

**Post-Cedar Fire
Ecosystem and Rare Plant Impact Survey
2004**

**Santa Ysabel Ranch Open Space Preserve
East Ranch**

Prepared For

**The Nature Conservancy
San Diego County Field Office**

**The County of San Diego
Department of Parks and Recreation**

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By

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Summary

California Department of Forestry BAER (Burned Area Emergency Response) maps show the portion of the East Ranch that was burned as having 76%+ vegetation mortality just weeks after the fire. Woody shrub vegetation (mainly chaparral) was the most seriously affected by the fire. The herbaceous layer was recovering though local biodiversity of the herb layer may be threatened by the prolific germination of non-native grasses following the fire. The vegetation types most seriously affected include: chaparral, Engelmann oak, mixed oak/coniferous/bigcone Douglas fir/Coulter pine forest, and black oak woodland/forest. Wetlands in the Santa Ysabel Creek valley and Santa Ysabel creek were more severely affected by illegal cattle grazing.

Many of the Coulter pines that burned had already died or were dying from the pine bark beetle. Only the outer bark and lower branches of the larger broadleaf trees appeared to be burned. Many of the burned branches were resprouting. Mortality to the larger trees appeared to be low.

One rare plant (*Monardella nana leptosiphon*) suffered significant population loss and another rare plant (*Thermopsis californica semota*) benefited from the fire. Population size of *Thermopsis* increased through rhizomatous sprouting and/or seed germination. Prolific growth of non-native grasses often surrounded areas of more severe burns (where nothing but shrub stumps are visible). Areas where the fire burned cooler and faster (on the edges of the more severely burned areas) may have resulted in actually stimulating germination of the non-native grasses. Erosion on the steeper, burned slopes was occurring and soils in these areas were unstable. Illegal cattle grazing exacerbated the fire damage by accelerating erosion on steep slopes and possibly adversely affecting remaining populations of *Monardella nana leptosiphon* which is found on the steeper slopes. Cattle also damaged wetlands, Santa Ysabel creek and the streambank. A noxious weed (*Cirsium vulgare*) was observed in a former high quality wetland. The wetland had been burned then grazed and used extensively for “wallowing” in by the cattle. The combination of the fire damage and the cattle activity has adversely affected the East Ranch. The East Ranch was previously recovering from 75 years of grazing activity and at least two previous fires prior to the Cedar Fire.

Introduction

After acquisition of the Edwards Ranch by The Nature Conservancy, the East Ranch was recovering from 75 years of grazing activity and at least two previous fires prior to the 2003 Cedar fire (Figure 1; *note paper figures attached*)

In October and November 2003, devastating fires raged through Southern California. An estimated 300,000 + acres were burned in the “Cedar Fire” in San Diego County. This was a firestorm that played by its own rules, not those of the many “fire models” familiar to fire-fighters. Approximately one-third of the East Ranch of the Santa Ysabel Preserve was burned in the Cedar Fire. The West Ranch did not burn. This report records general observations related to the recovery of the East Ranch from the fire.

California Department of Forestry BAER maps show the portion of the East Ranch that was burned as having 76%+ vegetation mortality just weeks after the fire (Figure 2 a, b, c).

Methods

Surveys were conducted on the East Ranch. The West Ranch did not burn. Surveys were conducted through the week of June 14- June 19, 2004. Only burned areas were visited. Surveys were conducted by vehicle and on foot. Areas surveyed are indicated on the enclosed maps (Figures 3, 4, 5).

Observations were made regarding:

- species recolonizing the burned areas
- fire effects on the Plant Species of Interest on the East Ranch
- fire effects on the sensitive habitats on the East Ranch
- plant communities affected by the fire
- new plant species observed since the fire
- native and non-native grass response to the fires
- fire effects on old growth trees
- fire effects on the Engelmann oak which is a dominant in some areas on the East Ranch
- erosion
- impacts exacerbated by the presence of large cattle on the East Ranch

Results and Discussion

General Observations

Woody shrub vegetation was the most seriously affected by the fire. The herbaceous layer was recovering though local biodiversity of the herb layer may be threatened by the prolific germination of non-native grasses following the fire. The vegetation types most seriously affected include: chaparral, Engelmann oak (*Quercus engelmannii*), mixed oak (*Quercus* spp.)/coniferous (*Pinus*, *Calocedrus*) /bigcone Douglas fir (*Pseudotsuga macrocarpa*)/Coulter pine (*Pinus coulteri*) forest, and black oak (*Quercus kelloggii*) woodland/forest. Wetlands in the Santa Ysabel Creek valley and Santa Ysabel creek were more severely affected by illegal cattle grazing.

