APPENDICES

APPENDIX A. REFERENCES AND CONTRIBUTORS

A.1 REFERENCES CITED

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Appendix B
GGNRA Special Status Species

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit				Potential Effect that Could Result from FMP Actions[1]			County Distribution			Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin	
PLANTS																					
Abronia umbellata ssp. breviflora	Pink sand-verbena	FSLC	1B				Coastal dunes and coastal strand.	Foredunes and interdunes with sparse cover. A. Umb. Breviflora is usually the plant closest to the ocean. 0-12m.	X		X					X			X	X	X	North Coast, Central Coast (Marin Co.)	Species occurences are documented in foredune habitat at Crissy Field (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003). It is anticipated that coastal foredune habitat would be unaffected by FMP actions
Acanthominthа duttonii	San Mateo thornmint	FE	1B	E	X		Chaparral, valley and foothill grassland, coastal scrub. Serpentine grasslands.	Endemic to San Mateo County.extant populations only known from very uncommon serpentinite vertisol clays; in relatively open areas. 50-200m.												X		Central Coast, San Francisco Bay Area (San Mateo Co.)	Only occurs in the San Francisco Watershed District. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Agrostis blasdalei	Blasdale's bentgrass	FSC	1B				Coastal dunes, coastal bluff scrub, coastal prairie.	Includes agrostis blasdalei var. Marinensis, state-listed rare.sandy or gravelly soil close to rocks; often in nutrient-poor soil with sparse vegetation. 5-150m.	X	X											X	s North Coast, n Central Coast, n San Francisco Bay Area	mo populations exist in GGNRA. CNDDB (2004); Marin occurance in Pt. Reyes, San Mateo-Franklin Pt. Quad
Allium peninsulare var. ranciscanum	Franciscan onion	FSLC	1B				Cismontane woodland, valley and foothill grassland.	Clay soils; often on serpentine. Dry hillsides. 100-300m.											X		Central Coast, San Francisco Bay Area	.
Alopecurus aequalis var. sonomensis	Sonoma alopecurus	FE	1B				Freshwater marshes and swamps, riparian scrub.	Wet areas, marshes, and riparian banks with other wetland species. 5-360m. Known from a few occurrences in sonoma and marin counties.	X	X											X	Central Coast	Four occurrences of this species are currently known on the Point Reyes peninsula, all occurring within pastures on agricultural permit lands (Point Reyes FMP, 2004). No populations exist in the GGNRA (CNDDB, 2004)
Amorpha californica var. napensis	Napa false indigo	FSLC	1B				Broadleafed upland forest, chaparral, cismontane woodland.	Openings in forest or woodland or in chaparral. 150-2000m												X	s North Coast Ranges (Napa, Sonoma cos.), n San Francisco Bay Area (Marin Co.)	
Amsinckia lunaris	Bent-flowered fiddleneck	FSLC	1B				Cismontane woodland, valley and foothill grassland.	Disturbed areas, areas with low vegetation cover in grasslands and open-canopied woodlands. 50-500m.												X	Inner North Coast Ranges, west-central Great Central Valley, San Francisco Bay Area .Heterostylous or anthers in upper and lower group. Fl size variable.	
Arabis blepharophylla	Coast rock-cress	FSLC	4		X		Broadleafed upland forest, coastal prairie, coastal scrub.	Prefers rocky coastal bluffs and ridges with thin soils. Often on serpentine soils. 15-500m.	X			X	X	X				X	X	X	Outer North Coast Ranges, San Francisco Bay Area .	Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Arctostaphylos andersonii	Santa Cruz manzanita	FSLC	1B				Broadleaved upland forest, chaparral, north coast coniferous forest.	Known only from the Santa Cruz Mtns.open sites, redwood forest. 180-800m.											X		w San Francisco Bay Area (Santa Cruz Mtns)	
Arctostaphylos hookeri ssp. Franciscana	San Francisco manzanita	FSC	1A				Chaparral.	Formerly Endemic To San Francisco Area; Now Exists Only In Cultivation. Coastal Hillsides, Serpentine Outcrops In Chaparral. 60-300m.	X	X								X			Central Coast (San Francisco Peninsula)	Species is extinct in the wild (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003).
Arctostaphylos hookeri ssp. montana	Tamalpais manzanita	FSC	1B		X		Chaparral, valley and foothill grassland.	Known from fewer than 20 occurrences in the Mt. Tamalpais area, Marin County,serpentine slopes in chaparral and grassland. 160-760m.												X	n Central Coast, nw San Francisco Bay Area (Mount Tamalpais, Marin Co.)	Special Status Vascular Plant Species Monitoring Report GGNRA 2001. Population monitored at Mill Valley Air Force Base.

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit				Potential Effect that Could Result from FMP Actions[1]				County Distribution			Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Arctostaphylos hookeri ssp. ravenii	Presidio (Raven's) manzanita	FE	1B	E	X		Chaparral, coastal prairie, coastal scrub.	Formerly endemic to s.f. area; only one wild plant plus clones remain.open, rocky serpentine slopes. 20-215m.	X			X			X				X			n Central Coast (San Francisco Presidio) .Plants apparently belong to a single clone	The USFWS Recovery Plan suggests that seed germination could be stimulated by burns (Kelley, 1987). The limited population would also be enhanced by invasive species control and management (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003). The fuel reduction actions for San Francisco lands may need further USFWS consultation to reduce direct affects during vegetation removal and to maximize long-term benefits.
Arctostaphylos imbricata	San Bruno Mountain manzanita	? CA	1B	E			Chaparral, coastal scrub.	Known from a handful of occurrences near San Bruno Mtn., San Mateo County, mostly known from a few sandstone outcrops in chaparral. 275-365m.												X		w San Francisco Bay Area (San Bruno Mtn)	
Arctostaphylos montaraensis	Montara manzanita	FSC	1B		X		Chaparral, coastal scrub.	Endemic to San Mateo County,slopes and ridges. 150-500m.												X		w San Francisco Bay Area (San Bruno, Montara mtns)	Only occurs in the SFWD. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Arctostaphylos regismontana	King's Mountain manzanita	FSLC	1B				Broadleaved upland forest, chaparral, north coast coniferous forest.	Endemic to Sacramento and San Mateo counties, granitic or sandstone outcrops. 305-730m.												X		w San Francisco Bay Area (n Santa Cruz Mtns) .	
Arctostaphylos virgata	Marin manzanita	FSLC			X		Broadleafed upland forest, closed-cone coniferous forest, chaparral, north coast coniferous forest.	Only known from about 20 eos in Marin County. On sandstone or granitic soil. 60-700m.	X			X		X						X	n Central Coast, nw San Francisco Bay Area (Marin Co.)	Known populations occur along Bolinas Ridge. Threatened by fire suppression. "GGNRA fire managers should be made aware of this potential threat from fire suppressions and include this with any future FMP". Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Arenaria paludicola	Marsh sandwort	FE	1B	E			Marshes and swamps.	Hist. From scattered coll. In ca and in wa; now known from one site in slo & appar. Also in mexico,growing up through dense mats of typha, juncus, scirpus, etc. In freshwater marsh. 10-170m										X				s Central Coast (Nipomo Mesa, San Luis Obispo Co.), South Coast (Santa Ana River)	
Astragalus nuttallii var. virgatus	Nuttall's milk-vetch	FSLC	4				Coastal bluff scrub, coastal dunes.	3-70m.	X			X					X	X	X	X	c&s Central Coast	Occurs in the Presidio coastal bluffs (pers. comm. Michael Chasse (NPS) 2004)
Astragalus pycnostachyus var. pycnostachyus	Marsh milkvetch	FSLC	1B				Coastal dunes, coastal salt marshes.	Mesic sites in dunes or along streams or coastal salt marshes, 0-30m.											X	X		North Coast, n Central Coast .	
Astragalus tener var. tener	Alkali milk-vetch	FSC	1B				Alkali playa, valley and foothill grassland, vernal pools.	Low ground, alkali flats, and flooded lands; in annual grassland, playas, and vernal pools. 1-170m.											X			s. Sacramento Valley, n. San Joaquin Valley, east SF Bay Area	
Atriplex californica	California saltbush	FSLC					Coastal strand, coastal salt marsh, coastal sage scrub, sea bluffs. North of Monterey this species generally occurs on the upper edges of sandy salt marshes and on coastal sandstone bluffs.		X			X				X		X	X	X	s North Coast, Central Coast, South Coast, Channel Islands	Occurs in the Presidio (pers. comm. Ling He (NPS). 2004). It is anticipated that edges of the coastal salt marsh and sandstone bluff habitat would not be unaffected by FMP actions

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit					Potential Effect that Could Result from FMP Actions[1]				County Distribution			Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Blennosperma nanum var. robustum	Point Reyes stickyseed	FSC	1B				Coastal prairie, coastal scrub.	Endemic to Marin and Mendocino Counties. On open coastal hills in sandy soil. 10-145m.												X	Central North Coast (Fort Bragg, Mendocino Co.), North Central Coast (Point Reyes peninsula, Marin Co.) .Fls late spring. Some populations on Point Reyes peninsula are intermediate to *var. nanum* in fruit length, pollen color	
Calamagrostis crassiglumis	Thurber's reed grass	FSC	2				Coastal scrub, freshwater marsh.	Usually in marshy swales surrounded by grassland or coastal scrub. 10-45m.												X	Central Coast	
Calochortus tiburonensis	Tiburon mariposa lily	FT	1B	T			Valley and foothill grassland.	Narrowly endemic to ring mountain, Marin County. On open, rocky, slopes in serpentine grassland. 50-150m.												X	nw San Francisco Bay Area (Ring Mtn, Marin Co.)	Per communication with Marin CNPS (2004), no populations occur within GGNRA. CNDDB (2004): Marin occurance in Pt. Reyes, San Mateo-Franklin Pt. Quad
Calystegia purpurata ssp. Saxicola	Coastal bluff morning-glory	FSLC	1B				Coastal dunes, coastal scrub.	15-105m.	X	X										X	s&c North Coast, n Central Coast (Brooks Island, Contra Costa Co.), n San Francisco Bay Area	Per communication with Marin CNPS, No populations exist within GGNRA. CNDDB-Marin occurance in Pt. Reyes.
Campanula californica	Swamp harebell	FSC	1B				Bogs and fens, closed-cone coniferous forest, coastal prairie, meadows, freshwater marsh, n coast coniferous forest.	Bogs and marshes in a variety of habitats; uncommon where it occurs. 1-405m.												X	s North Coast, n Central Coast	
Castilleja affinis ssp. neglecta	Tiburon paintbrush	FE	1B		X		Valley and foothill grassland.	Known only from Marin, Napa, and Santa Clara Counties. Rocky serpentine sites. 75-400m.												X	s Inner North Coast Ranges (Napa Co.), San Francisco Bay Area (Marin, Santa Clara cos.)	Occurs on Nicassio Ridge only. Special Status Vascular Plant Species Monitoring Report GGNRA 2001
Castilleja affinis var. affinis	Coast Indian paintbrush	FSLC					Chaparral, coastal scrub.	Sandy soils. <1200m.	X			X		X					X	X	c North Coast (Mendocino Co.), n Outer North Coast Ranges (Humboldt Co.), s Outer North Coast Ranges, n Cascade Range Foothills, Sierra Nevada Foothills, Central Western California, Southwestern California	Castilleja sp. (wightii or affinis ssp. affinis) occur in the Presidio coastal bluffs (pers. comm. Michael Chasse (NPS), 2004).
Castilleja ambigua ssp. ambigua	Salt marsh owl's-clover	FSLC					Coastal bluffs, grassland.	<100m.	X	X									X	X	North Coast, s North Coast Ranges, n&c Central Coast .	Occurred in 2002 at Cissy Field, but has not been observed since (pers. comm, Ling He (NPS) 2004).
Castilleja ambigua ssp. Humboldtiensis	Humboldt Bay owl's-clover	FSC	1B				Coastal salt marsh.	Known only from humboldt and marin counties. In coastal saltmarsh with spartina, distichlis, salicornia, jaumea. 0-3m.												X	n North Coast (Humboldt Bay), n Central Coast (Point Reyes)	Species is not documented in GGNRA. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Castilleja exserta ssp. Latifolia	Purple owl's-clover	FSLC					Coastal bluffs, dunes.	<200m.	-	X	X								X	X	North Coast, n&c Central Coast	Per communication with Marin CNPS (2004), no populations occur within GGNRA. In San Francisco, it is apparently either rare, intermittent(emerging only some years), or extirpated in coastal bluffs and dunes (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003).
Castilleja subinclusa ssp. franciscana	Indian paintbrush		4		X		Coastal scrub	<100m.	X				X	X							South North Coast (s Mendocino, Sonoma cos.), n Central Coast (to Santa Cruz Co.), w San Francisco Bay Area	Per communication with Marin CNPS (2004), populations occur within Marin Headlands (including Wolfback Ridge)

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Ceanothus gloriosus var. porrectus	Mount Vision ceanothus	FSC	1B				Closed-cone coniferous forest, coastal prairie, coastal scrub, valley and foothill grassland.	Low shrub in a variety of habitats on Pt. Reyes, sandy soils. 25-305m.												X	San Francisco Bay Area (Point Reyes)	
Ceanothus masonii	Mason's ceanothus	FSC	1B	R	X		Chaparral.	Endemic To Marin County. Serpentine Ridges Or Slopes In Chaparral Or Transition Zone. 180-460m.	X	X			X							X	San Francisco Bay Area (Bolinas Ridge, sw Marin Co.) . Closely related to *C. gloriosus*.	Species is documented on southern Bolinas Ridge (Special Status Vascular Plant Species Monitoring Report, GGNRA 2002).
Chenopodium californicum	California goosefoot	FSLC					Occurs in a wide range of plant communities in relatively dry and open conditions. In San Francisco it typically occurs in stabilized rear dune systems.	Sandy to clay soils. Dryish plains and slopes below 5000'.	X	X								X	X	X	s North Coast, Outer North Coast Ranges, c&s Sierra Nevada Foothills, Tehachapi Mountain Area, Great Central Valley, Central Western California, Southwestern California, s East of Sierra Nevada, w Mojave Desert	Occurs in the Presidio (Area B - interior) (pers. comm. Michael Chasse (NPS), 2004)
Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	FSC	1B		X		Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub.	Closely related to c. Pungens. Coastal strand & coastal scrub communities. Sandy soil on terraces and slopes. 5-550m.	X		X				X			X	X	X	not found in Jepson	Occurs within rear dune systems at the Presidio and Fort Funston. Special Status Vascular Plant Species Monitoring Report GGNRA 2001. Colonizes areas that have been recently disturbed, and spreads in dynamic dune systems.
Chorizanthe cuspidata var. villosa	Woolly-headed spineflower	FSC	1B				Coastal scrub, coastal dunes, coastal prairie.	Endemic to coastline from Bodega Bay to Pt. Reyes.sandy places near the beach. 3-60m.												X	not found in Jepson	
Chorizanthe robusta var. robusta	Robust spineflower	FE	1B				Cismontane woodland, coastal dunes, coastal scrub.	Sandy terraces and bluffs or in loose sand. 3-120m.											X	X	Bay region, south to Monterey	
Chorizanthe valida	Sonoma spineflower	FE	1B	E			Coastal prairie.	Known only from Marin and Sonoma Counties; extinct in Sonoma County.sandy soil. 10-50m.												X	n Central Coast (Point Reyes Peninsula, Marin Co.) .One extant population known; threatened by cattle. Closely related to *C. pungens*	
Cirsium andrewsii	Franciscan thistle	FSC	1B		X		Coastal bluff scrub, broadleaved upland forest, coastal scrub.	Sometimes serpentine seeps. 0-135m.	X			X	X	X				X	X	X	s North Coast, n Central Coast	Occurs in the Marin Headlands and Fort Point. Special Status Vascular Plant Species Monitoring Report GGNRA 2001. It is not anticipated that this species would be directly affected by FMP actions as populations occur primarily in seep and wetland habitat
Cirsium fontinale var. fontinale	Fountain thistle	FE	1B	E	X		Valley and foothill grassland, chaparral.	Endemic to San Mateo County. Serpentine seeps and grassland. 90-180m.											X		sw San Francisco Bay Area (San Mateo Co.)	Only occurs in the SFWD. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Cirsium hydrophilum var. vaseyi	Mount Tamalpais thistle	FSC	1B				Broadleafed upland forest, chaparral.	Endemic to Marin County. Serpentine seeps and streams in chaparral and woodland. 265-620m.												X	n San Francisco Bay Area (Mount Tamalpais)	
Cirsium occidentale var. compactum	Compact cobweb thistle	FSC	1B				Chaparral, coastal dunes, coastal prairie, coastal scrub.	On dunes and on clay in chaparral; also in grassland. 5-155m.											X		Central Coast (n San Luis Obispo, Monterey cos., formerly San Francisco) .Some inland plants suggest weak separation from var. *occidentale*	
Clarkia concinna ssp. raichei	Tomales clarkia	FSC	1B				Coastal bluff scrub.	Known only from one occurrence near Tomales, Marin County. Highly exposed rocky bluffs with a near-vertical slope. 15m.											X		n Central Coast (known only from type locality near Tomales, Marin Co.) .	

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Clarkia davyi	Davey's clarkia	FSLC					Coastal grassland, bluffs.											X	X		North Coast, n Central Coast, n Channel Islands (Santa Rosa Island).	
Clarkia franciscana	Presidio clarkia	FE	1B	E	X		Coastal scrub, valley and foothill grassland.	Endemic to Alameda and San Francisco Counties. Serpentine outcrops in grassland or scrub. 20-335m.	X	X								X			San Francisco Bay Area (Presidio, San Francisco; Oakland hills)	Occurs in the interior area of the Presidio, not the FMP Study Area. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001
Collinsia corymbosa	Round-headed Chinese houses	FSC	1B				Coastal dunes, coastal prairie.	Dunes and coastal priairie. 10-30m.										X		X	North Coast (scattered) formerly n CC_o, where transitional to *C. bartsiifolia* .	
Cordylanthus maritimus ssp. palustris	North Coast bird's-beak	FSC	1B		X		Coastal salt marsh.	Usually in coastal salt marsh with salicornia, distichlis, jaumea, spartina, etc. 0-15m.	X		X				X			X		X	n North Coast (Humboldt Co.), n Central Coast (Marin, Sonoma cos.)	Occurs at Crissy Field (pers. comm. Ling He (NPS), 2004). Occurs west of Hwy 1 b/w Hamlet & Nick's Cove, Special Status Vascular Plant Species Monitoring Report. GGNRA 2001. It is anticipated that coastal marsh habitat would be unaffected by FMP actions
Cordylanthus mollis ssp. mollis	Soft bird's-beak	FE	1B	R			Coastal salt marsh.	In coastal salt marsh with distichils, salicornia, frankenia, etc. 0-3m.												X	n Central Coast .	
Croton californicus	California croton	FSLC					Coastal sage scrub, chaparral.	Dry sandy soils, dunes, washes to 4000'.	X			X				X		X			Central Coast, South Coast, s Channel Islands (Santa Catalina Island), Desert	Occurences found on the Presidio (NPS, 2004)
Cupressus abramsiana	Santa Cruz cypress	FE	1B	E			Closed-cone coniferous forest, lower montane coniferous forest.	Narrow endemic from Santa Cruz and Santa Clara Co's. Restricted to the Santa Cruz mountains, on sandstone & granitic derived soils; often w/p. Attenuata, redwoods. 300-800m.											X		San Francisco Bay Area (Santa Cruz Mtns) .Threatened by development, agriculture.	
Cypripedium fasciculatum	Clustered lady's-slipper orchid	FSC	4				North coast coniferous forest, lower montane coniferous forest.	In serpentine seeps and moist streambanks. 100-1980m.										X			Northwestern California, Cascade Range, n Sierra Nevada, sw San Francisco Bay Area	
Delphinium bakeri	Baker's larkspur	FE, PCH	1B	R			Coastal scrub, grasslands.	Only site occurs on nw facing slope, on decomposed shale. Hist. Known from grassy areas along fencelines too. 90-205m.												X	n San Francisco Bay Area, n Central Coast, (s Sonoma Co.)	
Delphinium luteum	Yellow larkspur	FE, PCH	1B	R			Chaparral, coastal prairie, coastal scrub.	Endemic to a couple of occurrences hanging on in Sonoma County. North-facing rocky slopes. 0-100m.												X	n Central Coast (Marin, Sonoma cos.). Hybridizes with *D. decorum* , *D. madrcuale*.	
Dirca occidentalis	Western leatherwood	FSLC	1B		X		Broadleafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast coniferous forest, riparian forest, riparian woodland.	On brushy slopes, mesic sites; mostly in mixed evergreen & foothill woodland communities. 30-550m.	X										X	X	San Francisco Bay Area	Occurs in the GGNRA along Devils Gulch Rd & in the SFWD. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001
Erigeron supplex	Supple daisy	FSC	1B				Coastal bluff scrub, coastal prairie.	Usually in grassy sites. 5-50m.												X	n&c North Coast .Threatened by coastal development.	
Eriogonum luteolum var. caninum	Tiburon buckwheat	FSLC			X		Chaparral, valley and foothill grassland, coastal prairie.	Known from the greater bay area.serpentine soils. 10-500m.											X	X	c Inner North Coast Ranges (Colusa Co.), n Central Coast, n San Francisco Bay Area (Marin, formerly Alameda cos.)	Occurs only at MVAFB. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001.
Eriophyllum latilobum	San Mateo woolly sunflower	FE	1B	E	X		Cismontane woodland.	Endemic to San Mateo County.often on roadcuts; found on and off of serpentine. 45-150m.											X		cw San Francisco Bay Area (San Mateo Co.) .Probable derivative of *E. lanatum var. arachnoideum* X *E. conferitiflorum* . Threatened by development	Occurs only in the SFWD. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Erysimum ammophilum	Coast wallflower	FSC	1B				Chaparral (maritime), coastal dunes, coastal scrub.	Soils, sandy openings in coastal habitats. 0-130m.											X		c Central Coast (Monterey Bay), n Channel Islands (Santa Rosa Island) .Threatened by development. Plants intermediate to *E. capitatum* formerly in s SCo	
Erysimum franciscanum	San Francisco wallflower	FSC	4		X		Coastal dunes, coastal scrub, valley and foothill grassland.	Endemic to the greater s.f. bay area. Often occurs on serpentine soils or outcrops; sometimes granite. Occasionally on grassy, rocky slopes. 0-500m.	X		X				X				X	X	X	North Coast, n&c Central Coast, San Francisco Bay Area .Fleshy, coastal plants have been called *var. crassifolium* Rossbach; inland plants approach *E. capitatum*	Occurs in the Marin Headlands, Sweeney Ridge, Fort Funston, and the SFWD. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001.
Fissidens pauperculus	Fissidens moss	FSLC	1B				North coast coniferous forest.	Moss growing on damp soil along the coast. 10-100m.												X			
Fritillaria agrestis	Stinkbells	FSLC	4				Cismontane woodland, chaparral, valley and foothill grassland.	Sometimes on serpentine; mostly found in nonnative grassland or in grassy openings in clay soil. 10-1555m.											X		Outer North Coast Ranges (Mendocino Co.), Sierra Nevada Foothills, Great Central Valley. Central Western California	
Fritillaria biflora var. ineziana	Hillsborough chocolate lily	FSC	1B				Cismontane woodland, valley and foothill grassland.	Endemic to San Mateo County. Probably on serpentine; most recent site is in serpentine grassland. 90-160m.											X		San Francisco Bay Area (Hillsborough, San Mateo Co.) .	
Fritillaria lanceolata var. tristulis	Marin checker lily	FSC	1B		X		Coastal bluff scrub, coastal scrub, coastal prairie.	Endemic to Marin County. Occurrences reported from canyons and riparian areas as well as rock outcrops; often on serpentine. 30-300m.	X	X								X			X	Endemic to Marin County	** Referenced as *Fritillaria affinis var. tristulis* One population located in the GGNRA Northern District (Special Status Vascular Plant Species Monitoring Report. GGNRA 2001).
Fritillaria liliacea	Fragrant fritillary	FSC	1B		X		Coastal scrub, valley and foothill grassland, coastal prairie.	Often on serpentine; various soils reported though usually clay, in grassland. 3-410m.											X	X	X	Sacramento Valley (Solano Co.), Central Western California.	Occurs at Nicasio Ridge and in the SFWD. Special Status Vascular Plant Species Monitoring Report. GGNRA 2001.
Gilia capitata ssp. Chamissonis	San Francisco dune gilia	FSC	1B		X		Coastal dunes, coastal scrub.	2-200m.	X		X			X					X		X	n Central Coast	Located in rear dune habitat on the Presidio (Special Status Vascular Plant Species Monitoring Report. GGNRA 2001). Colonizes areas that have been recently disturbed, and spreads in dynamic dune systems.
Gilia capitata ssp. Tomentosa	Woolly-headed gilia	FSC	1B				Coastal bluff scrub.	Rocky outcrops on the coast. 15-155m.													X	North Coast . Intergrades with *subsp. capitata* in ne SnFrB	
Gilia millefoliata	Yarrow-leaf gilia	FSLC	1B				Coastal dunes.	2-20m.											X		X	North Coast, n Central Coast	
Grindelia hirsutula	San Francisco gumplant	FSC	1B		X		Coastal scrub, coastal bluff scrub, valley and foothill grassland.	Ocean bluffs and coastal hillsides, sandy or serpentine slopes, sea bluffs. 15-400m.	X			X		X					X	X	X	North Coast Ranges, n&c Sierra Nevada Foothills, Sacramento Valley, Central Western California, Western Transverse Ranges, Peninsular Ranges, Sonoran Desert	Occurs on Presidio coastal area. **Special Status Vascular Plant Species Monitoring Report GGNRA 2001. Forest Service indicates that *G. squarrosa* although it may be top-killed by fire, it may resprout and seedlings colonize and increase after a fire (www.fs.fed.us/database/feis)
Helianthella castanea	Diablo helianthella	FSC					Broadleaved upland forest, chaparral, cismontane wdlnd, coastal scrub, riparian woodland, valley & foothill grassland.	Usually in chaparral/oak woodland interface in rocky, azonal soils. Often in partial shade. 25-1150m.											X	X	X	n San Francisco Bay Area	

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Hesperolinon congestum	Marin dwarf-flax "Marin Western Flax"	FT	1B	T	X		Chaparral, valley and foothill grassland.	Known only from Marin, S.F., and San Mateo Counties. In serpentine barrens and in serpentine grassland and chaparral. 30-365m.	X			X		X			X	X	X		nw San Francisco Bay Area. Occurs on Presidio coastal area. **Special Status Vascular Plant Species Monitoring Report GGNRA 2001. It requires openings in grassland habitat with limited thatch and vegetation cover and open soil/outcrops's.	Its decline is attributable to invasive by invasive non-native vegetation; the population would be enhanced by invasive species control and management. The fuel reduction actions for San Francisco lands may need further USFWS consultation to reduce direct affects during vegetation removal and to maximize long-term benefits.
Holocarpha macradenia	Santa Cruz tarplant	FT	1B	E			Coastal prairie, valley and foothill grassland.	Light, sandy soil or sandy clay; often with nonnatives. 10-260m.												X	n Central Coast (n&c Monterey Bay), sw San Francisco Bay Area .Threatened by development, agriculture.	
Horkelia cuneata var. sericea	Kellogg's horkelia	FSLC	1B		X		Closed-cone coniferous forest, coastal scrub, chaparral.	Old dunes, coastal sandhills; openings. 10-200m.	X			X		X					X		Central Coast .Remaining plants less distinct from *subsp. cuneata* than those formerly near San Francisco. Threatened by coastal development	Re-introduced into Presidio dune habitat (pers. comm. Peter Brastow (NPS) 2004)
Horkelia marinensis	Point Reyes horkelia	FSC	1B				Coastal dunes, coastal prairie, coastal scrub.	Sandy flats and dunes near coast; in grassland or scrub plant communities. 5-30m.											X	X	c North Coast (Fort Bragg), n Central Coast (Point Reyes to Santa Cruz)	
Horkelia tenuiloba	Thin-lobed horkelia	FSLC	1B				Coastal scrub, chaparral.	Sandy soils; mesic openings. 45-500m.												X	c&s North Coast, c&s Outer North Coast Ranges, nw San Francisco Bay Area	
Lasthenia macrantha ssp. bakeri	Baker's goldfields	FSLC	1B				Closed-cone coniferous forest, coastal scrub.	Grasslands, woods, near coast. Openings in forests and scrublands. 60-520m.												X	c&s North Coast (Mendocino, Sonoma cos.)	
Lasthenia macrantha ssp. macrantha	Perennial goldfields	FSLC	1B				Coastal bluff scrub, coastal dunes, coastal scrub.	5-520m.	X	X										X	North Coast, Central Coast (2 stations)	CNDDB (2004)- Occurences in Marin are all Pt. Reyes, San Mateo is at Pigeon Point. Per communication with Marin-CNPS (2004) Marin populations located in Point Reyes only
Lathyrus jepsonii var. jepsonii	Delta tule-pea	FSC	1B				Freshwater and brackish marshes.	Most of distribution restricted to the Sacramento/San Joaquin River Delta. Often found w/ Typha, Aster lentus, Rosa calif., Juncus spp., Scirpus, etc. Usually on marsh and slough edges.												X	Great Central Valley, especially San Francisco Bay Area .	
Layia carnosa	Beach layia	FE	1B	E			Coastal dunes.	On sparsely vegetated semi-stabilized dunes, usually behind foredunes. 0-75m.	X	X									X		n North Coast, Central Coast	No occurences present in GGNRA (Lpers. Comm. Ling He (NPS), 2004). Seeds of species was re-introduced to Crissy Field in 1998-9, however did not establish)
Legenere limosa	Legenere	FSC	1B				Vernal pools.	Many historical occurrences are extirpated. In beds of vernal pools. 1-880m.											X		s North Coast Ranges, s Sacramento Valley, n San Joaquin Valley, San Francisco Bay Area (Santa Cruz Mtns, Mount Hamilton Range) .	
Leptosiphon parviflorus var. rosaceus (Linanthus rosaceus)	Rose linanthus	FSC					Coastal bluff scrub.	0-100m.	X	X								X	X	X	California Floristic Province	Per communication with Marin-CNPS (2004), no populations have been observed outside of PORE & near Dillon Beach.

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior		Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Lessingia arachnoidea	Crystal Springs lessingia	FSC	1B		X		Coastal sage scrub, valley and foothill grassland, cismontane woodland.	Known only from Santa Cara & Sonoma Counties. Grassy slopes on serpentine; sometimes on roadsides. 60-200m.												X			sw San Francisco Bay Area (San Mateo Co., near Crystal Springs Reservoir)	Occurs only in San Mateo Co. near Crystal Springs Reservoir; Special Status Vascular Plant Species Monitoring Report, GGNRA 2001
Lessingia germanorum	San Francisco lessingia	FE	1B	E	X		Coastal scrub.	Known only from San Francisco and San Mateo counties. From remnant dunes. Open sandy soils relatively free of competing plants. 20-125m.	X			X			X				X	X			San Francisco Bay Area. Species located in the coastal habitat region of the Presidio (Special Status Vascular Plant Species Monitoring Report, GGNRA 2001).	It is anticipated that the rear dune population located at Crissy Field would be unaffected by FMP actions. Species colonizes areas that have been recently disturbed, resulting in possible long-term benefit. The limited population would also be enhanced by invasive species control and management. The fuel reduction actions for San Francisco lands may need further USFWS consultation to reduce direct affects during vegetation removal and to maximize long-term benefits.
Lessingia micradenia var. micradenia	Tamalpais lessingia	FSC	1B				Chaparral, valley and foothill grassland.	Endemic to Marin County. Usually on serpentine, in serpentine grassland or serpentine chaparral. Often on roadsides. 100-305m.											X			n San Francisco Bay Area (Mount Tamalpais, Marin Co.)	
Lilaeopsis masonii	Mason's lilaeopsis	FSC	1B	R			Freshwater and brackish marshes, riparian scrub.	Tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. 0-10m.	X		X								X			s Sacramento Valley, ne San Francisco Bay Area . Locally abundant; threatened by development, flood control, agriculture	CNDDB (2004) - Closest occurrence in Marin -Inverness. Populations unknown to central and southern Marin, pers. comm, with Marin CNPS (2004).
Lilium maritimum	Coast lily	FSC	1B				Closed-cone coniferous forest, coastal prairie, coastal scrub, broadleaved upland forest, north coast coniferous forest.	Historically in sandy soil, often on raised hummocks or bogs; today mostly in roadside ditches. 10-335m.											X	X	X	s North Coast (extirpated in n Central Coast) . Hybridizes with *L. pardalinum* .	
Limnanthes douglasii ssp. sulphurea	Point Reyes meadowfoam		1B	E			Fresh. Marsh, vernal pools, coastal prairie. meadows & seeps, cismontane woodland.	Only known from San Mateo and Marin Counties. Vernally wet depressions in open rolling, coastal prairies & meadows; typically in dark clay soil. 10-120m.											X	X	X	North Coast (Marin Co.), Central Coast (San Mateo Co.)	
Linanthus grandiflorus	Large-flowered linanthus	FSC					Open, grassy flats, generally in sandy soil.												X	X	X	North Coast, Central Coast, San Francisco Bay Area	
Lupinus arboreus var. eximius	San Mateo tree lupine	FSLC			X		Coastal bluffs, dunes, or more inland.	<100m.												X		Known from San Mateo County and Sonoma County.	Occurs in the SFWD. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Lupinus tidestromii	Tidestrom's lupine	FE	1B	E			Coastal dunes.	Includes lupinus tidestromii var.tidestromii, state-listed endangered. Partially stabilized dunes, immediately near the ocean. 0-35m.													X	s North Coast (Sonoma Co.), nBcc Central Coast (Marin, Monterey cos.) . Shaggier plants from n NCo have been called *var. layneae* (Eastw.) Munz. Point Reyes lupine.	
Malacothamnus arcuatus	Arcuate bush mallow	FSLC	1B				Coastal sage scrub, chaparral	Prefers rocky soils, openings in scrub, gravelly alluvium. 80-355m.	X	X										X		INNER No. Coast range, Mendocino County, interior SF Bay Area	Occurred on Sweeney Ridge more than 10 years ago. Occurs in San Mateo Co. Special Status Vascular Plant Species Monitoring Report, GGNRA 2001. Seeds respond to fire.
Microseris paludosa	Marsh microseris (silverpuff)	FSLC	1B				Closed-cone coniferous forest,cismontane woodland, coastal scrub, valley and foothill grassland.	5-300m.												X	X	Central Coast, San Francisco Bay Area (Like *M. laciniata subsp. leptosepala* except pappus.	CNDDB- SF occurrence extirpated. Several Marin occurrences in San Rafael, Mt. Tamalpias and Point Reyes (communication with Marin-CNPS, 2004).

