

3. FIRE MANAGEMENT PROGRAM COMPONENTS

The fire management plan addresses strategies for reducing the accumulation of hazardous fuels in specific areas and for abating hazardous fire conditions resulting from past fire suppression programs, expansion of urbanization to park borders, or establishment of non-native, invasive plants. These strategies will entail strategic planning, interdisciplinary coordination, and inter-organizational collaboration as needed to provide appropriate treatment using adaptive management practices that range from site specific to landscape level. Fire management planning will also include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met and to improve future fire management. Fire education and communication are critical components of all preventive fire management planning and allow for communication of hazardous fuel reduction and fire prevention strategies across park boundaries.

Although prescribed fire remains the preferred and most widely used NPS tool for managing the accumulation of hazardous fuels, fire management planning will incorporate other activities, such as manual, mechanical, biological and, rarely, chemical treatments (applying integrated pest management principles), that may be appropriate in specific instances, as guided by NPS and DOI policies and legal requirement.

All components of fire management planning, including suppression, prescribed fire, or mechanical fuel reduction, will factor in the protection of natural and cultural resources, while maintaining that safety of employees and private citizens.

3.1 DESIGNATION OF WILDLAND FIRE PROTECTION RESPONSIBILITY

Federal land management agencies own and administer 48 million acres in California and have wildland fire protection responsibility for these lands designated as the Federal Responsibility Area (FRA). For GGNRA, the NPS FRA includes all lands managed by the NPS within the GGNRA legislative boundary. Unincorporated areas of the State of California, excluding the federal lands, are within the State Responsibility Area (SRA). The SRA is mainly privately owned forestlands, watersheds, rangelands, unincorporated communities with some non-federal public owned lands.

The federal agencies and Cal Fire, in conformance with their "Cooperative Fire Protection Agreement", have examine the unincorporated lands in the State and identified areas of the FRA and SRA where an exchange of wildland fire responsibilities would improve overall firefighting capabilities. The redrawn boundaries that result from the exchange define the "Direct Protection Area" (DPA) for an agency – the area of primary responsibility delineated by practical boundaries regardless of ownership. The objective of the DPA is to maximize on efficiency and effectiveness of each jurisdiction's resources. For example, if Cal Fire can only access a group of privately owned parcels in the SRA via an NPS road, it may make more sense for these parcels to be protected

by NPS firefighters who have a quicker response time. The exchange of responsibility is formalized by an agreement signed between the agencies.

3.2 GENERAL IMPLEMENTATION PROCEDURES FOR SUPPRESSION ACTIONS

All wildland fires will receive prompt and aggressive initial attack action to reduce burned acreage and protect improvements and residences in close proximity to wildland fuels (NPS 2006b). The objective of wildland fire suppression, as an integral part of wildland fire management in the NPS, is to manage wildland fires safely and efficiently to accomplish protection objectives. It is integrated into land and resource management plans and activities on a landscape scale, across agency boundaries, and is based on best available science. Protection priorities are (1) human life and (2) property and natural/cultural resources (NPS 2005b).

Federal agencies and Cal Fire have entered into Cooperative Fire Protection Agreements which provide for interagency cooperation. Because GGNRA has limited fire management capabilities, most suppression activities will be accomplished in

conjunction with the local fire agencies. Wildland fire suppression is accomplished by the closest available resources, whether federal, state or local government agencies through cooperative agreements. For GGNRA, Cal Fire and its mutual aid partners provide aggressive initial response and assume interim Incident Command of initial attack actions until a qualified federal Incident Commander and personnel arrives to assume Unified Command of the incident.

Under all circumstances, the NPS Incident Commander (IC) must be qualified for the complexity of the wildland fire incident. The GOGA-PORE Incident Complexity Analysis for Type 4 and 5 Incidents shall be used to determine the complexity of the incident. (see Appendix A, Part 12).

Within the boundary of the park, all wildland fires will be suppressed according to federal and local government protocols as determined by the Unified Incident Commanders. Federal actions will be consistent with direction provided in RM #18, Director's Order #60 Aviation Management (2003) and Interagency Standards for Fire and Fire Aviation Operations (NIFC 2006).

Agencies that have been given direct protection responsibility have the option of not requesting NPS tactical resources if they so desire. NPS units may have a delayed response that could be as much as four to twelve hours. Depending upon the severity



of the fire, NPS resources will provide liaison and agency representation, develop rehabilitation plans and provide tactical resources as requested by Cal Fire. Other fire agencies may be called upon by Cal Fire through its mutual aid agreements. If qualified for wildland firefighting, the Presidio Fire Department (the structural fire agency for GGNRA) will provide suppression assistance, as requested by the GGNRA wildland fire staff.

An Agency Representative will be requested to proceed to all fires or to fires that have the potential to spread into NPS lands. The Agency Representative is responsible for requesting a Resource Advisor through the Incident Ordering Point (ex., CAL FIRE Felton EEC) through Park Dispatch and/or the Fire Management Office.

The Resource Advisor will assist in identifying sensitive resources and provide input on appropriate actions to minimize the impacts to these resources. The Agency Representative will work through the IC whose agency has the DPA responsibility to emphasize those concerns and implement appropriate actions.

3.3 AGREEMENTS GOVERNING SUPPRESSION ACTIONS

In Marin County, all suppression activities on federal lands will be managed in cooperation with Marin County Fire Department, the Southern Marin Fire Protection District and other local government fire agencies. Due to the proximity of numerous local government and Cal Fire jurisdictional protection areas, Unified Command with Marin County Fire Department is often required for actual or potential multi-jurisdictional threats.

If qualified for wildland fire response, the Presidio Fire Department Station at Fort Cronkhite could respond to wildland fires as initial attack at Fort Baker, Fort Barry, Fort Cronkhite and the Capehart Housing area as well as Conzelman Road (M. Kiolassa, Ass't Chief, Presidio Fire Dept., pers. comm. 3/4/08).

Woodacre Emergency Command Center (ECC) is responsible for contacting the appropriate fire management or law enforcement personnel to respond to a report of a wildland fire. Typically the Fire Management Officer, Fire Duty Officer or Chief Ranger (as qualified), responds to the Incident Command Post and serves as a Unified Incident Commander, Agency Representative or Resource Advisor (as qualified). Other NPS fire resources will respond depending upon availability.

In City and County of San Francisco. The closest available fire resource will be dispatched along with NPS units. All fires will be managed using ICS. The Presidio Fire Department responds to structural and wildfire in the Presidio (both NPS and Presidio Trust jurisdictions), Fort Mason, Aquatic Park, Fort Point and, through a separate agreement, the San Francisco Maritime Museum. Through a mutual aid agreement with the Presidio Fire Department, the San Francisco Fire Department provides first response services to the Ocean Beach corridor, including Fort Funston, and Lands End, Sutro Heights, and Fort Miley (M. Kiolassa, Ass't Chief, Presidio Fire Dept., pers. comm. 3/4/08).

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In San Mateo County. NPS lands in San Mateo County are the Phleger Estate, Sweeney Ridge, Cattle Hill, Pedro Point, Mori Point and Milagra Ridge. With the exception of Phleger Estate, adjacent to the Town of Woodside at the southern limits of San Mateo County, the remaining NPS areas are clustered around the City of Pacifica in northern San Mateo County and occupy coastal bluffs, slopes and ridgetops.

The San Francisco Peninsula Watershed, situated between Sweeney Ridge to the north and the Phleger Estate to the south, is an SRA land managed by the San Francisco Public Utilities Commission. Watershed management personnel of the Peninsula Watershed are equipped with wildland fire patrol units and can provide limited immediate response to wildland fires on NPS lands adjacent to Peninsula Watershed lands (T. Ramirez, pers. comm. 12/05/06).

The NPS is currently negotiating an agreement with Cal Fire whereby that agency would add all NPS properties in San Mateo County to the Cal Fire DPA. The agreement conforms to the requirements of the Master Cooperative Wildland Fire Management and Stafford Act Response Agreement between the State of California and federal land management agencies with holdings in California. In turn, once this interagency agreement is adopted, those mutual aid agreements that local fire departments in the County have with Cal Fire would apply to the Cal Fire DPA revised to include the NPS lands.

3.4 Minimum Impact Suppression Tactics

The policy at GGNRA is to suppress all unplanned ignitions using Minimum Impact Suppression Tactics (MIST) to the extent feasible given the constraints along the urban interface. Suppression of fires will be aggressive and will be conducted with the highest regard for human safety. MIST Guidelines for GGNRA are in FMP Appendix A, Part 9.

Suppression will be accomplished through a combination of cooperative agreements with local fire agencies and qualified park fire personnel. Annual operating plans will identify individual suppression concerns in order to minimize suppression impacts. Furthermore, all control efforts will be evaluated for consideration of effects on resource values.

3.5 PREPAREDNESS ACTIONS

The term “preparedness” refers to activities that lead to a safe, efficient and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

The Network approach to the Fire Management Program requires, close coordination and operational consistency with PRNS in preparation for fire season is important. The FMOs from each unit should meet on a regular basis to coordinate preparedness activities, establish joint projects and procedures for wildland fire, mechanical fuels reduction and prescribed fire, readiness, funding issues, problem areas, and other items.

The following items will be reviewed annually by the GGNRA FMO:

- Conduct preparedness review.
- Prepare mutual severity needs analysis for coming fire season when conditions exceed those of a normal fire year (consider: pre-positioning of suppression resources; augmentation and support outside local organization needed).
- Review new policies, roles and responsibilities.
- Review and update as necessary all delegations of authority and Agency Administrator Briefing Package.
- Identify any mutual safety issues and mitigating actions required.
- Clarify mutual criteria for team transitions, managing mutual multiple fire activity.
- Update WFSAs and designate ID teams for preparing WFSAs for fires which escape initial attack.
- Develop mutual and integrated action items to implement staffing levels (Ref: Step-up Plan).
- Identify strategies to communicate fire program principles to cooperators and publics (Red Flag alerts, severity, closures, etc.).
- Agree on mutual standards to evaluate performance of the preparedness operations within the Bay Area National Parks Network.
- Address other issues requiring coordination.

3.5.1 Fire Prevention

Prevention objectives for the planning area will include:

- Reduce the number of human-caused wildland fires.
- Integrate fire prevention messages into a variety of programs, ranger activities, and local media, targeting the community, schools, visitors, and landowners.
- Coordinate fire prevention efforts with all cooperators and affected landowners.
- Prepare and post prevention-related signs and messages.

3.5.1.1 Training and Fire Readiness

The purpose of wildland and prescribed fire training is to promote safe and effective individual performance in accomplishing fire management goals and objectives.

All wildland fire personnel will be qualified and certified for the position(s) assigned, according to the Wildland and Prescribed Fire Qualifications System Guide (PMS 310-1, 2006). The Interagency Standards for Fire and Fire Aviation Operations, Chapter 2, "Requirements for Fire Management Positions" details additional requirements for fire positions (NIFC 2006). Reference Manual #18 (NPS 2006b) and Director's Order #18 (NPS 2005) provide the guidelines for training and readiness.

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All employees involved in wildland fire and prescribed fire operations will have their qualification records entered into and maintained annually in the Incident Qualification and Certification System (IQCS) and ROSS.

Refresher courses (firefighter safety, basic aviation operations, etc) and other required annual training will be coordinated by qualified staff and held annually.

Readiness actions (in addition to those listed above) are described below.

- Fire caches and equipment shall be inspected and documented for completeness and serviceability on a pre-season and fire season basis.
- Ensure timely follow-up actions to preparedness inspections.
- GGNRA will maintain supplies, materials, and equipment at the Fire Cache at the Fort Cronkhite Fire Management Office to meet normal fire-year requirements for two Type 6 engines. Minimum staffing during fire season includes 1-Duty Officer, 1-Engine Operator and 1-Firefighter for 5 days/week coverage. Per Interagency Red Book, this minimal staffing allows for response to in-park incidents only. Preferred and optimal staffing includes the 1-Duty Officer, 1-Engine Boss/Engine Module Leader, 1-Engine Operator and 1-Firefighter for 7 days/week coverage. This optimal staffing allows for the full range of wildland responses both in-park and out-of-park.