Most of the Coulter pines on the east and southeast portion of the East Ranch burned (Figures 3 & 5). Many of these were dead or dying from the western pine bark beetle. Bigcone Douglas fir populations were also reduced. Of those populations revisited, estimated at about 50 trees, about half were severely burned. Only the outer bark and lower branches of the larger broadleaf trees (coast live oak (*Quercus agrifolia*), canyon live oak (*Quercus chrysolepis*), and sycamore (*Platanus racemosa*) appeared to be

burned. Many of the burned branches were resprouting. Mortality to the larger trees appeared to be lower.

One rare plant (*Monardella nana leptosiphon*) suffered significant population loss and another rare plant (*Thermopsis californica semota*) benefited from the fire. Population size of *Thermopsis* increased through rhizomatous sprouting and/or seed germination. Prolific growth of non-native grasses often surrounded areas of more severe burns (where nothing but shrub stumps are visible) leading one to hypothesize that where the non-native grasses were growing the most prolifically may have been in areas where the fire burned cooler and faster resulting in actually stimulating germination of these species. Erosion on the steeper, burned slopes was occurring and soils in these areas were unstable. Illegal cattle grazing exacerbated the fire damage by accelerating erosion on steep slopes and possibly adversely affecting remaining populations of *Monardella nana leptosiphon* which is found on the steeper slopes. Cattle also damaged wetlands, Santa Ysabel creek, and the streambank. A noxious weed (*Cirsium vulgare*) was observed in a former high quality wetland. The wetland had been burned then grazed and used extensively for "wallowing" in by the cattle. The combination of the fire damage and the cattle activity has adversely affected the East Ranch. The East Ranch was previously recovering from 75 years of grazing activity and at least two fires previous to the Cedar fire (Figure 1).

Species Recolonizing the Burned Areas

(^N indicates new species not observed before the fire; * indicates a non-native species):

South and Western Portion of the East Ranch (Figure 3)

Species observed recolonizing the burned areas from resprouts and/or seed in this portion of the ranch include:

chamise (*Adenostoma fasciculatum*), buckwheat (*Eriogonum fasciculatum*), spiny redberry (*Rhamnus crocea*), white sage (*Salvia apiana*), chaparral whitethorn (*Ceanothus leucodermis*), saw-tooth goldenbush (*Hazardia squarrosa grindelioides*), Eastwood manzanita (*Arctostaphylos glandulosa*), poison oak (*Toxicodendron diversilobum*), basket bush (*Rhus trilobata*), acourtia (*Acourtia microcephala*), cryptantha (*Cryptantha* spp.), capitate gilia (*Gilia capitata*)^N, camissonia (*Camissonia hirtella*), caterpillar phacelia (*Phacelia cicutaria hispida*), wild heliotrope (*Phacelia distans*), Parry's phacelia (*Phacelia parryi*), branched phacelia (*Phacelia ramosissima latifolia*), white chaenactis (*Chaenactis artemisiifolia*)^N, yellow pincushion (*Chaenactis glabriuscula glabriuscula*), slender wild oat (*Avena barbata*)*, nemacladus (*Nemacladus rubescens*)^N, scarlet larkspur (*Delphinium cardinale*)^N, blessed thistle (*Cnicus benedictus*)*, slender sunflower (*Helianthus gracilentus*), slope semaphore (*Mimulus brevipes*), whispering bells (*Emmenanthe penduliflora*)^N, stinging lupine (*Lupinus hirsutissimus*), scarlet bugler (*Penstemon centranthifolius*), California peony (*Paeonia californica*), Coulter's snapdragon (*Antirrhinum coulterianum*), Fremont's monkeyflower (*Mimulus fremontii*)^N, splendid mariposa lily (*Calochortus splendens*), and Weed's mariposa lily (*Calochortus weedii*).