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Monardella undulata	Curley-leaved monardella	FSC	4				Chaparral, coastal dunes, coastal scrub, lower montane coniferous forest.	Ponderosa pine sandhills; sandy soils. 0-300m.										X	X	X	Central Coast, San Francisco Bay Area	
Mondardella villosa ssp. globosa	Robust monardella	FSLC	1B				Broadleaved upland forest, chaparral, cismontane woodland, valley and foothill grassland.	Openings. 30-300m.											X		Outer North Coast Ranges, San Francisco Bay Area	
Navarretia leucocephala ssp. bakeri	Baker's navarretia	FSC	1B				Cismontane woodland, meadows and seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest.	Vernal pools and swales; adobe or alkaline soils. 5-950m.												X	Inner North Coast Ranges, w Sacramento Valley .Intermediate between subspp. *leucocephala* and *plieantha*	
Navarretia rosulata	Marin County navarretia	FSLC	1B				Closed-cone coniferous forest, chaparral.	Known only from Marin and Napa counties. Dry, open rocky places; can occur on serpentine. 200-635m.												X	s Inner North Coast Ranges (Napa Co.), n San Francisco Bay Area (Marin Co.)	
Navarretia squarrosa	Skunkbush	FSLC					Sandy alluvium, roadsides, dryer winter pools, open wet gravelly flats, slopes.	Dunes, sandy soils	X	X									X		North Coast Ranges, n Sierra Nevada Foothills (Sacramento, Amador cos.), San Francisco Bay Area, South Coast Ranges	Rare in San Francisco area, with one site located in the interior of the Presidio (Area B) (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003).
Orobanche californica ssp. californica	California broomrape	FSLC					Coastal bluff grassland, and occassionally in dunes.	Numerous forested habitats, california floristic province sandy or heavy soils, locally on serpentine substrate. Plant is root parasite generally on grindelia species. <150m	X	X									X		North Coast, n&c Central Coast	Per communication with Marin-CNPS (2004), "not known except on PORE growing in association with Grindelia". NO CNDDB occurrences
Pedicularis dudleyi	Dudley's lousewort	FSC	1B	R			Chaparral, north coast coniferous forest, valley and foothill grassland, coast redwood forests.	Deep shady woods of older coast redwood forests; also in maritime chaparral. 100-490m.											X		Central Western California (except Outer South Coast Ranges). Widely scattered. Plants from c CCo (Arroyo de la Cruz, San Luis Obispo Co.) warrant further study (smaller, leaves < inflorescence, anthers often exserted with bases somewhat acuminate); also like *P. semibarbata* but filaments glabrous	
Pentachaeta bellidiflora	White-rayed pentachaeta	FE	1B	E	X		Valley and foothill grassland.	Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. 35-620m											X	X	San Francisco Bay Area	Occurs in the SFWD. Special Status Vascular Plant Species Monitoring Report GGNRA 2001.
Perideridia gairdneri ssp. gairdneri	Gairdner's yampah	FSC					Broadleafed upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools.	Adobe flats or grasslands, wet meadows and vernal pools, under pinus radiata along the coast; mesic sites. 0-350m.											X	X	s North Coast (Sonoma Co.), Central Coast (scarce s of Monterey Co.), South Coast	
Phacelia insularis var. continentis	North Coast phacelia	FSC	1B				Coastal bluff scrub, coastal dunes.	Known only from Mendocino and Marin counties. Open maritime bluffs, sandy soil. 10-160m.	X	X										X	North Coast	Per communication with Marin-CNPS (2004), Marin populations found in PORE only. CNDDB (2004) - Closest occurrence in Marin: Pt. Reyes & Inverness.
Piperia elegans	Coast rein-orchid	FSLC					Coniferous forests, scrub, coastal bluffs, headlands.	Numerous habitats, prefers moist soils, shade in forested and scrub habitat.	X		X				X						North Coast, w Klamath Ranges, Outer North Coast Ranges, Central Coast, San Francisco Bay Area	It is uncommon and local on sandy coastal bluff grassland and scrub in the Presidio, and under blue gum eucalyptus growes in remnant dunes near Baker Beach (GGNRA unpub. data)

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Piperia elegans ssp. Decurtata	Point Reyes rein orchid	FSC	1B				Coastal bluff scrub.	15-185m.												X	known only from two small populations at the tip of the Pt. Reyes peninsula, California, and separated from P. elegans subsp. elegans by only 14 km.	
Plagiobothrys chorisianus var. chorisianus	Choris's popcornflower	FSLC	1B		X		Chaparral, coastal scrub, coastal prairie.	Mesic sites. 15-100m.	X				X	X			X		X		Central Coast, sw San Francisco Bay Area	Occurs at Sweeney Ridge and on SFWD. Special Status Vascular Plant Species Monitoring Report, GGNRA, 2001. The 2001 draft USFWS recovery plan for rough popcorn flower (*P. hirtus*) states that fire suppression is a threat to the species resulting in encroaching native oaks and ash trees which shade the popcorn flower.
*Plagiobothrys diffusus***	San Francisco popcornflower		1B	E			Valley and foothill grassland, coastal prairie.	Historically from grassy slopes with marine influence. 60-485m.	X	X									X			** The treatment of Plagiobothrys in the Jepson manual interpreted the endemic San Francisco (Presidio) population of Greene's popconflower (*Plagiobothrys diffusus*) as a variant with *Plagiobothrys reticulatus* var. *rossianorum* .
Plagiobothrys glaber	Hairless allocarya	FSC	1A				Meadows and seeps, marshes and swamps.	Coastal salt marshes and alkaline meadows. 5-180m.												X	Central Coast, s San Francisco Bay Area (especially near Hollister) .Perhaps a var. of *P. stipitatus* .	
Plagiobothrys reticulatus var. rossianorum	Greene's popcorn flower	FSC					Forests, grasslands.	gen <300m.	X	X									X		Northwestern California, Has been extirpated from San Francisco Bay Area. (Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula, USFWS, 2003)	Per communication with Marin-CNPS (2004), Marin occurences known only in PORE. NO CNDDB occurences.
Pleuropogon hooverianus	North Coast semaphore grass	FSC	1B	T			Broadleafed upland forest, meadows and seeps, north coast coniferous forest.	Wet grassy, usually shady areas, sometimes freshwater marsh; associated with forest environments; 10-1150m.												X	s North Coast, n Central Coast .	
Polygonum marinense	Marin knotweed	FSLC	3				Marshes and swamps.	Coastal salt marshes and brackish marshes. 0-10m.											X		San Francisco Bay Area (especially Marin Co.) Related to *P. aviculare* . taxonomic status uncertain: possibly = *P. roberrii* Loisel.; if so, alien, native to w Medit. Endangered by salt marsh development. Merits immediate study.	Per comm. With Marin CNPS, Possible weed! And exists on Tomales Bay. CNDDB-Occurrences in Marin: Pt. Reyes and San Rafael.
Potentilla hickmanii	Hickman's potentilla = Hickman's cinquefoil	FE	1B	E			Coastal bluff scrub, closed-cone coniferous forest, meadows and seeps, marshes and swamps.	Freshwater marshes, seeps, and small streams in open or forested areas along the coast. 5-125m.											X		n&c Central Coast. Greene's popcorn flower is extirpated in San Francisco.	Per communication w/ Marin-CNPS, no Marin pops known. CNDDB - Occurences in San Mateo County - Montara Mountain Quad
Rhynchospora californica	California beaked-rush	FSC	1B				Bogs and fens, marshes and swamps, lower montane coniferous forest, meadows and seeps.	Freshwater seeps and open marshy areas. 45-1000m.												X	s Northwestern California (Sonoma Co.), n&c Sierra Nevada Foothills (Butte, Mariposa? cos.), n San Francisco Bay Area .Mariposa Co. plants not recently collected, may be undescribed.	
Rosa pinetorum	Pine rose	FSLC					Closed-cone coniferous forest.	2-300m.											X		west-central Central Western California . Possibly hybrids of *R. spithamea* , *R. gymnocarpa* , or others; further study essential	

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Sagittaria sanfordii	Valley sagittaria (Sanford's arrowhead)	FSC	1B				Marshes and swamps.	In standing or slow-moving freshwater ponds, marshes, and ditches. 0-610m.												X	n North Coast (Del Norte Co.), Great Central Valley (where mostly extirpated), n South Coast (Ventura Co.)	
Sanicula maritima	Adobe sanicle	FSC	1B	R			Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie.	Coastal grassy areas, wet meadows, playas, prefers moist clay or ultramafic soils. 30-240m.										X			SF Bay Area, Central Coast, San Luis Obispo	Per communication with Marin-CNPS, no known Marin pops. CNDDB- SF occurrence: Protrero Hills, possibly extirpated. Next closest occurrence in Monterey.
Sidalcea calycosa ssp. Rhizomata	Point Reyes checkerbloom	FSLC	1B				Marshes and swamps.	Freshwater marshes near the coast. 5-75(245)m.												X	c&s North Coast (Mendocino, Sonoma cos.), n Central Coast (Marin Co.)	
Sidalcea hickmanii ssp.viridis	Marin checkermallow (checkerbloom)	FSLC	1B				Chaparral.	Serpentine Or Volcanic Soils; Sometimes Appears After Burns. 0-430m.										X	X	X	s North Coast (Sonoma Co.), n Central Coast (Marin, San Francisco, San Mateo cos.)	
Sidalcea malviflora ssp. Purpurea	Purple-stemmed checkerbloom	FSLC	1B				Broadleafed upland forest, coastal prairie.	15-65m.			X							X	X	X	c North Coast (n Sonoma, s Mendocino cos.), n Central Coast (San Mateo Co.)	
Silene verecunda ssp. verecunda	Mission Delores (San Francisco) campion	FSC	1B		X		Coastal scrub, valley and foothill grassland, coastal bluff scrub, chaparral, coastal prairie.	Often on mudstone or shale; one site on serpentine. 30-645m.	X		X			X				X	X		n Central Coast, San Francisco Bay Area	Population located on the coastal section Presidio (pers. comm. Peter Brastow (NPS). 2003).
Spartina foliosa	Pacific cordgrass	FSLC					Coastal salt marsh	Baja to northern california	X		X	X						X	X	X	North Coast, Central Coast, South Coast	It is anticipated that this coastal salt marsh habitat would be unaffected by FMP actions.
Stebbinsoseris decipiens	Santa Cruz microseris (silverpuffs)	FSC	1B		X		Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub.	Open areas in loose or disturbed soil, usu. Derived from sandstone, shale or serp., on seaward slopes. 10-500m.	X		X							X			n&c Central Coast	Past occurences found at Stinson Beach, however not found in 2001 survey. Special Status Vascular Plant Species Monitoring Report, GGNRA 2001.
Stellaria littoralis	Seashore starwort	FSC	4				Bogs and fens, coastal bluff scrub, coastal dunes, coastal scrub, marshes and swamps.	5-40m.										X		X	North Coast, Central Coast	
Streptanthus glandulosus	Tamalpais jewel-flower	FSC	1B		X		Closed-cone coniferous forest, chaparral.	Endemic to Marin County. Talus serpentine outcrops. 410-650m.	X		X									X	s North Coast Ranges, San Francisco Bay Area, n&c South Coast Range	Occurs at Mill Valley Air Force Base on Mount Tamalpias, and Nicasio Ridge. Special Status Vascular Plant Species Monitoring Report, GGNRA 2001.
Streptanthus glandulosus ssp. Pulchellus	Mount Tamalpais jewelflower	FSC	1B				Chaparral, valley and foothill grassland.	Endemic to Marin County. Serpentine slopes. 150-800m.												X	nw San Francisco Bay Area (Marin Co.)	
Streptanthus niger	Tiburon jewelflower	FE	1B	E			Valley and foothill grassland.	Endemic to Marin County. Serpentine outcrops in grassland/shallow, rocky serpentine slopes. 30-150m.												X	n Central Coast (Tiburon Peninsula, Marin Co.)	
Suaeda californica	California seablite	FT			X		Coastal salt marshes.		X	X								X			Central Coast.	Species was re-introduced into Crissy Field marsh (1999) however no transplants survived (pers. comm. Ling He (NPS) 2004).
Tanacetum camphoratum	Dune tansy	FSC			X		Coastal dunes.	Prefers sandy soils, brackish water. Oregon to northern Central Coast of California. <30m	X			X					X	X	X	X	North Coast, n Central Coast	Occurs at Fort Funston and the Presidio in the GGNRA. Special Status Vascular Plant Species Monitoring Report, GGNRA 2001. It is anticipated that this coastal foredune habitat would be unaffected by FMP actions

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Trifolium amoenum	Showy Indian clover	FE	1B				Valley and foothill grassland, coastal bluff scrub.	Moist heavy soils and disturbed areas sometimes on serpentine soil, open sunny sites, swales. Most recently sited on roadside and eroding cliff face. 5-560m.	X	X										X	s North Coast Ranges, n Central Coast San Francisco Bay Area .Probably belongs to *T. albopurpureum* complex.	Per communication with CNPS-Marin (2004) only Marin population located on private land near Dillon Beach. CNDDB (2004) - Occurrences in Marin, Valley Ford Quad.
Trifolium depauperatum var. hydrophilum	Saline clover	FSC	1B				Marshes and swamps, valley and foothill grassland, vernal pools.	Mesic, alkaline sites. 0-300m.											X		Sacramento Valley, Central Western California	
Triphysaria floribunda	San Francisco owl's-clover	FSC	1B		X		Coastal prairie, valley and foothill grassland.	On serpentine and nonserpentine substrate (such as at Pt. Reyes). 10-160m.	X	X								X	X	X	n Central Coast, w San Francisco Bay Area	Populations occur in the Fort Scott and the serpentine bluff/grassland habitat east of Lincoln Blvd (NPS, 2004).
Triquetrella californica	California triquetrella moss	FSLC	1B				Coastal bluff scrub, coastal scrub.	Known in calif. From about 10 small occrs, and in oregon from one occurrence. Moss growing on soil. 10-100m.											X		Occurs in San Diego, Contra Costa, San Francisco, Marin, Mendocino, & Del Norte Counties.	
INVERTEBRATES																						
Adela oplerella	Opler's longhorn moth	FSC	n/a		X		Coastal grassland and serpentine grasslands.	All but Santa Cruz site is on serpentine grassland. Larvae feed on Platystemon californicus.	X				X				X	X	X	X	Marin County & the Oakland area on the Inner coast ranges south to Santa Clara Co. One record from Santa Cruz Co.	CNDDB.
Calicina diminua	Marin blind harvestman	FSC	n/a				Serpentine rock outcrops, serpentine grasslands.		X	X							X			X	Known only from Burdell Mountain in Marin County	
Calicina minor	Edgewood blind harvestman	FSC	n/a				Open grassland in areas of serpentine bedrock.	Found on the underside of moist serpentine rocks near permanent springs.	X	X							X		X		San Mateo & Santa Clara Counties (occurrences).	CNDDB
Callophrys mossii bayensis	San Bruno elfin butterfly	FE	n/a		X		Rocky outcrops and cliffs in coastal scrub habitat.	The larval host plant for san bruno elfins is *Sedum spathulifolium* , a succulent which grows on rocky, north-facing slopes along the coast.	X			X	X				X	X	X		Found in coastal mountains near San Francisco Bay, in the fog-belt of steep north facing slopes that receive little direct sunlight.	Species occurences at Milagra Ridge and Sweeney Ridge (NPS, 2004)(USFWS). Potential temporary impacts would be minimized to be insignificant.
Carterocephalus palaemon magnus	Sonoma arctic skipper	FSC	n/a				Redwood forest.	Most specimens collected in deep shade or at the edge of forested clearings.	X	X							X			X	Sonoma County (occurrences).	CNDDB
Cicindela hirticollis gravida	Sandy beach tiger beetle	FSC	n/a		X		Inhabits areas adjacent to non-brackish water along the coast of california from San Francisco Bay to northern Mexico.	Clean, dry, light-colored sand in the upper zone. Subterranean larvae prefer moist sand not affected by wave action.	X							X		X	X	X	Ventura, Santa Barbara, San Diego, & Los Angeles Counties (occurrences).	CNDDB. It is anticipated that this species would be unaffected by FMP actions as habitat will not be affected.
Cicindela ohlone	Ohlone tiger beetle	FE	n/a				Coastal terraces supporting remnant patches of native grasslands.		X	X							X		X		Santa Cruz County (occurrences).	
Coelus globosus	Globose dune beetle	FSC	n/a		X		Inhabitant of coastal sand dune habitat, from Bodega Head in Sonoma County south to Ensenada, Mexico.	Inhabits foredunes and sand hummocks; it burrows beneath the sand surface and is most common beneath dune vegetation.	X							X		X	X	X	Monterey, Santa Cruz, Ventura, Santa Barbara, San Diego, Los Angeles, & Counties (occurrences).	CNDDB. It is anticipated that the habitat supporting this species would be unaffected by FMP actions.
Euphydryas editha bayensis	Bay checkerspot butterfly	FT, CH	n/a		X		Serpentine soil grasslands that support larval host plants: owl's clover, Castilleja densiflorus, C. exserta, and erect plantain.	Serpentine soil grasslands that support larval host plants Orthocarpus densiflorus and Plantago erecta.	X	X							X		X		Known only from San Mateo and Santa Clara counties.	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
Haliotis cracherodii	Black abalone	FC	n/a				Intertidal to subtidal marine habitat		X	X							X	X	X	X	Santa Barbara & Ventura Counties (occurrences).	It is anticipated that the habitat supporting this species would be unaffected by FMP actions.

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Haliotis sorenseni	White abalone	FE	n/a				Subtidal marine habitat		X	X							X	X	X	X	Southern California especially near Channel Islands (occurrences). Historic distribution from Pt. Conception, CA to Baja California, Mexico.	San Mateo and Santa Clara. It is anticipated that the habitat supporting this species would be unaffected by FMP actions.
Helminthoglypta arrosa williamsi	William's bronze shoulderband snail	FSC	n/a				Known only from Hog Island, a small islet in Tomales Bay, Marin County.			X										X	Hog Island, a small islet in Tomales Bay, Marin County.(occurrences)	CNDDB
Helminthoglypta nicklininana awania	Nicklin's Peninsula Coast Range snail	FSC	n/a				Known only from exposed granitic headlands of the Point Reyes Peninsula, Marin County.	Inhabits coastal scrub habitat & weedy pastures; uniquely adapted to high winds, salt fogs, and variable precipitation.	X	X							X			X	Drakes Bay Quad in Marin County (Point Reyes) (occurrences)	CNDDB
Hydrochara rickseckeri	Ricksecker's water scavenger beetle	FSC	n/a		X		Various water bodies.	Aquatic; known from the San Francisco Bay area.	X							X		X	X	X	Marin, San Mateo, Sonoma & Solano County (occurrences)	CNDDB. It is anticipated that the habitat supporting this species would be unaffected by FMP actions.
Hydroporus leechi	Leech's skyline diving beetle	FSC	n/a				Aquatic.	Known to inhabit permanent ponds in northern San Mateo County.	X	X							X		X		Known to inhabit permanent ponds in the North end of San Mateo County. (occurrences)	CNDDB. It is anticipated that the habitat supporting this species would be unaffected by FMP actions.

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Icaricia icarioides ssp. missionensis	Mission blue butterfly	FE	n/a		X		Mission blue butterflies are closely tied to three lupine larval host plants—Lupinus albifrons, L. variicolor, and L. formosus. These host plants tend to occur on grasslands on thin, rocky soils within broader coastal-scrub habitats.		X			X	X	X				X	X	X	Marin Headlands, the coastal ridges in San Mateo County, San Bruno Mountain, and possibly Twin Peaks in San Francisco	Found in Tennessee Valley, Marin Headlands, Milagra, and Sweeney Ridges (NPS, 2004). Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
Icaricia icarioides ssp. Parapheres	Point Reyes blue butterfly	FSC	n/a				Coastal Dunes	Stabilized sand dunes with the common bush Lupinus arboreus & L. variicolor. L. Variicolor is the likely foodplant.	X	X							X			X	Confined to the Pt. Reyes Peninsula, from Pt. Reyes proper north to Tomales Pt.	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
Inecsalia massii marinensis	Marin elfin butterfly	FSC	n/a		X		Coastal grassland, coastal scrub.	Marin elfin butterfly are closely tied to a single larval host plant-broadleaf stonecrop (Sedum spatulifolium) which occurs in coastal grasslands on thin rocky soils within coastal scrub grassland habitats.	X	X							X		X		X	San Bruno mtn., Montara mtn., Mt. Diablo, and Alpine lake. Steep North facing slopes, and coastal mountains of SF Bay Area.	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
Lichnanthe ursina	Bumblebee scarab beetle	FSC	n/a		X		Inhabits coastal sand dunes from Sonoma County south to San Mateo County.	Usually flies close to sand surface near the crest of the dunes.	X						X			X	X	X	Sonoma, San Francisco, Marin & Pacific Ocean counties. (occurrences)	CNDDB. It is anticipated that the habitat supporting this species would be unaffected by FMP actions as habitat
Microcina edgewoodensis	Edgewood microblind harvestman	FSC	n/a				Serpentine grassland, serpentine scrub.	Found under serpentine rocks.	X	X					X				X		Edgewood County Park and a site west of Interstate Highway 280 in San Mateo County, California	
Microcina tiburona	Tiburon microblind harvestman	FSC	n/a				Open hilly grassland habitat in areas of serpentine bedrock.	Found on the undersides of serpentine rocks near permanent springs.	X	X					X					X	Marin County (occurrences).	CNDDB.
Speyeria adiaste adiaste	Unsilvered fritillary butterfly	FSC	n/a				Openings in redwood and coniferous forests, oak woodlands, chaparral.	Very local, restricted range in california: San Luis Obispo County north to San Mateo County; east to north Los Angeles County and Kern County.	X	X						X			X		Santa Cruz & Santa Clara counties	CNDDB
Speyeria calippe ssp. calippe	Calippe silverspot butterfly	FE	n/a				Coastal grasslands, opening in coastal scrub.	Native grassland and adjacent habitats that support the larval foodplant, johnny-jump-up (Viola pedunculata)	X	X								X			Sonoma, Alameda, Solano & San Mateo counties	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
Speyeria zerene myrtleae	Myrtle's silverspot butterfly	FE	n/a				Coastal dunes, scrub, and grassland.	Closely associated with larval and food plants violet (Viola adunca) in areas sheltered from the wind below 820 feet within 3 miles of the coast.	X	X					X					X	Western Marin & southwest Sonoma Counties	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
Syncaris pacifica	Californian fresh water shrimp	FE	n/a	SE	X		Streams of 12 - 36 inches in depth with exposed live roots of trees along under cut banks >6" with over hagning woody debris		X	X					X					X	Tributary streams in the lower Russian River drainage westward to the pacific Ocean	Found in Lagunitas Creek watershed. Surveys outside watershed have not identified other localities, although potential habitat present (NPS, 2004).
FISH																						
Acipenser medirostris	Green sturgeon	FC	n/a		X		Spawn in the Sacramento River and the Klamath River.	Spawn at temps between 8-14 c. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	X						X		X	X	X		Aleutian Islands and the Gulf of Alaska to Ensenada, Mexico. Considered vulnerable in Canada.	A mostly marine-estuarine species that is only known to spawn in large CA rivers (Sacramento and Klamath)

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Eucyclogobius newberryi	Tidewater goby	FE	n/a		X		Brackish water habitats along the CA coast from Agua Hedionda Lagoon, San Diego Co. to the mouth of the Smith River.	Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water & high oxygen levels.	X			X	X			X		X	X	X	Eastern Pacific: Del Norte County in northern California, USA to Del Mar in southern California.	Found in Rodeo Lagoon. Additional suitable habitat in GGNRA-managed areas unlikely. It is anticipated that this tidewater goby habitat would be unaffected by FMP actions. Potential impacts would be minimized to be insignificant.
Hypomesus transpacificus	Delta smelt	FT	n/a				Spawning and rearing mostly in Sacramento-San Joaquin Delta.	Brackish water in the Sacramento-San Joaquin Delta.										X	X	X	North America: Sacramento-San Joaquin Delta region in central California, USA.	
Lampetra ayresi	River lamprey	FSC	n/a				Lower Sacramento River, San Joaquin River & Russian River. May occur in coastal streams north of San Francisco Bay.	Adults need clean, gravelly riffles, ammocoetes need sandy backwaters or stream edges, good water quality & temps < 25 c										X	X	X	Eastern Pacific: Tee Harbor, Alaska to Sacramento-San Joaquin drainage in California, USA. Freshwater resident population in Morrison Creek, Vancouver Island, British Columbia	Uncertain whether in park
Lampetra tridentata	Pacific lamprey	FSC	n/a		X		Freshwater streams.	Pacific lamprey spend most of their life in freshwater streams before entering the ocean as adults to feed	X	X								X	X	X	Range in California, Oregon, Washington and Idaho with the most precipitous documented declines in the upper Columbia, Snake and North Umpqua River basins.	No occurences of this anadromous species have been observed in GGNRA-managed streams, however likely exists in Lagunitas Watershed (NPS, 2004)
Oncorhynchus kisutch	Coho salmon--Central California coast	FT,SE, CH	n/a	SE	X		Coastal streams draining to ocean (including those to S.F. Bay) with spawning, juvenile rearing habitat, and migratory corridor		X		X	X						X	X	X	Point Hope, Alaska south to Chamalu Bay, Baja California, Mexico.	Present in Muir Woods, Redwood Creek (NPS, 2004)
Oncorhynchus mykiss	Steelhead — Central California Coast	FT	n/a		X		Coastal streams draining to ocean (including those to s.f. bay) with spawning , juvenile rearing habitat, and migratory corridor		X		X	X						X	X	X	California streams from the Russian River to Aptos Creek, and the drainages of San Francisco and San Pablo Bays eastward to the Napa River (inclusive),	Present in Muir Woods, Redwood Creek (NPS, 2004)
Oncorhynchus mykiss	Steelhead — Central Valley	FT	n/a		X		Spawning and juvenile rearing habitat in Sacramento and San Joaquin Rivers and their tributaries		X*					X		X		X	X	X	Sacramento and San Joaquin Rivers and their tributaries.	*Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. It is anticipated that the habitat supporting this species would be unaffected by FMP actions (Darren Fong (NPS), pers. comm. 2004). Potential temporary impacts would be minimized to be beneficial. effects would be beneficial.
Oncorhynchus tshawytscha	Chinook salmon — Sacramento River winter run	FE, CH	n/a	SE	X		Spawning and juvenile rearing habitat in Sacramento River and tributaries		X*					X		X		X	X		Arctic and Pacific: drainages from Point Hope, Alaska to Ventura River, California, USA; occasionally strays south to San Diego in California, USA.	*Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. Critical habitat includes Bay waters to the Golden Gate Bridge. It is anticipated that the habitat supporting this species would be unaffected by FMP actions (Darren Fong (NPS), pers. comm. 2004). Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
Oncorhynchus tshawytscha	Chinook salmon — California coastal	FT	n/a				Spawning and juvenile rearing in large coastal stream and rivers draining to ocean.													X	Arctic and Pacific: drainages from Point Hope, Alaska to Ventura River, California, USA; occasionally strays south to San Diego in California, USA.	Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS)

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin	
Oncorhynchus tshawytscha	Chinook salmon — Central Valley spring run	FT	n/a	ST	X		Adult nos depend on pool depth & volume, amount of cover, & proximity to gravel. Water temps >27 c lethal to adults	Federal listing refers to pops spawning in Sacramento River & tributaries.	X*					X		X			X	X	Arctic and Pacific: drainages from Point Hope, Alaska to Ventura River, California, USA; occasionally strays south to San Diego in California, USA.	*Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS). It is anticipated that the habitat supporting this species would be unaffected by FMP actions (Darren Fong (NPS), pers. comm. 2004). Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
Oncorhynchus tshawytscha	Chinook salmon — Central Valley fall/late fall run	CH, FC	n/a		X		Populations spawning in the Sacramento & San Joaquin Rivers and their tributaries.												X	X	Arctic and Pacific: drainages from Point Hope, Alaska to Ventura River, California, USA; occasionally strays south to San Diego in California, USA.	Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS)
Pogonichthys macrolepidotus	Sacramento splittail	FT	n/a				Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay & associated marshes.	Slow moving river sections, dead end sloughs. Require flooded vegetation for spawning & foraging for young.										X	X	X	North America: formerly known throughout the Sacramento-San Joaquin River drainage in California, USA; now restricted to San Francisco Bay Delta and lower Sacramento River.	Found in San Joaquin-Sacramento Delta
Spirinchus thaleichthys	longfin smelt	FSC	n/a				Euryhaline, nektonic & anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column.	Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater.										X	X	X	North Pacific: Prince William Sound, Alaska to Monterey Bay, California, USA. Landlocked in Washington and Union Lakes in Washington, USA	found in S.F. Bay and embayments
REPTILES/AMPHIBIANS																					
Ambystoma californiense	California tiger salamander	FPT	n/a				Use stock ponds, vernal pools, & swales for breeding. Upland grasslands (rodent burrows) for estivations.	Vernal pool grasslands.		X									X	X	Foothills & valleys, Central Valley and Coast Ranges. Santa Barbara Co. & the Santa Rosa plains in Sonoma Co.	
Caretta caretta	Loggerhead turtle	FT	n/a				Continental shelves, bays, estuaries, and lagoons in temperate, tropical, and subtropical climates.	Offshore marine	X	X						X			X	X	Circum global, Alaska to Chile. Juveniles ... off coast of California	Marine migratory species, unlikely to be affected by FMP actions (NPS, 2004)
Chelonia mydas	Green turtle	FT	n/a				Continental shelves, bays, estuaries, and lagoons in temperate, tropical, and subtropical climates.	Offshore marine	X	X						X			X	X	Alaska to Baja.	Marine migratory species, unlikely to be affected by FMP actions (NPS, 2004)
Clemmys marmorata marmorata	Northwestern pond turtle	FSC	n/a		X		Aquatic turtle: requires ponds, slow-moving waterways such as creeks and irrigation ditches where water ponds. Prefers habitats with basking sites, aquatic vegetation, and suitable upland habitats for egg-laying.	Slow moving waterways, lakes and ponds.	X		X		X			X			X	X	north of the San Francisco Bay-Delta Estuary (the western pond turtle occurs on suitable aquatic habitats throughout California west of the Sierra Nevada and in parts of Oregon and Washington).	Limited numbers found at Rodeo Lake, Tenn Valley and Muir Beach (Redwood Creek). It is anticipated that the wetland and riparian habitats supporting populations would be unaffected by FMP actions (NPS, 2004)
Clemmys marmorata pallida	Southwestern pond turtle	FSC	n/a		X		Aquatic turtle: requires ponds, slow-moving waterways such as creeks and irrigation ditches where water ponds. Prefers habitats with basking sites, aquatic vegetation, and suitable upland habitats for egg-laying.	Slow moving waterways, lakes and ponds.	X	X					X				X	X	found south of the San Francisco Bay (the western pond turtle occurs on suitable aquatic habitats throughout California west of the Sierra Nevada and in parts of Oregon and Washington).	No occurences have been observed in Project Study Area (Darren Fong, pers. comm., 2004)

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Dermochelys coriacea	Leatherback turtle	FE	n/a				Offshore marine		X	X						X		X	X	X	Cape Sable Nova Scotia to Puerto Rico. Commonly sighted in Hawaii	Marine migratory species, unlikely to be affected by FMP actions (NPS, 2004)
Lepidochelys olivacea	Olive ridley sea turtle	FT	n/a				Offshore marine	Open ocean, continental shelves, bays, and estuaries.	X	X						X		X	X	X	Pacific Coast, nesting concentrated from Mexico to Costa Rica.	Marine migratory species, unlikely to be affected by FMP actions (NPS, 2004)
Phrynosoma coronatum frontale	California horned lizard	FSC	n/a		X		Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes.	Open areas for sunning, bushes for cover, patches of loose soil for burial, & abundant supply of ants & other insects.	X	X							X				Shasta County, Southwest along the Sacramento valley south Coast Ranges, San Joaquin Valleys, and Sierra Nevada foothills.	
Rana aurora aurora	Northern red-legged frog	FSC	n/a		X		Found in humid forests, woodlands, grasslands, and streamsides in northwestern california.	Generally near permanent water, but can be found far from water, in damp woods and meadows, during non-breeding season.	X	X									X		Mendocino Co., Oregon, and Washington. Range overlaps with R.a. draytonii in Pt. Arena, Mendocino Co.	Project Study Area outside known range of species
Rana aurora draytonii	California red-legged frog	FT	n/a		X		Ponds and other permanent slow-moving waterbodies: lakes, reservoirs, slow streams, marshes, and bogs.	Adult require a dense, shrubby or emergent riparian vegetation closely associated with deep (>0.7 meters) still or slow-moving water.	X		X			X			X	X	X	X	California red-legged frogs are still locally abundant within portions of the San Francisco Bay area (including Marin County) and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges.	Present at various localities within Marin and San Mateo Counties (NPS, 2004). Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
Rana boylii	Foothill yellow-legged frog	FSC	n/a		X		Partly-shaded, shallow streams & riffles with a rocky substrate in a variety of habitats.	Egg clusters attached to downstream side of submerged rocks. Need at least some cobble-sized substrate for egg-laying. Need at least 15 weeks to attain metamorphosis.	X	X					X			X	X	X	West of crest of Cascade mts., Ore., south in coastal mts. Of CA to San Gabriel River, Los Angeles County; Sierra Nevada foothills to about 6000'; Baja California.	Historic occurrence in Redwood Creek (Darren Fong, pers. comm., 2004).
Spea hammondii	Western spadefoot toad	FSC	n/a				Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands.	Vernal pools are essential for breeding and egg-laying.	X	X						X			X		North-central California, Central Valley, and foothills south to Baja.	Distribution maps do not show presence in S.F. Bay coastal areas.
Thamnophis sirtalis tetrataenia	San Francisco garter snake	FE	n/a	SE	X		Freshwater habitats are primary foraging sites. Adjacent uplands for basking and hibernaculae.	Prefer densely vegetated ponds with adjacent plants for basking. Preferred prey species is red-legged frogs. Estivates in burrow holes.	X			X	X	X				X			Historically San Francisco peninsula currently known from South San Francisco near airort and Mori Point near Pacifica. Known occurrence at Mori Pt.	Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
***BIRDS*[2]**																						
Agelaius tricolor	Tricolored blackbird	FSC	n/a		X		(Nesting colony) highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California.	Requires open water, protected nesting substrate, & foraging area with insect prey within a few km of the colony.	X						X			X	X	X	Gregarious; found year-round in large flocks in open country and dairy farms; nests in large colonies in marshes.	Mechanical removal and other FMP actions would occur outside of nesting season, and limited number of acres burned each year therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosytem processes.

