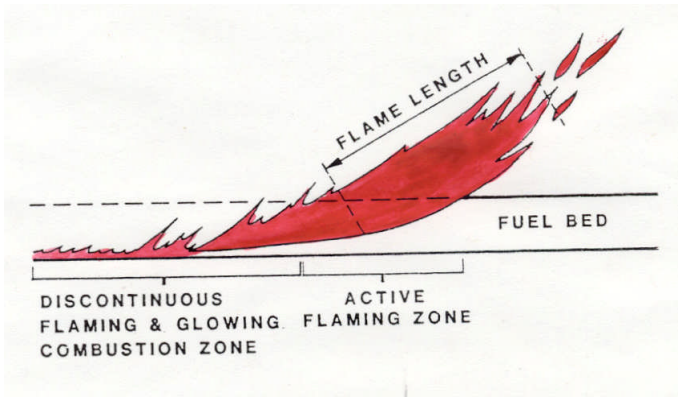
A backing fire is the back end of the fireline, fire spread is very slow as the wildfire is backing into the wind, or backing downhill in the face of an upslope wind generated by daytime heating and rising of warmer air, or an upslope wind created by the fire.

Flame lengths come up for lots of discussion among firefighters, however, each firefighter has their own interpretation of what constitutes “the flame length”. As can be seen on the following page, flame length is a very distinct measurement. The following graphic illustration is the fire behavior scientist’s definition of flame length, developed by the BEHAVE Program scientist’s so that all firefighters are using the same point of reference when describing observed flame lengths.

Live Woody Fuel Moisture (%)			100-200
Head Fire:			
Rate of Spread (ft/min)	10-42	8-33	7-30
Flame Length (in feet)	3-8	3-8	6-22
Backing Fire			
Rate of Spread (ft/min)	3-5	3-5	3-5
Flame Length (in feet)	1-3	1-5	8-11

↑ **Photo 2-1: Typical Chaparral Fire Behavior burning under a 10-15 MPH upslope wind in a Fuel Model 4.**

WIND→



↑ **Figure 1: A graphic depiction of Flame Length (expressed in feet)**

Figure N-9

4.5 Prescribed Fire Planning Model (Figure N-10)

The following flow chart depicts two options for the use of Prescribed Fire and various elements within the Prescribed Fire Planning Model:

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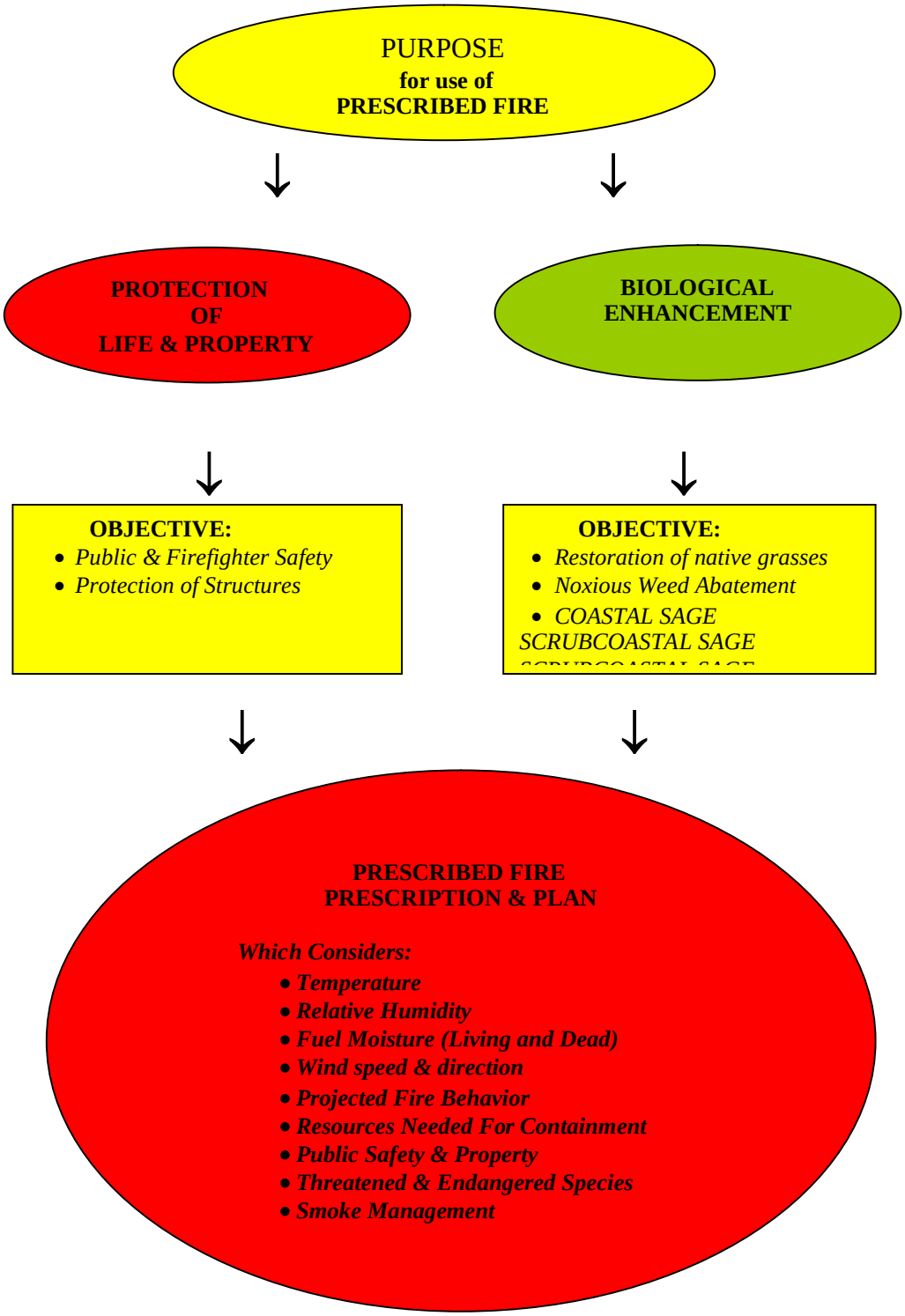

4.6 Pre-burn Planning Process and Checklist

4.6.1 Action Items 9 to 12 Months In Advance of Project

Item	Date Completed
Select burn site that meets Adaptive Management Objectives	
If VMP, sign up landowners	
Environmental review, wildlife, archaeology	
Confer with U.S. Fish & Wildlife Service	
Confer with California Fish & Game	

4.6.2 Action Items 6 to 9 Months in Advance of Project

Item	Date Completed
Develop burn plan and obtain burn permit	
Develop contingency plans	
Get burn plan approved by CDF if VMP burn through OCFA	
Establish pre and post fire photo points and permanently monument	
Construct hand lines, or dozer lines if needed, around perimeters	
Designate secondary control lines and safety zones	
Contact Southern California Edison or your utility company	

4.6.3 Action Items 3 to 6 Months in Advance of Project

Item	Date Completed
Develop list of required resources and volunteer help	
Involve Information Officer	
Develop Smoke Management Plan	
Approval from Air Quality Management District	
Develop contact list for prescribe burn opportunities	
Training opportunities identified with OCFA for OCFA personnel	

4.6.4 Action Items 1 to 3 Months in Advance of Project

Item	Date Completed
Set up portable weather station (Micro RAWS)	
Set up fuel stick at a representative site	
Take fuel moisture samples every 10 days (live and dead)	
Take pre-fire photos from monumented photo points (steel fence posts)	
Develop Incident Action Plan	
Develop large briefing map	
Do fire prediction calculations	
Organize staff duties: phones, weather, biological, rovers	
Designate Landing Zone for medical emergency	
Complete handlines and interior edge preparation	
Develop test burn site	
Entry permits and gate keys issued	
Access closures for the public	
Identify radio and cell phone blind spots	
Do fire behavior predictions	
Do pre-burn vegetation transects	
Survey for nesting birds within the unit *****	

* Note: the burn will be postponed if federally listed nesting birds are found immediately adjacent to or within the planned burn area.