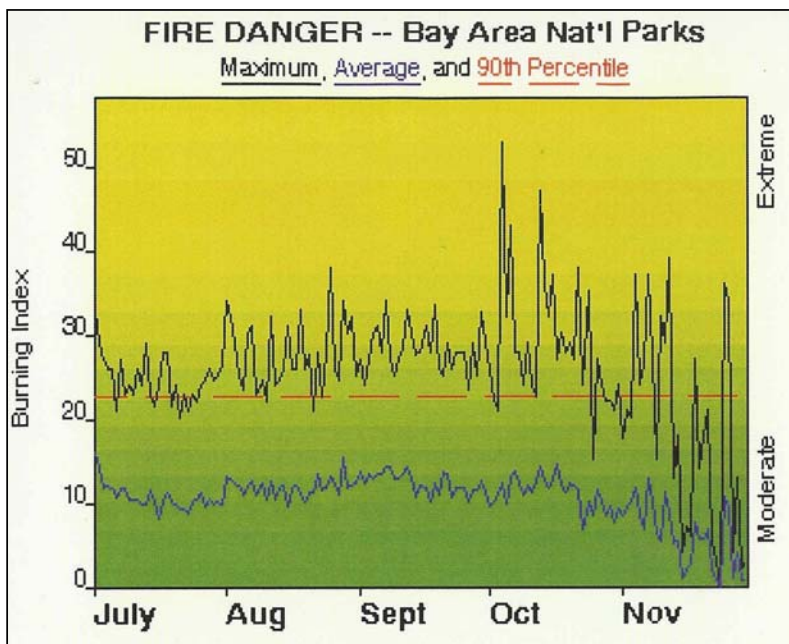
The following preparedness activity schedule will be followed annually as appropriate:

1. Year-round: NFDRS Weather Station (#042308) monitored daily.
2. Annually: Local Preparedness Review.
3. May 1: Annual Operating Plan (AOP) between Marin County Fire Department will be updated and agreed to by all parties.
4. May 1: Annual Operating Plans will be updated with Cal Fire for San Mateo County.
5. May 1 – June 15: All fire line qualified permanent personnel will take the Work Capacity Test; seasonal personnel will be tested upon entering on duty.
6. May 1 – June 30: All GGNRA Red Carded employees will have completed both annual refresher and Work Capacity Test.
7. May 1 – July 30: Red Cards will be signed by FMO and distributed to employees.
8. June 15 – 30: All engines and support equipment will be serviced and fire-ready; Step-Up Plan reviewed and updated.
9. May 15 – June 30: Training for all seasonal employees completed, including mandatory refresher for all carded employees.
10. May 1 – end of season: Roster of all fire qualified personnel maintained, with PPE/initial attack gear/Red pack ready for two-hour callout.

11. July 15: Annual Preparedness Review (RM#18 & 2006 Interagency Standards for Fire and Fire and Fire Aviation Operations, Chapter 19).
12. November 15: Fire Training and Experience Records will be entered in IQCS for permanent employees.
13. November 31: Equipment winterized, cache inventoried, post-season reviews and reports completed.

California Seasonal and Monthly Outlooks, prepared by the Northern California Geographical Area Predictive Services Unit will be analyzed as early as conditions

Figure 17 – Monthly Burning Index Levels (1981 – 2000)



warrant before and during fire season. Severity funding requests, if indicated from the Outlooks, should also be prepared and finalized in coordination with PRNS. Submissions will move through agency fire channels to Fire Program Staff at the Regional Office. Refer to Interagency Standards for Fire and Fire Aviation Operations, Chapter 9 (NIFC 2006), and/or RM #18, Chapter 18 (NPS 2006b).

3.5.1.2 Fire Weather and Fire Danger

Following the cessation of

winter rains in mid-April, fuels dry rapidly and the light fuels of the annual grassland (2,000 - 7,000 lbs/acre) cure and live, dead and downed round wood material and duff in the understory of the forest stands gradually lose moisture.

Fire season at GGNRA begins in early June. At this time, high-pressure air masses frequently stagnate over the Great Basin. Strong foehn winds, referred to as Mono winds in central California, may develop if there is a low-pressure trough off the coast. These winds bring warm, dry air to the central coast and cause rapid drying of fuels. These episodes usually last 1-2 days and fire danger can be extreme. In typical years, a persistent coastal fog bank is formed by July 1, following the stabilization of the Pacific high over central California. From July through early September, fog moves inland and back out to sea in a 3-4 day cycle in response to heating and cooling in California's Central Valley. Fine fuel moisture fluctuates in this cycle, while wood fuels and duff remain relatively wet. In mid-September the fog pattern changes and fuel moistures drop steadily. It is at this time that conditions contributing to Mono winds occur. The

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combination of prolonged drought, low relative humidity and a peak in fuel production often causes fire danger to be high through September and October. In addition, almost one fifth of the area's annual lightning storms occur during this period (Martin and Sugnet, 1984).

In summary, the fire season at GGNRA differs somewhat from most areas in the western United States. Bimodal peaks of fire danger occur in late spring and late summer/early fall. In most years, persistent fog keeps fire danger moderate in July and August when danger is highest in most of the western United States. The period from September 1 through October 31 can be considered the most critical time of fire danger for GGNRA (see Figure 17, Monthly Burning Index Levels). Figure 17 displays the FireFamily Plus Analysis for the FMP area indicating the periods when burning indices are at average, maximum and 90th percentile.

3.5.1.3 Range Of Potential Fire Behavior

All of the wildland fuels complexes represented at GGNRA display a range of fire behavior; the most typical are described below.

- May and June. Creeping ground fires in herbaceous litter and underlying duff with overall lighter fuels and soil moistures such as early in the fire season.
- July. Surface fire spread with active flame front generally occurs during periods of lowering fuel moistures.
- August and Early September. Active surface fire spread with torching, short range spotting, usually due to higher frontal winds and/or lower humidity.
- September and October. Running surface fire with torching, intermittent or sustained crown fire, short and long-range spotting under high winds, low humidity, low foliar and surface fuel moistures, during north and east wind conditions where indices can be over the 90th percentile.

Typical fire behavior for predominant vegetation types during the fire season at GGNRA are described below.

- Grasslands. The critical concern in this vegetation type is the rate of spread and ease of ignition with grasslands acting as a vector to ignite other vegetation types. This is one of the most dangerous wildfire types for firefighter safety due to its rapid frontal spread under dry and windy conditions. Production of airborne embers ahead of the flame front is not typical due to the rapid rate of spread.
- Brush and Scrub Dominated Communities. The Coastal Scrub vegetation types tend to be difficult to ignite. However, once ignited, fires in this community are difficult to suppress due to the dense stands and presence of volatile oils that make them burn faster and hotter.
- Non-native Evergreen Forests. The ignition potential of these forests is very high and directly related to the depth of the litter and dead materials on the ground. A continuity of fuel from the ground to the crown of the forest and the

potential for a crown fire to occur is the highest risk factor associated with the 340 acres of eucalyptus in GGNRA-managed lands.

- Hardwood forest. This vegetation type with a closed canopy presents a lower risk for wildland fire due to its relatively light surface fuels and moderate ignition potential is moderate due to the fairly continuous canopy cover. Fire behavior is dependent on the buildup of surface fuels and dead materials within the tree that can carry fire to the crown.
- Redwood/Douglas fir forest – Due to high coastal precipitation and summertime fog drip, wildland fire concerns for this plant community are focused on the extreme weather conditions that develop with offshore winds (Diablo winds) typically in late fall. Accumulations of dead and downed material can increase hazardous fuels and lead to an increased risk of fire during drier time periods. Some of this forest is bounded by eucalyptus groves and/or dense stands of exotics such as French broom. A fire in these adjacent areas with heavy fuels could result in an abnormally hot and fast fire that spreads into the neighboring redwood/fir forest with a higher than expected heat intensity than would be developed under similar environmental conditions in native scrub.
- Riparian forest, shrubland and herbaceous wetlands. The behavior of fire in this type of vegetation can be fairly benign due to high fuel moistures and high humidity, however at certain times of the year significant fire behavior can occur.

3.5.1.4 Weather Stations

GGNRA covers such a wide area across three counties that no single Remote Automated Weather Station (RAWS) could provide accurate fire weather. To increase the range of weather data that is available park-wide three primary RAWS sites can be accessed.

The Barnabe RAWS is located at the 800 foot elevation level in the San Geronimo Valley of Marin County. The weather readings from this station reflect inland valley, non-coastal areas such as Mill Valley, Tennessee Valley and other parts of GGNRA away from beaches. The station will over-predict weather for the Ocean Beach/Lands End area in San Francisco, the Marin Headlands and coastal beaches, Muir Woods and Fort Mason. Barnabe RAWS is cataloged in Weather Information Management System (WIMS) as #042308 and can provide NFDRS indices. The unit is maintained by Bay Area Network Preparedness Staff. Barnabe RAWS is part of Northern California Fire Weather Station 205 and Forecast Trend Zone 562. It is used for the GGNRA Step-Up Plan for Marin and San Francisco County areas.

La Honda RAWS, in San Mateo County, is located on Highway 84, 6.5 miles west of the intersection with Skyline Boulevard at Skylonda and ½ mile north of the intersection with Pescadero Road (see Figure 18, RAWS Weather Stations, San Mateo). The RAWS is located in the upper mid-slope of a ridge at the 800 foot elevation band and the station captures coastal influence weather readings for San Mateo Cal Fire. La Honda RAWS can also be used to determine fire weather for NPS managed lands at Milagra Ridge, Sweeny Ridge, Mori Point, Cattle Hill and Pedro Point. The station will be used for

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Corral de Tierra lands just south of Moss Beach on the San Mateo Coast once acquisition is finalized. La Honda RAWS is in Fire Weather Zone (FWZ) 275 -- San Mateo Hills -- and Forecast Zone 550. Felton ECC in Santa Cruz County manages the WIMS account and maintains this RAWS unit. It is not currently used to determine any Step-Up actions.

Pulgas RAWS, in San Mateo County, is located north of the Phleger Estate and Town of Woodside near the intersection Edgewood Road exit on I-280 (See Figure 18, RAWS Weather Stations, San Mateo County). Located at 600 foot elevation, this station reflects drier inland weather readings as it is situated on the east side of the Coastal Range. Pulgas RAWS picks up fire weather for the Phleger Estate and the southern portions of Crystal Springs Reservoir. The unit is FWZ 275 – San Mateo Hills -- and it is in Forecast Trend Zone 550. Felton ECC in Santa Cruz County manages the WIMS account but the RAWS is maintained by San Francisco Public Utilities Commission staff which manages 23,000-acre Peninsula Watershed just north of the RAWS. This unit is not used for any Step-Up actions.

Station Name	Station ID	MesoWest ID	Fuel Model	Location	Elevation	Owner
Barnabe	042308	BBEC1	7A2A2	38.0281 122.7022	810 feet	NPS/Marin County
La Honda (off Log Cabin Ranch Rd., ±2 mi SE of La Honda)	043304	LAHC1	2	37.3053 122:255	872 feet	SF PUC
Pulgas (Vista Pt., on I-280 NW of Edgewood Rd.)	043309	PUGC1	2	37.4750 122:2981	644 feet	Cal Fire

3.3.1.5 National Fire Danger Rating System (NFDRS)

NFDRS is a multiple index system developed to provide information about current and predicted fire danger conditions. Analysis of fire weather information from Barnabe RAWS uses NFDRS Model A, Slope Class 2 (0-25 percent), perennial herbs, and Climate Class of 2 (semi-arid). Restriction thresholds for Park Visitor Activities will be developed in 2008 for the FMP update. The Northern California Coordination Center Predictive Services Group, in conjunction with the National Weather Service San Francisco Bay/Monterey Weather Forecasting Office, monitors, analyzes and predicts fire weather, fire danger and fire management resource impacts across the Bay Area and East Bay Hills.