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Amphispiza belli belli	Bell's sage sparrow	FSC	n/a		X		(Nesting) nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range.	Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yds apart.	X								X		X	X	X	Western U.S. to n. Mexico	Mechanical removal and other FMP actions would occur outside of nesting season, and limited number of acres burned each year. therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes.
Arenaria melanocephala	Black turnstone	FSC	n/a				Breeds in coastal Alaska. Winters on rocky coasts.	Strictly coastal species.	X								X		X	X	X	Breeds in western Alaska and winters along the entire stretch of Pacific Coast from southern Alaska to Baja California.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions
Athene cunicularia hypugaea	Western burrowing owl	FSC	n/a		X		(Burrow sites) open, dry annual or perenial grasslands, deserts & scrublands characterized by low-growing vegtation.	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	X								X		X	X		Western U.S. into northern Mexico. In California, largely in Central Valley and southern and southeastern portions of state. A small area south of San Francisco Bay is considered part of the current breeding range.	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000).
Botaurus lentiginosus	American bittern	FSC	n/a		X		Freshwater and slightly brackish marshes. Also in coastal saltmarshes.	Dense reed beds.	X								X		X	X	X	Breeds from southeastern Alaska, Manitoba, and Newfoundland south to California, New Mexico, Arkansas, and Carolinas.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions
Brachyramphus marmoratus marmoratus	Marbled murrelet	FT, CH	n/a	SE	X		Old growth forest for breeding and sheltered waters/open coast for foraging.		X	X					X					X	X	Nests inland, usually in trees. Fairly common in breeding range; rare in Southern California.	Habitat present in Muir Woods, but no detections in 2 years of surveys (NPS, 2004). Potential temporary habitat impacts would be minimized to be insignificant and long-term effects would be beneficial to habitat.
Buteo regalis	Ferruginous hawk	FSC	n/a		X		(Wintering) open grasslands, sagebrush flats, desert scrub, low foothills & fringes of pinyon-juniper habitats.	Mostly eats lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.	X								X			X	X	Sw. Canada, Western U.S., Winters SW. U.S., N. Mexico	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000).
Calidris canutus	Red knot	FSC	n/a				Breeds on tundra; during migration, on tidal flats, rocky shores, and sandy beaches.	Often breeds with dowitchers.	X								X		X	X	X	Breeds on islands in High Arctic of Canada. Winters along coasts from California and Massachusetts southward to southern South America. Also in Eurasia.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions

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Calypte costae	Costa's hummingbird	FSC	n/a				Fairly common in desert washes, dry chaparral, and successional scrub.		X						X				X			Occurs mainly in Southern California, Arizona, Baja California, and western Mexico, but also extends into Nevada, extreme southeastern Utah, and southeastern New Mexico. Their range is expanding into new and historically occupied areas in parts of Arizona and California.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year, therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosystem processes.
Carduelis lawrencei	Lawrence's goldfinch	FSC	n/a				(Nesting) nests in open oak or other arid woodland & chaparral, near water. Nearby herbaceous habitats used for feeding	Closely associated with oaks.	X										X			Breeds n. California to n. Baja California. Winters sw. U.S.	Mechanical removal and other FMP actions would occur outside of nesting season, and limited number of acres burned each year, therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosystem processes.
Chaetura vauxi	Vaux's swift	FSC	n/a				(Nesting) redwood, douglas fir, & other coniferous forests. Nests in large hollow trees & snags. Often nests in flocks.	Forages over most terrains & habitats but shows a preference for foraging over rivers and lakes.	X								X	X	X	X		Western N. America to Venezuela	Per comm. With PRBO (Tom Gardali), potential habitat exists in Marin County. Breeds in Bolinas. Does not occur in MUWO.
Charadrius alexandrinus nivosus	Western snowy plover	FT, CH	n/a		X		Coastal beaches, sand spits, dune-backed beaches, beaches at river mouths, salt pans at lagoons and estuaries, mud flats, and man-made salt ponds.		X		X					X		X	X	X		breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico.	Overwintering population on Ocean Beach. Periodically sighted at other beaches. It is anticipated that foredune and beach habitat supporting this species would be unaffected by actions defined under the FMP. Potential temporary impacts from suppression activities would be minimized to be insignificant; other activities are not anticipated in plover habitat.
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	FC	n/a	SE			(Nesting) riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	X		X									X		S. Canada to Mexico, W. Indies. Winters to Argentina	Per comm. with PRBO, species does not occur in the GGNRA & does not breed on coast.
Contopus cooperi	Olive-sided flycatcher	FSC	n/a				(Nesting) nesting habitats are mixed conifer, montane hardwood-conifer, douglas-fir, redwood, red fir & lodgepole pine.	Most numerous in montane conifer forests where tall trees overlook canyons, meadows, lakes or other open terrain.	X							X		X	X	X		Breeds in Alaska, east across Canada to northern New England, and south to mountains of California, Arizona, and New Mexico, and in northern New York and New England. Winters in tropics.	The olive-side flycatcher and Pacific-slope flycatcher could be beneficially affected because studies have shown flycatchers (Wirtz, 1977) increased the first year after a burn.
Cypseloides niger	Black swift	FSC	n/a				(Nesting) coastal belt of Santa Cruz & Monterey Co; central & southern Sierra Nevada; San Bernardino & San Jacinto Mtns.	Breeds in small colonies on cliffs behind or adj to waterfalls in deep canyons and sea-bluffs above surf; forages widely	X							X			X	X		Breeds from southern Alaska south to southern California, Montana, and Colorado. Winters in tropics.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions

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Diomedea albatrus	Short-tailed albatross	FE	n/a				Marine and near shore habitats for foraging. Breeds in south pacific		X	X						X		X	X	X	Breeds on Bonin Island off Japan. Formerly ranged from Bering Sea to Baja California, may again do so.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions. Near extinction in 1956, now over 250 birds. Per comm. With PRBO species rarely comes inland
Diomedia nigripes	Black-footed albatross	FSC	n/a				Seen year-round off west coast; most common in spring, summer. Chiefly breeds on hawaiian islands									X		X	X	X	Ranges weel offshore from Bering Sea and Aleutians to Baja California.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions. Per comm. with PRBO (Tom Gardali), species rarely comes on shore.
Elanus leucurus	White-tailed kite	FSC	n/a		X		(Nesting) rolling foothills/valley margins w/scattered oaks & river bottomlands or marshes next to deciduous woodland	Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	X				X	X	X			X	X	X	Resident in coastal and interior California, Arizona, and southern Texas. Also in American tropics.	White-tailed kites could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000). However, white-tailed kites, and other canopy nesters could be subject to short-term negatives affects as a result of crown fires.
Empidonax trailii brewsteri	Little willow flycatcher		n/a	SE	X		Breeds in shrubby vegetation in meadow and riparian woodlands, typically where there are mature, dense stands of willows, cottonwoods, or alders.		X	X					X			X	X	X	Breeds in wet meadows & montane riparian habitas from 2,000 -8,000 feet in elevation.	It is anticipated that the riparian and other habitat supporting this species would not be affected by FMP actions
Falco peregrinus anatum	American peregrine falcon	DM	n/a	SE			(Nesting) near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Nest consists of a scrape on a depression or ledge in an open site.	X				X			X		X	X	X	breeds from non-Arctic portions of Alaska and Canada south to Baja California (except on the coast of southern Alaska and in British Columbia), central Arizona and Mexico (locally)	The endangered American peregrine falcon (Falco peregrinus anatum)has historically nested at three sites in GGNRA (Walton pers. comm. 1991). It has been released from hack sites at Muir Beach from 1983 to 1987 and in 1998, (GGNRA, RMP 1999). It is anticipated that the wetland coastal habitat supporting this species would not be affected by FMP actions
Geothlypis trichas sinuosa	Saltmarsh common yellowthroat	FSC	n/a		X		Resident of the San Francisco Bay region, in fresh and salt water marshes.	Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	X							X		X	X	X	Canada to s. Mexico. Winters s. U.S. to W. Indies, Panama.	It is anticipated that the salt marsh and coastal habitat supporting this species would not be affected by FMP actions
Haematopus bachmani	Black oystercatcher	FSC	n/a		X		Resident on rocky shores and islands along the Pacific Coast from the Aleutians to Baja California		X							X		X	X	X	Resident from w. Aleutians , east and south along coast to Morro Bay, CA; on offshore islands to Baja California	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions. Per comm. with PRBO, Tom Gardali, species occurs in the Presidio along rocky beaches. A few pairs breed on Alcatraz Island each year.
Haliaeetus leucocephalus	Bald eagle	FT	n/a	SE	X		Large trees near lakes, rivers, or estuaries for foraging. Disturbance intolerant.		X							X		X	X	X	Alaska, Canada, to s. U.S.	Has been observed to over-winter in the San Francisco Watershed. An occasional bald eagle is observed during the fall raptor migration by the Golden Gate Raptor Observatory.It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions
Histrionicus histrionicus	Harlequin duck	FSC	n/a		X		(Nesting) breeds on west slope of the sierra nevada, nesting along shores of swift, shallow rivers.	Nest often built in a recess, sheltered overhead by stream bank, rocks, woody debris, usually within 7 ft of water	X							X		X	X	X	Ne. Asia, Alaska, Canada, w. U.S.; Greenland, Iceland	It is anticipated that the wetland habitat supporting this species would not be affected by FMP actions

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Lanius ludovicianus	Loggerhead shrike	FSC	n/a		X		(Nesting) broken woodlands, savannah, pinyon-juniper, joshua tree, & riparian woodlands, desert oases, scrub & washes.	Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	X									X	X	X	S. Canada to s. Mexico	Per comm. with PRBO, species occurs within the GGNRA.
Laterallus jamaicensis coturniculus	Black rail		n/a	ST	X		Mainly inhabits salt-marshes bordering larger bays.	Occurs in tidal salt marsh heavily grown to pickleweed; also in fresh-water and brackish marshes, all at low elevation.	X							X		X	X	X	Ne and central U.S. and central California south locally to W. Indies, Chile	It is anticipated that the salt marsh and coastal habitat supporting this speceis would be relatively unaffected by FMP actions
Limosa fedoa	Marbled godwit	FSC	n/a				Common on west coast in winter, fairly common on texas gulf coast and in florida; rare but regular in the east.		X	X						X		X	X	X	N. Great Plains; locally sw. Alaska. Winters s. U.S. to north South America.	It is anticipated that the salt marsh and coastal habitat supporting this speceis would be relatively unaffected by FMP actions. Per comm. with PRBO, species occurs at Crissy Field in the GGNRA. Fairly common on many GGNRA beaches during winter.
Melospiza melodia pusillula	Alameda (South Bay) song sparrow	FSC	n/a				Resident of salt marshes bordering south arm of San Francisco Bay.	Inhabits salicornia marshes; nests low in grindelia bushes (high enough to escape high tides) and in salicornia.	X	X						X		X			Alaska, Canada to cen. Mexico.	It is anticipated that the salt marsh habitat supporting this species would be relatively unaffected by FMP actions. Per comm. with PRBO, species is only specific to the localized Alameda/South Bay area.
Melospiza melodia samuelis	San Pablo song sparrow	FSC	n/a				Resident of salt marshes along the north side of San Francisco and San Pablo Bays.	Inhabits tidal sloughs in the salicornia marshes; nests in grindelia bordering slough channels.	X	X										X	Alaska, Canada to cen. Mexico.	It is anticipated that the salt marsh habitat supporting this species would be relatively unaffected by FMP actions. Per comm. with PRBO species only occurs in the localized San Pablo Bay area.
Numenius americanus	Long-billed curlew	FSC	n/a		X		(Nesting) breeds in upland shortgrass prairies & wet meadows in northeastern california.	Habitats on gravelly soils and gently rolling terrain are favored over others.	X							X	X	X	X	X	Sw. Canada. W. U.S. Winters s. U.S. to Guatemala.	It is anticipated that the salt marsh habitat supporting this species would be relatively unaffected by FMP actions. Per comm. With PRBO, species occurs in the GGNRA particularly Crissy Field
Numenius phaeopus	Whimbrel	FSC	n/a				Breeds on arctic tundra, especially near coasts; coastal salt meadows, mudflats, and grassy shoreline slopes during migration.		X							X		X	X	X	Arctic, circumpolar. Winters to s. S. America	It is anticipated that the salt marsh habitat supporting this species would be relatively unaffected by FMP actions. Per comm. With PRBO, species occurs at Crissy Field in the GGNRA.
Oceanodroma homochroa	Ashy storm-petrel	FSC	n/a				(Rookery site) colonial nester on off-shore islands. Usually nests on driest part of islands. Forages over open ocean.	Nest sites on islands are in crevices beneath loosely piled rocks or driftwood, or in caves.	X							X		X	X	X	At sea from n. California (Pt. Reyes) to Baja California.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions.
Otus flammeolus	Flammulated owl	FSC	n/a				Common in oak and pine woodlands, especially ponderosa. Sometimes nests in loose colonies. Highly migratory. Accidental east to Louisiana and Florida.		X								X		X		Southern British Columbia, w. U.S. to Guatemala.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year; therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior		Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Pelecanus occidentalis californicus	California Brown pelican	FE	n/a	SE	X		Forage over near shore marine areas including open coast, San Francisco Bay, and rodeo lagoon. Utilize islands, rocks, cliffs, and some protected beach areas for roosting.		X								X		X	X	X	Coasts; s. U.S. to n. Brazil and Chile. Northern extent of breeding is southern CA, Channel Islands.	The endangered California brown pelican has significant roost areas in GGNRA (NPS 1982). Pelicans have been observed roosting at Seal Rocks, Alcatraz Island, the Hyde Street Pier, Bird Island, and Kent Island in Bolinas Lagoon. (GGNRA, RMP, 1999) This species does not breed within the Study Area, and it is anticipated that coastal habitats used for roosting would not be affected by FMP actions. Potential impacts would be either be discountable or minimized to be insignificant.
Ptychoramphus aleuticus	Cassin's auklet	FSC	n/a				Nests in colonies on islands and on isolated coastal cliffs and headlands.		X								X		X	X	X	Pacific Coast, breeds locally in Aleutians.	It is anticipated that the coastal habitat supporting this species would not be affected by FMP actions.
Rallus longirostris obsoletus	California clapper rail	FE	n/a	SE			Salt marsh with tidal channels.		X								X		X	X	X	Coasts of e. U.S. and California to n. S. America	It is anticipated that the salt marsh supporting this species would not be affected by FMP actions.
Riparia riparia	Bank swallow	CA	n/a		X		(Nesting) colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	X			X					X		X	X	X	Widespread in N. Hemisphere. Winters in S. America, Africa, s. Asia.	Species nest in the Fort Funston cliffs. It is anticipated that this bluff habitat would not be affected by FMP actions.
Rynchops niger	Black skimmer	FSC	n/a				(Nesting colony) nests along the north & south ends of the salton Sea; also, on salt pond dikes of south San Diego Bay.	Nests on gravel bars, low islets, and sandy beaches, in unvegetated sites. Nesting colonies usually less than 200 pairs.	X								X		X	X	X	Cape Cod, s. California, south to s. S. America. A recently established resident of s. California, nesting at Salton Sea and near San Diego. Occasional elsewhere on California coast; casual, Arizona, New Mexico.	It is anticipated that the habitats supporting this species would not be affected by FMP actions.
Selasphorus rufus	Rufous hummingbird	FSC	n/a		X		(Nesting) breeds in transition life zone of northwest coastal area from oregon border to southern Sonoma County.	Nests in berry tangles, shrubs, and conifers. Favors habitats rich in nectar-producing flowers.	X									X	X	X	X	Breeds in nw. N. America; winters in Mexico.	Per communication with PRBO, species passes through the GGNRA during migration.
Selasphorus sasin	Allen's hummingbird	FSC	n/a		X		Mixed evergreen, riparian woodlands, eucalyptus and cypress groves, oak woodlands, and coastal scrub areas in breeding season.		X									X	X	X	X	Breed in coastal California; winters in nw. Mexico	Per communication with PRBO, species may be affected by
Sphyrapicus ruber	Red-breasted sapsucker	FSC	n/a				Common in coniferous or mixed forests in coastal ranges, usually at lower elevations and in moister forests than Williamson's sapsucker. Most migrate south or move to lower elevations in winter.		X	X								X	X	X	X	Se. Alaska to Baja California	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year, therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosystem processes.

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Sterna antillarum browni	California least tern	FE	n/a	SE	X		Diked ponds or ditches along shorelines.		X				X			X		X	X	X	Temperate and tropical oceans. Winters south of U.S.	The endangered California least tern does not nest in the park, but uses abandoned piers for roosting and nearshore waters for foraging (GGNRA, RMP, 1999). It is anticipated that shoreline habitat supporting this species would not be affected by FMP actions.
Sterna elegans	Elegant tern	FSC	n/a		X		(Nesting colony) only known breeding colony in u.s. located in the salt work dikes at the south end of San Diego Bay.	Nests on dikes between salt ponds in association with caspian tern.	X	X								X	X	X	Breeds on islands off Baja California. Winters Peru to Chile. Wanders irregularly (Aug-Oct.) north to San Francisco Bay; recently even to Washington. Breeds near San Diego.	Per communication with PRBO, species exists in estuaries throughout the GGNRA. Habitat unlikely to be affected by FMP actions.
Strix occidentalis caurina	Northern spotted owl	FT	n/a		X		Utilizes coniferous and mixed-hardwood forest areas for breeding in the project area, often in drainages.		X	X		X	X							X	The range encompasses an area from southwestern British Columbia south through the coastal mountains and Cascade Range (both west and east sides) of Washington and Oregon, south into southwestern Oregon and northwestern California north of San Francisco	Potential temporary impacts would be minimized to be insignificant and long-term effects would be beneficial.
Synthliboramphus hypoleucus	Xantu's murrelet	FSC	n/a	ST			Forages over most terrains & habitats but shows a preference for foraging over rivers and lakes.	Nests in rock crevices, under bushes, in old burrows and among man-made debris.	X	X						X		X	X	X	Breeds s. California (Anacapa and Santa Barbara Is,) to central Baja. Some winter north to Monterey; asually to Washington.	It is anticipated that the habitats supporting this species would not be affected by FMP actions.
Toxostoma redivivum	California thrasher	FSC	n/a		X		Chaparral, foothills, valley thickets, parks, gardens.	The thrasher breeds from sea level to the higher parts of the montane chaparral. It will breed in adjacent oak woodlands and pine-juniper scrub as well as occasionally in parks and gardens, but only if dense cover is available. Its dispersal is very limited.	X	X							X			X	California, n. Baja California	Per communication with PRBO, species may be affected by the FMP plan. It is known to breed in Marin County, including the GGNRA.
MAMMALS[2]																						
Aplodontia rufa phaea	Point Reyes Mountain Beaver	FSC	n/a				Coastal area of Point Reyes in areas of springs or seepages.	North facing slopes of hills & gullies in areas overgrown with sword ferns and thimbleberries.	X								X			X	110 square miles in the Point Reyes area of Marin County	
Arctocephalus townsendi	Guadalupe fur seal	FT	n/a	ST			Protected haul out sites.		X							X		X	X	X	Breeds along the eastern coast of Guadalupe Island, approximately 200 km west of Baja California. In addition, individuals have been sighted in the southern California Channel Islands, including two males who established territories on San Nicolas Island.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior		Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Balaenoptera borealis	Sei whale	FE	n/a				Offshore marine		X								X			X	X	Worldwide, but favors warm waters.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Balaenoptera musculus	Blue whale	FE	n/a				Offshore marine		X								X			X	X	Worldwide and highly migratory. Summers in North Pacific. Not common in coastal waters when in our latitudes.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Balaenoptera physalus	Finback whale	FE	n/a				Offshore marine		X								X			X	X	Worldwide. Migrates to Bering Sea in summer and winters south to the Gulf of California.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Corynorhinus townsendii townsendii	Pacific western big-eared bat	FSC	n/a		X		Humid coastal regions of northern & central california. Roost in limestone caves, lava tubes, mines, buildings etc.	Will only roost in the open, hanging from walls & ceilings. Roosting sites limiting. Extremely sensitive to disturbance	X		X		X			X				X	X		Washington, Oregon, California, Nevada, Idaho, and possibly southwestern Montana and northwestern Utah	Minor short-term impacts could be both beneficial (creates food sources) and adverse (some mortality may occur in roosting sites).
Enhydra lutris nereis	Southern sea otter	FT	n/a		X		Near shore marine		X								X			X		Central Californian coast from Pigeon Point near Santa Cruz in San Mateo County, south to Purisma Point north of Point Conception in Santa Barbara County. Individuals sometimes observed farther north (e.g. Tomales Bay).	No large kelp forests present in Project Study Area. Observed at Fitzgerald Marine Reserve. Marine habitat unlikely to be affected by FMP actions.
Eschrichtius robustus	Gray whale	DM	n/a				Offshore marine		X								X			X	X	North Pacific: summers far north to Bering Sea and Arctic Ocean, breeds in winter in Gulf of California, Baja.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Eubalaena glacialis	Right whale	FE	n/a				Offshore marine		X								X			X	X	Summers in Gulf of Alaska and Aleutians. Winter range not well known, but observations in Baja and Hawaiian Islands. Right whales prefer coastlines and sometimes large bays, but may spend a lot of time on the open sea. Northern and Southern hemisphere right whale sub-species are separated by the "tropical belt" roughly between the latitudes of 20°N and 20°S.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Eumetopias jubatus	Steller sea lion	FT, CH	n/a		X		Protected haul out sites.		X								X			X	X	Breeds from northern Channel Islands north to Aleutians and Pribilofs. Breeding colony on Ano Nuevo Island.	Historic haul-out at Seal Rock, San Francisco. It is anticipated that FMP actions would not affect habitat supporting Steller's sea-lions, as they are more likely to use rocky shorelines as haulouts.

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		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin			
Eumops perotis californicus	Greater western mastiff-bat	FSC	n/a		X		Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral etc	Roosts in crevices in cliff faces, high buildings, trees & tunnels.	X						X			X	X	X		central California, southward to central Mexico. In California, they have been recorded from Butte County southward in the western lowlands through the southern California coastal basins and the western portions of the southeastern desert region	Available records indicate that Mastiff Bats were widespread in the San Joaquin Valley, Salinas Valley, and Coastal lowlands from the San Francisco Bay area southward to San Diego
Megaptera novaeangliae	Humpback whale	FE	n/a		X		Offshore marine		X							X		X	X	X		Worldwide. Migrates to Bering Sea and Gulf of Alaska in summer and winters south to California and Hawaii.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Myotis evotis	Long-eared myotis	FSC	n/a		X		Found in all brush, woodland & forest habitats from sea level to about 9000 ft. Prefers coniferous woodlands & forests.	Nursery colonies in buildings, crevices, spaces under bark, & snags. Caves used primarily as night roosts.	X					X	X			X	X	X		Southwestern Canada, south through California into Baja, eastward through northern Arizona and New Mexico and north into the Dakotas.	Minor short-term impacts could be both beneficial (creates food sources) and adverse (some mortality may occur in roosting sites).
Myotis thysanodes	Fringed myotis bat	FSC	n/a		X		In a wide variety of habitats, optimal habitats are pinyon-juniper, valley foothill hardwood & hardwood-conifer.	Uses caves, mines, buildings or crevices for maternity colonies and roosts.	X		X			X	X			X	X	X		western North America from southern British Columbia, Canada, south to Chiapas, Mexico and from Santa Cruz Island in California, east to the Black Hills of South Dakota.	Minor short-term impacts could be both beneficial (creates food sources) and adverse (some mortality may occur in roosting sites).
Myotis volans	Long-legged myotis bat	FSC	n/a		X		Most common in woodland & forest habitats above 4000 ft. Trees are important day roosts, caves & mines are night roosts.	Nursery colonies usually under bark or in hollow trees, but occasionally in crevices or buildings.	X		X			X	X			X	X	X		found from the Tongas National Forest in Alaska, south, through all of the western U.S. and into the Baja peninsula, and also along the Sierra Madre Occidental in Mexico.	Minor short-term impacts could be both beneficial (creates food sources) and adverse (some mortality may occur in roosting sites).
Myotis yumanensis	Yuma myotis bat	FSC	n/a		X		Optimal haabitats are open forests and woodlands with sources of water over which to feed.	Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices.	X		X			X				X	X	X		Throughout western North America, from British Columbia through Washington, Idaho, and western Montana, southern Wyoming, Colorado, New Mexico, West Texas and into Mexico.	
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	FSC	n/a		X		Forest habitats of moderate canopy & moderate to denise understory. Also in chaparral habitats.	Constructs nests of shredded grass, leaves & other material. May be limited by availability of nest-building materials.	X						X			X	X			Inhabits forest and chapparal throughout the S.F. Bay Area. Prefers a moderate canopy and bushy understory.	
Physeter catodon	Sperm whale	FE	n/a				Offshore marine		X							X		X	X	X		Worldwide, but favors warm waters. Females avoid polar waters.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Reithrodontomys raviventris	Salt marsh harvest mouse	FE	n/a	SE	X		Salt marsh, wetland.		X			X	X		X			X	X	X		There are two known subspecies divided in two ranges: Northern: found in Marin, Sonoma, Napa, Solano and northern Contra Costa counties; Southern. Found in San Mateo, Alameda and Santa Clara counties. Some isolated populations occur in Marin and Contra Costa.	Found in inventory at Rodeo Lagoon (USGS), although this identification is in question. Not captured in Big Lagoon Study Area (NPS, 2004). It is anticipated that the salt marsh habitat supporting this species would not be affected by FMP actions. Potential impacts would be discountable or minimized to be insignificant; some activities would not occur in harvest mouse habitat.

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Sorex vagrans halicoetes	Salt marsh vagrant shrew	FSC	n/a				Salt marshes of the south arm of San Francisco Bay.	Medium high marsh 6-8 ft above sea level where abundant driftwood is scattered among salicornia.	X	X						X		X	X		Limited to the salt marshes of the south arm of San Francisco Bay	It is anticipated that the salt marsh habitat supporting this species would be relatively unaffected by FMP actions.
Zapus trinotatus orarius	Point Reyes Jumping Mouse	FSC	n/a		X		Bunch grass marshes on the uplands of Point Reyes in areas safe from continuous inundation.	Eats mainly grass seeds w/ some insects & fruit taken. Builds grassy nests on ground under vegetation, burrows in winter	X	X							X			X	Confined to a small area on the Point Reyes Peninsula.	
KEY: FE (federally endangered), FT (federally threatened), FC (federal candidate), FSC (federal species of concern), CH (designated critical habitat)																						
[1] "Potential Affect" was determined considering the full implementation of all proposed conservation measures. Although habitat may be present in vicinity of project actions for certain species, marine and estuarine species were considered to have "No affect" from fire management activities as the proposed activities are not planned adjacent to coastal resources.																						
[2] For bird and mammal species found within the GGNRA, FMU/Project Unit Occurrence were not notated. Birds and mammals occurring in the GGNRA are assumed to migrate throughout the FMU/Project Units.																						

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GGNRA (not FWS)																							
BIRDS																							
Accipiter cooperi	Cooper's hawk		n/a	SC	X	X	(Nesting) Woodland. Chiefly of open, interrupted or marginal type.	Nest site mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	X		X	X	X	X				X	X	X	All California	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000). However, canopy-nesters such as great egrets, red-tailed hawks, white-tailed kites, sparrow hawks, and ravens could be subject to short-term negatives affects as a result of crown fires.
Accipiter striatus	Sharp-shinned hawk			SC	X	X	(Nesting) ponderosa pine, black oak, riparian deciduous, mixed conifer & jeffrey pine habitats. Prefers riparian areas.	North-facing slopes, with plucking perches are critical requirements. Nests usually within 275 ft of water.	X		X	X	X	X				X	X	X	All California	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000). However, canopy-nesters such as great egrets, red-tailed hawks, white-tailed kites, sparrow hawks, and ravens could be subject to short-term negatives affects as a result of crown fires.
Aquila chrysaetos	Golden Eagle		n/a	SC	X	X	(Nesting & wintering) Rolling foothills mountain areas, sage-juniper flats, desert.	Cliff-walled canyons provide nesting habitat in most parts of range; Also, large trees in open areas.	X					X				X		X	All California	
Ardea alba	Great egret (rookery)		n/a		X	X	(Rookery) Colonial nester in large trees.	Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.							X			X	X	X	Western half of California into Mexico.	Canopy-nesters such as great egrets, red-tailed hawks, white-tailed kites, sparrow hawks, and ravens - could be be subject to short-term negatives affects as a result of crown fires.
Buteo swainsoni	Swainson's hawk			T	X	X	Breeds in riparian systems adjacent to suitable foraging habitats, mainly open grasslands and agricultural fields. Swainson's hawks require large, open grasslands with abundant prey in association with suitable nest trees. Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Winters in Mexico and South America.		X													Currently, Swainson's hawks in California are restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Central Valley populations are centered in Sacramento, San Joaquin, and Yolo counties.	Current breeding range is outside of FMP project area.

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Callipepla californica	California quail				X	X	Primarily inhabits chaparral, coastal scrub, and grassland oak habitats; however, adaptable to riparian, woodlands, and some agricultural lands. Often forage on open or disturbed lands.		X		X	X	X		X						Much of California.	A common breeder in Marin and San Mateo Counties that will be protected by breeding season restrictions on FMP actions. The Presidio supports the largest known remaining breeding population in San Francisco County: currently estimated to be 20 or so individuals.
Catharus ustulatus	Swainson's thrush		n/a		X	X	In western mountains and along Pacific coast, often in dense riparian willows or alders. They may be found in both undisturbed or disturbed woodlands with dense understory, often near canopy gaps produced by fallen trees or other disturbances.		X		X	X	X		X				X	X	X	Breeding range is from Alaska through central Canada and portions of the northern U.S. Breeding range extends south into the Rocky Mountains into Utah, Colorado, and New Mexico. Distinct population on Pacific slope from British Columbia to southern California. Neotropical migrant.	Some species, such as California quail and Swainson's thrush are known to decline in the first few years after shrubland and forest fires (Lawrence, 1966, Lyon and Marzluff, 1985).
Chamaea fasciata	Wrentit		n/a		X	X	Varied habitat types in California that provide low, dense cover.		X		X	X	X				X		X	X	Pacific coast from Oregon through California to northern Baja California. Birds in the northern part of the range (Oregon) were recently described as defining a distinct subspecies.	Definite concern about this species in San Francisco County, where remaining birds in Golden Gate Park are thought to be declining or extirpated.
Chondestes grammacus	Lark Sparrow		n/a		X	X	Grasslands.										X		X	X	Grasslands and sagebrush areas in western U.S.	
Circus cyaneus	Northern harrier			SC	X	X	(Nesting) coastal salt & fresh-water marsh. Nest & forage in grasslands, from salt grass in desert sink to mtn cienagas.	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	X						X				X		X	All California	It is not anticipated that the habitat utilized by this speceis would be affected by FMP actions
Columba fasciata	Band-tailed pigeon		n/a		X	X	Hardwood and coniferous forests.		X								X			X	Forested habitat in California.	
Contopus borealis	Olive-side flycatcher		n/a		X	X	Hardwood and coniferous forests.				X	X	X	X				X	X	X	Forested habitat in California.	The olive-side flycatcher and Pacific-slope flycatcher could be beneficially affected because studies have shown flycatchers (Wirtz, 1977) increased the first year after a burn.
Dendroica nigrescens	Black-throated gray warbler		n/a		X	X	Forested habitat.				X		X		X				X	X	Forested habitat in California.	It is anticipated that riparian habitats supporting this species would be relatively unaffected by FMP actions, therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes.
Dendroica occidentalis	Hermit Warbler		n/a		X	X	(Nesting) coast redwood forests & interior mixed deciduous & coniferous forests farther inland.	Require cool, dark, moist forests for breeding.	X		X		X		X					X	Forested areas of California.	It is anticipated that riparian habitats supporting this species would be relatively unaffected by FMP actions, therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes.

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit					Potential Effect that Could Result from FMP Actions[1]				County Distribution			Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Dendroica petechia brewsteri	Yellow warbler		n/a	SC	X	X	(Nesting) riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores, & alders for nesting & foraging.	Also nests in montane shrubbery in open conifer forests.	X							X			X	X	X	Neotropical migrant. Breeds in riparian habiat and wet meadows in California.	It is anticipated that riparian habitats supporting this species would be relatively unaffected by FMP actions, therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosystem processes.
Empidonax difficilis	Pacific-slope flycatcher		n/a		X	X	Coniferous and hardwood forests.			X			X	X					X	X	Neotropical migrant. Breeds in forested habitat in California.	The olive-side flycatcher and Pacific-slope flycatcher could be beneficially affected because studies have shown flycatchers (Wirtz, 1977) increased the first year after a burn.
Eremophila alpestris actia	California horned lark			SC	X	X	Coastal regions, chiefly from Sonoma Co. to San Diego co. Also main part of San Joaquin valley & east to foothills.	short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.	X						X						X		Found in short grass and disturbed lands.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year, therefore it is anticipated that the effects on populations of
Falco columbarius	Merlin			SC	X	X	(Wintering) seacoast, tidal estuaries, open woodlands, savannahs, edges of grasslands & deserts, farms & ranches.	Clumps of trees or windbreaks are required for roosting in open country.	X						X						X	X	Breeds in Canada and northern Rocky Mountains. Often in California coastal areas in winter.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year, therefore it is anticipated that the effects on populations of
Larus occidentalis	Western Gull		n/a		X	X	Nests on rocky cliffs and nearshore and offshore islands.		X			X				X			X	X	X	Coastal areas of California. Large breeding colony on Farallones Islands, and colony on Alcatraz is about 1,000 breeding pairs.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities
Oporornis tolmiei	MacGillivray's warbler		n/a		X	X	Riparian habitats and wet meadows.		X							X			X	X	Throughout state in riparian and wet meadow habitat.	It is anticipated that riparian habitats supporting this species would be relatively unaffected by FMP actions, therefore it is anticipated that the effects on populations of these species would be minor, with potential benefical impacts from invasive species control and restoration of ecosystem processes.
Otus kennicottii	Western screech owl				X	X	Hardwood and coniferous forests.		X						X				X	X	Hardwood and coniferouse forestes in western U.S.	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000).
Pandion haluetus	Osprey			SC	X	X	(Nesting) ocean shore, bays, fresh-water lakes, and larger streams.	Large nests built in tree-tops within 15 miles of good fish-producing body of water.	X								X			X	X	California coast, Pacific NW, etc.	Species such as raptors and some owl species (burrowing, western screech) have been shown to increase in numbers after fires (USDA, 2000), and could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000).
Phalacrocorax penicillatus	Brandt's cormorant		n/a		X	X	Rocky cliffs on outer coast and into S.F. Bay.		X							X			X	X	Coastal areas of California. Large breeding colony on Farallones Islands, and colony on Alcatraz is about 700 breeding pairs.	Offshore marine species (e.g., whales, pelagic birds) are expected to receive little to no impact from fire management activities

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit				Potential Effect that Could Result from FMP Actions[1]					County Distribution			Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
Pheucticus melanocephalus	Black-headed grosbeak		n/a		X	X	Riparian habitat and some forests.		X								X		X	X	Riparian and forested areas of California.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year.
Picoides nuttallii	Nuttall's woodpecker		n/a		X	X	Forested habitat.		X								X	X	X	X	Forested areas of California.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year. therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes. Rare in San Francisco.
Poecile rufescens	Chestnut-backed chickadee		n/a		X	X	Forested habitat.		X								X	X	X	X	Forests habitats in northwestern portion of California, up into Northwest U.S.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year. therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes. Rare in San Francisco.
Progne subis	Purple martin		n/a	SC	X	X	(Nesting) inhabits woodlands, low elevation coniferous forest of douglas fir, ponderosa pine, & monterey pine.	Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag.	X		X						X		X	X	Low elevation forested habitat in California.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year. therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes.
Vireo gilvus	Warbling vireo		n/a		X	X	Shows a strong association with mature mixed deciduous woodlands especially along riparian corridors throughout range. Found at edges or openings (both natural and human-made) as well as forest interiors. In general, overall habitat structure consists of large trees with a semi-open canopy; apparently indifferent to density of undergrowth. Other habitats include urban parks and gardens; orchards; farm fencerows; campgrounds; deciduous patches in pine forests; mixed hardwood forests; and, rarely, pure coniferous forests.		X		X	X					X		X	X	Currently, the breeding range extends from the Canadian border south to the Santa Ana mountains (Orange County), San Bernadino mountains (San Bernadino County), Tehachapi mountains (Kern County), and east-central White and Inyo mountains (Inyo County), exclusive of the entire Central Valley.	Mechanical removal and other FMP actions would occur outside much of nesting season, and limited number of acres burned each year. therefore it is anticipated that the effects on populations of these species would be minor, with potential beneficial impacts from invasive species control and restoration of ecosystem processes.

Scientific Name	Common Name	Legal Status			Noted in GGNRA Records	GGNRA management concern not on USFWS list	Habitat requirement and/or association	Micro habitat	Habitat Present in Planning Area	Occurrence known in FMU/ Project Unit				Potential Effect that Could Result from FMP Actions[1]			County Distribution				Species Distribution / Range	Comments
		Federal	CNPS	State						None	Muir Woods	WUI	Interior	Beneficial	Negative	No affect	Unknown	San Francisco	San Mateo	Marin		
MAMMALS																						
Antrozous pallidus	Pallid bat				X	X	Pallid bats roost in rock crevices, buildings, and bridges in arid regions. The pallid bat is known for its unique habit of feeding almost entirely from the ground. Its most common prey include crickets, beetles, grasshoppers, and even scorpions		X				X	X							They are found from Mexico and the southwestern United States north through Oregon, Washington, and western Canada.	Minor short-term impacts could be both beneficial (creates food sources) and adverse (some mortality may occur in roosting sites).
FISH																						
Lavinia symmetricus ssp. 2	Tomales roach				X	X			X				X									
INVERTEBRATES																						
Anodonta californiensis	California floater (mussel)	FSC	n/a		X	X	Freshwater lakes and slow moving streams and rivers.	Generally in shallow water	X													It is anticipated that the habitat supporting this species would be unaffected by FMP actions as habitat
Caecidotea tomalensis	Tomales asellid	FSC	n/a		X	X	Inhabits localized freshwater ponds or streams with still or near-still water in several bay area counties.		X													It is anticipated that the habitat supporting this species would be unaffected by FMP actions as habitat
Danaus plexippus	Monarch butterfly				X	X	Utilize eucalyptus and Monterey cypress and pine trees for clustering sites during winter.		X			X	X		X			X	X	Southern Canada south through all of the United States, Central America, and most of South America. Also present in Australia, Hawai, and other Pacific Islands. Overwinters mainly in Mexico and California.	Mitigations would reduce impacts to monarchs to less than significant.
PLANTS																						
Calochortus umbellatus	Oakland star tulip		4		X	X	Chaparral, lower montane coniferous forest, broadleafed upland forest, valley and foothill grassland.	Often on serpentine. 100-700m.	X		X				X						s Outer North Coast Ranges, San Francisco Bay Area .	Occurs in the SFWD, MVAFB, & Nicasio Ridge. Special Status Vascular Plant Species Monitoring Report GGNRA 2001. Recently discovered in the vicinity of Muir Woods in non-serpentine grasslands (NPS, 2004)
Ceanothus gloriosus var. exaltatus	Glory Bush		4		X	X	Chaparral.	100-610m.	X				X	X					X		North Coast, Outer North Coast Ranges, n San Francisco Bay Area	Occurs on south Bolinas Ridge only. Special Status Vascular Plant Species Monitoring Report GGNRA 2002.
Ceanothus gloriosus var. gloriosus	Point Reyes ceanothus		4		X	X	Closed-cone coniferous forest, coastal dunes, coastal scrub, coastal bluff scrub.	Usually on bluffs along the coast in sandy soils, but also known from more inland sites. 5-500m.	X		X								X		s North Coast, n Central Coast (Marin Co.)	
Elymus californicus	California bottle-brush grass	FSC	4		X	X	North coast coniferous forest, ctsmontane woodland, riparian woodland.	In sandy humus soils. 15-455m.	X				X	X							North Coast, Outer North Coast Ranges, n Central Coast, San Francisco Bay Area (Santa Cruz Mnts)	Occurs in the GGNRA, Muir Woods, and SFWD. Special Status Vascular Plant Species Monitoring Report GGNRA 2001
Malacothamnus fasciculatus var. nesioticus	Santa Cruz Island bush mallow	FE	1B	SE	X	X	Coastal scrub, chaparral.	Steep slopes and outcrops. 30-215m.	X			X									Inner North Coast Ranges (Mendocino Co.), interior San Francisco Bay Area, Outer South Coast Ranges, Southwestern California, sw edge Mojave Desert	Occurs in SFWD, no occurences in Project Study Area. Special Status Vascular Plant Species Monitoring Report GGNRA 2001

APPENDIX C -- FMP EIS RECORD OF DECISION

U. S. DEPARTMENT OF THE INTERIOR

National Park Service

Final Environmental Impact Statement / Fire Management Plan

Golden Gate National Recreation Area

Marin, San Francisco and San Mateo Counties, California

RECORD OF DECISION

The Department of Interior, National Park Service has prepared this Record of Decision on the *Fire Management Plan/Final Environmental Impact Statement* (FMP FEIS) for Golden Gate National Recreation Area (GGNRA), Muir Woods National Monument, and Fort Point National Historic Site (collectively known as "the park" for purposes of this document). This document includes a description of the background for the project, a statement of the decision made, synopses of other alternatives considered, a description of the environmentally preferable alternative, the basis for the decision, findings on impairment of park resources and values, an appendix detailing measures to minimize environmental harm, and an overview of public involvement and agency consultation in the decision-making process.