4.6.5 Action Items For the Last Week Prior to Project

Item	Date Completed
Send notifications to neighbors	
Send Press Release to local media	
Order radios from communication section	
Complete ICS forms and briefing package (Incident Action Plan)	
Put Drop Point signs in place	
Drip torches and extra parts and fuel are ready	
Have Prescribe Burn signs ready	
Move porta-potties in place	
Burn cache inventory	
Weather personnel placement	

Lookout placement	
Plan for fluids, food and coffee	
Phone list of neighbors day before and day of burn	
Call AQMD day before and day of	
Fax copy of Incident Action Plan to ECC	
Set up Check-in	
Contact Local Fire Agencies (done by dispatch center)	
Post Prescribe Burn Signs	
Conduct Operational Briefing	
Staging area organization	
Do Go-No Go Check List	
Do Test Burn	

4.6.6 "Go/No Go" check list

(All items must be checked yes before the burn project can proceed)

Item	**YES**	**NO**
Prescribed burn plan (Incident Action Plan) completed and approved by appropriate jurisdictional authority(s)		
On site weather observations from preceding days indicate project will be in prescription		
Agreements with cooperating authorities are signed		
Public has been notified through Newspaper and postings on roads near the site		
OCFA and Orange County Sheriffs 911 Dispatchers notified		
Site specific current and long range weather forecasts received		
Medical Plan completed and nearest burn center location noted		
Med Evac notified about the location of the project and nearest heliport, all transmission and telephone lines are clearly marked on the map that OCFA and the Med Evac personnel have received		
Sufficient funding is on hand to execute the burning and mop up of the project		
A qualified Fire Behavior Officer is on site to take on going weather observations		
An organization chart indicating assignments is available for the pre fire briefing		
Radio communication is available for all personnel assigned to the project		
Air to ground radio frequencies are established		
All holding forces are available for initiation of the project and have been briefed		
All required equipment is in position and working properly		
The back up plan (fire suppression plan in the event of an escape) has been explained at the pre fire briefing		

A specific person is assigned on site to brief visitors and the press		
A specific person (s) is assigned to take photos and is wearing protective clothing		
A safety briefing has been given to all personnel assigned to the project		

IF ALL ITEMS ARE MARKED "YES" THE TEST BURN CAN BE INITIATED

NOTE AND RECORD THE FOLLOWING ITEMS AS THE TEST BURN PRODEEDS

Location of test fire:_____

Time of test fire:_____

Results of test fire (Note flame length and rate of spread in ft/min):

_____

Item	**YES**	**NO**
Are the fuels and weather conditions representative of the burn unit?		
Is the fire behavior and smoke dispersal within the prescription parameters?		
With the existing holding forces, is fire behavior within means of control?		
Do test burn results indicate the burn objectives will be met?		
THE TEST BURN WAS SUCCESSFUL?		

IF TEST BURN WAS SUCCESSFUL, PROCEED WITH THE BURN

RX BURN BOSS:_____ DATE:_____

IGNITION SPECIALIST:_____

HOLDING OPERATIONS SUPERVISOR:_____

4.7 Post Burn Evaluation

Item	**Date Completed**
Do Post Burn Analysis and survey for dead species	
Take post fire photos from monumented photo points	
Do short Post Burn Report	
1. What we did	

2. What we burned	
3. How many acres	
4. Where the Management Objectives Obtained	
5. What didn't burn and why	
Operational debriefing conducted as a learning tool	

All prescribed burn units would require baseline monitoring for birds, reptiles and vegetation prior to initiation of the prescribed burn. Post burn monitoring would occur for at least two years following treatment with prescribed fire to capture positive and negative ecosystem responses to the burn with post fire photos taken from the monumented photo points to document the vegetation responses following the prescribed burn.