Red Flag Warnings are issued to warn of an impending or unusually severe fire weather event. As shown in Table 10, a warning is issued when the combination of conditions shown in the chart are occurring or expected within 24 hours.

Figure 18 – RAWs Weather Stations – San Mateo County

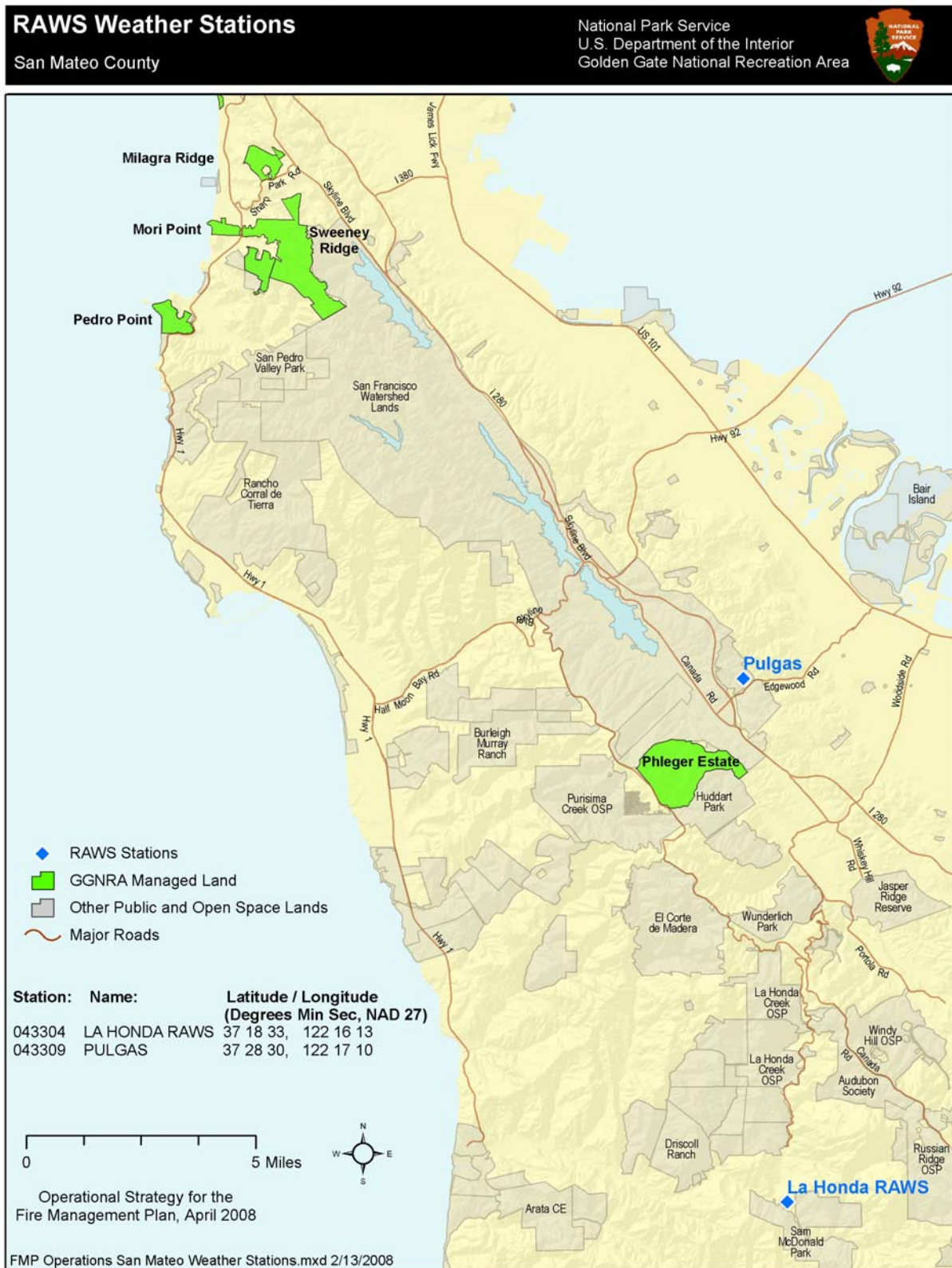


Table 11 – Red Flag Warning Matrix

Red Flag Guidance/Verification Matrix				
The matrix below assume 10-hour fuel moisture of less than 6%, annual grasses are cured, and no wetting rain (greater than 0.10 inch) has fallen in the past 24 hours.				
Relative Humidity	Sustained 20 foot Wind Speed (Note: the wind event should be expected to last at least 8 hours)			
	Sustained Wind 6-11 mph	Sustained Wind 12-20 mph	Sustained Wind 21-29 mph	Sustained Wind 30+ mph
<u>Day MIN 29-42%</u> <u>Ngt MAX 61-80%</u>				RED FLAG WARNING
<u>Day MIN 19-28%</u> <u>Ngt MAX 46-60%</u>			RED FLAG WARNING	RED FLAG WARNING
<u>Day MIN 9-18%</u> <u>Ngt MAX 30-45%</u>		RED FLAG WARNING	RED FLAG WARNING	RED FLAG WARNING
<u>Day MIN < 9%</u> <u>Ngt MAX < 30%</u>	RED FLAG WARNING	RED FLAG WARNING	RED FLAG WARNING	RED FLAG WARNING
To help verify Red Flag Warnings the links above will show you what RAWS sites have met the RFW criteria during the last 24 hours. After clicking on the Day MAX or Ngt MAX RH link <u>double check the times on the observations</u> . Both day and night observations will show up.				

Fire managers can use the NFDRS for computing daily and forecasted fire danger. Local thresholds documented on Fire Danger Pocket Cards that shout “Watch Out” are: 20 foot wind speeds exceed 15 mph, RH less than 25% and temperature over 80 degrees. The pocket card also uses the Burn Index (BI) of above the 90th percentile as a key indicator of increased fire activity. The graphic below from the Bay Area Parks Network Fire Danger Pocket Card shows the BI in relation to past major and minor incidents (See Figure 19, Burning Index Levels during Past Wildfires).

3.5.2 Step-Up Plan

The Step-Up Plan describes a series of escalating management responses which are intended to supplement normal wildland fire capabilities for short periods (i.e., normally one burn period). This policy-compliant plan is in table format and is located in Appendix A, Part 5.

3.5.3 Detection

Typically, most fires will be discovered and reported by local residents or members of the public recreating at GGNRA. It is expected that most individuals wishing to report a

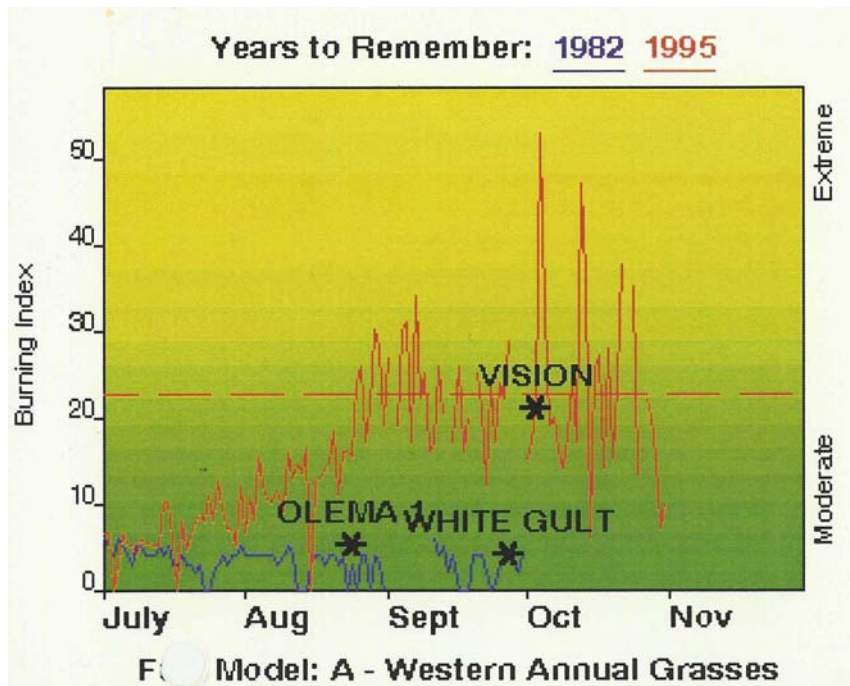
fire would contact 911 rather than notifying GGNRA staff directly. In Marin County, 911 calls are routed to the Marin County Sheriffs Department Communications Center (“Comm Center”). If the 911 call is in reference to a reported wildland fire, the Comm Center transfers the caller to Marin County Fire Department’s Woodacre ECC. Woodacre ECC then makes the appropriate notifications and tactical resource dispatching. There is also the potential for park visitors in Marin County and San Francisco parks to notify an NPS employee. In this event, the park employee will contact GGNRA Park Dispatch at the Presidio. GGNRA Park Dispatch will, in turn, notify Woodacre ECC and also begin the dispatching of NPS fire resources.

3.6 INITIAL ATTACK

Initial Attack is an aggressive suppression action consistent with firefighter and public safety and values to be protected.

All unplanned wildland fires must receive aggressive initial attack action (IA) by the nearest available suppression forces. Generally, first on scene would be a local fire department engine company. In Marin County, this would likely be Southern Marin Fire for Alta Ridge or Marin County Fire Department. In San Francisco, the Presidio Fire Department would respond to wildland fires in the Presidio, Fort Mason, Fort Point and San Francisco Maritime Museum. The San Francisco Fire Department would be the initial responder to

Figure 19 – Burning Index Levels during Past Wildfires



fires at Fort Funston, Sutro Heights, Land’s End and Fort Miley. Cal Fire would respond to Phleger Estate and the North Coast Fire Authority along with Cal Fire would respond to Sweeney Ridge, Milagra Ridge, Cattle Hill, Mori Point and Pedro Point near Pacifica.

NPS personnel will respond after notifying GGNRA Park Dispatch and Woodacre ECC (for Marin County) or Cal Fire’s Felton

ECC (for San Mateo County). Woodacre ECC will be the ordering point for all initial attack fires within GGNRA in Marin County. Cal Fire’s Felton ECC will be the ordering unit for fires in San Mateo County. If a federal Type 3 IC is not immediately available to take over

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the incident, a Battalion Chief or higher from the Marin County Fire Department, Southern Marin Fire Protection District, North Coast Fire Authority or Cal Fire may assume that position with the FMO and Superintendent's concurrence.

On federal lands in San Mateo County, where Cal Fire has direct protection area responsibility, Cal Fire will provide all qualified incident command.

3.6.1 Initial Attack Priorities and Closest Resources

In the unusual event that there are multiple simultaneous fires within GGNRA, a fire start which has the potential to threaten life or property would have priority for suppression actions.

GGNRA will follow the Closest Forces Concept for initial attack actions on GGNRA lands. Employing the closest forces concept means that regardless of the protecting agency, the fire suppression resource that has the shortest timeframe to be the first to reach the incident location will be the one dispatched. This concept is standard operating procedure for all cooperating fire protection agencies in Marin, San Mateo and San Francisco Counties and is included as part of operating plans with our local fire agencies.

3.6.2 Appropriate Management Response

The AMR will be based on objectives, relative risk, external influences and management boundary defensibility and may include one or some combinations of the following:

- Initial Attack. A planned response to a wildfire given the wildfire's potential fire behavior. The objective of initial attack is to stop the spread of the fire and put it out at least cost. This is an action where an initial response is taken to suppress wildfires consistent with firefighter and public safety and values to be protected.
- Wildfire suppression with multiple strategies. This action categorizes wildfires where a combination of tactics such as direct attack, indirect attack and confinement by natural barriers are used to accomplish protection objectives as directed in the Wildland Fire Situation Analysis (WFSA).
- Control and extinguishment. These actions are taken on a wildfire when the selected WFSA alternative indicates a control strategy. Sufficient resources are assigned so that control of the fire can be achieved with a minimum of acres burned.