Background of the Project

The legislated boundary of GGNRA consists of 74,816 acres in San Mateo, San Francisco, and Marin counties in California within which 15,700 acres are directly managed by GGNRA and comprise the planning area for the FMP FEIS. The planning area does not include the northern lands of GGNRA (approximately 18,000 acres) which are managed by Point Reyes National Seashore, or lands within the jurisdictional boundary of GGNRA that are not directly managed by the NPS.

The National Park Service (NPS) managed lands of GGNRA contain more than 1.7 million square feet of building space in both historic and non-historic structures. The park has roughly 59 miles of Pacific coast and San Francisco Bay shoreline and an estimated 40-mile long interface with developed lands, primarily residential communities. The parklands, part of the Golden Gate Biosphere Reserve, support 19 separate ecosystems and 12 distinct plant communities which together provide habitat for 25 federally-listed endangered or threatened plant and animal species and 52 additional species of concern. Within GGNRA are five National Historic Landmark Districts, 667 historic structures, and more than 350 known archeological sites. Each year, more than 16 million visitors come to the park from all over the world.

Fire management is an essential component of NPS operations and the GGNRA has been operating under a 1993 Fire Management Plan (FMP). Concerns about fire management in GGNRA are due to the fire hazards created from fuel buildup within parklands as a result of fire suppression efforts over the past century, the extension of residential development along much of the park boundary, and the spread of more flammable, non-native invasive plants within park lands, particularly along the boundary.

This revision of the GGNRA FMP was initiated in August 2003 in response to recent changes to NPS and federal fire management policies and the need to update the existing plan. The 1993 FMP focused primarily on fire ecology and natural resource management issues. The Federal Wildland Fire Management Policy (1995, 2000) reflects lessons learned from a catastrophic fire season in 2000. Updated policies stress the need for land managers to reintroduce the role of fire into fire adaptive natural

systems, to use fire management principals to protect sensitive park resources, and to reduce fire risk along the wildland urban interface through the implementation of cooperative fuel reduction strategies with neighboring communities and agencies.

The purpose of this FMP FEIS is to provide a framework for fire management activities in a manner that helps achieve resource management objectives consistent with the park's cultural and natural resources, and land management plans; reduces risks to developed facilities and adjacent communities; and addresses safety considerations for park visitors, employees, and resources. The specific purposes of this FMP FEIS are:

- To prepare a new FMP that is consistent with Federal Wildland Fire Management Policy and conforms to agency guidelines for fire management plans and programs; and
- To help achieve resource management objectives consistent with the park's cultural, natural resource, and land management plans and be responsive to safety considerations for park visitors, employees, and resources.

A set of goals were developed by NPS staff during this FMP EIS planning process. The goals were derived from federal wildland fire management policy, NPS management policies, the 1980 GGNRA General Management Plan (GMP), and comments and concerns expressed by the public and agencies during the scoping period. Management objectives, detailed in section 1.4 Purpose and Need for Action of the FMP FEIS, were developed for each goal and describe what must be accomplished in order for the fire management program to be considered successful. The goals were then used in the formulation of the alternatives analyzed in the FEIS.

In addition to the FMP goals, the planning area's topography, hydrology, the results of fire hazard modeling, analysis of current development patterns, and the locations and types of significant park resources served to inform NPS staff as they developed Fire Management Units (FMU's) for the FMP. The FMU's were then used as a means to evaluate and analyze management alternatives. An FMU is any land management area that can be defined by management goals and constraints, topographic features, access corridors, values at risk or values to be protected, political boundaries, fuel types, or major fire regime groups that set it apart from management characteristics of an adjacent unit.

The 1993 FMP FMU's were based upon vegetation communities and are used in the current FMP FEIS in *Alternative A – 1993 FMP, No Action*. The FMU's used in the action alternatives (Alternative B and Alternative C) were based upon different inputs to conform to current federal wildland fire management policy. The new FMU's consist of the Wildland Urban Interface FMU for areas of the park adjacent to relatively dense suburban neighborhoods; the Park Interior FMU comprised of open, largely undisturbed lands that are relatively remote from developed areas whether on the park perimeter or interior; and the Muir Woods FMU for Muir Woods National Monument, reflecting the important natural resources combined with high visitor use in this special park unit.

Three alternatives are analyzed in the FMP FEIS. The alternatives meet the park's goals and objectives to an acceptably large degree, and are within constraints imposed by regulations and policies, by risks associated with the wildland urban interface, and by technical and funding limitations. The three alternatives involve different combinations of prescribed burning and mechanical treatments for achieving fire risk reduction and resource protection and rehabilitation objectives. In each alternative, an upper limit

has been set on the number of acres that would be treated in any one year. Then, the alternatives are differentiated by the annual maximum acreages allowed for each treatment type (mechanical treatment or prescribed burning) within the FMU's in the three counties. The variations in annual, permissible acreages are one means of distinguishing differences among the alternatives. Potential impacts and appropriate mitigation measures are assessed for each of the alternatives.

Decision (Selected Action)

The selected action, *Alternative C - Hazard Reduction and Resource Enhancement through Multiple Treatments*, is the preferred alternative from the FMP FEIS. Alternative C will allow for the greatest number of acres to be treated annually to achieve fire management and resource objectives through the use of a broad range of fire management strategies. As documented in the FEIS, Alternative C is also deemed to be the "Environmentally Preferred" Alternative.

Given favorable weather conditions and adequate project funding, Alternative C would permit up to 595 acres be treated per year using mechanical treatments and prescribed fire. If project funding is not optimum, the park would seek other funding from other divisions such as maintenance and natural resources for projects that would result in benefit meeting the objectives of those divisions as well as fire management. Approved projects that lack funding would roll over to the next fiscal year. Low funding for prescribed burning projects can be supplemented in Marin County by sharing staff and equipment resources with other fire and land management agencies. The acreage limit for annual treatments of 275 acres by mechanical treatment and 320 acres of prescribed burning were developed as reasonable targets that could be achieved annually rather than absolutes that must be achieved. The plan acknowledges that the level of funding available for fire management projects has varied from year to year; in addition, heavy fogs in late summer/early fall can shift the park's focus to achieving the mechanical treatment acreages and away from prescribed burning.

Under Alternative C, mechanical treatment and prescribed burning will be used to reduce fuel loading near developed areas and achieve resource enhancement goals. Mechanical treatments, complemented by prescribed fire, will be employed to assist with the restoration and maintenance of the park's natural and cultural resources. An expanded research program will examine the role of fire and mechanical treatments in enhancing natural resources and the specific impacts of fire on these resources. Research will also be used to adaptively guide the fire management program and help maximize the benefits to park resources. Natural and cultural resource goals and objectives will be integrated into the design and implementation of fuel reduction projects.

Several actions that are part of the current GGNRA fire management program will continue under Alternative C. Some of these current activities are considered "best management practices" and are used by many land management agencies and fire districts. These actions include roadside fuel reduction; maintenance of defensible space around structures; the provision of fire education materials and public outreach; the continued implementation of successful fire management programs such as the Wildland Urban Interface Initiative coordinated with neighboring fire departments and homeowners' associations; fire effects monitoring; suppression of all wildland fires; centralizing the park's fire cache in a new structure; fire management actions for GGNRA lands within the City and County of San Francisco; and the fire management approach for Muir Woods National Monument. The NPS has been implementing the 1993 FMP strategy for Muir Woods National Monument for over a decade and would continue to do

so. The strategy uses prescribed fire and mechanical fuel treatments to reduce invasive species and fuel loading, and to restore the role of fire in the old growth coast redwood forest.

Based on the FMP, an implementation plan will be developed by the park's fire and resource management staff. The implementation plan will outline fire management actions that would occur over a 5-year planning period. This plan would be updated and reviewed annually for consistency with the FMP.

Other Alternatives Considered

In addition to the Selected Action, the FMP FEIS analyzes two alternatives for managing fire in the park, including a No Action Alternative. Similar to Alternative C (Selected Action), these alternatives are based upon park values, effective fire management strategies, NPS policy, and applicable law. Two other alternatives which focused on fuel reduction rather than a combination of resource and fuel reduction benefits were considered but dismissed.

Alternative A (No Action) – 1993 FMP, No Action

This alternative would be an update to the park's 1993 FMP only to reflect changes to the park's boundary (e.g., addition of new lands since 1993) and current national fire management policies. The focus of the 1993 FMP program is on ecosystem management through the application of prescribed fire to perpetuate fire-adaptive natural systems. This alternative would rely on the continued implementation of the 1993 FMP and recent emphasis on mechanical fuel reduction along with prescribed fire.

The six FMU's for Alternative A, derived from the 1993 FMP, are based upon vegetation communities. As shown in Table 1 below, a total of 210 acres could be treated by mechanical means and prescribed fire each year under this alternative. Nearly all of the projects would be in Marin County and account for 175 of the total 210 acres. An annual maximum of 110 acres for prescribed burning would be allowed; this total reflects what had been accomplished while the 1993 FMP was in full implementation in the 1990's. In practice, many fire management actions approved in recent years for GGNRA have been mechanical fuel reduction projects (e.g., mowing, cutting to remove nonnative shrubs and trees, and selective thinning in forested stands) as a result of the establishment of the Wildland Urban Interface Initiative. A combination of staff shortages, the requirement to develop a new FMP, and a year-long moratorium on prescribed burning has resulted in limited prescribed burning over the past five years.

Current research projects would continue and would focus on the role of fire to enhance natural resources and the effects of fire on key natural resources to determine the effectiveness of various fuel treatments. Prescribed burning would focus on resource management and research objectives with half of the annual acreage accounted for in projects within Muir Woods National Monument. Mechanical fuel reduction projects would focus on the park interface area in Marin County, consistent with projects funded in the past five years.

Alternative B – Hazard Reduction and Restricted Fire Use for Research and Resource Enhancement.

Under Alternative B, fire management actions would emphasize the use of mechanical methods to reduce fire hazards and fuel loads in areas with the highest risks. A total of 350 acres could be treated each year under this alternative – a maximum of 230 acres by mechanical means and a maximum of 120 acres through prescribed fire. Compared to Alternative A, Alternative B represents an increase in the number of acres mechanically treated each year. There would be a focus on the reduction of high fuel loads in the

Wildland Urban Interface FMU. Alternative B would permit the treatment of 50% fewer acres annually by mechanical treatment than the Selected Alternative. Limited use of prescribed fire could occur for research purposes within the park interior. Under Alternative B, prescribed burning is restricted to the Park Interior FMU in Marin County and Muir Woods FMU. No prescribed burning would occur in the San Mateo parklands. Research projects in Marin and San Mateo counties would examine the role of fire to enhance natural resources and the effects of fire on key natural resources to determine the effectiveness of various fuel treatments.

Table 1: Summary of Alternatives by Fire Management Unit (FMU) and Treatment Type

Treatment Type	County	Alternative A		Alternative B				Alternative C			
		All Fmu's[1]	Total	WUI FMU	Park Interior FMU	Muir Woods FMU	Total	WUI FMU	Park Interior FMU	Muir Woods FMU	Total
Mechanical Treatment (acres/yr)	Marin	75	100	130	45	5	230	130	90	5	275
	San Francisco	5		10	0	0		10	0	0	
	San Mateo	20		30	10	0		30	10	0	
	Total Acres	100		170	55	5		170	100	5	
Prescribed Burning (acres/yr)	Marin	100[2]	110	0	70	50	120	50	185	50	320
	San Francisco	<1		<1	NA	NA		<1	NA	NA	
	San Mateo	10		0	0	0		5	30	0	
	Total Acres	110		0	70	50		55	215	50	

Source: GGNRA Fire Management Office Data 2004.

Notes:

[1] Since 1993 FMP did not give number of acres per year for treatments by FMU, and since FMU's are by vegetation type and dispersed throughout park, total acreage is given by county only based upon projects cited in 1993 FMP and current practice.

[2] Includes 50 acres of prescribed burning in Muir Woods National Monument annually.

WUI = Wildland Urban Interface

NA = not applicable

Alternatives Considered for Inclusion in the EIS But Rejected

Two additional alternatives were considered for the GGNRA FMP but rejected as not meeting the purpose and need of the FMP. Developed in response to a suggestion during scoping, of the two alternatives proposed, one included no use of fire as a management tool and the second permitted fire to be used only in pile burning. Both alternatives focused on mechanical treatments to reduce fuels and fire hazard. The strategy for fire management at Muir Woods, which involves the reintroduction of fire into the ecosystem, could not be implemented under these alternatives. The first alternative, which did not permit pile burning, removed a very sustainable solution for disposing of cut vegetation. Often only part, and sometimes none, of the vegetation cut at a site can be chipped and broadcast in place; under this alternative all debris which could be chipped would have to be trucked to a legal disposal site. Chipping and broadcasting debris at a project site may be prohibited because it could alter favorable conditions for sensitive plant or animal species, involve the spread of invasive plant seeds or viable parts, suppress the native seed bank, or increase fire risk when if deposited overly thick. Pile burning is an important solution for vegetation harboring SOD, pitch pine canker, or other infectious diseases or pests that should neither be left onsite nor moved to another location.

After consideration, the alternatives were rejected as so many important FMP goals could not be achieved without some level of prescribed burning. Without the option of prescribed burning, there would be less opportunity to contribute to the enhancement and rehabilitation of cultural and natural resources through the use of prescribed burning. The park fire ecology and monitoring staff would not be able to build upon research and data derived first hand experience in the actual environment of GGNRA. The park fire staff would not expand their experience by planning and executing prescribed burns and the preferred strategy for reducing the potential for a high intensity wildland fire at Muir Woods could not be implemented being based on the reintroduction of fire into the Muir Woods ecosystem.

Environmentally Preferred Alternative

The analysis in the Final EIS determined that Alternative C is the environmentally preferred alternative. As described in the Final EIS, NPS and Section 101 NEPA criteria were used to make this determination. A summary of this analysis is as follows:

Alternative C will best achieve the purposes and goals of the plan by allowing for the use of a variety of management tools in order to achieve resource goals in balance with protection of visitors, life, and property. In comparison to Alternatives A and B, Alternative C's fire management treatment options provide the park with the flexibility to achieve, in a timely manner, a reduction in fire hazards that aid in the protection of human health, life, and property while also maximizing opportunities for restoring and maintaining ecological integrity, and protecting and enhancing the park's natural and cultural resources. Under Alternative C, the park's expedited implementation of fuel reduction projects in the urban interface areas would afford the greatest protection for park neighbors as well as the most sustainable approach to fire management. Alternative C presents the greatest potential for the control of stands of non-native evergreen forests within all of the FMU's which, once controlled, will require limited maintenance to discourage resprouting. With active restoration efforts from park staff and volunteer stewards, the areas that support stands of non-native evergreens should convert to native vegetation and require little maintenance in the long-term to maintain low fuel loading.

Alternatives A and B conform to FMP goals but would accrue benefits at much lower rates than Alternative C. Alternative A would achieve only one third the number of acreage for both prescribed burning and mechanical treatment than Alternative C. Alternative A, which continues the current resource-based FMP, would have a natural resource focus park-wide split into FMUs defined by vegetation type. Alternative A is not as closely allied to the life safety goal that is primary to current federal wildland fire policy. With the exception of specific WUI projects funding by the National Fire Plan, all project planning would continue to be natural resource based. Alternative B permits mechanical treatment at nearly the same level as Alternative C and would be nearly as effective in reducing excessive fuel loading as Alternative C. However, the amount of acreage of prescribed burning permitted annually is a third of that allowed in Alternative C and then only within the Interior FMU. No prescribed burning would occur in San Mateo County and no burns would be within the WUI FMU which often has the larger concentrations of escaped, invasive, non-native plants. Alternative B and C would permit similar annual achievements for mechanical treatment projects and both allow the greatest range of techniques to be used to treat cut vegetation based on environmental conditions. However, the higher annual acreage limits in Alternative C (at least 45 acres more annually of mechanical treatment and an additional 200 acres more of prescribed burning), with the ability to use prescribed burning throughout the park where warranted, results in a more proactive program that has the greatest potential to effectively reduce high fuel loading that currently threatens natural and built resources and public safety on both sides of the wildland urban interface.

Basis for Decision

After careful consideration of the alternatives presented, their environmental impacts, planning goals, and public comments received throughout the planning process, including comments on the Draft Fire Management Plan/Environmental Impact Statement, Alternative C has been selected for implementation. This alternative best accomplishes NPS and federal fire management policies, the legislated purpose of GGNRA, and the statutory mission of the NPS to provide long-term protection of park resources. The selected action best accomplishes the stated purposes of the Fire Management Plan as described in section 1.4, Purpose and Need for Action of the FMP FEIS. Alternative C offers the best combination of benefits with a high level of protection of life and property, and greater long- and short-term natural and cultural resource benefits than either Alternatives A or B.

A set of goals, developed and used in this planning process, were derived from guidance of the NPS Management Policies 2001 (NPS 2000) and NPS Director's Order and Resource Handbook 18, Wildland Fire Management (NPS 1999), in addition to federal policy and scoping input. The goals and subsequent management objectives describe what must be accomplished in order for the fire management program to be successful and were used to formulate the alternatives analyzed in this FMP FEIS. Of these goals, the first four are the criteria that were predominantly used to select Alternative C for implementation. Alternative C is the alternative which most successfully fulfills these goals, though each of the alternatives achieves the goals to a varying degree.

1. *Ensure that firefighter and public safety is the highest priority for all fire management activities.*

This alternative would permit the broadest use of fire management strategies throughout the park (mechanical treatment, pile burns, and prescribed burning) to reduce fuel loading near developed areas

and resources. Alternative C permits a larger number of acres to be treated annually than the other alternatives considered and it will thus accelerate the reduction of fuels in areas that present wildland fire hazards to adjacent communities and to sensitive park resources. Under Alternative C, a greater amount of fuel reduction (total 595 acres) could be achieved by both mechanical treatment and prescribed burning in the planning area than either under Alternative A (total 210 acres) or Alternative B (total 350 acres).

Under Alternative C, a maximum of 320 acres of prescribed burns and 275 acres of mechanical treatments could occur annually. This acreage cap grants the park the flexibility to take advantage of years with favorable weather conditions and funding availability. Though all of the alternatives depend on a range of variables for success, risks to firefighters and the public would be reduced at a more rapid rate under Alternative C.

The flexibility in treatment options provided under Alternative C, particularly in the Park Interior FMU, will allow the park to link together areas treated by prescribed burning or mowing with other areas of naturally-occurring light fuels. These linked zones of reduced fuels will then serve to slow the rate of fire spread in the event of a wildland fire, resulting in additional time for evacuation and response, and will provide relatively safe areas from which to stage firefighting efforts.

2. Reduce wildland fire risk to private and public property.

Full implementation of this alternative would allow for the greatest number of acres to be treated annually to achieve fire management objectives. Compared to Alternative A, Alternative C permits nearly three times as much mechanical fuel reduction and prescribed burning each year. The higher amount of acreage allowed to be treated annually produces the most accelerated progress towards reducing fuels in critical areas around the park; almost 1,375 acres could be mechanically treated over a five year implementation plan based on the annual allowable acreages. The greater acreage and full range of fuel management techniques permitted in the WUI FMU under Alternative C provides more opportunities to plan and annually implement joint projects with other agencies to strategically reduce fuels across jurisdictional boundaries. Similar to the other alternatives, the objective of fuel reduction projects under Alternative C would be to establish areas of reduced fuels to slow the rate of fire spread and facilitate fire suppression. However, given the flexibility in management tactics and the number of acres that could be treated annually, more could be accomplished in a shorter amount of time to reduce fire risk to private and public property under Alternative C.

3. Protect natural resources from adverse effects of fire and fire management activities, and use fire management wherever appropriate to sustain and restore natural resources.

Alternative C is the least constrained alternative in terms of the types of treatments that can be applied in individual areas. Treatments under Alternative C would pursue the enhancement of natural resources (e.g., increasing abundance or distribution of habitat for threatened and endangered species; reducing infestations of nonnative plants; increasing native plant cover; managing the rate of vegetation conversion, etc.) in addition to other management goals. The focus for prescribed burns under Alternative C would be in areas where NPS ecologists believe ecosystem health would be enhanced by burning and in areas where fuel accumulations create fire hazards. To the extent possible, prescribed burns would be conducted to approximate natural fire intensity and fire intervals. The intent would be to allow the process of fire to act on the landscape as it has for thousands of years, to the greatest extent possible, while

ensuring human safety and protecting property. Prescribed fire would be used to reduce infestations of highly nonnative plant species, restore native habitat, and rehabilitate cultural landscape settings. Only Alternative C would permit prescribed burning to be used in conjunction with mechanical treatments in the Wildland Urban Interface FMU, thus providing a range of strategies to effectively control infestations of invasive, non-native plants. In addition, only Alternative C permits mechanical treatment in combination with prescribed burning to be used in the Park Interior FMU's of both Marin and San Mateo counties. As such, Alternative C will provide more opportunities for vegetation management projects which focus on native plant community rehabilitation and the control of isolated, invasive plant populations in areas where fuel reduction may be a low priority.

4. *Preserve historic structures, landscapes, and archeological resources from adverse effects of fire and fire management activities, and use fire management wherever appropriate to rehabilitate or restore these cultural resources.*

Alternative C proposes use of a broad range of fire management strategies throughout the park – mechanical treatment, pile burning, and prescribed burning – as a means to reduce fuel loading near developed areas and achieve resource enhancement goals. Projects would focus on the protection and/or enhancement of cultural resource elements and values (e.g., burning would be used to reduce vegetation in areas that are identified as important historic viewscapes). Fire management activities, especially carefully applied prescribed fire and mechanical fuel reduction treatments, will be used to stabilize, preserve, maintain, and restore cultural resources. For example, mechanical thinning can effectively remove hazardous fuels from cultural resources and their vicinity, as well as restore, enhance, or maintain ethnographic resources and cultural landscapes in cases where the risk of direct effect from the application of fire is too high. Fire management activities will help to maintain and protect historic buildings by reducing fuels around these structures, both through prescribed burns and mechanical treatment. Historic field patterns may be restored in pastoral ranching landscapes where former grassland is being succeeded by scrub. In addition, the removal of dense ground cover may lead to the revelation of previously unknown archeological sites. Since this alternative allows for the greatest number of acres to be treated on an annual basis to achieve fire management objectives, it will therefore afford the greatest level of protection and enhancement of cultural resources.

Findings on Impairment of Park Resources and Values

The NPS has determined that implementation of Alternative C (Selected Action) will not constitute impairment to park resources and values. This conclusion is based on a thorough analysis of the environmental impacts described in the FEIS, the public comments received, relevant scientific studies, and the professional judgment of the decision-maker guided by the direction in NPS Management Policy. While the plan has some negative impacts, in all cases these adverse impacts are the result of actions to preserve and restore park resources and values. Overall, the Selected Action results in major benefits to park resources and values and it does not result in their impairment.

In determining whether impairment may occur, park managers consider the duration, severity, and magnitude of the impact; the resources and values affected; and direct, indirect, and cumulative effects of the action. According to NPS policy, "An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is: necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park; key to the natural or cultural integrity

of the park or to opportunities for enjoyment of the park; or identified as a goal in the park's general management plan or other relevant NPS planning documents" (NPS Management Policies, 2001).

The non-impairment policy does not prohibit impacts to park resources and values. The NPS has the discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, so long as the impacts do not constitute impairment. Moreover, an impact is less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values.

The actions comprising Alternative C will achieve the goals of the Fire Management Plan in a comprehensive, integrated manner that reduces fire-related risks while also allowing fire to be used to achieve resource management objectives. The potential for high-intensity catastrophic fire that would put high-value resources at risk would be greatly reduced under the Selected Alternative. The combined use of mechanical treatment and prescribed burning throughout the park would allow NPS to reduce fuel loading and also achieve resource enhancement goals in a more timely and efficient manner than the other alternatives. Under Alternative C, the FMP goals would be achieved in a productive, effective, and sustainable manner through a broad scope of treatments and treatment areas. Strategic areas of high fuel loading on the park's urban interface would be treated and maintained over a shorter period of time than under Alternatives A and B. Likewise, areas of nonnative plants would be treated earlier in the implementation of Alternative C and would therefore be treated before populations of nonnative species could expand to affect larger areas.

In conclusion, the NPS has determined that the implementation of Alternative C will not result in impairment of resources and values in GGNRA. This conclusion is documented in the FMP FEIS.

Measures to Minimize Environmental Harm

The NPS has investigated all practical means to avoid or minimize environmental impacts that could result from implementation of the selected action. The measures have been incorporated into Alternative C and are presented in detail in the FMP FEIS. A set of mitigation measures will be applied consistently to actions to implement this plan through the park's internal compliance processes. (See Attachment 1 – Mitigation Measures). Fire effects monitoring by the fire management staff and the GGNRA cultural and natural resource management programs will be implemented to detect deleterious results. The results from this program will guide and assure compliance monitoring, biological and cultural resource protection, noxious weed control, visitor safety and fire education, endangered, threatened and special status species protection, and other mitigation. In addition, the NPS will prepare appropriate compliance reviews under the NEPA, the National Historic Preservation Act, and other relevant legislation for future actions not covered by this EIS.

Public and Interagency Involvement

Scoping for EIS

Public scoping for the FMP EIS was formally initiated on August 8, 2003, with publication in the Federal Register of the Notice of Intent to Prepare an Environmental Impact Statement for the GGNRA FMP. In addition to the Federal Register notice, the scoping period was publicized through a mailing to the public that included background information on the FMP and a notice of scoping workshops. Scoping

comments were solicited from August 8, 2003, to December 5, 2003. Three open house meetings were held for the scoping of the GGNRA FMP. These meetings featured displays and offered attendees the opportunity to discuss the planning process with staff. In addition, internal NPS scoping sessions were conducted to identify staff issues and concerns.

Among the major issues raised during the scoping meetings were the need for monitoring fire management activities and the use of wildland fire and pesticides as fire management tools. In addition, the development of an education component for fire hazard reduction in adjacent communities was mentioned. Other concerns raised at the meetings included ongoing changes in land use as they relate to fire; the potential for changes in wind patterns and wind strength due to tree removal; public access limitations; use of native plant species to restore habitat; potential changes to visitor experience and aesthetics; increased fire risk and life safety; and effects on cultural resources, vegetation, wildlife, hydrology, water quality, soils, and air quality.

Review of EIS

A Notice of Availability for the Draft EIS (FMP DEIS) was published by the NPS in the Federal Register on March 21, 2005. The NPS also provided the notice of availability of the FMP DEIS through a direct mailing and posting on the park's web site. The FMP DEIS was made available for review at park headquarters, park visitor centers, local and regional libraries, and on the park's website. The EPA's Federal Register March 18 notice of filing initiated a 60-day public comment period ending on May 17, 2005 which was extended to May 27, 2005 to ensure adequate review time. The NPS conducted two public presentations and workshops on the FMP DEIS. The first workshop was held in San Mateo County as part of a regularly scheduled Pacifica City Council meeting on April 11, 2005. The second workshop was on April 19, 2005 in Marin County at the San Francisco Bay Model in Sausalito and was part of the regularly-scheduled, GGNRA bi-monthly public meeting. The public was encouraged to submit comments on the DEIS via email, fax, or regular mail.

Twelve comment letters were received (see Appendix H of the FEIS). Agencies commenting were the US Environmental Protection Agency, the State Clearinghouse, the State Department of Forestry and Fire Protection, the Marin County Community Development Agency, the San Mateo County Department Parks and Recreation, the Land and the Resources Division of the San Francisco PUC. Two members of the Pacifica City Council submitted comments as well as 3 members of the public. The EPA provided comments as required in their role of statutory administrator of NEPA, the Council on Environmental Quality implementing regulations and the Clean Air Act.

All comment letters are reprinted in Appendix H to the FMP FEIS and each letter is followed by the NPS response to the letter's comments. The major issues raised during the public comment period included: smoke management, clarification of the text on conformance with air quality regulations and the State Implementation Plan, herbicide use, protection of riparian and wetland areas, range of alternatives considered, effects on Monarch butterfly habitat, and the need and benefits from interagency cooperation. On February 10, 2006 the EPA published their notice that the FEIS is "complete and fully adequate" in the Federal Register.

The NPS's Notice of Availability for the FMP FEIS was published in the Federal Register on December *28*, 2005. Following the EPA's notice of filing published in the FR on December 23, 2005 the waiting period for preparation of the Record of Decision ended on January 23, 2006. The FMP FEIS was posted on the NPS park planning website and a postcard notification of its availability was mailed to 1,400 interested parties, including agencies and organizations which had requested information on the FMP FEIS or were on the park's planning office mailing list. Forty-seven individuals, organizations, and agencies that had received a copy of the FMP DEIS in either printed or CD format or had since requested a copy were sent the FMP FEIS in the format requested. The FMP FEIS was distributed to the GGNRA Visitor Centers and twenty-four libraries in Marin, San Francisco, San Mateo and Alameda counties.

Following distribution of the FEIS, the park received several requests from the public and agencies for copies of the document, and a private citizen request for additional information on the use of herbicides and fire retardant chemicals in the Muir Beach and Redwood Creek vicinity. The park responded that the park's preference is to use no retardants for suppression wherever possible and particularly in the vicinity of Redwood Creek, which provides habitat for listed salmonids. The Marin County Fire Department, as a CDF contract agency, has agreed to consult with the NPS before using retardants in the Redwood Creek drainage. It is mutually agreed that the protection of life and safety is the number one priority in any fire suppression effort and the use of retardants may be necessary where these threats are present. No herbicides have been used at the Golden Gate Dairy in conjunction with eucalyptus removal nor is any planned for this area or for work along Muir Woods Road. In conformance with the Endangered Species Act consultations undertaken for the FMP, direct applications to the cut stumps of eucalyptus, acacias or other readily resprouting non-native trees, is allowed in riparian or wetland habitats supporting special status species during the dry season (roughly July 1 through November 15), never within the wetted channel of the drainage and only when conditions meet the requirements of mitigation measures VEG-8 to prevent wind drift of herbicide.

Agency Consultation and Coordination

Advisory Council on Historic Preservation. The National Historic Preservation Act (NHPA) requires agencies to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places. The Advisory Council on Historic Preservation has developed implementing regulations (36 CFR 800) that allow agencies to develop agreements for consideration of these historic properties. The NPS, in consultation with the California State Historic Preservation Officer (SHPO), developed a Programmatic Agreement for the FMP based upon an existing draft Department of the Interior Fire Management Plan Programmatic Agreement. The NPS invited the participation of the Advisory Council, affected American Indian tribes, and the public in this consultation process. This Programmatic Agreement provides a process for compliance with the NHPA and includes stipulations for identification, evaluation, treatment, and mitigation of adverse effects for actions affecting historic properties. The NPS initiated consultation on the GGNRA FMP by letter to the SHPO dated May 23, 2003. Consultation was completed with the signing of the Programmatic Agreement on September 30, 2005. The Programmatic Agreement for Fire Management Activities is included as Appendix J in the FMP FEIS.

U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS). The Endangered Species Act (ESA) protects threatened and endangered species, as listed by the U.S. Fish and Wildlife Service (USFWS), from unauthorized take, and directs federal agencies to ensure that their actions do not

jeopardize the continued existence of listed species. Section 7 of the ESA defines federal agency responsibilities for consultation with the USFWS and National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) and requires preparation of a Biological Assessment to identify any threatened or endangered species that are likely to be affected by the proposed action.

The NPS initiated informal consultation with the USFWS on June 18, 2003. Upon request, the USFWS sent the NPS a species list for the GGNRA FMP EIS covering Marin, San Francisco, and San Mateo counties, as well as for the specific United States Geological Survey (USGS) quads within those counties in which NPS fire management activities will take place.

The NPS sent a biological assessment to the USFWS on March 16, 2005 to determine if formal consultation under Section 7 of the Endangered Species Act would be required for the GGNRA FMP. The NPS requested formal consultation with NMFS Fisheries Service on potential effects on listed salmonids and Essential Fish Habitat in a letter dated March 21, 2005.

USFWS issued a Final Biological Opinion on the GGNRA FMP EIS on October 7, 2005 (see Appendix K of the FMP FEIS). The Final Biological Opinion lays out the USFWS conclusions regarding the numerous listed wildlife and plant species within the FMP FEIS planning area and proposes several mitigation measures to assure protection of the species. All recommendations of the USFWS have been incorporated into the listing of mitigation measures included in Chapter 2 of the FMP FEIS and Attachment 1 to this ROD. The USFWS conclusions regarding implementation of Alternative C, the Preferred Alternative are:

1. Implementation of the FMP is not likely to jeopardize the continued existence of the mission blue butterfly, California red-legged frog, the San Francisco garter snake, Raven's manzanita, San Francisco lessingia, Presidio clarkia, and the Marin dwarf flax nor is it likely to destroy or adversely modify proposed California red-legged frog critical habitat. Critical habitat has not been designated or proposed for mission blue butterfly, San Francisco garter snake, Raven's manzanita, San Francisco lessingia, Presidio clarkia, and the Marin dwarf flax, therefore, none will be affected.

2. Implementation of the FMP is anticipated to result in incidental take of the mission blue butterfly, California red-legged frog, and the San Francisco garter snake. The nondiscretionary conservation measures proposed by the NPS and described in the FEIS and ROD will substantially reduce but do eliminate the potential for incidental taking of these listed species. The USFWS has determined that the level of anticipated take is not likely to result in jeopardy to the three listed wildlife species and proposed critical habitat of the red-legged frog.

3. Implementation of the FMP is not likely to adversely affect the San Bruno elfin butterfly, the salt marsh harvest mouse, tidewater goby, California brown pelican and the Pacific Coast population of the western snowy plover because of the avoidance measures included in the proposed project, actions proposed are either outside the range of the listed species or the action area does not contain suitable habitat for the taxa.

4. The USFWS concurs that Alternative C is not likely to adversely the northern spotted owl because of the specific measures for owl protection that will be implemented with the FMP regarding the siting and timing of project actions in relation to owl activity sites, limits on tree

and understory canopy modification near owl activity sites, avoiding disturbance of woodrat nests, limiting removal of larger diameter trees, and conducting post-project monitoring.

5. The USFWS concurs with the determination that the proposed project is not likely to adversely affect the marbled murrelet because of specific avoidance measures that will be implemented with the FMP regarding timing and siting of project actions, and avoidance the felling trees of larger diameter trees.

NMFS issued a Biological Opinion on the FMP FEIS on February 8, 2006 addressing potential effects of the FMP on the Central California Coast coho salmon (*Oncorhynchus kisutch)*, an Evolutionary Significant Unit (ESU) and the Central California Coast steelhead (*Oncorhynchus mykiss)*, designated a Distinct Population Segment.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (PL 104-267), requires all federal agencies to consult with NMFS Fisheries on all actions or proposed actions permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). NMFS provides recommendations to agencies through the Section 7 Consultation process to conserve EFH when agency activities may adversely affect EFH. Critical habitat has been designated for coho salmon and steelhead and includes streams and riparian areas within the FMP action area, triggering conformance with the Magnuson-Stevens Act.

After review of the biological assessment, best available scientific and commercial information, current status of the listed species, information on the environmental baseline of the action area, the anticipated effects of implementation of the FMP and cumulative actions, NMFS concluded that the FMP is unlikely to jeopardize the continued existence of the Central California Coast coho salmon or steelhead and unlikely to adversely modify their designated critical habitats. After review of the mitigation measures proposed for the control of erosion and protection of salmonids, NMFS recommended an additional conservation measure, taken directly from wording within the FEIS, be included to protect salmonid habitat from effects of herbicide use (see VEG-8 in Attachment 1). Modifications to two FMP mitigation measures (SS-12 and SS-13) were also requested. The issuance of an incidental take statement for the programmatic FMP was not required by NMFS.

As a condition supporting the issuance of their findings on the FMP, NMFS requires that the NPS provide them annually with information on the proposed implementation efforts for the upcoming fiscal year. Information will include a map of the project area, a project description and an assessment of potential effect on coho salmon and steelhead. NMFS will respond to the annual project report in writing within set time periods and inform the park whether the proposals may be appended or tiered from the programmatic biological opinion or whether project modifications, additional information or a separate consultation will be required.