On one burned east-facing slope, hundreds of *Calochortus* flowering stems had been clipped and eaten. Based on the tracks and scat present, this was most likely due to mule deer (*Odocoileus hemionus*) that may have been displaced from the valley by the

cattle. The display would have been spectacular if this had not happened and possibly new *Calochortus* species would have been discovered.

The Outcrops (Figures 3 & 4)

Species observed recolonizing the burned areas from resprouts and/or seed in this portion of the ranch include:

scrub oak (*Quercus berberidifolia*), chamise (*Adenostoma fasciculatum*), spiny redberry (*Rhamnus crocea*), holly-leaf cherry (*Prunus ilicifolia ilicifolia*), white sage (*Salvia apiana*), chaparral whitethorn (*Ceanothus leucodermis*), bush monkeyflower (*Mimulus aurantiacus*), elderberry (*Sambucus mexicana*), saw-tooth goldenbush (*Hazardia squarrosa grindelioides*), California peony (*Paeonia californica*), wild cucumber (*Marah macrocarpus macrocarpus*), lotus (*Lotus* sp.), clover (*Trifolium* sp.), Parish's nightshade (*Solanum parishii*), poison oak (*Toxicodendron diversilobum*), acourtia (*Acourtia microcephala*), cryptantha (*Cryptantha* spp.), granny's hairnet (*Pterostegia drymarioides*), camissonia (*Camissonia hirtella*), phacelia (*Phacelia brachyloba*)^N, caterpillar phacelia (*Phacelia cicutaria hispida*), wild heliotrope (*Phacelia distans*), branched phacelia (*Phacelia ramosissima latifolia*), bee plant (*Scrophularia californica floribunda*), shiny lomatium (*Lomatium lucidum*), cardinal catchfly (*Silene laciniata major*), western wallflower (*Erysimum capitatum capitatum*), leafy daisy (*Erigeron foliosus foliosus*), downy monkey flower (*Mimulus pilosus*), Nuttall's snapdragon (*Antirrhinum nuttallianum nuttallianum*), our-lord's-candle (*Yucca whipplei*), wild blue hyacinth (*Dichostemma capitatum capitatum*), Weed's mariposa lily (*Calochortus weedii*), foxtail chess (*Bromus madritensis rubens*)* and cultivated sunflower (*Helianthus annuus*)^N.

Calochortus flowering stems were also clipped in this burned area.

Burned North, Northeast, Northwest Slopes Above Santa Ysabel Creek (Figure 5)

chamise (*Adenostoma fasciculatum*), mountain mahogany (*Cercocarpus betuloides betuloides*), snowberry (*Symphoricarpos mollis*), scrub oak (*Quercus berberidifolia*), spiny redberry (*Rhamnus crocea*), white sage (*Salvia apiana*), chaparral whitethorn (*Ceanothus leucodermis*), saw-tooth goldenbush (*Hazardia squarrosa grindelioides*), California peony (*Paeonia californica*), Eastwood manzanita (*Arctostaphylos glandulosa*), poison oak (*Toxicodendron diversilobum*), basket bush (*Rhus trilobata*), acourtia (*Acourtia microcephala*), wild cucumber (*Marah macrocarpus macrocarpus*), lotus (*Lotus* sp.), clover (*Trifolium* sp.), cryptantha (*Cryptantha* spp.), camissonia (*Camissonia hirtella*), caterpillar phacelia (*Phacelia cicutaria hispida*), branched phacelia (*Phacelia ramosissima latifolia*), Nuttall's snapdragon (*Antirrhinum nuttallianum nuttallianum*), , goldenrod (*Solidago californica*), slender sunflower (*Helianthus gracilentus*), stinging lupine (*Lupinus hirsutissimus*), splendid mariposa lily (*Calochortus splendens*), and Weed's mariposa lily (*Calochortus weedii*). foxtail chess (*Bromus madritensis rubens*)* slender wild oat (*Avena barbata*)*

Mugwort (*Artemisia douglasiana*) was dominant on a few steep, north-facing slopes which is atypical for it. It was not growing in a lowland, near a creek or otherwise wet area.