3.6.3 Response Time Frames

The GGNRA road system is in relatively good condition with most areas in the park accessible by vehicle and thus, response times to fires by engines would be relatively short.

Cal Fire maintains several fire stations in San Mateo County within close driving range of Sweeney Ridge, Milagra Ridge, the Phleger Estate and Mori Point. The Cal Fire stations can provide rapid response to these areas.

Aerial delivery of firefighters by helicopter is an alternative to walk-in if speed to an incident is necessary.

Cal Fire maintains nearly all aerial tactical firefighting resources in the San Francisco Bay Area. No federal aerial resources are stationed in this part of the state. The closest Cal Fire helicopter capable of delivering and supporting firefighters are:

- Copter 104 (Boggs Mountain) for response to GGNRA lands in Marin and San Francisco Counties.
- Airtanker 85 (Sonoma) for response to GGNRA lands in Marin and San Francisco Counties.
- Copter 106 (Alma) for response to GGNRA lands in San Mateo County.
- Airtankers 82 and 83 (Hollister) for response to GGNRA lands in San Mateo County.

3.6.4 Restrictions and Special Concerns

As a unit of the NPS, there are sensitive resources requiring special protection throughout GGNRA. During the NEPA process which preceded the preparation of this FMP, NPS staff and the public considered the potential impacts to the park and general area resources from wildland fire, fire suppression actions and more routine fire management projects. After reviewing the level of adverse and beneficial effects that could result from implementation of the FMP, staff, regulatory agencies and the public contributed to the development of a series of mitigation measures to be applied to FMP actions in order to minimize or avoid the predicted potential effects. These mitigation measures were adopted by the NPS through the signature of the Record of Decision (ROD) for the FMP Final EIS by the Pacific West Region Deputy Director. Prior to and during suppression actions, appropriate mitigation measures from Appendix D should be implemented to the degree feasible while ensuring the protection of life, property and resources. The following mitigation measures pertain to preparation for suppression and active suppression of wildland fire.

Preparedness

- FMP-2** GGNRA staff will meet with representatives of local fire agencies that could respond to wildfires in GGNRA lands in Marin, San Francisco, and San Mateo counties. The purpose of the meeting will be to provide information to fire agencies on the location and preferred strategies for suppression actions that will minimize damage or afford protection to important park resources in the event of a wildfire. The information exchanged between the NPS and local fire agencies will include notification procedures, new or modified facilities in the park, updated information on cultural and natural resources, low-impact suppression techniques, or potential protection techniques for certain locales in GGNRA.
- FMP-3** GGNRA cultural and natural resources staff will work with the fire management staff in preparing and updating maps and other data sources showing areas of the park with sensitive resources such as National Register properties; archaeological sensitivity; cultural landscapes; plant communities of special management concern (e.g., wetlands, riparian areas, dunes, and

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Special Ecological Areas identified in the park's Natural Resource Management Plan); habitat of federal, state, and locally listed species; and other important natural and cultural resources.

FMP-6 The superintendent of GGNRA will appoint members of GGNRA staff to act as resource specialists to consult with operations crews in the event of wildland fire and during planning and execution of prescribed fire. The resource specialists will meet with local fire agencies likely to command wildland fire suppression actions on GGNRA lands and develop strategies for implementing flexible suppression to protect important resources.

AIR-2 The NPS will develop a Smoke Communication Strategy to guide management of smoke events during prescribed fires, managed wildland fires, suppression actions, and fires occurring outside the park.

SS-24 (And Suppression) During the information meeting with local fire agencies, the location of mission blue butterfly habitat will be identified. During this meeting and when providing information at an active wildland fire as a resource advisor, natural resources staff will advise the local fire agency of the following guidelines:

1. Avoid staging fire suppression actions in or directly adjacent to mission blue butterfly habitat;
2. Construct fire lines outside of mission blue butterfly habitat to the greatest extent possible;
3. Use wet lines wherever feasible, or narrow, hand-constructed fire lines where water is not available to help contain the spread of the fire; and
4. Avoid using saltwater or retardant on habitat of the mission blue butterfly.

SS-30 (And Suppression) During the information meeting with local fire agencies, the location of San Bruno elfin butterfly habitat will be identified. During the meeting and when advisors are called to provide information at an active wildland fire, natural resources staff will advise the local fire agency of the following guidelines:

1. Avoid staging fire suppression actions in or directly adjacent to San Bruno elfin butterfly habitat;
2. Construct fire lines outside of San Bruno elfin butterfly habitat to the greatest extent possible;
3. Use wet lines wherever feasible, or narrow, hand-constructed fire lines where water is not available to help contain the spread of the fire; and
4. Avoid the use of saltwater or retardant drops on San Bruno elfin butterfly habitat.

SS-32 (And Suppression) During information meetings with local fire agencies and on the scene of active suppression actions, natural resource advisors will

inform responding fire agencies that Rodeo Lagoon shall not be used for water drafting unless needed to protect life and property and no other feasible water source is available.

Suppression Actions

- FMP-7** Natural and cultural resources staff will be notified of wildland fires as soon as possible so that appropriate staff can advise the lead fire agency on the location of sensitive resources and preferred suppression techniques and begin planning for rehabilitation of the burned area. Natural and cultural resource advisors will be assigned to the incident as needed.
- FMP-8** For any multi-day fire suppression event, a local or regional Burned Area Emergency Response team will be requested to facilitate development, in conjunction with park staff, of the emergency suppression stabilization and rehabilitation proposals.
- SW-1** Planned and unplanned fire actions will include strategies to minimize impacts from erosion, such as avoiding steep slopes and highly erosive soils, timing burns to minimize erosion potential, avoiding scraping or burning to bare mineral soil (layer below duff), or using erosion control techniques during or after burns.
- WET-1** Fires will be allowed to back into, around, or through wetlands and meadows to avoid suppression damage. Wetlands will be avoided to the greatest extent possible while constructing fire lines and breaks during wildfire suppression. Where wetlands are used as a natural boundary to help contain a fire, the control line will be sited outside the wetland area. Trample lines (rather than dug lines) may be used if it is necessary to site the control line in the wetland.
- WET-2** Foams, saltwater or other fire retardants will not be used on or near wetlands to the greatest extent possible.
- VEG-2** Soil disturbance during mechanical treatments, prescribed burns, and suppression fires will be minimized to the greatest extent possible to reduce the potential for introduction or spread of nonnative plant species, to protect topsoil resources, and to reduce available habitat for new nonnative plant species.
- SS-1** When emergency actions must be taken to prevent imminent loss of human life or property and these actions would result in a taking of listed species or adverse modification of critical habitat not covered under existing FMP biological opinion, the NPS will respond to the situation in an expedient manner to protect human health and safety. After the incident is under control, the NPS will initiate emergency consultation procedures with the appropriate agency(ies).
- SS-4** To avoid the spread of highly nonnative animal species (e.g., bullfrogs) and protect the habitat of federally listed threatened or endangered species, GGNRA resource advisors and fire management staff will advise local fire

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agencies responding to wildland fires in the park and vicinity of the following guidance:

1. Drawing water from freshwater bodies in GGNRA and Rodeo Lagoon should be avoided unless there are no alternative sources available. If freshwater is drawn or scooped from water bodies in the park, it should be used on wildfires within the same watershed whenever possible.
 2. Ocean and bay waters are preferred water sources for fighting wildfires in the park and vicinity. Habitats of sensitive aquatic species and mission blue butterflies should be avoided when saltwater is used.
- SS-11** Except in emergency situations, water drafting from park streams and creeks that support salmonids must be halted when water levels drop to a level that could result in disconnected pools of water in the channel. Any water pumping from salmonid streams will require measures to prevent injury to fish, such as using offstream sumps, restricting approach velocities to less than 0.8 foot per second, and screening at intake with openings no greater than 0.25 inch.
- SS-19** No heavy equipment will be used off of existing fire roads or developed features in areas of known San Francisco garter snake habitat. If use of heavy equipment and trucks is required during emergency situations or for work that would improve San Francisco garter snake habitat, mitigation measures to avoid mortality will be incorporated into the project schedule.
- SS-37** To avoid disturbance of western snowy plovers, aircraft assisting the NPS in the implementation of FMP projects will avoid flying directly over and parallel to the beach to the greatest extent possible.
- SS-38** To avoid disturbance to the California brown pelican from late spring to early winter:
1. Avoid operating aircraft below and within 500 feet of Rodeo Lagoon, Bird Island, and Bolinas Lagoon to the greatest extent possible.
 2. Avoid drafting water from Rodeo Lagoon, the ocean near Bird Island, or Bolinas Lagoon.

3.6.5 Extended Attack and Large Fire Suppression

The Incident Command System (ICS) provides for a management/organizational structure on incidents that evolve in complexity or increase in size, whether within a few hours or over several days. While the criteria for incident complexity vary by local conditions, a fire that has escaped initial attack is considered in extended attack (Type 3 incident) when it:

1. Has not been contained by the initial attack resources dispatched to the fire.
2. Will not have been contained within management objectives established for that unit or area.

3. Has not been contained within the first operational period and there is no estimate of confinement or control.

When complexity levels exceed initial attack capabilities (Type 4 and 5 incidents), the appropriate ICS positions should be added commensurate with the complexity of the incident. The Incident Complexity Analysis and the WFSA assist the Superintendent in determining the appropriate management structure to provide for safe and efficient fire suppression operations. When an Incident Management Team is ordered to manage a fire, a Superintendent In-Briefing Package and Delegation of Authority as well as a draft WFSA will be prepared and presented to the team upon arrival at GGNRA. A unified command structure will be a requirement in all multi-jurisdictional incidents.

As safety allows, initial attack Incident Commanders will assess the complexity of the fire to determine their capacities to manage the incident. If the initial attack Incident Commander (IC) is unable to initiate action due to the management complexity of the incident, forces will be staged in a safe location or modified tactics will be used until a fully qualified Type 3 Incident Commander arrives on scene. Qualified IC's from those local fire agencies that have a Cooperative Fire Agreement with GGNRA (i.e., Marin County Fire Department, Cal Fire, etc.) may fill the Type 3 Incident Commander role if a qualified federal IC is not available or until federal oversight can be provided.

Qualified local agency personnel may be used to fill ad-hoc Type 3 incident positions. The decision to transition to a Type 2 or 1 complexity incident will be made by the Park Superintendent in consultation with the FMO and the Type 3 Incident Commander.

All wildland fires (with the exception of GGNRA lands under CalFire DPA) that meet Type 2 or 1 complexity levels will require a federal Type 2 or 1 Incident Management Team

A Delegation of Authority will be prepared for all incidents involving federal lands which transition to a federal Type 1 or 2 Incident Management Team. Mendocino NF ECC will be the ordering point for all Type 1 or Type 2 complexity fires and any extended incident beyond one or two operational periods.

A Delegation of Authority will be prepared for the Cal Fire Incident Commander at any complexity level on GGNRA lands in San Mateo County which is within the Cal Fire DPA. Inherent in DPA Agreements, Cal Fire can call upon its Type 1 Incident Management Teams to manage a complex fire incident. Felton ECC will be the ordering point for all incidents on GGNRA managed lands within the Cal Fire DPA.

An Incident Complexity Analysis (NIFC 2006, Chapter 10, Appendices 10-4 or 10-5) will be used as a guide for IC's, fire managers and Agency Administrators to evaluate emerging fires in order to determine the level of management organization required to meet agency objectives. This will assist in identifying resource, safety, and strategic issues that will require mitigation.

The WFSA is a decision-making process in which the Superintendent or representative describes the situation, compares multiple strategic wildland fire management alternatives, establishes objectives and constraints for the management of the fire, selects the preferred alternative, and documents the decision. The format and level of detail required depends on the specific incident and its complexity. When a wildland fire

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cannot be controlled during the initial suppression response action or a prescribed fire has exceeded its parameters and been declared both unsuccessful and a wildfire, a WFSA will be initiated and a new strategy selected *Interagency Standards for Fire and Fire Aviation Operations*, Chapter 10-E (NIFC 2006).