California Coastal Commission. The Coastal Zone Management Act protects coastal environments. While the act transferred regulatory authority to the states and excluded federal installations from the definition of the "coastal zone," it requires that federal actions be consistent with state coastal management plans. Activities taking place within the coastal zone under the definition established by the California Coastal Management Plan (CCMP) require a federal consistency determination. The FMP FEIS was submitted to the California Coastal Commission for federal consistency determination. In a letter dated February 10, 2006, the Coastal Commission determined that the programmatic FEIS would

not adversely impact coastal resources and would meet the requirements for a negative determination with the adoption of a requirement for the NPS to provide the CCC Executive Director annually with an implementation plan. The Executive Director requested that NPS staff meeting annually with CCC staff to discuss how implementation of the annual work plan and mitigation measures will ensure protection of sensitive coastal resources. The NPS will submit additional consistency and/or negative determinations to the Commission for any future FMP projects within GGNRA that hold the potential to adversely affect resources within the coastal zone.

Changes Made for the Final EIS

A number of minor changes were made in the FEIS based on public comment received during the review period for the DEIS.

- A tenth FMP goal, accompanied by two objectives, to address smoke management and protection of air quality was added to the list of FMP goals in Chapter 1
- Figures 2-7, Fire Roads North Lands, and 2-8, Fire Roads South Lands were removed from the document and text edits were made to clarify which road-related functions at GGNRA are the responsibility of fire management staff (and are within the scope of the FMP FEIS) and which are the responsibility of other NPS divisions.
- Additional information was provided on herbicide use in conjunction with mechanical fuel removal as requested by the U.S. Environmental Protection Agency (EPA). This includes information on the park's common herbicide used, the review and approval process, regulatory conformance, protections for sensitive resources, the public and firefighters.
- Changes were made to the Mitigation Measures for Air Quality and Special Status Species in response to a comment from the EPA. As a result of the consultation between the NPS and the U.S. Fish and Wildlife Service (USFWS), two new Special Status Species mitigation measures were added. NMFS requested that a paragraph from FEIS Chapter 4 regarding herbicide application be added to the list of mitigation measures and that text modifications be made to two Special Status Species mitigation measures addressing protection of salmonids.
- On the recommendation of the EPA, changes were made to the Impacts on Air Quality section to clarify the relationship between BAAQMD's smoke management plan (SMP) and the State Implementation Plan (SIP). Text was added to address whether the three FMP alternatives would trigger a conformity analysis with the SIP; new text and a new table were also added to explain and state the *de minimus* levels for criteria pollutants with which the Air Basin is in nonattainment or maintenance status; and Table 3-4 was updated to reflect the current attainment status of criteria pollutants for the Bay Area Air Basin.
- In response to the EPA's request for more information regarding smoke management practice, a new appendix was added that lists smoke management techniques and non-burning alternatives that GGNRA could incorporate into a smoke management plan and/or that BAAQMD could require as part of the smoke management plan approval process. The referenced appendix is Appendix I – Non-burning Alternatives and Air Emissions Reduction Techniques for Fuel Reduction and Resource Benefiting Prescribed Burns in GGNRA.

Conclusion

Alternative C provides the most comprehensive and effective method among the alternatives considered for meeting the NPS purposes, goals, and objectives for managing fire and fire risks in GGNRA and for meeting national environmental and fire policy goals. The selection of Alternative C, as reflected in the *Final Fire Management Plan/Environmental Impact Statement* would not result in the impairment of park resources and would allow the NPS to conserve park resources and provide for their enjoyment by visitors.

Approved:

[Signed by Jon Jarvis on 2/23/06]

_____ _____

Jonathan B. Jarvis, Regional Director Date

Pacific West Region, National Park Service

Attachment 1 – FMP Mitigation Measures

The NPS will implement the following mitigation measures in implementing the Selected Alternative of the FMP FEIS. The measures are designed to minimize or avoid the potential environmental impacts of the actions to be implemented under the FMP FEIS or to create a beneficial effect. These measures would not be fully applicable in the event of a catastrophic fire. The NPS will regularly evaluate and monitor the mitigation measures during implementation to determine their continued effectiveness in reducing impacts. The NPS, as Lead Agency, will have primary and full responsibility for coordinating the specific elements of each mitigation measure and will be responsible for ensuring that each mitigation measure has been implemented as specified in this document.

General FMP Mitigation Measures

FMP-1(a) To ensure that GGNRA fire management actions are in conformance with NEPA, the Record of Decision on the Final EIS, and NPS policy, individual fire management projects and modifications to the GGNRA five-year implementation plan will be subject to the GGNRA project review. Through the project review process, an interdisciplinary team will evaluate whether the potential effects of a proposed action or five-year plan, including appropriate mitigation measures, are adequately addressed by the Final EIS and reflect NPS management policies. If it is determined that the project has the potential for new environmental effects not addressed in this EIS or effects greater than those described in this EIS, a separate environmental process will be conducted.

FMP-1(b) To ensure compliance with 36 CFR 800, the regulations for implementing the NHPA, the Programmatic Agreement that will be developed specific to this park's fire management program will stipulate that each five-year implementation plan will made available to the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the public for comment.

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 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-4 GGNRA staff will conduct a training session for all contractor crews at the beginning of new fuel reduction projects to familiarize the crews with sensitive resources at the project site and review project conditions. Training sessions may include identification of NPS staff resource contacts; special status plants, wildlife, or other sensitive resources in the work area; identification and specific removal techniques to protect cultural resources from disturbance or prevent resprouting of nonnative plants; markings for the limit line of disturbance; thresholds that trigger a change in implementation techniques or require a halt in project implementation; proper disposal of food waste and garbage to discourage feeding by vectors and corvids; daily close-up of the project site to assure public safety; and information for public contacts during project implementation.

FMP-5 An education program for field personnel involved with implementation of FMP projects will be conducted prior to the initiation of field activities. The program may include a brief presentation on any listed species at the work area, including a description of the species and its ecology, habitat needs, legal status, and protection afforded to the species. Cultural resource issues may include the type of artifacts or soils that could indicate the presence of subsurface cultural resources, the presence of known resources at the site, and important elements of the cultural landscape that must be left undisturbed, among other issues.

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.

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.

Air Quality Mitigation Measures

AIR-1 If recommended by BAAQMD, smoke management plans submitted by the NPS for BAAQMD review can be modified to reduce production of pollutants by reducing the amount of fuels available for burning. Options for reducing the amount of fuels available and emissions produced include reducing the area to be burned, reducing fuel loading (e.g., mowing and understory thinning), managing the rate of fuel consumption, and redistributing the emissions. Treatments to reduce overall air emissions from prescribed burns will be based on current smoke management techniques such as those listed in the Western Regional Air Partnership publication “Non-burning Alternatives to Prescribed Fire on Wildlands” (Jones and Stokes, 2004) and those listed in Appendix I of this FEIS.

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. Notification of proposed burns will be disseminated locally to provide adequate advance notice to persons with sensitivities to smoke.

AIR-3 To reduce smoke and pollutant generation during the prescribed burning season, efforts will be made to burn fuel concentrations, piles, landings, and jackpots at other times of the year.

AIR-4 To reduce impacts on visibility in the national park, burning will be avoided on holidays or other periods when recreational visitation is typically high.

AIR-5 To avoid public health and nuisance impacts on neighboring communities, information about upcoming prescribed burns, including guidance for those who are sensitive to smoke, will be provided to park visitors, park employees, and park partners. Prescribed burns will be conducted under meteorological conditions that best avoid smoke drift into nearby residential areas and roadways.

AIR-6 The NPS will arrange in advance with other parks that routinely monitor air quality (i.e., Yosemite National Park or Sequoia National Park) to monitor particulate levels during larger prescribed burns in GGNRA provided the necessary staff and equipment can be made available for GGNRA use.

Soils and Water Quality Mitigation Measures

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. Subject matter experts will ensure that the erosion control plan for each action is sufficient to prevent long-term moderate or major impacts on the rate of soil erosion. Sites with identified high potential for soil erosion will be monitored.

SW-2 Following a prescribed fire or wildland fire, visual monitoring will be conducted downslope of the area burned and at down-gradient water bodies (including ditches, streams, and wetlands) for evidence of increased soil erosion or increased sedimentation. Additional erosion control/sediment control measures will be applied where warranted.

SW-3 Following wildland fires or prescribed burning, all fire lines (both hand and dozer lines) or other areas disturbed by equipment or vehicles will be rehabilitated as quickly as possible to prevent erosion, discourage the spread of nonnative plants and address soil compaction. Burned area rehabilitation techniques, including recontouring, soil stabilization, and removal and monitoring of nonnative plants, will be used for rehabilitation efforts.

SW-4 Unless no feasible alternative is available, heavy equipment working on fire management actions (excluding suppression) will not be used in areas with soils that are undisturbed, saturated, or subject to extensive compaction. Where staging of heavy equipment, vehicles, or stockpiling is unavoidable, the limit of allowable disturbance will be clearly demarcated by

staking, flagging, or fencing. Following the end of work, surface soils will be scarified to retard runoff and promote revegetation.

SW-5 During implementation of prescribed burns, some of the available coarse, woody debris will be left on the site to foster nutrient recycling and mycorrhizal function and other natural resource benefits.

SW-6 Mechanical regrading and rehabilitation of fire roads will be conducted to specifications identified in the GGNRA Trails Inventory and Condition Assessment and the Memorandum of Understanding for Maintenance and Management of Dirt Roads with adjacent land management agencies.

SW-7 After tree felling, stumps will be left in place in areas with highly erosive soils or on steep slopes.

SW-8 Where surface soils supporting native vegetation will be disturbed as part of fire management actions, the topsoil layer will be excavated and stockpiled separately from other fill and replaced as topsoil at the end of the action.

SW-9 Erosion and sediment control measures will be implemented as prescribed where project actions could leave soils exposed to runoff prior to revegetation.

SW-10 Where multiple burn piles are created on undisturbed soils, the size of the piles will be kept small with sufficient distance between piles to minimize impacts on soils from high-intensity fires and to facilitate reestablishment of mycorrhizal fungi and soil microorganisms from adjacent unburned land.

SW-11 A post-project site stabilization plan will be developed and implemented for all fire management projects.

Wetland Mitigation Measures

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.

Vegetation Mitigation Measures

VEG-1 Prescribed burns will be conducted at a time of year when introduction or spread of nonnative plants will be minimized and mortality of nonnative plant species will be maximized.

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.

VEG-3 Areas subject to fire management treatments will be monitored periodically for the presence of nonnative plant species; if such species become established or spread as a result of such activities, the nonnative, nonhistoric plants will be removed.

VEG-4 All vegetation management actions under the FMP will conform to federal and state regulations governing interstate and intrastate restrictions (respectively) adopted to prevent the artificial spread of Sudden Oak Death (*Phytophthora ramorum*) beyond the currently affected area. It will be the responsibility of the natural resources division chief to ensure that current guidelines and regulations are circulated to GGNRA staff involved in fire management actions. Relevant regulations are the Code of Federal Regulations, Title 7, Section 301.92 (updated 9/27/04) and California Code of Regulations, Title 3, Section 3700 (updated 9/2/04). Current regulations do not permit the movement of plant species and associated material listed in 3700(c) outside of the regulated quarantine area (defined in 3700(b)), which includes all three GGNRA counties.

VEG-5 All FMP projects will incorporate techniques that control existing populations of weed species at the project site and incorporate practices to reduce the potential spread of weed species to noninfested areas of the park. Practices to reduce the spread of weed species include the following:

- Movement or deposition of fill, rock, or other materials containing weed seed or viable plant cuttings to areas relatively free of weeds will be restricted.
- Where feasible based on the density of the weed population present, the fire management project manager will survey the road shoulders of the routes that provide project access for nonnative plant species and coordinate removal of those plants that could be disturbed by passing vehicles.
- When project vehicles are required to move from off-road use in weed-infested areas to relatively weed-free areas, and water lines and water tenders are available for use, the tires and body of heavy equipment and vehicles will be hosed down before each transit to the relatively weed-free area.

VEG-6 All herbicide use will be administered through the park's integrated pest management (IPM) coordinator, and only licensed personnel will be allowed to apply pesticides. All herbicide use for fire management actions will be reported monthly to the IPM coordinator.

VEG-7 No herbicide foliar spraying or direct stump applications will be allowed in riparian or wetland habitats supporting special status species except in the dry season (roughly July 1 through November 15 of each year).

VEG-8 In addition to restrictions for riparian and wetland areas, foliar herbicide will not be applied where saturated soils are present, at wind speeds over 5 miles per hour, or when weather conditions facilitate herbicide movement toward drainages. To limit the potential for wind drift, herbicide application will be limited to backpack sprayers.

Special Status Species Mitigation Measures

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-2 The fire management project manager will ensure that contractor crews working in areas designated as habitat of listed species are monitored by a qualified biological monitor to ensure that project actions conform to restrictions developed for species protection.

SS-3 All fire management actions will operate under a policy of No Net Loss of Endangered Species Habitat, which applies to all species federally listed as threatened or endangered or proposed for listing. The project review process will be used to document the no net loss finding through the conformance assessment conducted for each FMP action proposed for listed species habitat.

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

- 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.

- 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-5 An education program for the field personnel involved with the FMP shall be conducted prior to the initiation of field activities. The program shall consist of a brief presentation by a person(s) knowledgeable in the California red-legged frog, San Francisco garter snake, mission blue butterfly, and other appropriate listed species. The program shall include the following: a description of these species, their ecology, and habitat needs; an explanation of their legal status and their protection under the Act; and an explanation of the measures being taken to avoid or reduce effects to these species during implementation of the FMP. The

education may be conducted in an informal manner (e.g., ranger and field personnel in a field setting).

SS-6 If a California red-legged frog(s), San Francisco garter snake, or early stages of the mission blue butterfly are observed in the work/burn areas, a qualified biologist or an individual trained in the biology and ecology of these listed animals and designated by the NPS shall capture it and move the animal(s) to an appropriate aquatic of upland location outside of the work area.

Special Status Plants

SS-7 Potential impacts associated with tree removal in the vicinity of the Raven's manzanita, San Francisco lessingia, and Marin dwarf-flax will be evaluated in consultation with the USFWS.

SS-8 To address fire actions occurring within special status plant species populations, site- and/or species-specific rehabilitation plans will be developed to minimize or avoid impacts on the greatest extent possible.

SS-9 When FMP actions disturb the habitat of special status plant species, revegetation and weeding plans will be developed in conjunction with project planning.

SS-10 The potential for research burning and/or mechanical fuel treatments to enhance federally listed threatened or endangered plant habitat will be investigated. Burning in these habitats will be limited to carefully prescribed research burns, designed in conjunction with USFWS staff consultation and in accordance with established recovery plan objectives. Experimental treatments will be scientifically designed with replicate controls and a commitment to post-treatment monitoring.

Salmonids

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-12 A buffer will be maintained around riparian areas where fire management activities will be restricted. Staging, fire line construction, and vehicle and heavy equipment use will occur outside the buffer area, and any activities such as nonnative vegetation removal and limited prescribed burning will occur under tightly controlled conditions. Any impacts that occur in the buffer area must be correctable by site-specific actions, and must be confined to short-term, minor (or less) adverse effects. In riparian areas directly adjacent to salmonids streams, mechanical FMP projects will be limited to an annual treatment of less than 10 acres and prescribed burning will require additional consultation.

SS-13 The fire management officer will consult with natural resources subject matter experts to identify rehabilitation and revegetation strategies where fuel reduction projects require bank stabilization in riparian areas. Rehabilitation in riparian areas will be accomplished by hand treatment techniques, using erosion control materials if treatment areas are bare prior to rains, revegetating where needed, and where possible, returning native woody material (large woody debris) to stream banks. If removal of vegetation critical to channel shading is planned or work is proposed for the wetted channel of salmonids streams, additional consultation will be needed.

Northern Spotted Owl

SS-14 Treatment activities described in the FMP or any noise generation above ambient noise levels will not occur within 0.40 kilometer (0.25 mile) of a known occupied or previously used northern spotted owl nest site, or within potential spotted owl habitat between February 1 and July 31 (breeding season), or until such date as surveys conforming to accepted protocol have determined that the site is unoccupied or nonnesting or nest failure is confirmed.

SS-15 Mechanical fuel reduction activities in suitable spotted owl habitat, known or potential, will not substantially alter the percent cover of canopy overstory and will preserve multilayered structure. When shaded fuel break features in suitable northern spotted owl habitat are constructed, the resulting multilayered canopy will only be reduced to a height of 6 to 8 feet, or along roadways as needed for emergency vehicle clearance.

SS-16 Prior to fire management activities, project areas will be surveyed for the presence of dusky footed woodrat nests. If feasible, woodrat nests will be protected.

SS-17 Within northern spotted owl habitat, the cutting of native trees greater than 10 inches diameter at breast height (dbh) will be avoided unless a determination is made that the native tree presents a clear hazard in the event of a fire or cutting is the only option to reduce high fuel loading.

SS-18 The fire management officer will arrange for qualified biologists to conduct post-project monitoring to determine short- and long-term effects of fire management actions on spotted owl activity centers if resources are available.

San Francisco Garter Snake

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. Measures to avoid mortality include hand-clearing areas prior to fire management activities, hand-excavating all burrows, trapping snakes out of the excavation area, using monitors to prevent equipment from injuring listed species, and training workers on identification and avoidance of listed species. Work will be conducted by biologists with a valid 10(a)(1)(A) permit and any collected San Francisco garter snakes will be relocated outside affected areas.

Marbled Murrelet

SS-20 Where marbled murrelet habitat overlaps northern spotted owl habitat, the restrictions on noise generation in spotted owl habitat above the level of ambient noise will be to August 5. Further, from August 6 through September 30, noise generation will be limited to ambient noise levels from two hours before sunset to two hours after sunrise to protect any nesting marbled murrelets that have not been noted during surveys (USFWS letter to NPS dated April 13, 1994).

SS-21 In marbled murrelet habitat, felling of very large Douglas-fir or coast redwood trees will be avoided and the fire perimeter will be established at a distance that will preclude the need to fell large trees.

Mission Blue Butterfly

See also Mitigation Measure SS-4 regarding use of ocean and bay waters for suppression actions.

SS-22 Fire management activities will not occur within or immediately adjacent to existing or potential mission blue butterfly habitat during the flight period of the butterfly from February 15 through July 4.

SS-23 Pile burning will only be permitted on barren, disturbed soils in mission blue butterfly habitat.

SS-24 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:

- Avoid staging fire suppression actions in or directly adjacent to mission blue butterfly habitat;
- Construct fire lines outside of mission blue butterfly habitat to the greatest extent possible;
- 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
- Avoid using saltwater or retardant on habitat of the mission blue butterfly.

SS-25 The potential for research burning and/or mechanical fuel treatments to enhance butterfly habitat will be investigated. Burning in mission blue butterfly habitat will be limited to carefully prescribed research burns. Experimental treatments will be scientifically designed with replicate controls and a commitment to post-treatment monitoring. No more than five percent of existing mission blue butterfly habitat in each county will be treated experimentally each year.

SS-26 Where possible, maintain a 100-foot-wide buffer between fire management activities and mission blue butterfly habitat except when fires are being conducted for research purposes. For habitat enhancement projects, additional measures will include establishment of buffer areas, flagging of *Lupinus albifrons* in the vicinity of activities, installation of temporary fencing, dust control, and worker education (USFWS Biological Opinion for the Fort Baker Plan/EIS, September 29, 1999).

SS-27 The fire management officer will arrange for the removal of nonnative plants within and adjacent to mission blue butterfly habitat following fire management actions, including fire suppression.

San Bruno Elfin Butterfly

SS-28 No planned fire management actions will occur in San Bruno elfin butterfly habitat. Proposed project areas in San Mateo County will be assessed to determine the potential for occurrence of San Bruno elfin butterfly habitat.

SS-29 A 100-foot-wide buffer will be maintained between fire management activities and potential San Bruno elfin butterfly habitat.

SS-30 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:

- Avoid staging fire suppression actions in or directly adjacent to San Bruno elfin butterfly habitat;
- Construct fire lines outside of San Bruno elfin butterfly habitat to the greatest extent possible;
- 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
- Avoid the use of saltwater or retardant drops on San Bruno elfin butterfly habitat.

SS-31 Conduct fire management activities in areas directly adjacent to San Bruno elfin butterfly habitat outside the flight period of the butterfly, which is from February 1 through May 15.

Tidewater Goby

See also Mitigation Measure SS-4 regarding scooping of Rodeo Lagoon water for use in suppression actions.

SS-32 During information meetings with local fire agencies (see Mitigation Measure NR-1), 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.

California Red-Legged Frog

See also Mitigation Measure SS-4 regarding use of freshwater ponds as a water source for suppression actions and areas of the park sensitive to the use of ocean and bay waters for suppression actions.

SS-33 All suitable habitat within areas proposed for fire management activities will be surveyed and flagged by a qualified biologist to determine whether the site supports suitable breeding or nonbreeding areas for the California red-legged frog.

SS-34 To prevent direct injury to California red-legged frogs, removal of vegetation within suitable frog habitat will be accomplished by a progressive cutting of vegetation from the overstory level to ground level to allow frogs to move out of the treatment area.

SS-35 If likely habitat is identified at the project site, a qualified and permitted biologist will follow accepted protocol and collect and relocate any individual red-legged frogs to nearby suitable habitat, in accordance with the biological opinion from the USFWS.

Western Snowy Plover

SS-35 Where fire management actions involve operation of vehicles or heavy equipment on the beach, the fire management officer or the resource advisor (in the case of a wildfire) will ensure that vehicles will be driven at slow speeds (15 miles per hour maximum) over the wet sand portion of the beach and that natural wave-cast debris will be left on the beach to provide foraging habitat for the western snowy plover.

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.

California Brown Pelican

SS-38 To avoid disturbance to the California brown pelican from late spring to early winter:

- Avoid operating aircraft below and within 500 feet of Rodeo Lagoon, Bird Island, and Bolinas Lagoon to the greatest extent possible.
- Avoid drafting water from Rodeo Lagoon, the ocean near Bird Island, or Bolinas Lagoon.

Monarch Butterfly

SS-39 All known clustering sites of monarch butterflies will be considered for protection from fire management actions.

Wildlife and Important Habitat Mitigation Measures

WIL-1 Prescribed burns, mechanical treatments, and mowing of shrubs and grasses taller than 8 inches will not be conducted during the bird-nesting season, from March 1 through July 31, unless a qualified biologist conducts a pre-project survey for nesting birds and determines that birds are not nesting within the project area. To the greatest extent possible, these activities will be planned and conducted outside bird-nesting season. In intensively managed landscapes where mowing is justified for fuel reduction, vegetation will be maintained at a

height of less than 8 inches throughout the nesting season (March 1 through July 31) to discourage the nesting of ground-dwelling bird species.

WIL-2 In addition to WIL-1, in order to protect nesting raptors, trees shall not be removed between January 1 and March 1 unless qualified personnel conduct a pre-project survey for nesting birds and determine that birds are not nesting within the project area. If nesting raptors are detected, a qualified biologist will delineate a suitable buffer.

WIL-3 Subject to project review conditions, fire management actions proposed for areas of the park that provide only limited habitat (such as areas dominated by broom or ivy species) may be conducted at any time

WIL-4 Since older burn piles could provide wildlife habitat, the piles will be spread out (to move out animals) as much as possible before burning. If moving the piles is not feasible, the fire management project manager will ensure that piles are lit from one side only (with firefighters on the ignition side), so that any wildlife in the pile can run out.

WIL-5 For prescribed fire projects proposed in the Muir Woods FMU, the fire management officer will arrange for a qualified biologist to conduct bat surveys of the tree hollows within the burn unit to identify potential maternity colonies. Measures will be implemented to protect active maternity roosts.

Cultural Resources Mitigation Measures

CUL-1 ***Project Preparation Phase.*** To assure that cultural resources are considered early in the fire management planning process and afforded the utmost protection, the following preparatory actions will be undertaken:

- Computer and other databases containing cultural resources data will be maintained by cultural resource staff in coordination with the needs of fire management activities.
- Appropriate cultural resources monitoring protocols will be established by cultural resources staff and applied to fire management practices as warranted.
- Potential research opportunities to study the effects of fire management actions on cultural resources will be identified by cultural resources staff.
- Cultural resources specialists from adjacent land management agencies will be consulted by NPS staff, as appropriate, in order to coordinate mitigation efforts prior to fire management actions.
- Indigenous archeological sites, spiritual sites, and important plant communities will be identified and appropriately managed for preservation, maintenance, and/or enhancement by park cultural resources staff. Consultation with local Native American communities will, where pertinent, continue to occur in the context of fire management actions.

- Fire management personnel and other staff will receive annual training in cultural resources in relation to fire management activities.

CUL-2 ***Project Planning Phase.*** All areas slated for fire management activities will be considered for pre-action field surveys, based on the recommendations of cultural resource specialists and the need to identify cultural resources in proposed project areas. This includes areas likely to be disturbed during future wildfire suppression activity, such as helispots, staging areas, and spike camps. Site-specific information gathering may include the following:

1. In cultural landscape areas, parameters for identifying vegetation for removal or retention will be incorporated into project planning.

2. Evaluation of the relative hazards of fuel loads in proposed project areas will address the protection of cultural resource values, including:

   2(a) Maintenance of light fuel loads on and in close proximity to cultural resources;

   2(b) Benefits gained from reduced fuel loads in relation to the need to avoid or minimize adverse effects on cultural resources;

   2(c) Opportunities to restore or enhance the historic character of cultural landscapes;

   2(d) In developing burn plans, assessment of the potential effects of heat intensity and duration above, at, and below the surface in relation to cultural resources; and

   2(e) For projects with the potential for accelerating the rates of erosion, potential effects of erosion on cultural resources.

CUL-3 ***Project Implementation***. Adverse effects on known and unknown cultural resources will be avoided or minimized during the implementation of fire management projects. A variety of treatments and techniques, as detailed in the project planning and preparation phase for individual projects, will be used for the protection of cultural landscape features during implementation of both prescribed fire and mechanical treatment activities, as follows:

1. A cultural resource specialist or resource advisor will:

   1(a) Be present during fire management actions, as stipulated, where recorded and suspected but not-yet-recorded historic or prehistoric resources are considered at risk;

   1(b) Deliver a pre-project briefing to fire management staff as necessary; and

   1(c) Share data with fire management personnel as needed to avoid or minimize adverse effects.

2. Vegetation will be flagged, or otherwise identified, in order to properly carry out project planning stipulations for:

   2(a) Retention, based upon age determination or diameter thresholds as previously agreed upon;

   2(b) Raising the skirts on landmark trees and other tree pruning;

   2(c) Flush-cutting trees removed from cultural resource areas unless otherwise stipulated; and

   2(d) Brush removal within agreed-upon boundaries.

3. Fences may be a character-defining feature of historic properties. In such cases:

   3(a) Avoid fences with heavy equipment;

   3(b) Remove brush and scrub only by hand or with hand-tools in a 10-foot-wide buffer zone along fence lines;

   3(c) Provide vehicle access at gates where necessary; and

   3(d) Cut other openings, if necessary, between fence posts.

4. Field patterns may be a character-defining feature of historic properties. In such cases:

   4(a) Use prescribed burn to restore field patterns;

   4(b) Protect fences by not using heavy equipment within a 10-foot-wide buffer zone, and instead using less damaging methods to lessen fire danger, such as watering, hand removal, and hand tools; and

   4(c) Use hand removal of noncontributing vegetation near or in historic vegetation.

5. Structures and small-scale features may contribute, or be themselves, historic properties. In such cases:

   5(a) Remove brush approximately 30 feet from burnable structures, depending on slope, with hand tools being the default method; and

   5(b) If there are foundation plantings, create defensible space outside ornamental edge plantings wherever possible.

6. Some areas may be sensitive for archeological resources on or near the surface. In such cases:

   6(a) Do not drag cut vegetation;

   6(b) Do not use rakes;

6(c) Use no burning when surface or subsurface resources are sensitive to heat; and

6(d) Avoid using surface scarification to retard runoff in archeological sites.

7. Erosion will be minimized to the extent possible, by methods such as:

7(a) Constructing control lines perpendicular to the slope;

7(b) Using the existing road network;

7(c) Keeping heavy equipment off paths and trails;

7(d) Keeping heavy equipment away from areas adjacent to ponds and riparian corridors; and

7(e) Avoiding these and other areas marked by flagging.

CUL-4 ***Post-Project Phase***. Adverse effects on known and suspected cultural resources will continue to be avoided or minimized through careful consideration of actions during the post-action phase of mechanical treatment, prescribed fire, and fire suppression activities.

1. The post-action condition of all recorded cultural resources will be assessed, as necessary.

1(a) Post-action surveys may be conducted both in previously surveyed areas and in unsurveyed areas.

1(b) Previously unrecorded cultural resources will be assessed for condition, and stabilization and other protection needs.

2. Stabilization and other treatment needs of cultural resources will be addressed in the development and implementation of Emergency Stabilization Plans and Burned Area Restoration Plans, and in the development of funding requests for these and other post-fire programs as needed.

3. Monitoring and research data will be compiled, evaluated, and used to help refine cultural resource compliance for future fire management actions and objectives.

Visitor Use and Visitor Experience Mitigation Measures

VUE-1 Project work hours will normally be limited to normal work hours (8 A.M. to 5 P.M.) to minimize potential noise impacts on nearby residents and park visitors. Exceptions may occur outside of normal work hours where warranted, for example to take advantage of windows of favorable weather or to allow for project completion before wildlife breeding period restrictions begin.

VUE-2 Where noise levels from project operations could be intrusive to adjacent residents or park trail users, all efforts will be made during project planning to site project staging areas in order to optimize the noise level reduction gained from natural barriers and screening

vegetation. Staging areas will be sited to minimize noise levels for sensitive receptors to the extent feasible without causing adverse environmental effects on park resources, values, or public access.

VUE-3 Park fire staff will avoid temporary closures of areas of the park during fuel reduction projects if spotters can be available to escort the public safely through the work area.

VUE-4 To the extent feasible while protecting public health and safety, fire management officer will instruct contractors or NPS crews to secure work sites at the end of the work day so that closures around a project site can be lifted prior to and after working hours during weekdays and all day on weekends.

VUE-5 The fire management office will develop and implement an education and communication plan for all site-specific fire management implementation projects. For large scale fuel reduction projects (more than 1 acre) that could affect mid- to close-range viewsheds for residents on the park boundary, park staff will arrange a meeting with the community to present the scope of work and provide an opportunity for public comment. Communication plans for projects may include information such as the project scope, schedule, and alternative trail routes, where needed, to be posted in the project vicinity.

Public Health and Safety Mitigation Measures

PHS-1 Site plans for tree removal projects will be reviewed by the project review committee for potential safety hazards from windthrow and wind pattern change as a result of implementation.

APPENDIX E
SUPPLEMENTAL INFORMATION

APPENDIX E, PART 1, GGNRA RUN CARD

GGNRA – MT. TAM AREA RUN CARD				
DAILY FIRE DANGER	**MARIN COUNTY RESPONSE ZONES**			
	2A	**2B**	**2D**	**3C**
LOW	BC	BC	BC	BC
	PREV	PREV	PREV	PREV
	E1565	E1565	E1565	E1563
	E1585	Hand crew	E1585	Hand crew
	Hand crew	--	MUI E761/762	PSF BC
	--	--	Hand crew	--
MEDIUM	E1563	E1564	E1563	E1565
	E1566	E1563	E1566	E1566
	E1568	E1566	E1568	E1568
	E1564	D21540	D21540	WT1596
	D21540	--	WT1596	Local Gov't T3(2)
	WT1596	WT1592	SNB E861	
	Local Gov't T3(2)	BOL E265	SNB WT890	--
HI	E1562	E1568	E1564	E1562
	--	E1562	E1562	E1564

AIRCRAFT AND HANDCREW DISPATCH LOCATIONS (Medium & High Dispatch)	
Air Attack Supervisor -- OV-10	AA140 -- Sonoma
Air Tanker Type 2 – S-2T	AT85 AT95 -- Sonoma
Copter Type 2 -- Super 204	H104 -- Boggs Mtn
Hand crew -- Type 1 (Inmate)	Delta Conservation Camp
Hand crew -- Type 1 (Paid County)	Hamilton Field

Key to Abbreviations:
BC – Battalion Chief
BOL – Bolinas
DZ – Dozer
E – Engine
MUI – Muir Beach
PSF – Presidio Fire Dept
PREV – Prevention Officer
SNB – Stinson Beach
T3 – Type 3 Engine
WT – Water Tender

APPENDIX E, PART 2, DAILY RESOURCE AVAILABILITY

BAY AREA NATIONAL PARKS
GOLDEN GATE NRA-POINT REYES NS
DAILY RESOURCE AVAILBILITY

Date:_____

Fire Management Office ……..415-464-5233
Point Reyes Law Enforcement-Public Safety Dispatch……...415-464-5170

Duty Officer (Call in order listed): [personally identifiable information removed]

Roger Wong	**(w)** 415-464-5232	**(c)** xxx-xxx-xxxx	**(h)** xxx-xxx-xxxx
Jordan Reeser	**(w)** 415-464-5235	**(c)** xxx-xxx-xxxx	**(h)**xxx-xxx-xxxx
Jon Haag	**(w)** 415-464-5236	**(c)**xxx-xxx-xxxx	**(h)**xxx-xxx-xxxx
Greg Jones	**(w)** 415-331-6374	**(c)**xxx-xxx-xxxx	**(h)** xxx-xxx-xxxx

Agency Administrator/Chief Park Ranger:

Colin Smith	**(w)** 415-464-5175	**(c)** xxx-xxx-xxxx	**(h)**xxx-xxx-xxxx
Yvette Ruan	**(w)** 415-464-5175	**(c)** xxx-xxx-xxxx	**(h)** xxx-xxx-xxxx

TODAY'S PREDICTED FIRE DANGER (circle):

LOW MODERATE HIGH VERY HIGH EXTREME

TODAY'S AVAILABLE RESOURCES (circle):

ENGINES

Patrol 6-2	Type 6	Available	staffing	_____
Engine 1176	Type 6	Available	staffing	_____
Engine 3-1	Type 3	Available	staffing	_____

HAZARDOUS FUELS REMOVAL MODULE

Crew #9	Type 2-IA	Available	staffing	_____

SINGLE RESOURCES: Contact Duty Officer to confirm availability of positions and personnel listed in /ROSS.

COMMITTED RESOURCES: **ACTIVE FIRES:**

APPENDIX E, PART 3

WEATHER INFORMATION MANAGEMENT SYSTEM WALK-THROUGH (WIMS)

Go to [not public information]

Click on WIMS

User Name: [not public information]

Password: [not public information]

Go to “fast path”, type in “didx” and hit “go”

Click on Station ID, enter date (@1730 today’s date, 0800 yesterday’s date), enter

xxxxx = **Barnabe** or enter PORE in SIG to get all the data

xxxxx = Big Rock

xxxxx = Sky Oaks

As stated in the Step-Up plan, xxxxx **is the first choice**. If it is not available, collect information from either of the others listed (xxxxx, xxxxx)

Scroll over to the BI column to retrieve fire danger information.

forecasted BI (OT column will be F, O = observed)

fuel model MSGC7A2A2 (***NOT*** MSGC7B2A2)

Step-Up Plan

Low	Mod	High	Very High	Extreme
0-18	19-27	28-33	34-37	38+

Fax information to GGNRA Dispatch before 1300 hours daily.

APPENDIX E, PART 4

DISPATCH PROTOCOL FOR FIRES 2008

The Dispatch Protocol is a procedure to be used by the Golden Gate National Recreation Area's Communications Center (CommSec) and responding units, outlining the initial actions to be taken and necessary notifications to be made in the event of a wildland fire within or threatening the Park's boundaries.

The Dispatch Protocol contains time-sensitive information such as names and phone numbers and, thus, should be reviewed and updated annually.

PROCEDURE

1. CommSec gathers the following information about the fire:

   - Location,
   - Type (Structure, Wildland, Vehicle),
   - Color of smoke,
   - Approximate size and character of fire,
   - Any threatened structures/people in the area (which will determine the type of resources dispatched (structural fire, medical, LE for traffic control, etc.),
   - Name, location, and phone number of reporting party.

2. CommSec notifies the following dispatch centers:

   - For Marin County: Marin County Woodacre Dispatch: 415-499-6717

     This dispatch center will become the primary point of contact for ordering resources for both initial attack and extended attack fires in Marin County.
   - For San Francisco County: San Francisco Fire Dept.: 415-558-3268.
   - For San Mateo County: CAL FIRE Felton Dispatch: 831-335-5355 and North County Fire Authority: 650-991-8138.

     San Mateo County Public Safety Communications: 650-363-4342 (Back-up contact).

3. CommSec will notify Wildland Fire Management, Presidio Fire Department, and, per request of responding Fire units, Law Enforcement personnel as necessary to provide additional support to the incident. The notification process is::

- A long tone followed by "[*Vegetation/Structural/Vehicle Fire*] reported in the vicinity of [*reported street/trail/beach, etc.*]". Dispatcher will provide additional information. "The following units to respond [*based on the nature of the call*]:
    - Presidio Fire Units,
    - Fire Management Engine(s) 1166/1176
  - Presidio Fire will be paged out per normal procedure.
  - Responding units will provide enroute and on scene times for documentation by CommSec.