Fire Effects on the Plant Species of Interest on the East Ranch

Ranks are those listed by the California Department Fish and Game, California Natural Diversity Database, Special Plants List, October 2003.

PREFIRE CONDITION = **Prefire**
POSTFIRE CONDITION = **Post Fire**

Bitter Gooseberry *Ribes amarum*

CNDDDB lists subspecies *hoffmannii*, but Jepson submerges this into species.

No state or federal status

CNPS List-3

Prefire: Habitat and/or plant community where found: riparian woodland understory along Santa Ysabel Creek. *Notes:* Uncommon along SY Creek.

Postfire: Plants were relocated and no damage observed

Caraway-leaved Gilia *Gilia (Saltugilia) caruifolia*

No state or federal status

CNPS-List 4

Prefire: Habitat and/or plant community where found: opening in chaparral and within outcrops. *Notes:* Uncommon in openings in chaparral

Postfire: No plants observed. Plants were observed by the author growing in new burns in Julian (Kentwood in the Pines) and the Laguna Mountains 2003 and 2004.

Cleveland Sage *Salvia clevelandii*

No longer listed by NDDDB

Prefire: Habitat and/or plant community where found: chamise chaparral

Postfire: Estimated 100 plants burned based on areas surveyed and resprouting was evident. *Salvias* are fire-adapted plants and this population should recover.

Descanso (San Diego) milkvetch *Astragalus oocarpus*

No state or federal status

CNPS List-1B

Prefire: Habitat and/or plant community where found: grassy understory of scrub/Engelmann oak. *Notes:* Large patch found dead in 2002. Confirmed dead in 2003. Infrequently, patches occur.

Postfire: New location for plants was discovered. It is not thought existing locations on the East Ranch were affected by the fire therefore these sites were not visited.

Engelmann Oak *Quercus engelmannii*

No state or federal status

CNPS List-4

PreFire: Habitat and/or plant community where found: forms its own large plant community. Notes: Dominant species on both Ranches

Postfire: Approximately 70 % of the observed Engelmann oaks showed severe to moderate impacts. This loss can be considered significant.

Jewelflower *Caulanthus heterophyllus heterophyllus*

Taxonomic conundrum at present.

Synonymous with *Streptanthus heterophyllus* (Rollins)

Considered to be synonymous with *Caulanthus stenocarpus* (Buck-Jepson Manual)

Caulanthus stenocarpus is considered to be synonymous with *Caulanthus lasiophyllus lasiophyllus* (Rollins)

Caulanthus heterophyllus has been split into two subspecies: *heterophyllus* and *pseudosimulans* (Buck).

C. h. pseudosimulans is listed by CNDDDB with no status (January 2003).

Prefire: Habitat and/or plant community where found: openings in chaparral or within outcrops Notes: Uncommon; occurs in openings at boulder/chaparral interface. Estimated number of plants prior to the fire was at four locations was 115.

Postfire: Estimated dead fruiting plants observed was 90. Germination of *Caulanthus heterophyllus* seed is induced by fire (Keeley et. al. 1998). Other species of *Caulanthus* are also positively affected by fire. *Caulanthus amplexicaulis var. barbara* also benefits from fire (Danielson 1993).

Kern's Brodiaea *Brodiaea terrestris kernensis*

Not listed by CNDDDB

Prefire: Habitat and/or plant community where found: matchweed meadow, mixed wildflower /non-native grassland, native grassland, wet meadow and drainages (Kanaka Flats). Total estimate on whole ranch is thousands of plants.

Postfire: No flowering plants were observed in the Santa Ysabel creek valley area (seen in the hundreds there in 2003) but an estimated 200 flowering plants were observed on Kanaka Flats.

Long-spined Spineflower *Chorizanthe polygonoides longispina*

No state or federal status

CNPS List-1B

Prefire: Habitat and/or plant community where found: in the road next to junegrass-bluegrass "pebble plain" growing on Julian schist. Very few plants

Postfire: No plants relocated.