3.6.5.1 *The Wildland Fire Situation Analysis (WFSA) Development*

The WFSA is a decision making process in which the Superintendent (or designee) describes the situation, compares strategy alternatives, evaluates expected effects of each alternative, establishes objectives and management constraints, selects the preferred alternative, and documents the decision. It serves as a contingency to undesirable outcomes. If the selected alternative does not accomplish objectives, the WFSA can be amended.

The Superintendent or designee and the FMO and/or Incident Commander prepare the WFSA. Required elements to be addressed in a WFSA are:

- Current Situation
- Evaluation Criteria
- Alternatives
- Analysis of Effects
- Record of Decision
- Review/Evaluation/Update
- Probability of Success
- Consequences of Failure

3.6.5.2 *Complexity Decision Process for Incident Management Transition.*

GGNRA has developed a unit-specific Incident Complexity Analysis for Type 4 and 5 fires and criteria for transitioning to a Type 3 incident command structure. See further information in Section 3.3.4, Extended Attack, and Appendix E, Part 12, GGNRA Incident Complexity Analysis for Type 5, Type 4 and Transition to Type 3 Incidents.

3.6.5.3 *Delegation of Authority for IC*

The Delegation of Authority for IC form permits the Superintendent to delegate the responsibility for all incident suppression efforts to another qualified individual. The newly delegated IC may be from another park unit, another federal agency or a state or local agency. The person has to be qualified for the complexity level of the incident as determined by the previous IC. See further information in Section 3.3.4, Extended Attack, and Appendix E, Part 14, Example of Delegation of Authority Form.

3.6.6 REHABILITATION GUIDELINES AND PROCEDURES

While many wildfires cause only limited damage to the land and pose few threats to fish, wildlife and people downstream, some fires create conditions that require proactive

efforts to prevent further damage from occurring. Loss of vegetation exposes soil to erosion; runoff may increase and cause flooding, sediments may move downstream and damage houses or fill reservoirs, and put endangered species and community water supplies at risk. The Burned Area Emergency Response (BAER) program addresses these situations with the goal of protecting life, property, water quality, and deteriorated ecosystems from further damage after the fire is out.

There are four complementary parts to the BAER Program:

1. Suppression Activity Damage (SAD) are those repairs necessitated by damage resulting from the suppression activity rather than a result of the wildfire. The repairs are planned and implemented primarily by the incident command organization prior to demobilization. Suppression Activity Damage repairs are charged to the incident account.
2. Emergency stabilization (ES) actions are set out in the Burned Area Emergency Response Plan completed within 7 days of the containment of the fire by an interdisciplinary Burned Area Emergency Response Team. The Team surveys the burn area, identifies where repairs are needed and how the repair will be conducted. The goal of ES is to minimize threats to life and property or to stabilize and prevent unacceptable degradation to natural and cultural resources. ES repairs are to be implemented within one year of containment of the wildfire. ES is part of the Emergency Operations appropriation
3. Burned Area Rehabilitation (BAR) requires the preparation of a Rehabilitation Plan identifying projects that are in need of repair or improvement on a landscape scale resulting from direct damage by the wildfire. The goal of the rehabilitation plan is to rehabilitate and establish healthy, stable ecosystems in the burn area, prioritizing relative values to be protected, commensurate with rehabilitation costs. The plan is developed with public participation and describes projects and follow-up actions occurring up to three years after containment. BAR is a separate non-emergency appropriation.
4. Long-term (>3 years) Restoration are those rehabilitation actions occurring beyond the initial three years or after the repair or replacement of major facilities damaged by the fire.

Interior Department Guidance on the BAER program is found in Departmental Manual 620, Chapter 3. An Interagency Burned Area Emergency Response Handbook, Version 4.0 can be found at <http://fire.r9.fws.gov/ifcc/esr/Policy/es%20handbook%202-7-06.pdf>. The Burned Area Rehabilitation Handbook is currently in Draft form and circulating for review. Specific best management practices for implementing ES and BAR actions at GGNRA should consider the following recommendations:

- Burn area seeding may be considered, depending on specific local impacts. All seed applications must be approved by the GGNRA Resource Advisor prior to purchase and application.

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- To the greatest extent possible, waterbars shall be hand-placed. No mechanical equipment will be used in wilderness areas unless such action is in response to an immediate threat to watershed stability.
- A post-burn watershed assessment will be made for fires affecting sensitive watersheds.
- Rehabilitation actions may require consultation with the FWS and the NMFS. See Endangered Species Act (ESA) Section 7 Handbook, Chapter 8 for further guidance. Consultation shall be coordinated through the BAER Team in conjunction with local GGNRA staff. If a BAER Team is not assigned to the incident, an ESA Coordinator will be assigned to this duty.
- NHPA compliance may be required prior to implementation of ES or BAR projects. A determination should be made as to whether the actions meet the requirements for NHPA compliance under emergency conditions described in the NHPA regulations, provision 800.12.
- Emergency stabilization funds can be used to control nonnative invasive plants within burned areas when it can be documented that the invasive may spread quickly and can out-compete emergency stabilization relying on seedings or reestablishment of native vegetation. Options for treatment may include chemical, biological or mechanical methods to control aggressive invasives, post-fire detection and monitoring which may be funded for up to one year following containment of the fire.
- If herbicides are prescribed for emergency stabilization actions, they will be applied according to strict specifications using detailed Material Safety Data Sheets. Any application requires the approval of the GGNRA's Integrated Pest Manager and the Washington Office coordinator for herbicide application. No applications would occur in riparian or wetland areas.
- Monitoring intensity should be commensurate with the complexity of the emergency stabilization treatments, level of concern or controversy associated with the emergency stabilization treatment. See Appendix F, Wildland and Prescribed Fire Monitoring and Research Plan. Monitoring of rehabilitation treatments will be coordinated with the GGNRA Fire Ecologist and Bay Area Network Fire Effects Monitoring Program.

3.6.7 Records and Reports

Quality, long-term documentation records for all actions taken on a wildland fire is critical. All decision documents, monitoring data, supporting documentation, and operational documents (Incident Action Plans, maps, unit logs, etc.) will be assembled and organized during and following a wildland fire management action.

Specifically, the fire report and file should contain:

- Any written policies, guidelines or authority statements signed by the Superintendent.

- Copy of the NPS WFSAs.
- ICS-209's (Incident Status Report) for fires over 100 acres in Timber or over 300 acres in Grass.
- Copies of purchase orders, personnel request orders, etc. associated with the fire.
- All situation maps.
- Personnel rosters.
- Press releases, clippings, videotapes.
- Accident reports.
- All monitoring data, spot weather forecasts, Internet printouts.
- Documentation of financial charges made against the assigned account number.
- Narratives and unit logs.
- Burned Area Rehabilitation plan.
- DI-1202 Fire Report (completed within 10 working days after fire has been declared out).

It is particularly important to include IC narratives (see above) regarding effectiveness of planned strategies, trigger points, holding actions, and other pertinent factors encountered during the fire.

3.7 PRESCRIBED FIRE

For purposes of the FMP and as defined by federal Wildland Fire Management Policy, prescribed fire is any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan (burn plan) must exist prior to ignition. This burn plan contains a prescription defining goals, weather and fire behavior parameters, monitoring, and treatment methods used to achieve project specific objectives, while prioritizing firefighter and public safety. All prescribed fire projects also require an approved Smoke Management Plan filed with BAAQMD.

For the foreseeable future, the prescribed fire program will be aimed at restoring fire as a natural ecological process and reducing hazard fuels concentrations. Many areas subject to first entry treatment may require subsequent treatment(s) in order to achieve hazard fuels reduction objectives, rather than attempting to meet all objectives on the first treatment and risk costly escape and/or unacceptable resource damage.

The range of possible beneficial outcomes of prescribed burning projects includes an increase in firefighter and public safety, protection of real property and natural and cultural resources, reduced risk of high intensity wildland fires, avoidance of savings property damage costs and the restoration of fire to fire-adapted landscapes.

The late fall wildfire season is one of the primary constraints limiting the number of days available in the project area during which prescribed burns can be conducted each year. Other constraining factors are air quality and disruption of wildlife breeding periods.

3.7.1 Annual Planning, Review and Documentation for Prescribed Burning

Prescribed fire project prioritization for GGNRA is determined as part of the five year implementation plan update that occurs annually in early winter. Project priorities are set for the coming year based on actual accomplishments during the prior year and



target goals of the FMP. Projects scheduled but uncompleted for the prior year and re-evaluated in light of the current years project list and some project rescheduling normally occurs. The effects of rescheduling the current year ripples through the five year plan causing some reshuffling in the project schedule. The following actions and dates structure the planning process:

- Prepare annual program priority list based on projects listed in the multi-year implementation plan.
- Prepare map of archaeological/biological survey before January 15 for anticipated projects to be conducted during the following fiscal year.
- Submit prioritized listing of projects through NFPORS database by March 10.
- Regional fire staff informs GGNRA FMO of the final list of selected projects by mid-summer.

3.7.1.1 *Prioritizing and Review the Annual Implementation Plan*

The five-year fuels treatment plan will be updated annually as target units are burned and fuel reduction projects completed. [The GGNRA Five Year Fuels Treatment Plan will be developed in 2008 for the FMP update.] Fire Management staff at the PWR office have established a process for the annual review of the five year fuels treatment plan *vis-à-vis* ensuring that actions conform to the findings and commitments agreed to in the NEPA process for the FMP. In addition to NEPA conformance, the annual review process provides a framework for ensuring continued conformance with the requirements of the ESA consultations and NHPA programmatic mitigation measures. The review of the five year fuels treatment plan will be undertaken by a multi-disciplinary team representing the range of expertise of the fire staff.

For the specific process to follow for the annual review of the fire management program and FMP, please see FMP Section 4.6.

To update the annual implementation plan for the coming fiscal year, the fire management branch developed priorities based on their professional expertise, input from outside fire agencies, and hazard mapping such as Marin County's Fuel Ranking and Hazard maps and the Park's Wildland Fire Hazard Maps. Sites for prescribed burning are initially proposed based on the risk factors, fuel conditions and resource management issues identified in the GGNRA FMP for each project area.

Project selection and prioritization involve a conglomerate of multi-divisional staff members including but not limited to: Vegetation, Wildlife, Cultural Resources, Fire Ecology, Fire Suppression Operations, Environmental Compliance, and Interpretation and Education.

Based on the relative strength of the justification, projects are further considered for potential effectiveness in addressing critical needs and feasibility of implementation. The FMUs and project areas have goals and objectives, and the development and prioritization of projects must be based on the reasoned expertise of fire staff. Though NPS fire staff is not bound by the strategies in the Marin CWPP or the Cal Fire annual plan, these preventive plans are seriously considered when prioritizing NPS projects as are NPS efforts to coordinate, cooperate, and plan with our local fire agencies and land managers to ensure efficiency, and that overall fire management goals and strategies can be achieved in unison.

All these disciplines gather and are able to bring new ideas to the table and to discuss and provide input for projects that are developed by the FMO office.

New projects for resource enhancement, vegetation management, and urban interface protection are presented to the group. These projects are prioritized base on the likelihood of funding, difficulty of operations, actual benefits from project completion, and the safety of the public and park staff. An additional key ranking criteria is how future projects relate to previous ones. Projects that are a continuation of work begun on long-term fuel reduction zones carry a high ranking. This ensures that previous efforts are maximized.

Another reality facing fuels and prescribed fire management decisions is the lack of funding. This reality must also be included in project decision criteria. Some of the highest ranked priorities based on fuel ranking and hazard maps would also be the most costly based on their proximity to private property. These projects require smaller acres to minimize public impacts and require more resources to ensure protection of property. The likelihood of these projects being funded by the regional office is diminished by the associated high cost per acre.

There is no set formula for determining and prioritizing projects. Park staff needs to remain very flexible to address and react to changing management goals and budget realities. All projects that are approved have the complete involvement and support from the various management disciplines within the park.