4. CommSec contacts the following individuals:

- Fire Duty Officer (Identified on Daily Resource Availability List),
- Network Fire Management Officer – Roger Wong: 415-464-5232 (work) or xxx-xxx-xxxx (cell),
- Chief Ranger – Yvette Ruan: 415-561-4745 (work) or xxx-xxx-xxxx (cell),
- Public Affairs officer on duty.

5. CommSec and/or Woodacre Dispatch gathers the following fire size-up information from **Qualified** fire personnel upon arrival (first unit on-scene, Initial Attack Incident Commander). **Prompt the I.C. for this information if not relayed**:

- Specific fire location,
- Fire size,
- Fuel type,
- Fire behavior (smoldering, creeping, running, torching, crowning),
- Direction of fire spread and wind speed,
- Values at risk (structures, etc.),
- Best **safe** access,
- Request for resources (type and quantity)
- Special hazards (e.g. downed power lines, aerial hazards, hazmat, etc.).

Note: By this time, a **Qualified I.C.** should have arrived on-scene at the incident, assumed command, and identified himself/herself to CommSec and/or Woodacre Dispatch. In turn, the appropriate dispatch center will alert all incoming and on-scene personnel that an I.C. has been established. Additionally, the dispatch center(s) will broadcast similar updates of any changes in command. All incident tactical radio traffic should be relayed to the I.C. The I.C. will identify himself/herself on the radio by using the fire name, followed by "I.C." **It is the**

understanding that, by agreement, MCFD in Marin County, CAL FIRE and/or NCFA in San Mateo County, and PFD and/or SFFD in San Francisco County, will handle some fire incidents alone. CommSec will, nonetheless, request a copy of the appropriate incident dispatch log for Park records. Once obtained, CommSec will send a copy of the incident dispatch log to the Fire Management Office.

Definition of terms:

Fire Duty Officer (FDO): A designated daily fire supervisor in charge of coordinating wildland fire activities. The Fire Duty Officer is responsible for knowing fire resource availability and, if necessary, responding to wildland fires within or threatening the Park's boundaries.

Network Fire Management Officer (FMO): Currently, the Division Chief for Fire Management at Point Reyes National Seashore (PRNS), Roger Wong, is serving as the FMO for the Bay Area Network Parks (GGNRA, PRNS, Pinnacles National Monument, Eugene O'Neill National Historic Site and John Muir National Historic Site). The FMO will designate an acting FMO when he is unavailable.

APPENDIX E, PART 5

GGNRA

NFDRS INDICES AND PARK VISITOR FIRE RESTRICTIONS

Fire Danger – How Will It Affect You?

If the FIRE DANGER RATING is….	Is this type of use allowed??			
	Self-contained gas stoves (in designated picnic areas and campgrounds)	**Park provided grills (in designated picnic areas and campgrounds)**	**Self-contained charcoal barbecue grills (in designated picnic areas and campgrounds)**	**Beach open pit fires***
LOW	YES	YES	YES	YES
MODERATE	YES	YES	YES	YES
HIGH	YES	YES	YES	NO
VERY HIGH	YES	NO	NO	NO
EXTREME or RED FLAG WARNING	YES	NO	NO	NO

* In conformance with GGNRA revised Ocean Beach Fire Policy.

- Fires shall at all times be maintained in a safe condition that does not threaten any person, natural or structural feature.
- Firewood gathering is prohibited.
- The possession or discharge of fireworks is prohibited.
- Never leave a fire unattended.
- Report all wildfires immediately.
- Extinguish all fires prior to departure.
- Ground fires are not permitted.
- Ask a park ranger for further information.

APPENDIX E, PART 7

GOLDEN GATE NATIONAL RECREATION AREA

FIRE MANAGEMENT STEP- UP PLAN (SOP 37)

ACTION CLASS	FIRE DANGER (NFDRS RATING)	BURNING INDEX	ACTIONS
I	**LOW**	**0-18**	➢ Optimal Staffing: Minimum of two (2) firefighters on duty (one FF must be at least ENOP qualified). ➢ Fire personnel conduct preparedness operations during regular tour of duty hours. ➢ Conduct daily fire weather and safety briefings. ➢ Maintain engines in fire-ready condition. ➢ Perform apparatus inspections and report inoperative units to FMO by 1000 hours. ➢ Deliver daily staffing report and fire danger rating to FMO, GGNRA Dispatch, Marin County Fire, and Mendocino N.F. dispatch by 1000 hours. ➢ Ensure PPE and IA gear are immediately available.
II	**MODERATE**	**19-27**	➢ Includes all actions for Action Class I. ➢ Optimal Staffing: Minimum of three (3) firefighters on duty (staffing must include at least one ENOP and one, separate, ICT5).

ACTION CLASS	FIRE DANGER (NFDRS RATING)	BURNING INDEX	ACTIONS
III	**HIGH**	**28-33**	➢ Includes all actions for Action Class II. ➢ Optimal Staffing: Minimum of four (4) firefighters on duty (staffing must include one ENGB and one ICT4). ➢ Engine captain places firefighters on two-hour, after-hour call-back. ➢ GGNRA Dispatch will broadcast the "High" Fire Danger Broadcast at 1000 hours.***** ➢ All open fires prohibited except for portable gas stoves and charcoal grills. ➢ Issued open fire permits are voided. ➢ "High Fire Danger" signs posted at pre-designated locations by fire personnel and ranger staff. ➢ "No Fires" signs posted at pre-designated locations.

ACTION CLASS	FIRE DANGER (NFDRS RATING)	BURNING INDEX	ACTIONS
IV	**VERY HIGH**	**34-37**	➢➢ Includes all actions for Action Class III. ➢➢ Optimal Staffing: Minimum of five (5) firefighters on duty. (staffing must include one ENGB, one ENOP, and one ICT4) ➢ Coordinate with PORE Fire Mgmt. Office on the distribution of BAN suppression resources. ➢➢ Chief Ranger briefed on situation and staffing. ➢➢ Fire personnel may be called to work extended hours and/or weekends at FMO's discretion. ➢ FMO may request additional staffing by red-carded personnel from other park divisions. ➢ Establish funding for extended and/or additional staffing though appropriate emergency account. ➢ Engine crew will patrol for smokes at least once in the afternoon hours. ➢ Engine crew stays within a five minute hike from vehicles after 1000 hours. ➢ Projects may be postponed if they pose an unacceptable fire risk. ➢➢ Firefighters placed on one-hour after-hours call-back. ➢➢ Park Dispatch will broadcast the " Very High" Fire Danger Broadcast at 1000 hours.** ➢ All open fires prohibited except for portable gas stoves.

ACTION CLASS	FIRE DANGER (NFDRS RATING)	BURNING INDEX	ACTIONS
V	**EXTREME**	**38+**	➢ Includes all actions for Action Class IV. ➢ All firefighters will wear full PPE. ➢ Optimal Staffing: Minimum of six (6) firefighters on duty (staffing must include one ICT4, one ENGB, one ENOP, and one FFT1). ➢ Physical fitness training cancelled. ➢ Park Dispatch will broadcast the " Extreme" Fire Danger Broadcast at 1000 hours.******* ➢ FMO recommends road, campground, and/or picnic area closures to the Chief Ranger. ➢ Post "Extreme Fire Danger" signs at pre-designated locations. ➢ Prohibit the use of any equipment that could provide a potential source of ignition. ➢ Prohibit all outdoor "Hot Work" permits.

***** High Fire Danger Rating Broadcast: "Standby for today's fire danger information. Today's fire danger rating is **HIGH**. Action class is 3. All open fires are prohibited today except for charcoal grills and self-contained, portable gas stoves, which are allowed only in designated campground and picnic areas. The Fire Management Office has Engine 1166/1176 staffed today with "X" firefighters. This concludes today's fire danger broadcast."

** Very High Fire Danger Rating Broadcast: "Standby for today's fire danger information. Today's fire danger rating is **Very High**. Action class is 4. All fire personnel and red-carded law enforcement personnel are required to have their wildland fire gear immediately available. All fires, including cooking fires and charcoal grills, are prohibited today except for self-contained, portable gas stoves, which are allowed only in designated campground and picnic areas. The Fire Management Office has Engine 1166/1176 staffed today with "X" firefighters. This concludes today's fire danger broadcast."

*** Extreme Fire Danger Rating Broadcast: "Standby for today's fire danger information. Today's fire danger rating is **Extreme**. (If appropriate) The National Weather Service has issued a Red Flag Warning. Action class is 5. All fire personnel and red-carded law enforcement personnel are required to have their wildland fire gear immediately available. All fires, including cooking fires and

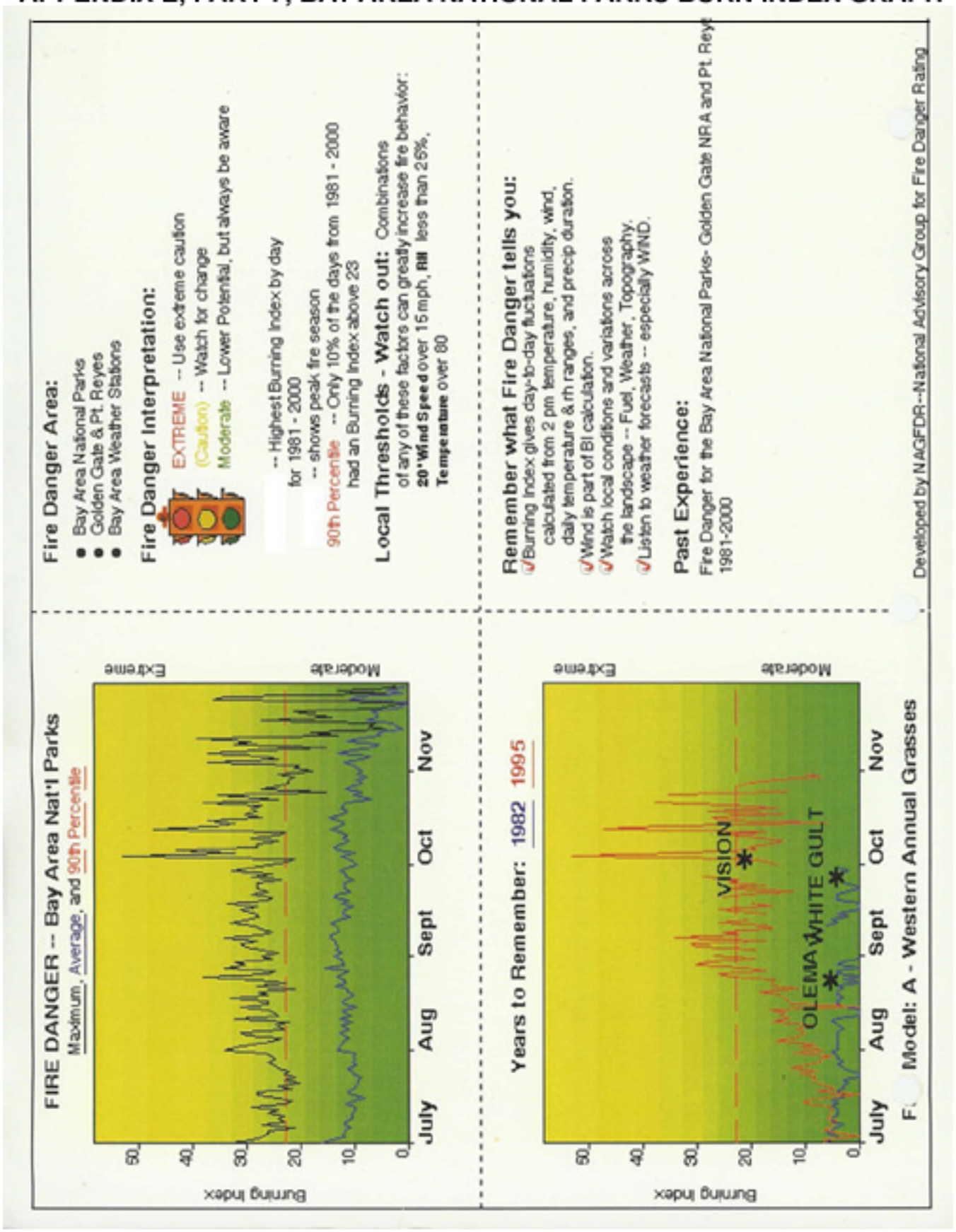
charcoal grills, are prohibited today except for self-contained, portable gas stoves, which are allowed only in designated campground and picnic areas. Smoking on trails is prohibited. The Fire Management Office has Engine 1166/1176 staffed today with "X" firefighters. All fire management personnel are to remain on duty until further notification. This concludes today's fire weather broadcast".

NOTE: Certain factors can potentially contribute to increased fire activity. At the discretion of the Fire Management Officer or, alternatively, the pre-designated Fire Duty Officer, the following conditions may increase the Action Class to level IV (Very High) or Action Class V (Extreme) (per RM-18):

- Extreme wind conditions (e.g. sustained 20-foot wind speed in excess of 20 mph)
- Red Flag Warnings issued by the National Weather Service
- Weather conditions which approximate local thresholds documented on Bay Area National Parks Fire Danger Pocket Cards (i.e. a combination of any two or more of the following factors: 20-foot winds speeds of 15+ mph, relative humidity (of less than 25%, and temperature in excess of 80 degrees Fahrenheit.
- Predicted or observed lightning activity level (LAL) of 4, 5, or 6
- Predicted burn index in exceedance of the 90th percentile (B.I.=24+)
- Periods of unusually high park visitation (e.g. National holidays and special events)

Golden Gate National Recreation Area fire management personnel base management responses to observed and predicted fire danger, including preparedness (pre-suppression) activities and minimum staffing levels, on the Step-up Plan (SOP 37). The Step-up Plan is a policy-compliant plan which provides a documented procedure designed to direct incremental preparedness actions in response to increasing fire danger. The Step-up Plan's five Action Classes are based upon a range of burning indices (BI) predicted daily, using the National Fire Danger Rating System (NFDRS). As the burning index increases with escalating fire danger, preparedness activities and staffing levels subsequently increase. NFDRS outputs can be obtained from the Weather Information Management System (WIMS). Additionally, the Fire Management Officer, or alternatively, the pre-designated Fire Duty Officer, may elect to move the Action Class to a higher level. The criteria for doing so are defined in the Step-up Plan. The Step-up Plan will be in operation from approximately June 1 through November 15 each year.

APPENDIX E, PART 7, BAY AREA NATIONAL PARKS BURN INDEX GRAPH



APPENDIX E, PART 8, DELEGATION FROM SUPERINTENDENT TO FMO

United States Department of the Interior

NATIONAL PARK SERVICE
Golden Gate National Recreation Area
Fort Mason, Building 201
San Francisco, California 94123

DELEGATION FOR PARK FIRE MANAGEMENT OFFICER FROM GENERAL SUPERINTENDENT, GOLDEN GATE NATIONAL RECREATION AREA

THE FIRE MANAGEMENT OFFICER FOR POINT REYES NATIONAL SEASHORE IS DELEGATED AUTHORITY TO ACT ON MY BEHALF FOR THE FOLLOWING DUTIES AND ACTIONS:

- PROVIDE DIRECTION, SUPERVISION AND LEADERSHIP TO THE PARK FIRE PREPAREDNESS-OPERATIONS STAFF OUTLINED IN THE ATTACHED ORGANIZATION CHART.

- COORDINATE WITH AND PROVIDE TIMELY AND ACCURATE REPORTS TO CHIEF RANGER ON ALL ACTIVITIES OF FIRE PREPAREDNESS OPERATIONS PERSONNEL.

- COORDINATE HAZARDOUS FUELS BUDGET EXPENDITURES WITH GOGA BUDGET ANALYST TO ASSURE FISCAL GUIDELINE ACCOUNTABILITY PER REGIONAL AND PARK FUNDING CRITERIA.

- ASSURE PERSONNEL PARTICIPATING IN PRESCRIBED FIRE AND WILDFIRE OPERATIONS ARE FULLY QUALIFIED.

- RESPOND TO PREPAREDNESS, SEVERITY AND HAZARDOUS FUELS FUNDING REQUESTS FOR FY08 PARK WILDLAND FIRE OPERATIONS.

- ENSURE ALL PARK FIRE INCIDENTS ARE MANAGED IN A SAFE AND COST-EFFECTIVE MANNER.

- RESPONSIBLE FOR REPRESENTING GOLDEN GATE NATIONAL RECREATION AREA IN ALL MATTERS RELATED TO WILDLAND AND PRESCRIBED FIRE MANAGEMENT WITH LOCAL COOPERATORS AND THE NORTHERN CALIIFORNIA GEOGRAPHICAL AREA.

- COORDINATE PARK FIRE PREVENTION ACTIVITIES WITH THE CHIEF RANGER AND FIRE CHIEF - PRESIDIO FIRE DEPARTMENT AND ASSIST WITH APPROPRIATE PROGRAM DIRECTION AND GUIDANCE.

- COORDINATE, PREPOSITION, SEND AND ORDER FIRE AND AVIATION RESOURCES IN RESPONSE TO CURRENT AND ANTICIPATED PARK, REGIONAL AND NATIONAL FIRE CONDITIONS.

- RESPONSIBLE FOR REPRESENTING GOLDEN GATE NATIONAL RECREATION AREA ON ALL PACIFIC WEST REGION MATTERS RELATED TO THE WILDLAND FIRE MANAGEMENT PROGRAM.

- MANAGE INCIDENT QUALIFICATIONS CERTIFICATION SYSTEM AND CERTIFY INCIDENT QUALIFICATION CARDS EXCLUSIVELY FOR GOLDEN GATE NATIONAL RECREATION WILDLAND FIRE STAFF (EXCLUDES PRESIDIO FIRE DEPARTMENT AND COLLATERAL FIRE DUTY PERSONNEL).

- CREATE AWARENESS THAT PUBLIC AND FIREFIGHTER SAFETY IS THE FIRST PRIORITY IN ANY FIRE ACTIVITY.

- RESPONSIBLE FOR DETERMINING IF SAFETY ISSUES RELATED TO WILDLAND FIRE REQUIRE SITUATIONAL “STAND DOWNS” AND/OR SUSPENSION OF WILDLAND FIRE ACTIVITIES IF SAFETY CONCERNS DICTATE.

THIS DELEGATION AND AUTHORIZATION WILL EXPIRE ON OCTOBER 1, 2007. AFTER THAT DATE GOLDEN GATE NATIONAL RECREATION AREA WILL ASSUME ALL FIRE MANAGEMENT RESPONSIBILTIES UNLESS A NEW DELGATION OF AUTHORITY IS SIGNED.

_____

BRIAN O’NEILL
GENERAL SUPERINTENDENT, GOLDEN GATE NATIONAL RECREATION AREA

MERA FIRE TALKGROUP TEMPLATE - 3/30/07

Z \ M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A EMS	**FD DSP** Fire Dispatch	**EMS** EMS Dispatch	**HOSP** All Hospital	**MGH 1** Marin Consult	**MGH 2** Marin Report	**KSR 1** Kaiser Consult	**KSR 2** Kaiser Report	**NCH 1** Novato Consult	**NCH 2** Novato Report	**EMS 10** EMS Tactical	**LG CLL** Local Gov. Call	**LG TLK** Local Gov. Talk	**PD CLL** Law Call	**PD TLK** Law Talk	**911** Emerg	**FD EMR** Fire Emerg
B DPW	**FD DSP** Fire Dispatch	**FD CLL** Fire Call	**FD TLK** Fire Talk	**CPW** County Pub Wks	**NPW** Novato Pub Wks	**SRPW1** San Rafael Pub Wks	**CMPW** Corte Mad Pw	**LPW** Larkspur Pub Wks	**RPW** Ross Pub Wks	**SAPW** San Ans Pub Wks	**FPW** Fairfax Pub Wks	**SPW** Sausalito Pub Wks	**MVPW** Mill Vly Pub Wks	**TPW** Tiburon Pub Wks	**BPW** Belvedere Pub Wks	**FD EMR** Fire Emerg
C ICS	**FD DSP** Fire Dispatch	**IC CLL** ICS Call	**ICS 3** ICS 3	**ICS 4** ICS 4	**ICS 5** ICS 5	**ICS 6** ICS 6	**ICS 7** ICS 7	**ICS 8** ICS 8	**ICS 9** ICS 9	**ICS 10** ICS 10	**ICS 11** ICS 11	**ICS 12** ICS 12	**ICS 13** ICS 13	**ICS 14** ICS 14	**ICS 15** ICS 15	**FD EMR** Fire Emerg
D Novato	**FD DSP** Fire Dispatch.	**CTL D2** Novato Control	**CTL D3** Novato Control	**TAC D4** Fire Tactical	**CMD D5** Fire Command	**TAC D6** Fire Tactical	**NV CMD** Novato Command	**TAC D8** Fire Tactical	**TAC D9** Fire Tactical	**NP** Novato PD Dispatch	**NP 2** Novato PD Dispatch	**PD MAC** PD Mut Aid	**CNV 13** Fire Car To Car	**CNV 14** Fire Car To Car	**NF AD** Novato Admin	**FD EMR** Fire Emerg
E San Rafael	**FD DSP** Fire Dispatch	**CTL E2** San Rafael Control	**CTL E3** San Rafael Control	**TAC E4** Fire Tactical	**CMD E5** Fire Command	**TAC E6** Fire Tactical	**SR CMD** San Rafael Command	**TAC E8** Fire Tactical	**TAC E9** Fire Tactical	**SRP** SRPD Dispatch	**JL CLL** Jail Call	**COURT** Marin Fire Disp	**CNV 13** Fire Car To Car	**CNV 14** Fire Car To Car	**SRF AD** San Rafael Admin	**FD EMR** Fire Emerg
F Central	**FD DSP** Fire Dispatch	**CTL F2** Central Control	**CTL F3** Central Control	**TAC F4** Fire Tactical	**CMD F5** Fire Command	**TAC F6** Fire Tactical	**CA CMD** Central Command	**TAC F8** Fire Tactical	**TAC F9** Fire Tactical	**TCP** TCPD Dispatch	**SAP** SAPD Dispatch	**FP** Frfx PD Dispatch	**CNV 13** Fire Car To Car	**CNV 14** Fire Car To Car	**CAF AD** Central Admin	**FD EMR** Fire Emerg
G Southern	**FD DSP** Fire Dispatch	**CTL G2** Southern Control	**CTL G3** Southern Control	**TAC G4** Fire Tactical	**CMD G5** Fire Command	**TAC G6** Fire Tactical	**SA CMD** Southern Command	**TAC G8** Fire Tactical	**TAC G9** Fire Tactical	**SMP** SMPD Dispatch	**GGNRA** GoldenGate Nat Rec	**CHP** CHP Dispatch	**CNV 13** Fire Car To Car	**CNV 14** Fire Car To Car	**SAF AD** Southern Admin	**FD EMR** Fire Emerg
H Marin County	**FD DSP** Fire Dispatch	**CTL H2** Woodacre Control	**CTL H3** Woodacre Control	**TAC H4** Fire Tactical	**CMD H5** Fire Command	**TAC H6** Fire Tactical	**WS CMD** Western Command	**TAC H8** Fire Tactical	**TAC H9** Fire Tactical	**SO** Marin SO Disatch	**MMWD** Marin Water Dist	**FD INF** Fire Weather	**CNV 13** Fire Car To Car	**CNV 14** Fire Car To Car	**WSF AD** West Fire Admin	**FD EMR** Fire Emerg
I Event	**FD DSP** Fire Dispatch	**EVNT 2** Special Events	**EVNT 3** Special Events	**EVNT 4** Special Events	**EVNT 5** Special Events	**EVNT 6** Special Events	**EVNT 7** Special Events	**EVNT 8** Special Events	**EVNT 9** Special Events	**EVNT10** Special Events	**EOC** Emrg Ops Center	**OES** County of Marin OES	**CPR RG** Cnty Park Ranger	**OSD** Open Space	**KNOX** Knox Boxes	**FD EMR** Fire Emerg
M USAR	**FD DSP** Fire Dispatch	**USAR 2** USAR Tactical	**USAR 3** USAR Tactical	**USAR 4** USAR Tactical	**USAR 5** USAR Tactical	**ICS 6** ICS 6	**ICS 7** ICS 7	**ICS 8** ICS 8	**ICS 9** ICS 9	**ICS 10** ICS 10	**SAR 1** Search & Rescue	**SAR 2** Search & Rescue	**SAR 3** Search & Rescue	**CWMA R** Mutual Aid Repeater	**CWMA D** Mutual Aid Direct	**FD EMR** Fire Emerg

Scan 1 Conventional Scan

Scan 2 Radio-Wide Trunked Scan

Scan 3 Tac D4, CMD D5, Tac D6, FD EMR

Scan 4 NV CMD, Tac D8, Tac D9, FD EMR

Scan 5 Tac E4, CMD E5, Tac E6, FD EMR

Scan 6 SR CMD, Tac E8, Tac E9, FD EMR

Scan 7 Tac F4, CMD F5, Tac F6, FD EMR

Scan 8 CA CMD, Tac F8, Tac F9, FD EMR

Scan 9 Tac G4, CMD G5, Tac G6, FD EMR

Scan 10 SA CMD, Tac G8, Tac G9, FD EMR

Scan 11 Tac H4, CMD H5, Tac H6, FD EMR

Scan 12 WS CMD, Tac H8, Tac H9, FD EMR

Conventional Channels, Not on Trunked System

APPENDIX E, PART 10, MINIMUM IMPACT SUPPRESSION TACTICS

MINIMUM IMPACT SUPPRESSION TACTICS (MIST) GUIDELINES

TABLE OF CONTENTS

CONCEPT

The concept of Minimum Impact Suppression Tactics (MIST) is to use the minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of suppression tactics and their long-term effects when determining how to implement an appropriate suppression response. In some cases, MIST tactics may indicate that cold trailing or wet line would be a more appropriate approach than constructed hand line. In another example, the use of an excavator may be used rather than a dozer. Individual determinations will be dependent on the specific situation and circumstances of each fire.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set of how to suppress a wildfire while minimizing the long-term effects of the suppression action. When the term MIST is used in the GGNRA Operational FMP it reflects the above principle.

Suppression actions on all wildfires within GGNRA will be those having a minimum impact on the physical resources associated with each site. In so doing, the principle of fighting fire aggressively but providing for safety first will not be compromised.

The key challenge to the line officer, fire manager and firefighter is to be able to select the wildfire suppression tactics that are appropriate given the fire's probable or potential behavior. The guiding principle is always least cost plus loss while meeting land and resource management objectives. It is the second part of this statement which must be recognized more than it has been in the past. Appreciation of the resources, both tangible and intangible, and the elements of the visitor experience at GGNRA, may be sometimes difficult to articulate but, nevertheless, are an important component of wildland fire management. As this recognition grows, actions must be modified to accommodate a new awareness and appreciation of them.

These actions, or MIST, may result in an increase in the amount of time spent watching, rather than disturbing, a dying fire to insure it does not rise again. They may also involve additional rehabilitation measures on the site that may not have been previously employed.

When selecting an appropriate suppression response, firefighter and public safety remain the highest concern. Fire managers must also have confidence and assurance in the selected actions to be implemented – that the actions will be effective and will remain effective for the duration of the emergency situation.

GOAL

The goal of MIST is to halt or delay fire spread in order to maintain the fire within predetermined parameters while producing the least possible impact on the resource being protected. These parameters are represented by the initial attack

incident commander's size-up of the situation in the case of a new start or by the escaped fire situation analysis (EFSA) in case of an escaped fire.

It is important to consider probable rehabilitation need as a part of selecting the appropriate suppression response. Tactics that reduce the need for rehab are preferred whenever feasible.

SUPPRESSION RESPONSIBILITY

As stated previously, safety is the highest priority. All action will be anchored to the standard fire orders and watch out situations. Safety will remain the responsibility of each person involved with the incident.

Initial/Extended Attack

Incident Commander Responsibility – To understand and carry out an appropriate suppression response, which will best meet the land management objectives of the area at the least cost plus loss. Insure all forces used on the fire understand the plan for suppressing the fire in conjunction with MIST.

Keep in communication with responsible fire management or line officer to insure understanding and support of tactics being used on the fire. Evaluate and provide feedback as to the tactical effectiveness during and after fire incident.

Project Fire

Type 1/ Type 2 Incident Commander Responsibility – to carry out instructions given by the responsible line officer both verbally and through the WFSA. Establish and nurture a close dialogue with the resource advisors assigned to the fire team. Review actions on site and evaluate for compliance with land line officer direction and effectiveness at meeting fire management protection objectives.

Responsible Line Officer Responsibility – to transmit the land management objectives of the fire area to the fire team and to define specific fire management protection objectives. Periodically review the operation for compliance.

Resource Advisor Responsibility – to insure the interpretation and implementation of WFSA and other oral or written line officer direction is adequately carried out. Provide specific direction and guidelines as needed. Participate in fire team planning sessions, review incident action plans and attend daily briefings to emphasize resource concerns and management's expectations. Provide assistance in updating WFSA when necessary. Participate in incident management team debriefing and assist in evaluation of team performance related to MIST.

IMPLEMENTATION GUIDELINES

Following is a list of considerations for each fire situation. (Text in parenthesis refers to the specific FMP Mitigation Measure (MM) referenced).

Hot-Line/Ground Fuels

- Allow fire to burn to natural barriers.
- Allow fires to back into, around, or through wetlands and meadows to avoid suppression damage. (FMP MM WET-1)
- 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 a wetland. (FMP MM WET-1)
- Wetlands will be avoided to the greatest extent possible while constructing fire lines and breaks during wildfire suppression. (FMP MM WET-1)
- Resource advisors will work through the Agency Representative to inform the IC to construct fire lines outside of the habitat of the San Bruno elfin or mission blue butterflies to the greatest extent possible. If habitat areas must be used, wet lines should be used if water is available, and if not, narrow, hand-constructed lines should be considered (FMP MM SS-24 & SS30).
- Use cold-trail, wet line or combination when appropriate.
- If constructed fire line is necessary, use only width and depth to check fire spread.
- Burn out and use low impact tools like swatter or ‘gunny’ sack.
- Minimize bucking and cutting of trees to establish fire line; build line around logs when possible.
- Use alternative mechanized equipment such as excavators, rubber tired skidders, etc. rather than tracked vehicles. Use high pressure type sprayers to clean equipment prior to assigning equipment to the incident command in order to reduce the potential to spread noxious weeds.
- Constantly re-check cold trailed fire line.

B. Hot-Line/Aerial Fuels

- Limb vegetation adjacent to fire line only as needed to prevent additional fire spread.
- During fire line construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.

- Minimize felling of trees and snags unless they threaten the fire line or seriously endanger workers. In lieu of felling, identify hazard trees with a lookout or flagging.
- Scrape around tree bases near fire line if it is likely they will ignite.

Mop-up/Ground Fuels

- Do minimal spading; restrict spading to hot areas near fire line.
- Cold-trail charred logs near fire line; do minimal tool scarring.
- Minimize bucking of logs to extinguish fire or to check for hotspots; roll the logs instead if possible.
- Return logs to original position after checking and when ground is cool.
- Refrain from making bone yards; burned and partially burned fuels that were moved should be returned to a natural arrangement.
- Consider allowing large logs to burn out. Use a lever rather than bucking to manage large logs that have to be extinguished.
- 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. (FMP MM SS-11)
- Use gravity socks in stream sources and/or a combination of water blivits and fold-a-tanks to minimize impacts to streams.
- Consider using infrared detection devices along perimeter to reduce risk.
- Personnel should avoid using rehabilitated fire lines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work, i.e. water bars.

Mop-up/Aerial Fuels

- Remove or limb only those fuels which if ignited have potential to spread fire outside the fire line.
- Before felling consider allowing ignited tree/snag to burn itself out. Ensure adequate safety measures are communicated if this option is chosen.
- Identify hazard trees with a lookout or flagging.
- If burning trees/snags pose a serious threat of spreading fire brands, extinguish the fire with water or dirt whenever possible.

- Align saw cuts to minimize visual impacts from more heavily traveled corridors. Slope cut away from line of sight when possible.

LOGISTICS

Campsite Considerations

- Resource advisors will work through the Agency Representative to inform the IC to avoid, if feasible, staging fire suppression actions in or directly adjacent to the habitat of San Bruno elfin or mission blue butterflies (FMP MM SS-24 & SS-30).
- Coordinate with the Resource Advisor in choosing a site with the most reasonable qualities of resource protection and safety concerns.
- Evaluate short-term low impact camps such as coyote or spike versus use of longer-term higher impact camps.
- Use existing campsites whenever possible.
- New site locations should be on impact resistant and naturally draining areas such as rocky or sandy soils, or openings with heavy timber.
- Avoid camps in meadows, along streams or on lakeshores. Camps should be located at least 200 feet from water resources or other sensitive areas.
- Consider impacts on both present and future users. An agency commitment to resource values will promote those values to the public.
- Lay out the camp components carefully from the start. Define cooking, sleeping, latrine, and water supply.
- Minimize the number of trails and ensure adequate marking.
- Consider fabric ground cloth for protection in high use areas such as around cooking facilities.
- Use commercial portable toilet facilities where available. If these cannot be used a latrine hole should be used.
- Select latrine sites a minimum of 200 feet from water sources with natural screening.
- Do not use nails in trees.
- Constantly evaluate the impacts which will occur, both short and long term.

Personal Camp Conduct

- Use “leave no trace” camping techniques.
- Minimize disturbance to land when preparing bedding site. Do not clear vegetation or trench to create bedding sites.
- Use stoves for cooking, when possible. If a campfire is used limit to one site and keep it as small as reasonable. Build either a “pit” or “mound” type fire. Avoid use of rocks to ring fires.
- Use down and dead firewood. Use small diameter wood, which burns down more cleanly.
- Don’t burn plastics or aluminum – “pack it out” with other garbage.
- Keep a clean camp and store food and garbage so it is unavailable to wildlife. Ensure items such as empty food containers are clean and odor free, never bury them.
- Select travel routes between camp and fire and define clearly.
- Carry water and bathe away from lakes and streams. Personnel must not introduce soaps, shampoos or other personal grooming chemicals into waterways.

AVIATION MANAGEMENT

One of the goals is to minimize the disturbance caused by air operations during an incident.

Aviation Use Guidelines

- Maximize back haul flights as much as possible.
- Use long line remote hook in lieu of constructed helispots for delivery or retrieval of supplies and gear.
- Take precautions to insure noxious weeds are not inadvertently spread through the deployment of cargo nets and other external loads.
- Use natural openings for helispots and paracargo landing zones as far as practical. If construction is necessary, avoid high visitor use areas.
- Consider maintenance of existing helispots over creating new sites.
- Obtain specific instructions for appropriate helispot construction prior to the commencement of any ground work.
- Consider directional falling of trees and snags so they will be in a natural appearing arrangement.

- Buck and limb only what is necessary to achieve safe/practical operating space in and around the landing pad area.
- To the greatest extent possible, avoid operating aircraft below and within 500 feet of Rodeo Lagoon, Bird Island, and Bolinas Lagoon from late spring to early winter to avoid disturbance to the California brown pelican. (FMP MM SS-38)
- To avoid the spread of highly nonnative animal species (e.g., bullfrogs) and protect the habitat of federally listed threatened or endangered species, resource advisors will advise responding fire agencies of the following guidance:
    - Drawing water from freshwater bodies in GGNRA and Rodeo Lagoon should be avoided unless needed to protect life and property and there is no other feasible water source available. (FMP MM SS-4, SS-32 & SS-38)
    - Avoid drawing water from the ocean near Bird Island or Bolinas Lagoon from late spring to early winter to avoid disturbance to California brown pelicans to the greatest extent possible. (FMP MM SS-38)
    - If freshwater is drawn or scooped from water bodies in the park, it should be used on wildfires within the same watershed whenever possible. (FMP MM SS-4)
    - Ocean and bay waters are preferred water sources for fighting wildfires in the park and vicinity. (FMP MM SS-4)
    - Habitats of sensitive aquatic species, such as wetlands, and mission blue butterflies should be avoided when saltwater is used. (FMP MM SS-4)

Retardant, Foam and/or Saltwater Use

During initial attack, fire managers must weigh the non-use of retardant with the probability of initial attack crews being able to successfully control or contain a wildfire. If it is determined that use of retardant may prevent a larger, more damaging wildfire, then the manager might consider retardant use even in sensitive areas. This decision must take into account all values at risk and the consequences of larger firefighting forces' impact on the land.

- Consider impacts of water drops versus use of foam/retardant. If foam/retardant is deemed necessary, consider use of foam before retardant use.
- Determine if there restrictions on certain types of retardant.
- Foams, saltwater or other fire retardants will not be used on or near wetlands to the greatest extent possible. (FMP MM WET-2).

- Resource advisors will work through the Agency Representative to inform the IC to avoid, if feasible, using saltwater or retardant on habitat of the San Bruno elfin and mission blue butterflies. (FMP MM SS-24 & SS-30).