Mountain pink currant *Ribes nevadense*

Not listed by CNDDDB

Prefire: Habitat and/or plant community where found: riparian woodland understory along Santa Ysabel Creek; uncommon.

Postfire: Plants were relocated and no damage observed

Palomar monkeyflower *Mimulus (diffusus) palmeri*
M. diffusus has been submerged into *M. palmeri* (Thompson-Jepson Manual)
No state or federal status
CNPS List-4

Prefire: Habitat and/or plant community where found: opening in chaparral and within outcrops. about 50 plants found in single patch; outcrops in Engelmann oak/chaparral

Postfire: no plants relocated

San Diego Gumplant *Grindelia hirsutula hallii*
No state or federal status
CNPS-List 1B

Prefire: Habitat and/or plant community where found: meadows, wet areas, grasslands, dirt roads, disturbed areas, native and non-native grasslands, ruderal areas; more common on the East Ranch

Postfire: Plants in the Santa Ysabel creek valley suffered impacts most likely from vehicle access as these plants grow in the dirt roads. This species is common on the East Ranch and serious impacts are not expected.

San Felipe Monardella *Monardella nana leptosiphon*
No state or federal status
CNPS List-1B

Prefire: Habitat and/or plant community where found: mountain mahogany and white sage chaparral on the edge of mixed/oak coniferous forest; scattered patches located in mountain mahogany/chamise chaparral. Prefire population estimate was 500 plants.

Postfire: All populations were in the fire. Impacts from cattle trampling and possible grazing could affect recovery of populations. Estimated population size was 115 plants.

Western Azalea *Rhododendron occidentale*
Not listed by CNDDDB

Prefire: Habitat and/or plant community where found: oak riparian woodland along creek; three plants found on preserve thus far.

Postfire: All three plants were relocated and showed no signs of fire damage though impact from illegal cattle grazing is highly possible. Cattle had grazed and were grazing adjacent to all three plant locations.

Wright's Hymenothrix *Hymenothrix wrightii*
No state or federal status
CNPS List-4

Prefire: Habitat and/or plant community where found: matchweed meadow and native grassland (three-awn); locally dominant to co-dominant species in three-awn and matchweed meadow; widely distributed on East Ranch.

Postfire: Populations in the Santa Ysabel Creek Valley were not affected but two populations of three on the eastern edge of the Kanaka Flats area were eliminated either through direct burning or vehicle access. In these specific areas the soil was charred, loose and vegetation recovery had not begun. Cattle activity was evident in these areas.

Yellow (Velvety) False Lupine *Thermopsis californica semota*
No state or federal status
CNPS List-1B

Prefire: Habitat and/or plant community where found: patch of non-native grass within white sage/buckwheat "scrub"; only one small patch was located with approximately 100 plants.

Postfire: This species appears to have benefited from the fire. In the area where the population was burned and an adjacent area, an estimated 1500 vegetative plants were observed. Prior to the fire, this population occurred within an area where there was a predominance of white sage. The genus *Salvia* is known to have an allelopathic affect on adjacent vegetation (Barbour et. al 1999). Removal of the white sage by the fire may have also facilitated increased germination and regrowth of *Thermopsis* by removing allelopathic substances in the soil and removing the shrub canopy

Thermopsis macrophylla angina, another rare species of *Thermopsis* that occurs in the Santa Ynez Mountains near Santa Barbara responds positively to fire through rhizomatous resprouting and heat-simulated germination of refractory seed (Borchert 1989). This study also found that this species relies on seed production by resprouts to maintain a significant amount of seed in the seed bank. They also determined the interfire period is critical in the life history of the population biology of the species. "Recruits that survive both the interfire period and the next fire show marked increases in stem production, seed output, and survivorship." Other species of *Thermopsis* resprout from rhizomes following fire. There is a possibility the eastern species, *Thermopsis mollis* responds in the same manner including the germination of fire-scarred buried seed (USFS 2004).