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Once verified, the annual FMP review can be conducted. The finalized list of projects is presented at the beginning of the fiscal year to the Division Chief and Superintendent for review and comment. At that point, it is appropriate to conduct NEPA project review on the finalized list. As FPA comes on-line, the annual FMP review may be tied to the FPA schedule changing the annual review period to each January.

3.7.1.2 *Review of Projects for NEPA Conformance*

Requirements set forth in RM #18, Chapter 10, Part VIII, Prescribed Fire (revised 9/26/06), will be followed. These revised guidelines conform to the Interagency Prescribed Fire Policy Planning and Implementation Guide (NIFC 2006). The following information should be included in project-level plans involving prescribed fire:

- Develop project objectives and site-specific treatment methods to accomplish objectives into a comprehensive project description for the NEPA assessment.
- Input project information into the Planning, Environment and Public Comment (PEPC) database system, implemented agency-wide for all levels of NEPA review. Burn plans for areas that were sufficiently assessed through the FMP FEIS will be reviewed by the IDT and the conformance with the FEIS documented through a Memo to the File of the FEIS. The project impacts and mitigation measures must conform to the formal consultations conducted as part of the FMP and the findings of the FMP Record of Decision. If a proposed project does not conform, additional consultation may be warranted. Upon completion of annual review process, any additional written documentation will be filed as part of the FMP EIS NEPA process as a Memo to File.
- If, due to proposed burn location or burn intensity, sensitive resources could be directly or indirectly affected in a manner not anticipated and addressed in the FEIS, the burn will require a separate NEPA review and perhaps additional ESA or NHPA consultation. NEPA conformance for these projects will be conducted per DO-12, RM-12 and GGNRA SOP-601 for NEPA Compliance. Conformance would be achieved by an EIS or EA if there is potential for significant adverse effect or exceptional circumstances; projects without potential for significant adverse effect may meet the requirements for a categorical exclusion for prescribed burning (categorical exclusion G.1).
- Following mitigating actions, an original copy of the burn plan will be routed with attached clearances by the FMO/Burn Boss.

3.7.1.3 *Developing Burn Plans*

All NPS prescribed fire programs will adhere to the following requirements for planning, reporting and documenting prescribed burns:

1. All prescribed fire projects will be coordinated in a collaborative process involving adjacent neighbors and local governments.
2. A Delegation of Authority for all off-Park Burn Bosses will be prepared and signed by the Agency Administrator or acting.

3. An Incident Action Plan will be developed for each operational period of a prescribed fire. It is permissible to develop a multishift IAP to cover a period of several days. The 215A (Incident Safety Analysis) process will be utilized in the development of the IAP. Required components of the IAP include:
 - a) Organization Assignment (ICS-203)
 - b) Medical Plan (ICS-206)
 - c) Safety Message (or ICS-215A)
 - d) Division Assignment List (ICS-204)
 - e) Communication Plan (ICS-205)
 - f) Project Map
 - g) Weather Forecast (preferably spot weather)
 - h) Aviation Operations Summary (if applicable) (ICS-220)
4. Resources listed as “contingency” must be available to respond to the incident within a specified timeframe. If the contingency resource becomes unavailable to respond to the prescribed fire, it must be replaced immediately, as the burn is now out of prescription.

Other actions which should be considered by the FMO or assigned Burn Boss in implementing a prescribed fire are the following:

- Reconnaissance (GPS) and burn unit layout and compliance (involve resources staff as needed to identify values to be protected, etc.).
- On-site documentation, fire effects monitoring, Job Hazard Analysis (JHA) elements, logistics, and identified mitigation work; complete complexity rating.
- Analyze potential ignition patterns with prescriptions, weather, fuels, and topography.
- Coordinate all burns w/grazing permit holders, cooperators, and media.
- Smoke management considerations, monitoring, modeling, and consultation with the Bay Area Air Quality Management District.
- Pre-burn notifications.
- Briefings, logistics, contingencies.
- Go/No-Go decision process.
- Organization, implementation plans.
- Follow-up coordination, evaluations, cost summaries, record keeping, reporting requirements (a DI-1202 will be completed for each burn and submitted via input through relevant agency channels within 10 working days after declared out date).
- Submit data for GIS addition to prescribed fire thematic map.

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3.7.1.4 Long-Term Strategy

The long-term strategy for the prescribed fire program is to employ prescribed fire as a tool to reduce hazardous fuel buildups and restoring fire as a key ecosystem process, while ensuring public safety and protection of property or resource values. Consideration should be made such that prescribed fire treatments should be implemented in a manner that simulates the natural ecosystem function of fire as determined through fire ecology and historic research to restore fire as a keystone natural process.

Goals and Objectives for the GGNRA FMP were developed during the initial stages of the FMP NEPA process. These goals and objectives, along with the principles of federal wildland fire management policy and NPS fire management guidelines, constitute the long-term strategy of the FMP. Goals and objectives are found in FMP Section 2.1. Federal and agency fire management policies are summarized in FMP Chapter 1.

3.7.1.5 Personnel

All prescribed fire personnel assigned to prescribed fires will meet all national requirements for training and experience in NWCG 310-1. The Burn Boss assigned to prescribed fires will be certified according to complexity and fuel type of the treatment unit.

3.7.1.6 Fire Behavior and Fire Effects Monitoring

Before the burn, fuels characteristics such as live and dead fuel moisture contents will be established to check prescription parameters and fire behavior calculations. Prior to ignition, a Spot Weather Forecast will be submitted and the results analyzed by the Fire Effects Monitor and the Burn Boss as a factor of the Go/No-Go decision making process. During ignition, on a timetable agreed upon by the Fire Effects Monitor and the Burn Boss, but not to exceed one hour, on-site weather, smoke, and fire behavior observations will be recorded on forms found in the Western Region Fire Monitoring Handbook.

The Bay Area Cluster Fire Effects Monitoring Crew has established plots in a representative number of prescribed burn units. After the burns, on a schedule established by monitoring protocols, the crew will record post-fire data and submit annual reports to the Fire Ecologist and resources division for evaluation of burn effectiveness.

3.7.1.7 Reporting and Documentation

For NPS, all prescribed fires will be documented with the following information, stored in an individual fire folder and maintained in the Seashore's files:

- Original signed Prescribed Burn Plan.
- Checklist of pre-Burn prescribed fire activities.
- All reviewer comments.

- All maps.
- Notification checklist.
- Permits such as burn, smoke, etc.
- Monitoring data.
- Weather forecasts.
- Superintendent Go/No-Go pre-ignition approval.
- Operational Go/No-Go checklist.
- Incident Action Plans.
- Unit logs, Daily Validation or other unit leader documentation.
- Press releases, public comments, and complaints.
- Smoke dispersal information.
- Post fire analysis.
- Fire Occurrence Report (DI-1202).
- NFPORS entry.

3.7.1.8 *Prescribed Burn Plan Elements*

For NPS, each plan shall include at the minimum, the elements listed below. An example of the outline of a Prescribed Fire Plan is in Appendix E, Part 17 of this FMP. The *Interagency Prescribed Fire Planning and Implementation Guide* lists the elements required for prescribed fire plans and briefly describes how to develop the contents for each element and the implementation policy that goes along with it. Prescribed fire plans must address the following 21 minimum elements and appendices in the following sequence (see the *Interagency Prescribed Fire Planning and Implementation Guide* for description and guidance):

1. Signature page
2. GO/NO-GO Checklists
3. Complexity Analysis
4. Description of the Prescribed Burn Area
5. Goals and Objectives
6. Funding
7. Prescription
8. Scheduling
9. Pre-burn Considerations
10. Briefing
11. Organization and Equipment
12. Communication
13. Public and Personnel Safety
14. Test Fire

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15. Ignition Plan
16. Holding Plan
17. Contingency Plan
18. Wildfire Conversion
19. Smoke Management and Air Quality
20. Monitoring
21. Post-burn Activities

Appendices

- Maps
- Technical Review Checklist
- Complexity Analysis
- Job Hazard Analysis
- Fire Behavior Modeling Documentation or Empirical Documentation (unless empirical documentation is included in the fire behavior narrative in the Element 7, Prescription)

Although not required, the following recommendations are offered in RM-18, Chapter 10, Section VIII:

1. An Executive Summary is not required in the burn plan, but highly recommended, especially for high complexity burns and omnibus plans. An informative summary is useful for the Agency Administrator and reviewers of complex burn plans.
2. The Implementation Guide states only three signatures are required (Agency Administrator, Plan Preparer and Technical Reviewer). It is recommended that Resource Management, the Fire Ecologist and the Fire Management Officer are also signatories as reviewers or for concurrence.
3. The *Adequate Holding Worksheet* is an optional tool for determining holding resources in Element 16. If it is not used, provide other rationale for determining holding resources.
4. For Element 20 (Monitoring) of the prescribed burn plan, follow direction in RM-18, Chapter 10 and in RM 18 Chapter 11.

3.7.2 Exceeding Existing Prescribed Burn Plan

If prescription parameters are exceeded during project execution, the Burn Boss will terminate ignition operations at a safe and appropriate location based on fire behavior, fuels, topography and weather conditions. If the project area comes back into prescription based on current and forecasted weather, ignition operations may continue. If not, the project area is put into a mop-up or patrol status. Holding actions will maintain control of the fire until a decision to continue, postpone or extinguish the prescribed fire is made and the Agency Administrator or their designee is notified. This decision making process will be articulated in the prescribed burn plan.

If the prescribed fire exceeds project boundaries and/or slopovers and spot fires are not contained within one burning period, suppression actions will be taken and the entire

prescribed fire project will be declared a wildfire. Once declared a wildfire, suppression is the only option. A wildland fire cannot be converted back to a prescribed fire.

If at any time the prescribed fire poses a threat to life, property, or high value resources, beyond those mitigated in the plan, suppression actions will be taken and the fire will be declared a wildland fire.

Once the prescribed fire is declared a wildland fire, all subsequent actions (i.e. operational needs, notification, strategies, resource orders, etc.) will be defined under a wildland fire transition plan, which is part of the prescribed fire plan until an initial Wildland Fire Situation Analysis (WFSA) is completed.

Parks are required to notify the Regional Fire Management Office within 24 hours of any of the following actions taken on a prescribed fire that has escaped or is a threat to escape:

- a) any prescribed fire converted to a wildfire.
- b) any prescribed fire requiring activation of the contingency plan specified in the burn plan.
- c) any prescribed fire that requires additional resources or operational time not accounted for in the Incident Action Plan.

If the burn is not an escape or a threat to escape, or is not and will not be declared a wildfire, regional notification is not required (RM #18, Chapter 10, Section VIII, A. 5, 9/26/06).

3.7.3 AIR QUALITY AND SMOKE MANAGEMENT

3.7.3.1 Regulatory Compliance and the Approval Process

Visibility and clean air are primary natural resource values in all NPS units. The protection of these resources must be given full consideration in fire management planning and operations.

GGNRA is a Class II air shed under the amendments to the Clean Air Act (CAA) adopted in 1977. Class I areas, such as Yosemite National Park and PRNS, are national parks established before 1977 with a total area greater than 6,000 acres where emissions of particulate matter, sulfur dioxide, and nitrogen dioxide would be restricted to control impacts to visibility at sensitive airsheds. In Class II area, some incremental increase in emission levels would be allowed based on the proximity of the park or monument to a population center.

The Federal Government has ceded responsibility and authority to establish air quality standards and regulations to the states (RM #18, Chapter 14). Therefore, GGNRA complies with the Clean Air Act by adhering to the requirements of the California Air Resources Board (CARB) and the BAAQMD.

The CARB is responsible for disseminating regulations about air quality, including state ambient air quality standards and area designation. Title 17 of the California Code of Regulations, entitled Smoke Management Guidelines for Agricultural and Prescribed

Burning, provides direction to air pollution control and air quality management districts for the regulation and control of agricultural burning and prescribed burning. These guidelines are intended to allow the use of prescribed burning as a tool, while minimizing smoke impacts on the public.