HAZARDOUS MATERIALS

Flammable/Combustible Liquids

- Store and dispense aircraft and equipment fuels in accordance with National Fire Protection Association (NFPA) and Health and Safety Handbook requirements.
- Avoid spilling or leakage of oil or fuel, from sources such as portable pumps, into water sources or soils.
- Store any liquid petroleum gas (propane) downhill and downwind from firecamps and away from ignition sources.

Flammable Solids

- Pick up residual fusees debris from the fire line and dispose of properly.

Fire Retardant/Foaming Agents

- Do not drop retardant or other suppressants near surface waters.
- Use caution when operating pumps or engines with foaming agents to avoid contamination of water sources.

FIRE REHABILITATION

Rehabilitation is a critical need. This need arises primarily because of the impacts associated with fire suppression and the logistics that support it. The process of constructing control lines, transport of personnel and materials, providing food and shelter for personnel, and other suppression activities has a significant impact on sensitive resources regardless of the mitigating measures used. Therefore, rehabilitation must be undertaken in a timely, professional manner.

During implementation, the resource advisor should be available for expert advice and support of personnel doing this work as well as quality control.

Rehabilitation Guidelines

- Pick up and remove all flagging, garbage, litter, and equipment. Dispose of trash appropriately.
- Clean fire pit of unburned materials and fill back in.

- Discourage use of newly established trails created during the suppression effort by covering with brush, limbs, small diameter poles, and rotten logs in a naturally appearing arrangement.
- Replace dug-out soil and/or duff and obliterate any berms created during the suppression effort.
- Resource Advisors will work through the Agency Representatives on advising the preferred techniques to use to prevent soil erosion and sedimentation of drainages. The standard for waterbar placement is presented below. Waterbar construction must be approved by the Park Resource Advisor prior to any construction as waterbars may not be the environmentally preferred solution to control erosion.

Trail Percent Grade	Maximum Spacing Ft.
6-9	400
10-15	200
15-25	100
25+	50

- Where soil has been exposed and compacted, such as in camps, on user-trails, at helispots and pump sites, scarify the top 2-4 inches and scatter with needles, twigs, rocks, and dead branches. Seed from sources other than the park will not be appropriate to use on barren areas, in order to maintain the genetic integrity of the area. It may be possible, depending on the time of year and/or possibility of a rainy period, to harvest and scatter nearby seed, or to transplant certain native vegetation.
- Blend campsites with natural surroundings, by filling in and covering latrine with soil, rocks, and other natural material. Naturalize campfire area by scattering ashes in nearby brush (after making sure any sparks are out) and returning site to a natural appearance.
- Where trees were cut or limbed, cut stumps flush with ground, scatter limbs and boles, out of sight in unburned area. Camouflage stumps and tree boles using rocks, dead woody material, fragments of stumps, bolewood, limbs, soil and fallen or broken green branches. Scattered sawdust and shavings will assist in decomposition and be less noticeable. Use native materials from adjacent, unimpacted areas if necessary.

- Remove newly cut tree boles that are visible from trails or meadows. Drag other highly visible woody debris created during the suppression effort into timbered areas and disburse. Tree boles that are too large to move should be slant cut so a minimal amount of the cut surface is exposed to view. Chopping up the surface with an axe or pulaski, to make it jagged and rough, will speed natural decomposition.
- Leave tops of felled trees attached. This will appear more natural than scattering the debris.
- Consider -- if no other alternatives are available -- helicopter sling loading rounds and tops from a disturbed site when there has been an excessive amount of bucking, limbing and topping.
- Tear out sumps or dams, where they have been used, and return site to natural condition. Replace any displaced rocks or streambed material that has been moved. Reclaim streambed to its predistrubed state, when appropriate.
- Walk through adjacent undisturbed area and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible. Good examples should be documented and shared with others!

DEMOBILIZATION

Because demob is often a time when people are tired or when weather conditions are less than ideal, enough time must be allowed to do a good job. When moving people and equipment, choose the most efficient and least impactive method to both the landscape and fire organization mission. An on-the-ground analysis of “How Things Went” will be important.

POST-FIRE EVALUATION

Post-fire evaluation is important for any fire occurrence so management can find out how things went. Identify areas needing improvement, to formulate strategies and to produce quality work in the future. This activity is especially important in sensitive areas due to their fragility and inclination to long-term damage by human impacts.

Resource advisors and functional specialists such as park ecologists, hydrologists, fire management staff and rangers will be responsible for conducting the post-fire evaluation. They are the people who have the experience and knowledge to provide information required to make the evaluation meaningful and productive.

Post-fire evaluation by Burn Area Response Team (BAER) will begin during the suppression effort. An emergency stabilization plan will be completed within 7 days of the date of fire containment per 620 DM 3.

DATA COLLECTION/DOCUMENTATION/RECOMMENDATIONS

This phase will be completed by a review of the rehab plan and visit to the fire site as soon after demobilization as possible. An inventory of comps and helispots will be completed. This will also include an objective overview of other areas covered by the rehab plan.

Observations will be documented in a brief report to the line officer with a copy to the appropriate incident commander. In the report, the evaluator will include recommendations for ensuing fire suppression activities on similar lands. It is important that the evaluator recognize and commend the initial attack forces or overhead team for positive activities. Make special note of the extra efforts and sensitivity to suppression impacts.

STANDARD FIRE ORDERS

FIRE BEHAVIOR

1. Keep informed on the fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.

FIRELINE SAFETY

4. Determine escape routes and safety zones and make them known.
5. Post lookouts where there is possible danger.
6. Be alert. Be calm. Think clearly. Act decisively.

ORGANIZATIONAL CONTROL

7. Maintain prompt communications with your forces, your boss and adjoining forces.
8. Give clear instructions and be sure they are understood.
9. Maintain control of your forces at all times.

IF YOU CONSIDER 1 – 9, THEN

10. Fight fire aggressively, having provided for safety first.

WATCH OUT SITUATIONS

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior.
5. Uninformed on strategy, tactics and hazards.
6. Instructions and assignments not clear.
7. No communication link with crew members/supervisor.
8. Constructing fire line without safe anchor point.
9. Building fire line downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain and fuels make escape to safety zone difficult.
18. Taking a nap near the fireline.

APPENDIX C -- FMP EIS RECORD OF DECISION

WILDLAND FIRE SITUATION ANALYSIS

Wildland Fire Situation Analysis (WFSA) is a decision-making process in which the Agency Administrator or representative describes the situation, establishes objectives and constraints for the management of the fire, compares multiple strategic wildland fire management alternatives, evaluates the expected effects of the alternatives, selects the preferred alternative, and documents the decision. The format and level of detail required is dependent on the specific incident and it's complexity. The key is to document the decision.

WFSA INITIATION

FIRE NAME	
JURISDICTION(S)	
DATE AND TIME INITIATED	

WFSA COMPLETION/FINAL REVIEW

THE SELECTED ALTERNATIVE ACHIEVED DESIRED OBJECTIVES ON (DATE/TIME):	
THE SELECTED ALTERNATIVE DID NOT ACHIEVE THE DESIRED OBJECTIVES AND A NEW WFSA WAS PREPARED ON (DATE/TIME):	
AGENCY ADMINISTRATOR OR REPRESENTATIVE SIGNATURE:	

WFSA INSTRUCTIONS

Section I. WFSA Information Page

The Agency Administrator completes this page.

I.A. Jurisdiction(s): Assign the agency that have or could have fire protection responsibility, e.g., USFWS, Forest Service, BLM, etc.

I.B. Geographic Area: Assign the recognized "Geographic Coordination Area" in which the fire is located, e.g., Northwest, Northern Rockies, etc.

I.C. Unit: Designate the local administrative unit, e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

I.D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

I.E. Fire Name: Self-explanatory.

I.F. Incident Number: Identify the agency number assigned to the fire, e.g., BOD 296, BNF 001.

I.G. Accounting Code: Insert the local unit's accounting code.

I.H. Date/Time Prepared: Self-explanatory.

I.I. Attachments: Check here to designate attachments used in the completion of the WFSA. "Other" could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. WILDLAND FIRE SITUATION ANALYSIS

A. JURISDICTION(S):	B. GEOGRAPHIC AREA:
C. UNIT(S):	D. WFSA #:
E. FIRE NAME:	F. INCIDENT #:
G. ACCOUNTING CODE:	
H. DATE/TIME PREPARED:	

I. ATTACHMENTS:

- ☐ COMPLEXITY MATRIX/ANALYSIS[1]
- ☐ RISK ASSESSMENT[1]
- ☐ PROBABILITY OF SUCCESS[1]
- ☐ CONSEQUENCES OF FAILURE[1]
- ☐ MAPS[1]
- ☐ DECISION TREE[2]
- ☐ FIRE BEHAVIOR PROJECTIONS[1]
- ☐ CALCULATIONS OF RESOURCE REQUIREMENTS[1]
- ☐ OTHER (SPECIFY)

[1] Required
[2] Required by the USFS

Section II. Objectives and Constraints

The Agency Administrator completes this page.

II.A. Objectives: Specify criteria that should be considered in the development of alternatives.

Safety objectives for firefighters, aviation, and public must receive the highest priority, Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all portions of an area, thus impacting the public, or impacts to transportation, communication and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire, safety, etc.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

II.B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints such as public and Agency cost could be considered here.

II. OBJECTIVES AND CONSTRAINTS

A. OBJECTIVES (must be specific and measurable):

1. SAFETY:

Public

Firefighter

2. ECONOMIC:

3. ENVIRONMENTAL:

4. SOCIAL:

5. OTHER:

B. CONSTRAINTS:

Section III. Alternatives

The FIRE MANAGER/and or INCIDENT COMMANDER complete(s) this page.

III.A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

III.B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example, "Contain within the Starvation Meadows' watershed by the first burning period".

III.C. Resources Needed: Resources listed must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

III.D. Estimated Final Fire Size: Estimated final size for each alternative at time of containment.

III.E. Estimated Contain/Control Date: Estimates for each alternative shall be made based on predicted weather, fire behavior, resource availability and the effects of wildland fire management efforts.

III.F. Cost: Estimate all fire costs for each alternative. Consider mopup, rehabilitation, and other costs as necessary.

III.G. Risk Assessment: Probability of success/Consequences of failure: Describe probability as a % and associated consequences for success and failure. Develop this information from models, practical experience or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

III.H. Complexity: Assign the complexity rating calculated in the Guide for Assessing Fire Complexity.

III.I. Maps: A map for each alternative must be prepared. The map shall be based on the "Probability of success/Consequences of Failure" and include other relative information.

III. ALTERNATIVES

	A	B	C
A. WILDLAND FIRE STRATEGY:			
B. NARRATIVE:			
C. RESOURCES NEEDED:			
HANDCREWS			
ENGINES			
DOZERS			
AIRTANKERS			
HELICOPTERS			
D. ESTIMATED FINAL FIRE SIZE:			
E. ESTIMATED CONTAIN/ CONTROL DATE			
F. COSTS:			
G. RISK ASSESSMENT: PROBABILITY OF SUCCESS/			
CONSEQUENCES OF FAILURE			
H. COMPLEXITY:			
I. ATTACH MAPS FOR EACH ALTERNATIVE			

Section IV. Evaluation of Alternatives

The Agency Administrator(s), FMO and/or Incident Commander(s) completes this page.

IV.A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objective shall match those identified in section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, -100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and be consistent with prescriptions and objectives of the Fire Management Plan.

Sum Of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV. EVALUATION OF ALTERNATIVES

A. EVALUATION PROCESS	A	B	C
SAFETY			
Firefighter			
Aviation			
Public			
Sum of Safety Values			
ECONOMIC			
Forage			
Improvements			
Recreation			
Timber			
Water			
Wilderness			
Wildlife			
Other (specify)			
Sum of Economic Values			
ENVIRONMENTAL			
Air			
Visual			
Fuels			
T & E Species			
Other (specify)			
Sum of Environmental Values			
SOCIAL			
Employment			
Public Concern			
Cultural			
Other (Specify)			
Sum of Social Values			
OTHER			

Section V. Analysis Summary

The Agency Administrator(s), FMO and/or Incident Commander(s) complete this page.

V.A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narratives could be based on effectiveness and efficiency. For example: "most effective and least efficient", "least effective and most efficient", "or "effective and efficient". Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective". Use a system that best fits the manager's needs.

V.B. Pertinent Data: Data for this section has already been presented and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed on page three, section III.D. Complexity is calculated in the attachments and displayed on page three, section III.H. Costs are displayed on page three, section III.F. Economic Values have been calculated and displayed on page four. Probability of Success/Consequences of Failure are calculated in the attachments and displayed on page three, section III.G.

V.C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center and needed to select a viable alternative. Designate "yes" indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "other" category as needed by the Agency Administrator(s).

Section VI. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) signature is mandatory.

V. ANALYSIS SUMMARY

ALTERNATIVES	A	B	C
A. COMPLIANCE WITH OBJECTIVES:			
SAFETY			
ECONOMIC			
ENVIRONMENTAL			
SOCIAL			
OTHER			
B. PERTINENT DATA:			
FINAL FIRE SIZE			
COMPLEXITY			
COST			
RESOURCE VALUES			
PROBABILITY of SUCCESS			
CONSEQUENCES of FAILURE			

C. EXTERNAL/INTERNAL INFLUENCES:

NATIONAL AND GEOGRAPHIC PREPAREDNESS LEVEL _____

INCIDENT PRIORITY _____

RESOURCE AVAILABILITY _____

WEATHER FORECAST (LONG-RANGE) _____

FIRE BEHAVIOR PROJECTIONS

VI. DECISION

The selected alternative is:

RATIONALE:

AGENCY ADMINISTRATOR SIGNATURE _____

DATE/TIME _____

Section VII. Daily Review

The Agency Administrator(s), or designate complete(s) this page.

The date, time and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA Validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed on page five, section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

VII. DAILY REVIEW

SELECTED ALTERNATIVE TO BE REVIEWED DAILY TO DETERMINE IF STILL VALID UNTIL CONTAINMENT OR CONTROL

PPENDIX E, PART 19, BAAQMD APPLIC/

DATE	TIME	BY	PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID

IF WFSA IS NO LONGER VALID, A NEW WFSA WILL BE COMPLETED

APPENDIX E, PART 12, INCIDENT COMPLEXITY ANALYSIS: TYPES 5, 4 AND TRANSITION TO TYPE 3

If you have checked "Yes" on 3 to 5 of the analysis boxes, consider requesting the next level of incident management support.		
Incident Complexity Analysis (Type 3, 4, 5)		
Fire Behavior	**Yes**	**No**
Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
Weather forecast indicating no significant relief or worsening conditions.		
Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
Firefighter Safety		
Performance of firefighting resources affected by cumulative fatigue.		
Overhead overextended mentally and/or physically.		
Communication ineffective with tactical resources or dispatch.		
Organization		
Operations are at the limit of span of control.		
Incident action plans, briefings, etc. missing or poorly prepared.		
Variety of specialized operations, support personnel or equipment.		
Unable to properly staff air operations.		
Limited local resources available for initial attack.		
Heavy commitment of local resources to logistical support.		
Existing forces worked 24 hours without success.		
Resources unfamiliar with local conditions and tactics.		
Values to be protected		
Urban interface; structures, developments, recreational facilities, or potential for evacuation.		
Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
Sensitive political concerns, media involvement, or controversial fire policy.		
Release Date: January 2007		

APPENDIX E, PART 13, REDBOOK COMPLEXITY ANALYSIS

Guide to Completing the Incident Complexity Analysis. (Type 1, 2)

- If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.
- If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is or is predicted to be of Type 1 complexity.
- Factor H should be considered after numbers 1–3 are completed. If more than two of the items in factor H are answered yes, and three or more of the other primary factors are positive responses, a Type 1 team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type 2 team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

Incident Complexity Analysis Type 1 & 2	YES	NO
A. Fire Behavior (Observed or Predicted)		
1. Burning index (from on-site measurement of weather conditions) predicted to be above the 90% level using the major fuel model in which the fire is burning.		
2. Potential exists for extreme fire behavior (fuel moisture, winds, etc.).		
3. Crowning, profuse or long-range spotting.		
4. Weather forecast indicating no significant relief or worsening conditions.		
Total		
B. Resources Committed		
1. 200 or more personnel assigned.		
2. Three or more divisions.		
3. Wide variety of special support personnel.		
4. Substantial air operation which is not properly staffed.		
5. Majority of initial attack resources committed.		
Total		

Incident Complexity Analysis Type 1 & 2	YES	NO
C. Resources Threatened		
1. Urban interface.		
2. Developments and facilities.		
3. Restricted, threatened, or endangered species habitat.		
4. Cultural sites.		
5. Unique natural resources, special-designation areas, wilderness.		
6. Other special resources.		
Total		
D. Safety		
1. Unusually hazardous fireline construction.		
2. Serious accidents or fatalities.		
3. Threat to safety of visitors from fire and related operations.		
4. Restrictions and/or closures in effect or being considered.		
5. No night operations in place for safety reasons.		
Total		
E. Ownership		
1. Fire burning or threatening more than one jurisdiction.		
2. Potential for claims (damages).		
3. Different or conflicting management objectives.		
4. Disputes over suppression responsibility.		
5. Potential for unified command.		
Total		
F. External Influences		
1. Controversial fire policy.		
2. Pre-existing controversies/relationships.		
3. Sensitive media relationships.		
4. Smoke management problems.		
5. Sensitive political interests.		
6. Other external influences.		
Total		
G. Change in Strategy		
1. Change in strategy to control from confine or contain		
2. Large amounts of unburned fuel within planned perimeter.		
3. WFSA invalid or requires updating.		

Incident Complexity Analysis Type 1 & 2	YES	NO
Total		
H. Existing Overhead		
1. Worked two operational periods without achieving initial objectives.		
2. Existing management organization ineffective.		
3. Overhead overextended mentally and/or physically.		
4. Incident action plans, briefings, etc. missing or poorly prepared.		
Total		
Release Date: January 2008		

APPENDIX E, PART 14, MINIMUM REQUIREMENT DECISION GUIDE

ARTHUR CARHART
NATIONAL WILDERNESS TRAINING CENTER
"Fostering interagency excellence in wilderness stewardship"

MINIMUM REQUIREMENTS DECISION GUIDE

Process Outline 2008

Step 1: Determine if any administrative action is *necessary*

First, describe the situation that may prompt action and describe why it is a problem or issue.

Then, answer the following questions to determine if administrative action is necessary in wilderness:

A. Options Outside of Wilderness - Is action necessary within wilderness ?

B. Valid Existing Rights or Special Provision of Wilderness Legislation - Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows consideration of the Section 4(c) prohibited uses?

C. Requirements of Other Legislation - (ESA, ARPA, NHPA, Dam Safety Act, Clean Air Act, etc.) - Is action necessary to meet the requirements of other laws?

D. Other Guidance - Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

E. Wilderness Character - Is action necessary to preserve one or more of the qualities of wilderness character including: ***untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation***, or unique components that reflect the character of this wilderness area?

F. Public Purposes of Wilderness - Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Step 1 Conclusion: Is Administrative Action Necessary?
If action is necessary, proceed to Step 2 to determine the minimum activity which least impacts the wilderness resource and character.

Step 2: Determine the *minimum* activity

A. Description of Alternative Action - For each alternative, describe what methods and techniques will be used, when the action will take place, where the action will take place and what mitigation measures are necessary.

Alternatives considered should include one with the use of the suggested prohibited equipment or facilities, one with none of the Section 4 (c) prohibitions, and, if possible one with a mix of prohibited and non-prohibited uses. Alternatives should be "feasible" and creative.

B. Alternative Comparison - For each alternative, describe effects based on:

- Wilderness Character
  - Untrammeled
  - Undeveloped
  - Natural
  - Outstanding Opportunities for Solitude or a Primitive and Unconfined Type of Recreation
- Heritage and Cultural Resources
- Maintaining Traditional Skills
- Special Provisions
- Safety of personnel, visitors, and contractors
- Economics and Time Constraints
- Additional wilderness-specific Criteria.

- Include mitigation (timing, location, frequency, design standards, etc.)

Step 2 Decision: What is the Minimum Activity?

- Identify the selected alternative.
- Describe the rationale for selecting this alternative, based on law and policy criteria.
- Describe any monitoring and reporting requirements.

Approvals and NEPA analysis - Follow agency guidelines.

Reporting – Follow agency requirements

Refer to the MRDG ***Instructions*****,** and ***Worksheets*** for more information.

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER
2008

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

". . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

– the Wilderness Act, 1964

Please refer to the accompanying MRDG *Instructions* for filling out this guide.
The spaces in the worksheets will expand as necessary as you enter your response.

Step 1: Determine if any administrative action is necessary.

Description: Briefly describe the situation that may prompt action.

To determine if administrative action is necessary, answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Is action necessary within wilderness?

Yes: ☐ **No:** ☐

Explain:

B. Describe Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows consideration of the Section 4(c) prohibited uses? Cite law and section.

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws?

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

D. Describe Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area?

Untrammeled: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Undeveloped: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Natural: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Outstanding opportunities for solitude or a primitive and unconfined type of recreation:

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Other unique components that reflect the character of this wilderness:

Yes: ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Scenic: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Scientific: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Education: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Conservation: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Historical use: **Yes:** ☐ **No:** ☐ **Not Applicable:** ☐

Explain:

Step 1 Decision: Is any administrative action necessary in wilderness?

Yes: ☐ **No:** ☐ **More information needed:** ☐

Explain:

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity.

Please refer to the accompanying MRDG *Instructions* for an explanation of the effects criteria displayed below.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

Alternative # _____

Description:

Effects:

Wilderness Character
- **"Untrammeled"**
- **"Undeveloped"**
- **"Natural"**
- **"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"**

Heritage and Cultural Resources

Maintaining Traditional Skills

Special Provisions

Safety of Visitors, Personnel, and Contractors

Economic and Time Constraints

Additional Wilderness-specific Comparison Criteria

Step 2 Decision: What is the Minimum Activity?

Please refer to the accompanying MRDG *Instructions* before describing the selected alternative and describing the rationale for selection.

Selected alternative:

Rationale for selecting this alternative:

Monitoring and reporting requirements:

Check any Wilderness Act Section 4(c) uses approved in this alternative:

- ☐ mechanical transport
- ☐ motorized equipment
- ☐ motor vehicles
- ☐ motorboats
- ☐ landing of aircraft
- ☐ temporary road
- ☐ structure or installation

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

Approvals	Signature	Name	Position	Date
Prepared by:				
Recommended:				
Recommended:				
Approved:				

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER
2008

MINIMUM REQUIREMENTS DECISION GUIDE

INSTRUCTIONS

". . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

– the Wilderness Act, 1964

Introduction

The Minimum Requirements Decision Guide (MRDG) is designed to assist wilderness managers in making appropriate decisions for wilderness. These instructions refer to completing the MRDG *Worksheets*. More information about the background of the MRDG and its appropriate uses can be found in the *Overview*. Please also refer to your agency policies and other guidance in *Agency Guidelines* for more direction on how and when to use the MRDG.

Use of this document assumes familiarity with the Wilderness Act, other relevant legislation, and agency policy.

The MRDG is derived from Section 4.(c) of the Wilderness Act and involves two steps. Step 1 determines whether action is ***necessary***. If action is necessary, then Step 2 provides guidance for determining the ***minimum*** activity.

Worksheet Instructions

Step 1: Determine if any administrative action is necessary

Description: **Briefly describe the situation.** This should not be a description of a possible method or tool, but rather of the situation that prompts the possible need for action. This step should **not** be used to justify use of motorized equipment or mechanical transport, or to approve placement of a structure, facility, or temporary road. In wilderness, the appropriate administrative response may be no action at all.

Correct Examples of description	Incorrect examples of description
An administrative cabin is deteriorating	Need to restore the administrative cabin
A request is received for access into a valid, existing mining claim	Need to build a temporary road for mining claim access.
Blown down trees are blocking trails	Need to use chainsaws to clear the blown down trees
Lack of information on a wildlife species	Need to land a helicopter to survey population
Fire alters wildlife habitat	Need to re-seed area to maintain wildlife habitat
A trail bridge has washed out	Need to replace the washed out bridge, using mules for supplies
Riverbank erosion is destabilizing a pioneer cabin listed on the National Historic Register	Need to sling-load rock gabions to stop erosion
Lack of information on air quality in Class I wilderness air shed	Need to set up air quality monitoring station in wilderness
Invasive species present	Need to use motorized sprayer to treat invasives

A. Options Outside of Wilderness

Is action necessary within wilderness ?

Examples of administrative action that might be explored outside wilderness include:

- Putting up nest boxes or conducting wildlife surveys outside wilderness boundaries.
- Surveying visitors about user conflicts at the trailhead or visitor center, rather than on the trail or at their wilderness campsite
- Locating trail destination and distance signs can be located at trailheads outside wilderness (unless already determined by agency policy).
- Locating monitoring or other administrative structures outside wilderness.

B. Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows consideration of the Section 4(c) prohibited uses? Cite law and section.

If there is special provision language (e.g. maintenance of dams and water storage facilities with motorized equipment and mechanical transport, control of fire, insects and disease, access to private lands, etc), whether in the Wilderness Act of 1964 or subsequent designation legislation, consideration of some actions may be required even though they would otherwise be prohibited. The exact reference to the legislation is needed in this box. Examples include:

- Existence of public use cabins and subsistence use and access in Wilderness (Alaska National Interest Lands Conservation Act of 1980, P.L. 96-487, Sec. 1315.(c)).
- Use of motorboats of ten horsepower or less in the Okefenokee Wilderness (Wilderness Act of 1964, P.L. 88-577, Sec. 4.(d)(1); Okefenokee Wilderness Act of 1974, P.L. 93-430, Sec.2).

Some Valid Existing Rights or the provisions of special legislation may be satisfied by an option outside wilderness. Such possibilities would likely reduce impacts to the wilderness resource and character and should be explored.

C. Requirements of Other Legislation

Is action necessary to meet the requirements of other laws ?

Laws not directly concerned with wilderness (such as the Endangered Species Act or National Historic Preservation Act) may influence the need for actions in Wilderness. In some instances, the administrator is asked to satisfy the requirements of multiple laws. For example:

- Recovery of an endangered species dependent on wilderness ecosystems (Endangered Species Act).
- Treatment of a site listed on the National Register of Historic Places (National Historic Preservation Act).

Apparent conflicts between the Wilderness Act and other legislation may require innovative approaches. Not all apparent conflicts are genuine. The requirements of all applicable laws must be met.

D. Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Review guidance for conformance and carefully consider the context of the guidance, plan or agreement. Plans developed using a NEPA analysis are decisions that provide stronger guidance than plans developed with less public or interdisciplinary involvement. Examples include:

- A programmatic decision to treat invasive weeds has already been addressed in a unit level plan that included wilderness. No decision was made regarding the method of treatment.

- The need for bridges, fords, or in-stream structures has been addressed in a listed fish species recovery plan. The plan does not dictate the type of structure, method of construction, or tools required.

Even if relevant programmatic decisions have already been made that satisfy Step 1 of the MRDG, both Step 1 and Step 2 should be completed to determine the minimum administrative activity.

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area?

Explain how taking action in wilderness is necessary to preserve wilderness character. If there is no need to take action to preserve character explain how taking action may impair one or more of the qualities of wilderness character.

Section 2.(a) of the Wilderness Act directs us to manage wilderness areas for the preservation of their wilderness character. Similar direction is repeated in Section 4.(b). It is recommended that particular attention is paid to the general guidance in the Wilderness Act, as outlined in the boxes on Page 2 of the *Overview*, and to agency policy. In addition, at least four major components of wilderness character* are mentioned in Section 2.(c) of the Wilderness Act. These are:

"**Untrammeled**" – Wilderness is ideally unhindered and free from modern human control or manipulation. We strive to have areas where wild nature is allowed to "run free."

"**Undeveloped**" – Wilderness retains its primeval character and influence, and is essentially without permanent improvement or human occupation. It provides a contrast with other areas where humans and their work dominate the landscape.

One of the purposes of the Wilderness Act is "…to assure that …expanding settlement and growing mechanization, does not occupy and modify all areas…". Structures, installations, and the use of tools which make it easier for modern humans to occupy and modify the land (e.g., motorized equipment and mechanical transport) are limited.

"**Natural**" – Wilderness ecological and evolutionary systems are substantially free from the effects of modern civilization. Changes in wilderness areas should be the result of natural conditions.

"**Outstanding opportunities for solitude or a primitive and unconfined type of recreation**" – Wilderness provides opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance.

In some cases, a particular quality of wilderness character may not be applicable to a proposed action because there would be no change as a result of taking action. For example, replacing an existing trail bridge does not increase or decrease the number of structures and there would be no change to the undeveloped quality of wilderness character. Similarly use of a chainsaw to clear a trail has no effect on wilderness being unhindered or un-manipulated and therefore does not apply to the untrammeled quality of wilderness character.

An example of an action that would preserve or impair certain qualities of wilderness character is treatment to control non-native invasive weeds:

Untrammeled: Weed treatment would impair the untrammeled quality because the action, even if necessary, is an intentional human caused manipulation of "the earth and its community of life".

Undeveloped: Weed treatment is not applicable to this quality unless motorized equipment or mechanical transport is to be used. In that case, assess the effects of implementing specific alternatives in Step 2.

Natural: Weed treatment improves naturalness and helps preserve this quality.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Weed treatment is largely not applicable to this quality. Any enhancement of opportunities for primitive recreation that result from weed eradication is because of the contribution to preserving naturalness.

The potential loss of opportunities for solitude or primitive recreation due to workers using motorized sprayers or other methods may be an impairment of this quality. The effects of implementing specific alternatives should be determined in Step 2.

* This list of wilderness character components is not comprehensive. For a detailed discussion of wilderness character refer to the U.S. Forest Service, Rocky Mountain Research Station, General Technical Report, RMRS-GTR-151: *Monitoring Selected Conditions Related to Wilderness Character: A National Framework.* Other components can be defined that are of particular importance and reflect the character of your wilderness.

F. The Public Purposes of Wilderness

Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Identify which of the public purposes are applicable to the issue and then describe how they apply. For example:

Trail bridge replacement.

- Recreation Purpose – Considering whether there is a need to replace an existing trail bridge is consistent with the Recreation public purpose of wilderness.
- Explanation – A trail bridge, as part of the trail system which provides for recreation visitor access, may be considered a necessary structure in wilderness if needed to address safety or resource protection needs.

Air quality monitoring station

- Scientific Purpose – Considering whether there is a need for an installation in wilderness to monitor air quality is consistent with the Scientific public purpose of wilderness.
- Explanation – Gathering information about wilderness use and the effects of outside forces on wilderness may be needed to assist in the management of wilderness.

Commercial cabin rental program

- Recreation purpose - Considering a commercial proposal for a cabin rental program in wilderness is not consistent with the Recreation purpose of wilderness.
- Explanation - Section 4.(c) prohibits commercial enterprise in wilderness.

Step 1 Decision: Is any administrative action <u>necessary</u>? Evaluate the responses made to all questions in Step 1 and determine whether there is a need to proceed to Step 2 and why. If the responses indicate adverse impacts to the wilderness resource and character, document whether there is sufficient reason to proceed to Step 2.

It is possible that at this point more information will be needed in order to ascertain if administrative action is needed. In rare instances, it may be useful to continue with Step 2 to evaluate the benefits and effects of alternatives in order to help determine if any administrative action is necessary.

Step 2: Determine the <u>minimum</u> activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

The description of alternatives and effects varies by the complexity of the activity. Identify and describe a full range of feasible alternatives, including necessary mitigation measures that represent the various activities and the methods and tools that could be used. Include a “No Action” alternative to allow for a comprehensive comparison of effects. Complete a form for each alternative being considered.

Compare the potential effects of each alternative on the wilderness resource and character by describing the effects of implementation using the criteria below. This list is not all-inclusive, and other criteria which address the special features or unique character of each wilderness should be developed as needed. Use the criteria for comparing the effects of each applicable phase of the activity including design, construction, management, removal, or restoration.

Alternative Comparison Criteria

Wilderness Character

Describe the effects of each alternative on the preservation of wilderness character in terms of the four qualities listed below. Determine if there will be effects that will prevent the wilderness from remaining unimpaired for the future use and enjoyment as wilderness.

"Untrammeled"

Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

"Undeveloped"

Identify how "the imprint of man's work will remain substantially unnoticeable" and wilderness will continue to be in contrast to other areas of "growing mechanization." Include the effects of the use of any motorized equipment, mechanical transport, structures or installations on maintaining the undeveloped quality of wilderness character.

"Natural"

Describe the potential for protection, impairment, or restoration of natural conditions (air, water, soil, wildlife, fish, plants, etc.) including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Discuss effects related to protecting natural conditions within the regional landscape (i.e. insects, disease, or non-native species).

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"

Identify how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or impaired.

Describe the effects that will be noticeable to the visitor and that could affect their experience in wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Heritage and Cultural Resource

Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills

Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Special Provisions

Explain how the special provisions or rights (grazing, mining, water developments, access to non-federal land, etc.) identified in the Wilderness Act (Sections 4 and 5) or subsequent legislation, are managed to minimize impairment to the wilderness resource and character.

Safety of Visitors, Personnel, and Contractors

Describe any safety concerns associated with implementing the alternative on agency personnel, volunteers, and/or contractors and identify hazards that cannot be addressed through training and use of protective equipment.

Identify any potential public safety hazards resulting from implementation of the alternatives.

Economic and Time Constraints

Describe the costs and the amount of time it will take for implementation of the alternative.

Explain how each alternative satisfies any significant timing requirements or identified need for urgency based on protection of the wilderness resource and character.

Note - while administrative activities should always be accomplished with economic efficiency, neither the cost nor the time required for implementation are the over riding factors for administrative use of otherwise prohibited activities.

Additional Wilderness-specific Comparison Criteria

Identify any other decision factors that are relevant to the unique characteristics and special features of this wilderness.

Step 2 Decision: What is the minimum activity?

Select the alternative that represents the minimum requirements necessary to administer the areas as wilderness.

Describe the rationale for selecting it. The selected alternative must conform to law and agency policy and explain why the use of motorized equipment, mechanical transportation, structures, or installations is the minimum necessary requirement.

List any monitoring or reporting requirements.

Track and report the number and type of authorizations by checking the box for each Section 4.(c) use that is included in the selected alternative. Your agency may require additional reports.

Approvals

Depending on agency policy, include the signatures of the administrator who has the authority to approve Section 4.(c) uses or other activities included in the decision, and sign the MRDG. Check your agency policy and consult with your regional or state wilderness program managers to determine the current policy.

APPENDIX E, PART 15
EXAMPLE OF DELEGATION OF AUTHORITY FORM
Fire Management Plan

Delegation of Authority
Golden Gate National Recreation Area

As of *[Time] [Date]*, I have delegated authority to manage the [*Fire Name*], *[Fire Number]*, at Golden Gate National Recreation Area, to *[IC's Name]*, the Incident Commander and *[Team Name]*, the Incident Management Team.

The *[Fire Name]* Fire, which originated on *[Date]* is burning in the *[Location]*. My considerations for management of this fire are:

1. Provide for firefighter and public safety.
2. Manage the fire with as little environmental damage as possible. The guide to Minimum Impact Suppression Tactics (MIST) is attached.
3. Key cultural features requiring priority protection are: *[list here]*
4. Key resource considerations are: *[list here]*
5. Restrictions for suppression actions include: *[list here]*
6. Minimum tools for use are: *[list here]*
7. My agency Resource Advisor will be: *[list here]*
8. Manage the fire cost-effectively for the values at risk.
9. Provide training opportunities for the resources area personnel to strengthen our organizational capabilities.
10. Minimum disruption of visitor use consistent with public safety.

Signature and Title of Agency Administrator Date

Amendment to Delegation of Authority (if appropriate)
The Delegation of Authority dated *[Date]*, issued to *[Name of IC]* for the management of the *[Fire Name]* Fire, *[Fire Number]*, is hereby amended as follows. This will be effective at *[Time]*, *[Date]*.

[Text of Amendment here].

Signature and Title of Agency Administrator Date

APPENDIX E, PART 16
BRIEFING CHECKLIST TEMPLATE

FIRE MANAGEMENT PLAN
GOLDEN GATE NATIONAL RECREATION AREA
BRIEFING CHECKLIST TEMPLATE

Situation
Fire name, location, map orientation, other incidents in the area
Terrain influences
Fuel type and conditions
Fire weather (previous, current, and expected)
Winds, RH, temperature, etc.
Fire behavior (previous, current and expected)
Time of day, alignment of slope and wind, etc.