Fire Effects on the Sensitive Habitats on the East Ranch

The "Dudleya rock garden" (*Dudleya edulis*) was discovered in 2003 on outcrops that rise above Highway 79 across from the Inaja Memorial Rest Area. Plants were large and vigorous with many flowering in 2003. Thousands of Dudleyas occurred in this area growing on and within the fissures and cracks of the granitic outcrops:

approximately 50% of the dudleya "garden" was destroyed from the fire. There was limited recovery observed of the remaining plants whose leaf tips were brown and curled

Santa Ysabel Creek and floodplain, and associated riparian habitat and wetlands, including all tributaries:

minimally affected by the fire but impacts from cattle have exacerbated the impacts and include grazing of wetland vegetation, trampling and “wallowing”. Native wetland vegetation within the creek had been grazed and the streambank was damaged. One of the highest quality wetlands in Santa Ysabel creek valley had been grazed and “wallowed” in and the native rushes, sedges and native wet meadow grass (*Hordeum brachyantherum californicum*) were being displaced by the noxious weed, bull thistle (*Cirsium vulgare*).

"Perched wetlands" associated with seeps, occurring on upper slopes of the preserve:

Impact from the fire was probably minimal but seep of high value on the upper slope of the north and east section of the East Ranch had also suffered cattle damage similar to above.

"Pocket wetlands" or isolated wetlands that did not appear to be associated with any above-ground (i.e. visible) water source:

due to the limits of this survey, these sites were not checked but serious damage is not expected and these may be ephemeral locations dependent on precipitation and surface water.

Kanaka Flats wetlands:

impacts from fire were minimal but impacts from cattle were evident.

All drainages and seeps on the preserve, some of which occur in the outcrops at the higher elevations:

due to the limits of this survey, these sites were not checked but serious damage is not expected and these may be ephemeral locations dependent on precipitation and surface water. Annual and perennial flora associated with these outcrops may have been affected.

Native grasslands: Nodding and purple needlegrass (*Nassella cernua* and *purpurea*, respectively) and three-awn (*Aristida purpurea longiseta*) grasslands/meadows occurred frequently on the East Ranch, most often as patches or locally dominant stands. Other native grasses occur on the East Ranch as well:

no severe impacts from the fire are expected to the native grasses and of those populations burned, recovery was high. Non-native grasses are a more serious threat to these species than the fire and the non-native grasses may have increased their range on the East Ranch as a result of the fire. In high quality wetlands in the Santa Ysabel creek valley, the native wet meadow grass (*Hordeum brachyantherum californicum*) was being displaced by the noxious weed, bull thistle (*Cirsium vulgare*).

Plant Communities Affected by the Fire

The shrub layer suffered the greatest impacts from the fire. The herb layer will recover though non-native grasses seemed to have benefited from the fire. Engelmann oak mortality is estimated at 30%, big-cone Douglas fir trees were seriously affected as were

Coulter pines and all pines in the burn areas. Like Coulter pine, big cone Douglas fir has a restricted range and naturally occurring populations are not known outside of S. California. Julian is the southern-most edge of its range. During surveys in 2002, a small burned area was located (“waypoint 65”) and it appeared as if it had burned more recently than the data from the California Department of Forestry indicated (CDF, FRAP database) which as of 2002, was in 1940 (Figure 1). Many of the same species as those listed above were observed in this area but this area also included the largest stand of bigcone Douglas fir we had found on the preserve (we estimated about 20 trees). The d.b.h. (diameter at breast height) of these young trees was very similar (15-20 cm d.b.h.) leading us to conclude that quite possibly these were trees that germinated after the fire.

Reports of fire ecology for this species are mixed but bigcone Douglas fir is generally not favored by fires, especially repeated fire. Repeated fire kills bigcone Douglas-fir (McDonald, no date, USFS 2004, Minnich 1980) and their seeds are also killed from fire (USFS 2004, Minnich 1980). Minnich (1980), reports that long distance seed dispersal by wind may not be efficient because the seeds are heavy. Reproduction may also be inhibited by the lack of shade due to the combustion of canyon live oak. He found that reproduction occurred in the least disturbed habitats free of fire for 50 years. Resprouting and seedling development does occur (Little 1992, McDonald, no date and USFS 2004) but generally postfire regeneration can take decades (USFS 2004). It may be prudent to protect all remaining populations from fire as part of an overall forest management plan (Sproul 2001).