BAAQMD is the air quality management district for GGNRA and has primary responsibility for control of air pollution from prescribed burning. BAAQMD has procedures that must be followed prior to implementation of a prescribed burn plan.

Prescribed burn plans must include a Smoke Management Plan that is to be submitted to BAAQMD a minimum 30 days in advance of the planned burn date. The Smoke Management Plan must include primary information about the proposed burn including smoke emission data. After reviewing and approving the Smoke Management Plan, BAAQMD issues a written approval to conduct the burn with specific conditions. The BAAQMD Application Form for Pile Burning is included as Appendix E, Part 18 to this FMP.

All fire management-ignited fires must be conducted on an “allowable burn day” unless the district has granted a variance in advance. Notice of an allowable burn day is posted by BAAQMD each afternoon for the burns planned for the following day

BAAQMD makes available a 96, 72, 48, and 24 hour burn forecast service to better assist fire agencies in determining their proposed burns dates. Final approval to burn is obtained by contacting BAAQMD the morning on the planned burn day. BAAQMD verifies the total acreage burning allocations in the district and if the fire agency's acres and/or tonnage to be burned that day would not exceed the total allocation for the area, final approval is granted.

Following the burn, the Fuels Management Specialist must submit information to BAAQMD on the fuel types and quantities or acres burned.

3.7.3.2 *Regional Air Quality Considerations for Prescribed Burning*

Marin County

In the winter, proximity to the ocean keeps the coastal regions relatively warm. Temperatures do not vary much over the year at these coastal areas, and are typically in the high 50s in the winter and low 60s in the summer. The warmest months are September and October, with temperatures into the mid- to upper 60s (BAAQMD 1998).

The eastern side of Marin County has warmer weather and less fog. This is due less to the blocking effect of the hilly terrain to the west, but more to the area's distance from the ocean. Although there are a few mountains above 1,500 feet, most of the terrain is only 800 to 1,000 feet high. Much of time, this is not high enough to block the marine layer, which averages 1,700 feet in depth. Because of the wedge shape of the county, areas to the north are farther from the ocean. This extra distance from the ocean allows the marine air mass to be heated before it arrives at eastern Marin County cities. In southern Marin County, the travel distance is short and the elevations lower, so there is a higher incidence of cool, unmodified, maritime air (BAAQMD 1998).

Cities next to the bay have their temperatures somewhat moderated. For example, San Rafael, being near the bay, experiences average maximum winter temperatures in the high 50s to low 60s, and average maximum summer temperatures in the high 70s to low 80s. Inland areas, such as Kentfield, experience average maximum temperatures two degrees cooler in the winter and two degrees warmer in the summer. Average minimum temperatures in San Rafael are in the low 40s in winter and low 50s in summer. Minimum temperatures farther inland in Kentfield are two degrees cooler all year (BAAQMD 1998).

Wind speeds are highest along the western coast of Marin, about 8 to 10 miles per hour. Although most of the terrain throughout central Marin County is not high enough to act as a barrier to the marine airflow, the complex terrain creates sufficient friction to slow the airflow. Downwind, at the former Hamilton Air Force Base in eastern Marin County, the annual average wind speeds are only 5 miles per hour. The prevailing wind directions throughout Marin County show less variation, and are generally from the northwest (BAAQMD 1998).

The mountainous terrain in Marin County has higher rainfall amounts than most parts of the Bay Area with the exception of the southern Santa Cruz Mountains. Areas near Mount Tamalpais have rainfall amounts twice as high as the rest of the Bay Area, with San Rafael reporting an average of 37.5 inches per year and Kentfield reporting 49 inches per year (BAAQMD 1998).

Smoke problems are likeliest on the eastern side of Marin County. This is where the semi-sheltered valleys and largest population centers are located. Most urban development is located along the bay, particularly in southern Marin. In the south, where distances to the ocean are short, the influence of the marine air will keep smoke levels low. Farther north where the valleys are more sheltered from the sea breeze, the potential for greater smoke accumulation is higher (BAAQMD 1998).

San Mateo County

The peninsula region of GGNRA extends from the Golden Gate south to the Phleger Estate in Woodside. The Santa Cruz Mountains extend up the center of the peninsula, with elevations exceeding 2,000 feet at the south end, and gradually decreasing to 500 feet near South San Francisco. Coastal towns such as Half Moon Bay and Pacifica experience a high incidence of cool, foggy weather in the summer. The larger cities on the eastern side of the peninsula experience warmer temperatures and few foggy days, because of the blocking effect of the 2,000-foot ridge to the west. At the north end of the peninsula lies San Francisco, where most elevations are less than 200 feet and the marine layer is able to flow across nearly all of the city, making its climate cool and windy (BAAQMD 1998).

The blocking effect of the Santa Cruz Mountains can be seen in the summertime maximum temperatures. For example, at Half Moon Bay and San Francisco, the maximum daily temperatures in June through August are 62 to 64 degrees Fahrenheit, F, while on the eastern side at Redwood City, the maximum temperatures are in the low 80s for the same period. Daily maximum temperatures throughout the peninsula during

the winter months are in the high 50s. Large temperature gradients are not seen in the minimum temperatures, which range from the 40s to 50s (BAAQMD 1998).

Annual average wind speeds range from 5 to 10 miles per hour throughout the peninsula. The tendency is for the higher wind speeds to be found along the western coast. However, winds on the eastern side of the peninsula can also be high in certain areas because low-lying areas in the mountain range, i.e., San Bruno Gap and Crystal Springs Gap, commonly allow the marine layer to pass across the peninsula (BAAQMD 1998). While prevailing winds are westerly along the peninsula's western coast, individual sites can show significant differences. For example, Fort Funston has a southwest wind pattern, while Pillar Point in San Mateo County has a northwest wind pattern. A rise in elevation of ridgelines by a few hundred feet will induce wind flow around that feature instead of over it during stable atmospheric conditions. This can change the wind pattern by as much as 90 degrees over short distances. On mornings without a strong pressure gradient, areas on the eastern side of the peninsula often experience eastern flow in the surface layer, induced by upslope flow on the east-facing slopes and by the bay breeze. The bay breeze is rarely seen after noon because the stronger sea breeze dominates the flow pattern (BAAQMD 1998).

Rainfall amounts on the eastern side of the peninsula are somewhat lower than on the western side. San Francisco and Redwood City report an average rainfall of 19.5 inches per year, while Half Moon Bay reports 25 inches per year. Areas to the south in the Santa Cruz Mountains have significantly higher rainfall, especially west of the ridgeline, due to elevation-induced condensation, close proximity to a moisture source, and fog drip.

Smoke accumulation potential is highest along the southeastern portion of the peninsula because this area is most protected from the high winds and fog of the marine layer, the emission density is relatively high, and smoke transport from upwind sites is possible. In San Francisco, wind speeds are generally fast enough to carry any smoke away before it can accumulate (BAAQMD 1998).

3.8 NON-FIRE TREATMENT APPLICATIONS

GGNRA uses two primary non-fire treatments to achieve FMP objectives: mechanical treatments and herbicide treatments. Grazing could also be used infrequently under special circumstances. Non-fire treatments allow fire managers to produce a desired change in vegetation based on values to be protected and fuel characteristics without the risks associated with applying fire.

The defensible space zone created around a structure is tactically located to increase the effectiveness of adjoining fuel breaks, prescribed burn control lines or to help alter future fire behavior or the event of a wildfire. Removed vegetation is chipped, piled and burned or moved to another area for reuse.

Mechanical treatments may involve the use of the following equipment: chainsaws , chippers, mowers, weed whackers, and heavy equipment such as bulldozers, front loaders or haul trucks. Based on the type of vegetation to be treated, some projects will require the use of approved herbicides to ensure that plants do not re-sprout. The non-

native, invasive plants most commonly treated with herbicide are eucalyptus, acacia, cotoneaster and broom. Herbicides are typically spot applied to the stump directly after the plants have been cut. All herbicide treatments will be approved through the park's IPM coordinator.

Defensible space around buildings within the park is accomplished annually. All efforts are made to conform to the California Fire Marshal's code pertaining to defensible space.

GGNRA will follow RM-18 and the requirements to prepare a Hazard Fuels Project Plan that includes specified elements for all mechanical treatments and the *Interagency Standards for Fire and Fire Aviation Operations*, Chapter 6. Prescribed fire follow-up treatments may or may not be employed.

Fuel break construction should be identified on an appropriate Geographic Information System (GIS)-compatible project location map (exact locations using GPS).

Fuel break planning will consider the following guidelines (see also mitigation measures below):

- Canopy thinned and feathered (or gradually opened) toward the area being defended, with spacing necessary to prevent crown fire and/or "wind tunnel" effect.
- Retaining a reasonable level of surface forbs and other plants to discourage exotic invasion.
- Fuel-break width is dependent on fuels conditions and other considerations.
- Photo-points installed to monitor vegetative recovery, exotic invasion, etc. Additional monitoring will be carried out as necessary.
- Levels of vegetation reduction will vary for each project based on the vegetation type, fuel loading levels, and surrounding vegetation types.
- All burn preparations involving pre-treatment with mechanical techniques will be reviewed through the park's project review process and described in the burn plan. This may include but is not limited to:
 1. Snag felling, bucking in and around the treatment perimeter.
 2. Reducing tree densities along the treatment perimeter.
 3. Pruning individual trees and brush along the treatment perimeter.
 4. Bucking and removal of logs near the control line only (through bucking into short lengths, piling and burning on site).
- Fuel break siting should take advantage of and expand upon clearings accomplished for defensible space around park buildings.

High priority mechanical fuel treatments will be sited strategically with the objective of meeting the goals and objectives of this FMP. Specific mechanical fuel reduction projects would fall under one of the following broad categories of project types:

1. Creation of Defensible Space Surrounding Park Structures and High Value Resources at Risk. GGNRA has over 700 historic structures and many non-historic structures used for housing and operations. Many of these buildings are located in areas with burnable vegetation and need to be protected. Once any potential negative impacts are mitigated, protection is accomplished by clearing vegetation around these structures to provide the minimum 100-foot radius of defensible space now recommended by the California Fire Code. The predominant fuel to be cleared around most of these structures is grass. The remaining herbaceous cover post treatment will be either low grass or a patchy continuity of taller grasses. The targeted completion date for annual defensible space is August 15th. Some structures need additional work to create adequate defensible space with tactics that might include, but are not limited to, tree trimming and removal, brush removal and herbicide application. The Division of Maintenance and Engineering is responsible for maintaining the defensible space around park structure. The Bay Area Network Hazard Fuels Reduction Crew or GGNRA fire management staff may be available to assist, depending on annual budgets, staffing levels and workloads. The term “defensible space” is typically used in reference to the protection of structures. For the purpose of this document and actions taken under the direction of the fire management office, this term and associated treatments may be applied to the protection of resources that are determined to be culturally, historically or ecologically significant.
2. Maintenance of Required Roadside Fuel Reduction and Overhead Roadway Clearance. Fire roads are maintained to allow for safe access by emergency vehicles in the event of a wildland fire or other emergency. The maintenance and clearing required is based on the minimum standard that would allow for the access requirements of a Type III fire engine. FMP actions may include grading of road surfaces, placement of erosion control measures, and vegetation thinning by mowing or cutting along the road corridor to a specified width based on fuel type, slope, and roadway composition.

Larger, native, roadside trees may be limbed up and smaller trees removed as needed to ensure emergency vehicle clearance is met. Thinning of vegetation will focus on the removal of non-native invasive species or non-native species when ever possible. Where roadside vegetation is predominantly native, natural resource staff will provide guidance on prioritizing plants to remove to achieve the desired result. Grass that grows within the roadway may be cut or mowed. Material that is removed would be cut up and broadcast in the immediate area, piled and burned, or chipped and hauled offsite.