Mission/Execution
Command
Incident commander/immediate supervisor
Commander's intent
Overall strategy/objectives
Specific tactical assignments
Contingency plans

Communications
Communication plan
Tactical, command, air-to-ground frequencies
Cell phone numbers
Medivac plan

Service/Support
Other resources
Working adjacent and those available to order
Aviation operations
Logistics
Transportation
Supplies and equipment

Risk Management
Identify known hazards and risks
Identify control measures to eliminate hazards/reduce risk
Anchor point and LCES
Identify trigger points for disengagement/re-evaluation of operational plan

Questions or Concerns?

APPENDIX E, PART 17, BRIEFING TO THE INCIDENT MANAGEMENT TEAM

Agency Administrator's Briefing to Incident Management Team – Page 1/7

GENERAL INFORMATION
Name of Incident:
Type of Incident:
Incident Start Date:
Approximate Size of Incident:
Location:
Time:
Cause:
General Weather Conditions:
Local Weather or Behavioral Conditions:
Land Status:
Local Incident Policy:
Resource Values Threatened:
Private Property or Structures Threatened:
Capability of Unit to Support Team (Suppression and Support Resources):
Agency:
Agency Administrator's Representative:

Agency Administrator's Briefing to Incident Management Team – Page 2/7
INCIDENT COMMAND (IC) AND TRANSITION
Name of Current Incident Commander:
Incident Type (circle one): Type 3 Type 2 Type 1
Date and Time Team will Assume Command:
Recommended Local Participation in IMT Organization
Current IC and Staff Roles Desired after Transition:
Other Incidents in Area:
Other Command Organizations (Unified/Area/MAC):
Local Emergency Operations Center (EOC) Established:
Trainees Authorized:
Legal Considerations (Investigations in Progress):
Known Political Considerations:
Sensitive Residential and Commercial Developments:
Resource Values:
Cultural/Archaeological Sites:
Roadless, Wilderness Areas
Other Unique Suppression Considerations:
Local Social/Economic Considerations:
Private Representatives such as timber, utility, railroads, environmental groups:

Agency Administrator's Briefing to Incident Management Team – Page 3/7
Incident Review Team Assigned (FAST, Audit, Other):
Name of Incoming Incident Commander:
Name of Agency Administrator:
Local Community Public Affairs Contact(s):
Agency Public Affairs Contact:
Other Contacts:
Unit FMO:
Expanded Dispatch
Other Dispatch:
SAFETY INFORMATION
Accidents and Injuries to Date:
Condition of Local Personnel:
Known Hazards:
Injury and Accident Reporting Procedures:
PLANNING SECTION/GENERAL INFORMATION
Access to Fax and Copy Machines:
Access to Computers and Printers:
Existing Pre-Attack Plans:
Other Nearby Incidents Influencing Strategy/Tactics/Resources:

Agency Administrator's Briefing to Incident Management Team – Page 4/7
Training Specialist Assigned or Ordered:
Training Considerations:
SITUATION UNIT
General Weather Conditions/Forecasts:
Fire Behavior:
Local Unusual Fire Behavior and Fire History in Area of Fire:
Fuel Type(s) at Fire:
Fuel Type(s) Ahead of Fire:
RESOURCES UNIT/REFER TO ATTACHED RESOURCE ORDERS
Personnel on Incident (General):
Equipment on Incident (General):
Resources on Order (General):
Incident Demobilization Procedures:
OPERATIONS SECTION
Priorities for Control, Wildland Fire Situation Analysis Approved:
Current Tactics:
Incident Accessibility by Engines and Ground Support:
AIR OPERATIONS
Air Tactical Group Supervisor:
Air tankers Assigned:

Agency Administrator's Briefing to Incident Management Team – Page 5/7
Effectiveness of Air tankers:
Air Base: Telephone:
LOGISTICS SECTION/FACILITIES UNIT
ICP/Base Pre-Plans: Yes No
ICP/Base Location:
Catering Service/Meals Provided:
Shower Facilities:
Security Considerations:
Incident Recycling:
SUPPLY UNIT
Duty Officer or Coordinator Phone Number:
Expanded Dispatch Organization:
Supply System to be Used (Local Supply Cache):
Single Point Ordering:
LOGISTICS SECTION/COMMUNICATIONS
National Radio Cache System on Order: Yes No Type:
Local Network Available: Yes No
Temporary:

Agency Administrator's Briefing to Incident Management Team – Page 6/7		
Cell Phone Cache Available:	Yes	No
Landline Access to ICP:	Yes	No
Local Telecom Technical Support:		
GROUND SUPPORT UNIT		
Route to ICP/Base:		
Route From ICP/Base to Fire:		
Medical Unit:		
Nearest Hospital or Desired Hospital:		
Nearest Burn Center, Trauma Center:		
Nearest Air Ambulance:		
FINANCE SECTION		
Name of Incident Agency Administrative Representative: \		
Name of Incident Business Advisor (If Assigned):		
Agreements and Annual Operating Plans in Place:		
Jurisdictional Agencies Involved:		
Need for Cost Share Agreement:		
COST UNIT		
Fiscal Considerations:		
Cost Collection or Trespass:		
Management Codes in Use:		

Agency Administrator's Briefing to Incident Management Team – <u>Page 7/7</u>
PROCUREMENT UNIT
Buying Team in Place or Ordered:
Contracting Officer Assigned:
Copy of Local Service and Supply Plan Provided:
Is All Equipment Inspected and Under Agreement?
Emergency Equipment Rental Agreements:
COMPENSATION/CLAIMS UNIT
Potential Claims:
Status of Claims/Accident Reports:
TIME UNIT
Payroll Procedure Established for T&A Transmittal:

APPENDIX E, PART 18: Prescribed Fire Plan Template

A standardized, reproducible template form for the Prescribed Fire Plan development process is included in this appendix. A standardized format is provided for the Prescribed Fire Plan in PDF. An electronic version editable in Word is also available. Users should prepare the plan using the electronic version.

In the electronic Word version, the Project Name and/or Unit Name should be entered in the document's header which will automatically appear on each following page of the plan.

To insert information into the document's header:

1. Double-click in the header region (upper region of each page displayed on the screen).
2. Type Project and/or Unit information.
3. Double-click *outside* the header region in the body of the document.

You may also access the header under **View** > **Headers and Footers**. This will open the header region for edits automatically. After entering the information, go again to **View** > **Headers and Footers** which will return you to being able to enter information into the body of the document.

PRESCRIBED FIRE PLAN

ADMINISTRATIVE UNIT(S): _____

PRESCRIBED FIRE NAME: _____

PREPARED BY: _____ **DATE:** _____

Name & Qualification

TECHNICAL REVIEW BY: _____ **DATE:** _____

Name & Qualification

COMPLEXITY RATING: _____

APPROVED BY: _____ **DATE:** _____

Agency Administrator

Project Name: _____

Unit Name: _____

ELEMENT 2: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST

Instructions: The Agency Administrator's Pre-Ignition Approval is the intermediate planning review process (i.e. between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator's Pre-Ignition Approval evaluates whether compliance requirements, Prescribed Fire Plan elements, and internal and external notifications have been or will be completed and expresses the Agency Administrator's intent to implement the Prescribed Fire Plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

YES	NO	KEY ELEMENT QUESTIONS
		Is the Prescribed Fire Plan up to date? *Hints: amendments, seasonality.*
		Will all compliance requirements be completed? *Hints: cultural, threatened and endangered species, smoke management, NEPA.*
		Is risk management in place and the residual risk acceptable? *Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?*
		Will all elements of the Prescribed Fire Plan be met? *Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources*
		Will all internal and external notifications and media releases be completed? *Hints: Preparedness level restrictions*
		Will key agency staff be fully briefed and understand prescribed fire implementation?
		Are there any other extenuating circumstances that would preclude the successful implementation of the plan?
		Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?
		Other:

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

Project Name: _____

Unit Name: _____

ELEMENT 2: PRESCRIBED FIRE GO/NO-GO CHECKLIST

	YES	NO
A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist., if YES go to item B.		
B. If YES have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If YES proceed with checklist below, if NO STOP.		

YES	NO	QUESTIONS
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results

_____ _____

Burn Boss Date

Project Name: _____

Unit Name: _____

ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY

PRESCRIBED FIRE NAME			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape			
2. The number and dependence of activities			
3. Off-site Values			
4 On-Site Values			
5. Fire Behavior			
6. Management organization			
7. Public and political interest			
8. Fire Treatment objectives			
9 Constraints			
10 Safety			
11. Ignition procedures/ methods			
12. Interagency coordination			
13. Project logistics			
14 Smoke management			

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	
CONSEQUENCES	
TECHNICAL DIFFICULTY	
SUMMARY COMPLEXITY DETERMINATION	
RATIONALE:	

Project Name: _____

Unit Name: _____

ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA

A. Physical Description

1. Location**:**
2. Size:
3. Topography:
4. Project Boundary:

B. Vegetation/Fuels Description:

1. On-site fuels data
2. Adjacent fuels data

C. Description of Unique Features:

ELEMENT 5: GOALS AND OBJECTIVES

A. Goals:

B. Objectives:

1. Resource objectives:
2. Prescribed fire objectives:

ELEMENT 6: FUNDING:

A. Cost:

B. Funding source:

Project Name: _____

Unit Name: _____

ELEMENT 7: PRESCRIPTION

A. Environmental Prescription:

B. Fire Behavior Prescription:

ELEMENT 8: SCHEDULING

A. Ignition Time Frames/Season(s):

B. Projected Duration:

C. Constraints:

ELEMENT 9: PRE-BURN CONSIDERATIONS

A. Considerations:

1. On Site:

2. Off Site

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):

C. Notifications:

Project Name: _____

Unit Name: _____

ELEMENT 10: BRIEFING

Briefing Checklist:

- ☐ Burn Organization
- ☐ Burn Objectives
- ☐ Description of Burn Area
- ☐ Expected Weather & Fire Behavior
- ☐ Communications
- ☐ Ignition plan
- ☐ Holding Plan
- ☐ Contingency Plan
- ☐ Wildfire Conversion
- ☐ Safety

ELEMENT 11: ORGANIZATION AND EQUIPMENT

A. Positions:

B. Equipment:

C. Supplies:

Project Name: _____

Unit Name: _____

ELEMENT 12: COMMUNICATION

A. Radio Frequencies

1. Command Frequency(s):

2. Tactical Frequency(s):

3. Air Operations Frequency(s):

B. Telephone Numbers:

ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL

A. Safety Hazards:

B. Measures Taken to Reduce the Hazards:

C. Emergency Medical Procedures:

D. Emergency Evacuation Methods:

E. Emergency facilities:

ELEMENT 14 TEST FIRE

A. Planned location:

B. Test Fire Documentation:

1. Weather conditions On-Site:

2. Test Fire Results:

Project Name: _____

Unit Name: _____

ELEMENT 15: IGNITION PLAN

A. Firing Methods:

B. Devices:

C. Techniques:

D. Sequences:

E. Patterns:

F. Ignition Staffing:

ELEMENT 16: HOLDING PLAN

A. General Procedures for Holding:

B. Critical Holding Points and Actions:

C. Minimum Organization or Capabilities Needed:

ELEMENT 17: CONTINGENCY PLAN

A. Trigger Points:

B. Actions Needed:

C. Additional Resources and Maximum Response Time(s):

Project Name: _____

Unit Name: _____

ELEMENT 18: WILDFIRE CONVERSION

A. Wildfire Declared By:

B. IC Assignment:

C. Notifications:

D. Extended Attack Actions and Opportunities to Aid in Fire Suppression:

ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY

A. Compliance:

B. Permits to be Obtained:

C. Smoke Sensitive Areas/Receptors:

D. Impacted Areas:

E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:

ELEMENT 20: MONITORING

A. Fuels Information (forecast and observed) Required and Procedures:

B. Weather Monitoring Required and Procedures:

C. Fire Behavior Monitoring Required and Procedures:

D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:

Project Name: _____

Unit Name: _____

E. Smoke Dispersal Monitoring Required and Procedures:

ELEMENT 21: POST-BURN ACTIVITIES

Post-burn Activities That Must be Completed:

Project Name: _____

Unit Name: _____

APPENDICES

A. Maps: Vicinity and Project

B. Technical Review Checklist

C. Complexity Analysis

D. Job Hazard Analysis

E. Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)

Project Name: _____

Unit Name: _____

A: MAPS

1. Vicinity Map:

Project Name: _____

Unit Name: _____

2. Project Map:

Project Name: _____

Unit Name: _____

C. TECHNICAL REVIEWER CHECKLIST

PRESCRIBED FIRE PLAN ELEMENTS:	S /U	COMMENTS
1. Signature page		
2. GO/NO-GO Checklists		
3. Complexity Analysis Summary		
4. Description of the Prescribed Fire 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, Medical		
14. Test Fire		
15. Ignition Plan		
16. Holding Plan		
17. Contingency Plan		
18. Wildfire Conversion		
19. Smoke Management and Air Quality		
20. Monitoring		
21. Post-burn Activities		
Appendix A: Maps		
Appendix B: Complexity Analysis		
Appendix C: JHA		
Appendix D: Fire Prediction Modeling Runs		
Other		

S = Satisfactory **U = Unsatisfactory**

Recommended for Approval: **Not Recommended for Approval:**

_____ _____ _____

Technical Reviewer Qualification and currency (Y/N) Date

☐ **Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.**

Project Name: _____

Unit Name: _____

C: COMPLEXITY ANALYSIS

Project Name: _____

Unit Name: _____

D. JOB HAZARD ANALYSIS

Project Name: _____

Unit Name: _____

E. FIRE BEHAVIOR MODELING DOCUMENTATION OR EMPIRICAL DOCUMENTATION

APPENDIX E, PART 19, BAAQMD APPLICATION FOR PILE BURNING

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000
Fax # (415) 928-0338
24-Hour Burn Status Recording (800) 792-0787

REGULATION 5
OPEN BURNING

NOTIFICATION FORM "C"

HAZARD REDUCTION FIRES

Please Print Legibly **BURNER AND BURN SITE INFORMATION**

Property Owner(s): Date:
Location (Street Address): Tel: ( )
City: County: Planned burn dates:
Name of Person Setting the Fire if different:

SPECIFIC TYPE(S) OF MATERIAL TO BE BURNED

Natural Vegetation Cleared From Around Buildings or Structures: (PRC Section 4291-related)	Quantity: ( ) Yd^3 or ( ) Tons
Natural Vegetation Cleared From Other Areas on Property: (Unrelated to PRC Section 4291)	Quantity: ( ) Yd^3 or ( ) Tons

Fires must be set or allowed by the public fire official having jurisdiction. Compliance with Regulation 5 does not relieve a person of the responsibility to know and comply with any other applicable rule, regulation, or law governing the use of fire.

BURN AUTHORIZATION (if required by local fire agency)

Authorizing Public Fire Official: Tel: ( )
Title: Date Authorized:
Authorizing Fire Agency:

Emergency Waivers (This section should only be completed by an authorizing public fire official to grant an emergency waiver, pursuant to Regulation 5-404.)

☐ 5-401.6 Hazardous Material – See Regulation 5 for definition.

Authorizing Public Fire Official: Tel: ( )

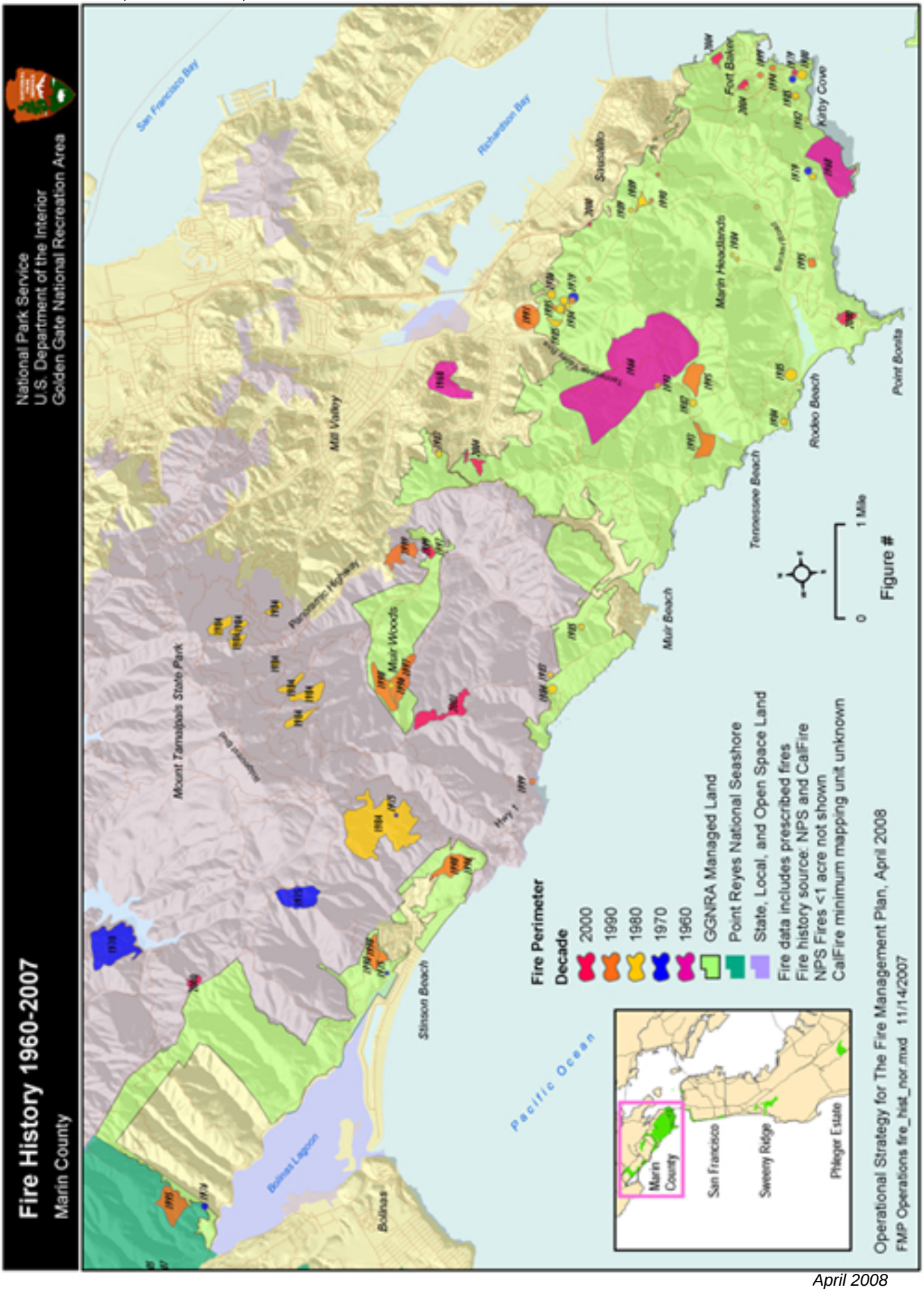
*This notification form is **not** an application for a permit. The District does **not** require a permit in order to burn. You are required to notify the District prior to burning by submitting this form. You will **not** receive a response.*

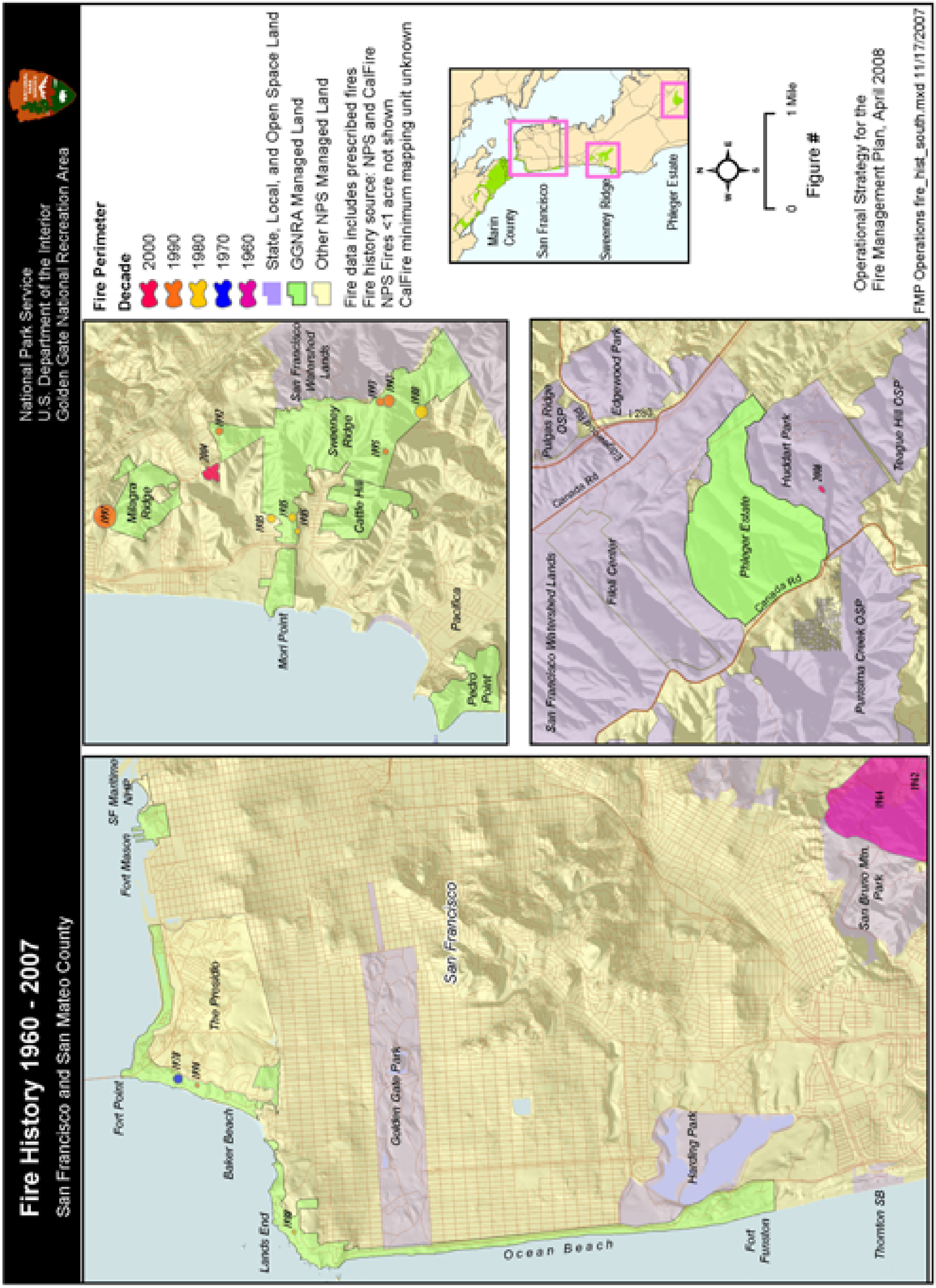
By submitting this notification, I understand and acknowledge the restrictions set forth for a Hazardous Material fire as defined in BAAQMD Regulation 5-208, "Hazardous Material."

Name: Date:

SEE BACK OF FORM FOR INSTRUCTIONS

APPENDIX E, PART 20, FMU MAPS OF PAST AND PROPOSED FMP PROJECTS




Fire History 1960 - 2007
San Francisco and San Mateo County
National Park Service
U.S. Department of the Interior
Golden Gate National Recreation Area
Fire Perimeter
Decade
2000
1990
1980
1970
1960
State, Local, and Open Space Land
GGNRA Managed Land
Other NPS Managed Land
Fire data includes prescribed fires
Fire history source: NPS and CalFire
NPS Fires <1 acre not shown
CalFire minimum mapping unit unknown
Marin County
San Francisco
Sweeney Ridge
Phleger Estate
0
1 Mile
Figure #
Operational Strategy for the
Fire Management Plan, April 2008
FMP Operations fire_hist_south.mxd 11/17/2007
Lands End
Baker Beach
Fort Point
The Presidio
Fort Mason
SF Maritime NHP
Golden Gate Park
San Francisco
Ocean Beach
Fort Funston
Thornton SB
Harding Park
San Bruno Mtn. Park
Mori Point
Milagra Ridge
Sweeney Ridge
Cattle Hill
San Francisco Watershed Lands
Pacifica
Pedro Point
San Francisco Watershed Lands
Pulgas Ridge OSP
Edgewood Park
Canada Rd
Filoli Center
Phleger Estate
Huddart Park
Teague Hill OSP
Purisima Creek OSP
Canada Rd

APPENDIX E, PART 21, IGNITION INDEX & FUEL HAZARD RATING WILDAND RESOURCE MANAGEMENT, INC., LSA ASSOCIATES, 2007.

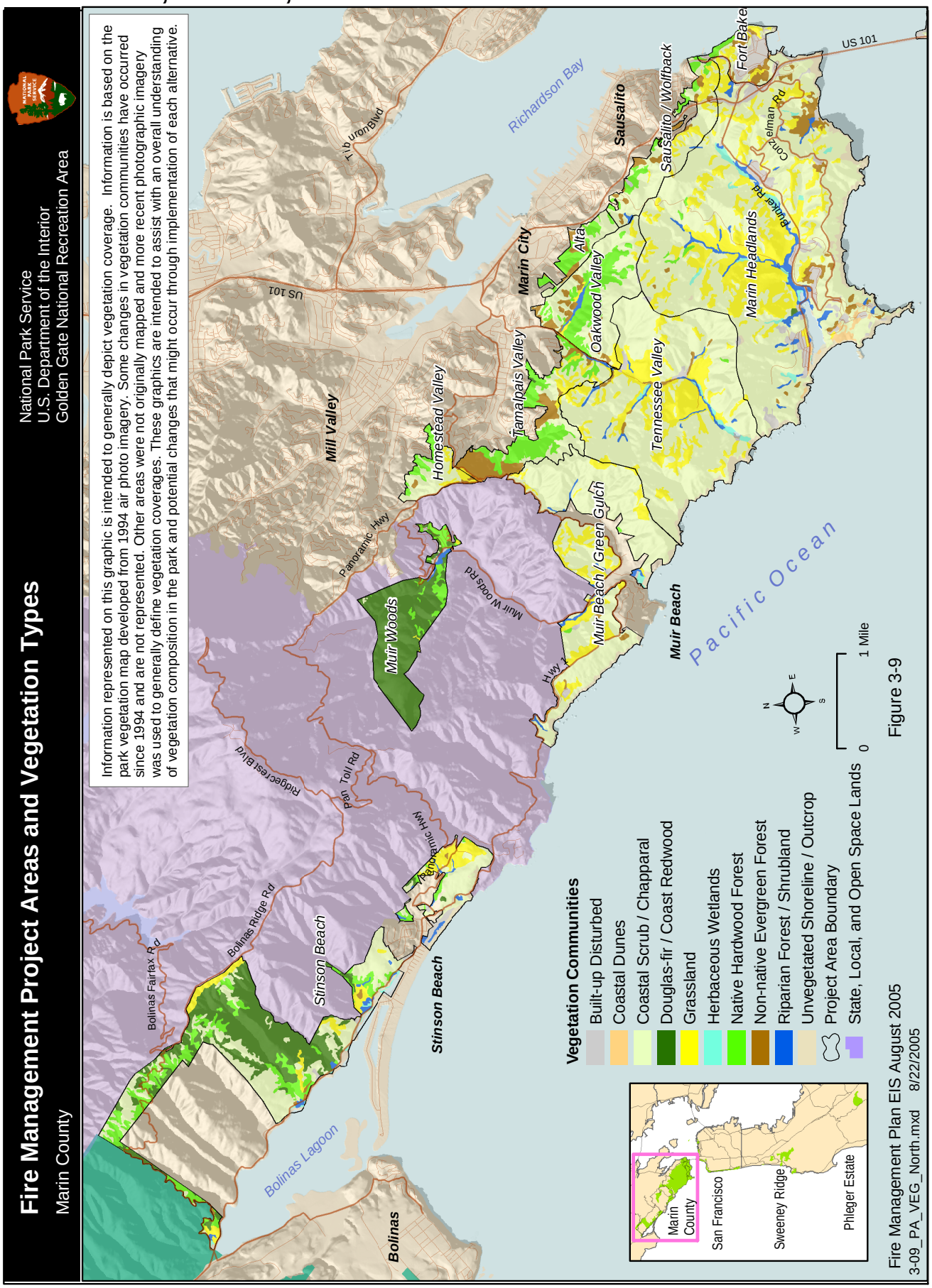
Vegetation Type	Fuel Hazard Rating (low, moderate, high, extreme)	Ignition Index (1 to 10; 1 is easy to ignite)	Key Resource Considerations	Potential Fuel Treatments	Treatment Cycle
Grassland and Herbaceous Vegetation					
Coastal Prairie Serpentine bunchgrass California Annual Grassland Ruderal Vegetation	Moderate	1 to 2	• Special status plants • Special status animals • Ground nesting birds • Native perennial grasslands • Serpentine grassland • Control of ruderal vegetation	• Hand labor • Grazing (goats) • Prescribed burn • Mechanical (mowing of open fields and roadsides).	1 to 3 years
Scrub Vegetation					
Maritime Chaparral	Extreme	6	• Sensitive plant community • Pallid manzanita • Obligate seeders • Nesting special status birds	• Hand labor • Grazing (goats) • Prescribed burn • Mechanical (mosaic thinning with small equipment to cut selected shrubs) • Chemical (Direct application of Garlon 4 limited to eucalyptus stumps)).	5 to 7 years
North Coast Scrub (Xeric and Mesic)	Xeric – Extreme Mesic – High	Xeric – 4 Mesic – 8	• Nesting special status birds • Alameda whipsnake	• Hand labor • Mechanical (knock down shrubs or cut off tops)	3 to 7 years
Coyote Brush Scrub	High	4	• Special status nesting birds • Alameda whipsnake	• Hand labor • Mechanical (knock down shrubs or cut off tops)	3 to 7 years

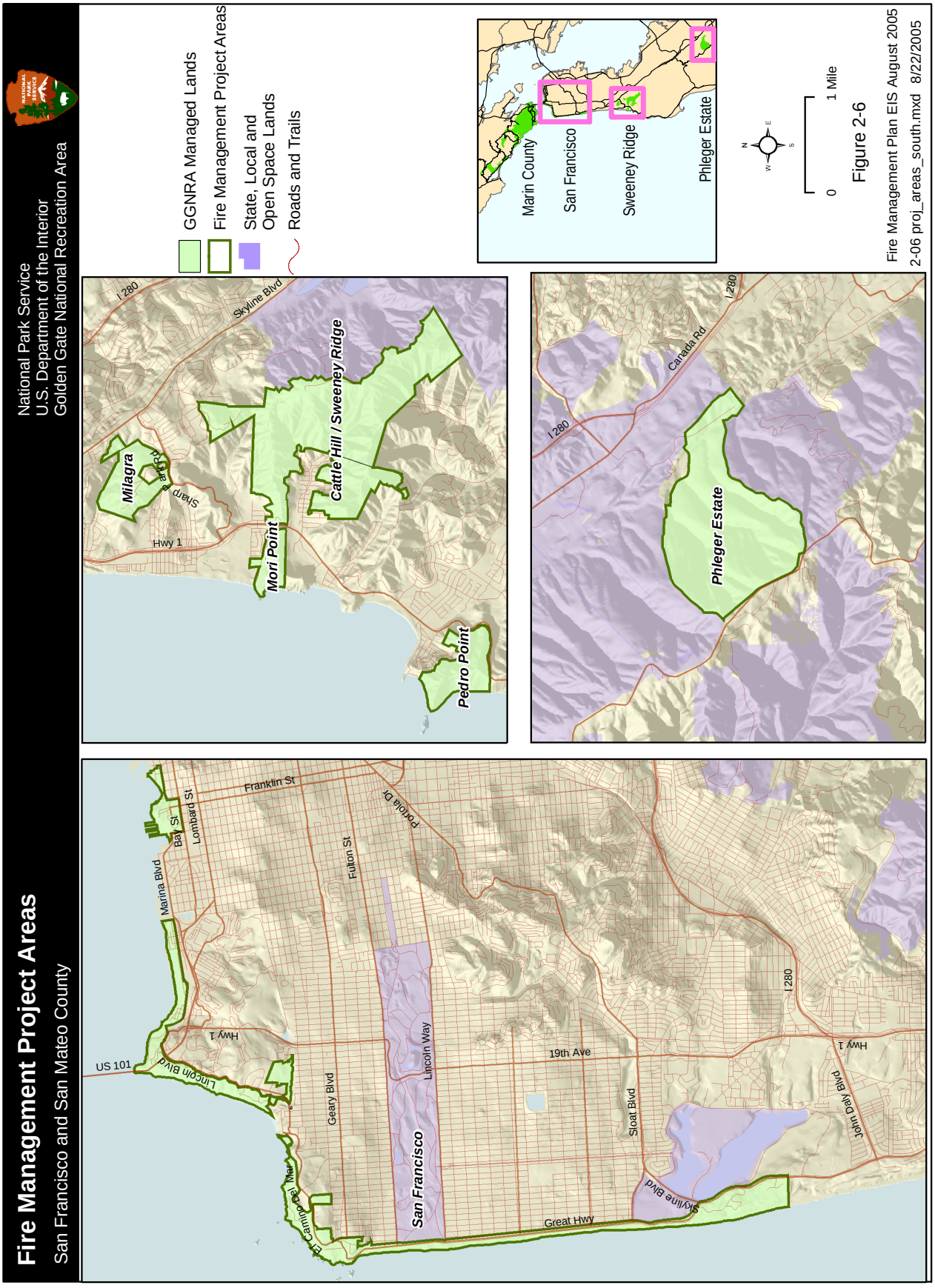
Vegetation Type	Fuel Hazard Rating (low, moderate, high, extreme)	Ignition Index (1 to 10; 1 is easy to ignite)	Key Resource Considerations	Potential Fuel Treatments	Treatment Cycle
Broom Scrub	High	6	• Alameda whipsnake • Control of non-native perennials	• Hand labor • Grazing (goats) • Prescribed burn • Mechanical (cut broom prior to seed production) • Chemical (Direct application of Garlon 4 for French broom).	Annually
Woodlands and Forest					
Mature Eucalyptus Forest (over 5 years old)	High	1	• Nesting raptors • Wintering monarch butterflies • Hummingbirds winter food source • Native understory trees & shrubs	• Hand labor • Prescribed burn • Mechanical (tree removal) • Chemical (Garlon 4 directly applied to stump to reduce resprouts).	5 to 7 years
Young Eucalyptus Forest	HIgh	2	• Intermixed native species (shrubs & trees)	• Hand labor • Prescribed burn (other methods required to prepare stand) • Mechanical (removal of tree stumps • Chemical (Garlon 4 directly applied to stump to reduce resprouts).	2 to 3 years
Mature Monterey Pine Forest	Moderate to High	2	• Native understory trees and shrubs • Raptor nesting	• Hand labor • Grazing (goats) • Prescribed burn (other methods required to prepare stand) • Mechanical (tree removal)	3 to 10 years

Vegetation Type	Fuel Hazard Rating (low, moderate, high, extreme)	Ignition Index (1 to 10; 1 is easy to ignite)	Key Resource Considerations	Potential Fuel Treatments	Treatment Cycle
Young Monterey Pine Forest (under 20 years old)	High	2	• Native shrubs and trees	• Hand labor • Prescribed burn (other methods required to prepare stand) • Mechanical (tree removal)	2 to 3 years
Oak – Bay Woodland	Low	6 to 8	• Special status plants • Animal species of special concern • Nesting special status birds and raptors	• Hand labor • Grazng (cattle, goats) • Prescribed burning(other methods required to prepare stand) • Mechanical (small equipment to cut selected shrubs and remove brush)	3 to 10 years
Redwood Forest	Low	8	• Raptor nesting	• Hand labor • Prescribed burning(other methods required to prepare stand) • Mechanical (small equipment to cut selected shrubs and remove brush)	10 – 15 years
Riparian Woodland	Low	8	• Regulatory restrictions • Special status species (e.g. steelhead, San Francisco dusky-footed woodrat, California red-legged frog) • water quality, e.g., erosion and sediment • Streams and water bodies which provide aquatic habitat	• Hand labor	10 to 15 years

Source: LSA Associates, Inc. Wildland Resource Management, Inc. 2007

APPENDIX E, PART 22, GGNRA FMU VEGETATION MAPS




Fire Management Project Areas
San Francisco and San Mateo County
National Park Service
U.S. Department of the Interior
Golden Gate National Recreation Area
GGNRA Managed Lands
Fire Management Project Areas
State, Local and Open Space Lands
Roads and Trails
Marin County
San Francisco
Sweeney Ridge
Phleger Estate
0
1 Mile
Figure 2-6
Fire Management Plan EIS August 2005
2-06 proj_areas_south.mxd 8/22/2005
Milagra
Cattle Hill / Sweeney Ridge
Mori Point
Pedro Point
Phleger Estate
I 280
Skyline Blvd
Sharp Park
Hwy 1
Canada Rd
Franklin St
Bay St
Lombard St
Marina Blvd
Lincoln Blvd
US 101
Fulton St
Portola Dr
Geary Blvd
Lincoln Way
19th Ave
Sloat Blvd
Skyline Blvd
Great Hwy
John Day Blvd
El Camino Del Mar
San Francisco