Of the plant communities observed during the surveys, the following ratings were issued. Note these are ratings that estimate % burn prior to recovery based on charred wood still present, soil color and condition, and adjacent burned vegetation.

Impact Level: Low—10% or less of ecosystem burned
 Moderate—10-50% of ecosystem burned
 High—greater than 50% of ecosystem burned

Plant Community	Impact level
Forests and Woodlands	
Mixed Oak/Coniferous/Bigcone Fir/Coulter Pine	M-H
<i>Coniferous Forest Types</i>	
Bigcone Douglas Fir (<i>Pseudotsuga macrocarpa</i>)	M-H
Coulter Pine (<i>Pinus coulteri</i>)	H
Incense Cedar (<i>Calocedrus decurrens</i>)	M
<i>Oak Woodland/Forest Types</i>	
Mixed Oak Woodland/Forest	M-H
Black Oak (<i>Quercus kelloggii</i>) Woodland/Forest	M-H

Coast live oak (<i>Quercus agrifolia</i>) woodland/forest	M
Engelmann Oak (<i>Quercus engelmannii</i>) woodland/savanna	H
Golden cup oak (<i>Quercus chrysolepis</i>)	M
Woodland herb-no types	H

Shrub-dominated Communities

Chamise (<i>Adenostoma fasciculatum</i>)	H
Mixed-Montane Chaparral	H
Scrub oak (<i>Quercus berberidifolia</i>) dominated chaparral	H
White sage (<i>Salvia apiana</i>) dominated chaparral/scrub	H
Mountain mahogany (<i>Cercocarpus betuloides</i>)	H
Matchweed (<i>Gutierrezia sarothrae</i>)	M
Matchweed-California Buckwheat (<i>Eriogonum fasciculatum polifolium and fasciculatum</i>)	M
Matchweed-Wright's Eriogonum (<i>Eriogonum wrightii membranaceum</i>)	M
Matchweed-Three Awn (<i>Aristida purpurea longiseta</i>)-Buckwheat	L-M

Wetland

More serious damage to wetlands has occurred from illegal cattle grazing since the fire greatly affecting recovery of these areas and local hydrology.

Wetland-Riparian herbaceous	M
Pacific Rush (<i>Juncus effusus pacificus</i>)	M
Pondweed (<i>Lemna minuscula</i>)	L
Sedge Meadow	M
Mixed Wet Meadow	M
Kanaka Flats Alluvial Drainages	L-M
Seep or "perched wetlands"	M
Ponds	L

Riparian

Coast Live Oak Riparian Woodland	L
White Alder (<i>Alnus rhombifolia</i>) forest	L
Willow scrub	L

Upland Herbaceous Communities

Native grassland Junegrass (<i>Koeleria macrantha</i>)/One-sided Bluegrass (<i>Poa secunda secunda</i>)	M
Melica (<i>Melica imperfecta</i>) grassland (Forms locally dominant stands).	M
Needlegrass (<i>Nassella cernua</i>)	M
Giant Stipa (<i>Achnatherum coronatum</i>)	M-H
Deergrass (<i>Muhlenbergia rigens</i>)	M-H
Blue Wild Rye (<i>Elymus glaucus glaucus</i>)	M-H
Squirreltail (<i>Elymus elymoides</i>)	M-H
Native Grassland (Needlegrass)/Wildflower Meadow	M
Three Awn Grassland (<i>Aristida purpurea longiseta</i>)	L-M
Non-native grassland	H
Non-native Grassland/Wildflower Meadow	H
Ruderal/Non-native grassland	H
Wildflower Meadow	H
Ruderal/Agricultural	H

Disturbed

Exotic Plants	M-H
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New Plant Species Observed Since the Fire

The following new species were observed: white chaenactis (*Chaenactis artemisiifolia*)^N, scarlet larkspur (*Delphinium cardinale*)^N, whispering bells (*Emmenanthe penduliflora*)^N, capitate gilia (*Gilia capitata*)^N, Fremont's monkeyflower (*Mimulus fremontii*)^N, nemacladus (*Nemacladus rubescens*)^N, phacelia (*Phacelia brachyloba*)^N, and cultivated sunflower (*Helianthus annuus*)^N.