In Marin County, there are approximately 44 miles of fire roads, amounting to 52 acres requiring treatment each year to keep clear and open from debris. In San Mateo County, there are 10 miles of fire roads, amounting to 16 acres of mechanical treatment each year. Roadside mowing may be accomplished by the Division of

Maintenance and Engineering with assistance from the GGNRA fire management staff for limbing or tree removal. A collaborative effort between local cooperating fire agencies and NPS fire management staff will determine the areas in need of treatment.

3. Creation of Fuel Reduction Zones in Areas of the Park Not Accessible by Road. Fuel reduction zones may be approved for areas along the park boundary or other interior locations not accessible by road in an effort to reduce hazardous fuels. An example would be a fuel break that removes dead and down fuels, limbing trees and removing selected trees and shrubs with minimal ground disturbance.



These semi-cleared areas will be

sited to take advantage of topography and naturally occurring areas of low fuels and may not necessarily be adjacent to structures. The Marin County CWPP proposes fuel breaks along much of the southern Marin boundary with GGNRA (see Figure 2 and Table 1 of this FMP). GGNRA will work with Marin County's fire agencies to implement the recommended fuel break system where possible, provided that conformance with the FMP EIS and ROD are assured and park resources or the visitor experience is not unduly impacted.

4. Whole Tree Removal to Reduce Hazardous Fuels and Contain the Spread of Non-Native Trees on NPS Lands. Projects that remove non-native evergreen trees, such as eucalyptus or Monterey cypress and pine, are strategically located to help protect adjacent communities or sensitive resources from wildfire and also to break up the continuity of fuels within a large stand. Projects are often sited to take advantage of similar actions being implemented in the nearby WUI by community organizations. The removal projects focused on containing the spread of existing stands, reducing ladder fuels, and providing breaks in the canopy to help limit the ability of fire to spread from tree crown to tree crown. The projects typically involve the felling of eucalyptus trees with chain saws, which can then be piled, burned onsite, cut into lengths and loaded on haul trucks for removal, or chipped and spread evenly over the project area. Eucalyptus wood removed from the park can be recycled as firewood, landscaping chips, used in stream restoration projects, or possible commercial reuses. The projects are conducted by park staff or private contractors.

3.8.1 Annual Review

The five-year fuels treatment plan will be updated annually as target units are burned and fuel reduction projects completed. [The Five Year Fuels Treatment Plan will be developed in 2008 for the FMP update.] Fire Management staff at the PWR office have established a process for the annual review of the five year fuels treatment plan *vis-à-*

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vis ensuring that actions conform to the findings and commitments agreed to in the NEPA process for the FMP. In addition to NEPA conformance, the annual review process provides a framework for ensuring continued conformance with the requirements of the ESA consultations and NHPA programmatic mitigation measures. The update of the five year fuels treatment plan will be undertaken by a multi-disciplinary team representing the range of expertise of the fire staff. More information on the Annual Review process can be found in FMP Section 4.6.

3.8.2 Equipment and Seasonal Use Restrictions

Project equipment will be selected for effectiveness and the potential to avoid or minimize impacts to park resources. The process is the same as described for prescribed burning. Please refer to Section 3.3.3.4.

3.8.3 Effects Monitoring

For non-fire treatments, treatment prescriptions and locations will be documented and photo-monitoring will take place. Monitoring of non-fire treatments will be carried out by the Fire Effects Monitoring Crew according to the protocols found in Appendix F, Wildland and Prescribed Fire Monitoring and Research Plan.

3.8.4 Reporting and Documentation

All mechanical treatment projects will be listed in the GGNRA five year fuels treatment plan and subject to the FMP annual review process. Individual projects will be assessed for potential effect and conformance with federal regulations through the Planning, Environment and Public Comment (PEPC) database system. Site specific projects that have been sufficiently assessed through the FMP FEIS will be reviewed by the IDT and the conformance with the FEIS documented through a Memo to the File of the FEIS.

Projects proposing types of activities or an intensity of impact or type of impact not anticipated in the FEIS will require separate NEPA review. NEPA conformance for these projects will be conducted per D.O 12, RM-12 and GGNRA SOP-601. Conformance may be satisfied with a Memo to File to the FMP FEIS or, if there are new environmental effects not addressed in the FEIS, by a separate NEPA process.

3.8.5 Annual Planned Projects

All fire management projects, including mechanical treatments and prescribed burns, will be scheduled in the GGNRA Five Year Implementation Plan. Where projects will require recurring maintenance on a predictable interval or several initial re-treatments, these actions will also be scheduled in advance on the five year plan.

3.9 FIRE COMMUNICATION AND EDUCATION

Public information and education are essential components of a successful fire management program. Informed and supportive agency staff, local community, visiting public, and partner organizations, will contribute greatly to the effectiveness of the fire program and the resources that it is designed to benefit.

Based on the ecological principles and operational procedures of the Fire Management Plan, the goals for the fire communication and education program are:

Goal 1: Offer year- round educational opportunities focusing on fire ecology, fire history, and fire management, which communicates how fire and fuels management activities meet natural resource management goals, and accomplish the mission of the National Park Service.

Goal 2: Work with local communities, park residents, and park permittees to promote fire safety, fire prevention, defensible space, firewise community planning, and fuels management. Provide fire safety messages with campfire permits.

Goal 3: Develop and maintain interagency, educational, and community partnerships to improve and expand fire education activities.

Goal 4: Provide accurate and timely incident information for local, regional, and national fire operations as needed.

Goal 5: Support regional and national fire management program activities through information and education.

Strategies for the public information and education program include:

- Establish a network of contacts and develop a proactive process that disseminates current and accurate fire information to multiple audiences.
- Incorporate the principles of fire's role in the ecosystem and the importance of fire as a resource management tool into interpretive programs, exhibits, video, interpretive trails through burned areas, publications, and special group presentations.
- Use national and local websites to promote prevention/mitigation and wildland fire education objectives.
- Report wildland fire activity through the NPS Fire News website.
- Forward all fire-related press releases to the respective Agency Administrator or Public Information Officer (PIO) for approval and keep members of the administrative staffs well informed of fire activity.
- Develop public information programs that promote the benefits of firewise community planning, defensible space, mechanical fuel reduction, and fire safe recreation.
- Establish relationships with local media representatives, and accommodate requests for information and access in order to promote the fire program.
- Conduct outreach to owners of adjacent lands and/or groups with traditional cultural concerns in conjunction with planning fire education, and fire management activities.

A detailed Fire Communication and Education Plan is in FMP Appendix G.

3.10 FIRE ECOLOGY AND FIRE EFFECTS MONITORING PROGRAMS

3.10.1 Programmatic and Policy Direction

The NPS is committed to monitoring fire management activities to determine whether management goals and objectives are being met and to facilitate adaptive management. The authority for fire management monitoring in the NPS is found in Director's Order #18, Wildland Fire Management, Section 5.2 Fire Management Plans and Section 5.8 Prescribed Fire Monitoring. The NPS Fire Ecology Strategic Plan: 2004-2008 (http://www.nps.gov/fire/ecology/program_direction/strategic_plan.htm) provides programmatic direction and Reference Manual #18, Chapter 11, provides policy direction for fire management monitoring (http://www.nps.gov/fire/download/fir_wil_rm18_ch11.pdf).

3.10.2 Current Program

GGNRA is served by the San Francisco Bay Area Network Fire Ecologist and the Southern and Central California Fire Effects Monitoring Crew. The Fire Ecologist is stationed at PRNS and serves Pinnacles National Monument and PRNS in addition to GGNRA. The Fire Effects Monitoring Crew is also stationed at PRNS and serves six California parks in addition to GGNRA. The goal of the Fire Ecology and Fire Effects Monitoring program at GGNRA is to determine whether prescribed fire and mechanical fuels treatments objectives are being met and to help refine projects and objectives based on monitoring data.

The primary ecosystems at GGNRA include coastal scrub and chaparral, grassland, Douglas-fir forest, redwood forest, non-native pine/cypress/eucalyptus forest, hardwood forest, riparian woodland, and herbaceous wetlands. However, the fire management program is currently actively managing only the coastal scrub and chaparral, redwood forest, grassland, and non-native eucalyptus forest ecosystems. GGNRA has 117 fire effects monitoring plots in 13 different monitoring types: northern coastal scrub, northern coastal scrub (southern phase), chaparral, non-native annual grassland (*Bromus diandrus* dominated), non-native annual grassland (*Brachypodium distachyon* dominated), non-native annual thistle, eucalyptus, non-native tall perennial grassland (*Festuca arundinacea* dominated), non-native tall perennial grassland (*Phalaris aquatica* dominated), non-native summer mustard, northern coastal prairie, redwood forest, and mixed broadleaf evergreen forest. All of the monitoring types follow the protocols described in the FMH Monitoring Handbook (NPS 2003).

3.10.3 Monitoring Levels

Fire effects monitoring occurs at a variety of levels. The most basic of these, Level 1, is the monitoring of environmental conditions including weather, fuel conditions, fire danger rating, etc. The fire effects program will coordinate with the Bay Area Network Inventory and Monitoring program to coordinate Level 1 monitoring efforts. Both programs will work together to ensure that monitoring efforts are not duplicated and to determine the most efficient way to accomplish Level 1 monitoring.

Monitoring Level 2 is fire observation, including fire behavior, smoke volume and movement, fire location and size, etc. Data will continue to be collected at levels 1 and

2 to satisfy the requirements for a Post-Fire Report for prescribed fires or a Wildland Fire Report for wildfires. Protocols for Level 2 post-wildfire monitoring will be included in Appendix F. Additionally, burn severity assessments will be completed for all fires greater than 500 acres and CBI plots will be installed in association with the burn severity assessment. For mechanical projects, treatment prescriptions and locations will be documented and photo-monitoring will take place. Protocols for monitoring non-fire treatments will be included in Appendix F.

Levels 3 and 4 are the monitoring of short-term (≤ 2 years) and long-term (> 10 years) change. Variables monitored at these levels of change include fuel loading and vegetation composition among others. Level 3 and 4 monitoring will take place in all monitoring types that are being actively managed by the fire management program through either prescribed fire or non-fire treatments. The monitoring effort must be sufficient to evaluate whether fire management objectives are being met.

3.10.4 Data Management and Analysis

Fire effects data will be maintained by the fire ecologist and lead fire effects monitor in both paper and digital form. Data will be analyzed by the fire ecologist on an ongoing basis. Data analysis will be presented to park fire management and resource staff annually as part of the annual review/update process. This analysis will be used to determine whether fire management projects are meeting their objectives, to adjust and refine fire management objectives if necessary, to adjust how and where fire management projects are carried out, and to identify fire research needs.

3.10.5 Wildland and Prescribed Fire Monitoring and Research Plan

The Wildland and Prescribed Fire Monitoring and Research Plan describes in detail how monitoring is to be conducted at GGNRA. The Fire Monitoring and Research Plan presents ecological models for each of the monitoring types within GGNRA and outlines the management and monitoring objectives for each. It also details the methods, locations, and frequency of monitoring. The format for the Plan will follow the guidelines provided by the NPS Fire Ecology Steering Committee. Appendix F will be added to the FMP coincident with the 2009 annual FMP update.

3.11 FIRE RESEARCH

The NPS is committed to supporting fire research to promote sound fire management decisions. The policy direction for fire research within the NPS is found in RM #18, Chapter 15 (http://www.nps.gov/fire/download/fir_wil_rm18_ch11.pdf). It is the goal of the fire program at GGNRA to increase in-park research efforts and to recruit high caliber research from outside organizations.

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Several fire-related research projects are currently under way at GGNRA. These include using fire and other methods to enhance habitat for the Mission blue butterfly and examining fire as a potential tool for restoring two rare plant species, *Presidio clarkia* and Marin dwarf flax.

A fire research plan for GGNRA will be developed and added to Appendix F of this FMP during the first months of 2009. High priority topics for future fire research include fire in redwood forests; the effects of fire on invasive species; the effects of fire on rare chaparral plants; the effects of fire on the spread of Sudden Oak Death; and the reconstruction of historical vegetation patterns.