Native and Non-native Grass Response to the Fires

Non-native (annual) grasses are the 'wave' of the future if fire frequency continues to increase. The combination of repeated fires, drought, and increased development under the umbrella of climate change makes type conversions from native ecosystems to non-native weedy ones highly likely.

It has been clearly documented that repeated fires favor the establishment of non-native weedy grasses such as cheatgrass (*Bromus tectorum*), ripgut (*Bromus diandrus*), soft chess (*Bromus secundus*), foxtail chess (*Bromus madritensis rubens*) and wild oat (*Avena* spp.), (Minnich and Scott, no date, AllReference, no date, USDA 1999, UC Davis 1992, BLM 2001, D'Antonio and Haubensak 1998, Bossard et. al. 2000). Annual grasses also compete for resources needed by native grasses and other native species (D'Antonio and Haubensak 1998, Schierenbeck et. al. 1998, Dudley 1998, Kemp and Brooks 1998, Gerlach et. al. 1998, and Bossard et. al. 2000).

Isolated stands of native *Nassella* were observed in the burn areas primarily as resprouts. Native grasslands appeared to be fully recovering.

Non-native grasses did not occur in the areas where the burn seemed to be the most severe, possibly killing the seed bank. Non-native grasses were prolific in areas around the most severely burned sites. In many of these places, non-native grass species occurred there prior to the fire so no extreme shifts of the distribution of these species on the Ranch were observed. As mentioned above, a greater threat is as a result of the prolific postfire germination of the non-native grasses, they may encroach even more upon remaining native plant habitats.

Species observed were: cheatgrass (*Bromus tectorum*), ripgut (*Bromus diandrus*), soft chess (*Bromus secundus*), foxtail chess (*Bromus madritensis rubens*) and wild oat (*Avena barbata*).

Fire Effects on Old Growth Trees

Species of old growth trees on the East Ranch primarily include: coast live oak, a few Engelmann oak and sycamore. Old growth coast live oak and sycamores were observed that suffered some impacts but mainly to the bark and lower branches and many of these trees were resprouting. Mortality of old growth from the fires appeared to be low.

Fire Effects on the Engelmann Oak--a dominant plant community on the East Ranch

Estimated mortality of the Engelmann oak based on the areas visited were 30% of the Engelmann oak were killed in the fire, 40% were burned but were resprouting either from the crown or from the branches and 30% remained unburned. Of the oak tree species, Engelmann oak suffered the most damage and mortality from the fire. All other oak species (mostly coast live oak trees observed) appeared to have only their lower limbs and outer bark burned and mortality appeared to be lower with these species. Similarly, other live oak tree species attain greater height and the crown of these trees was rarely burned. The Engelmann oak appeared to be at the height limit of the fire based on the fire scars seen on the bark of the taller oak trees.

Engelmann oak inhabits the smallest range of any oak tree in the southwestern U.S. (Scott 1990). Scott cites observations by others that Engelmann oak hybrids (x scrub oak) survive fire and drought more frequently than the pure species. Large numbers of hybrid Engelmann oaks were observed on the East and West Ranches of the preserve. Whether they show greater survivorship from the fires requires further investigation and was not part of this survey. Scott cites evidence that Engelmann oak seedlings subjected to fire survive at a higher rate than live oak seedlings. Lathrop (1990) reports that 40 of 42 burned Engelmann oak saplings recovered by resprouting but mortality was then suffered from dehydration. This changes when one compares Engelmann oak to mature live oaks. Engelmann oaks have thinner bark and are less resistant to fire than those oak species that have thicker bark. Live oaks often resprout from the trunk and branches after fire. Scott mentions that the heat of brush fires can kill Engelmann oaks down to the root crown even when the bark is not charred. This may affect the distribution of Engelmann on a regional scale.

Erosion

Soil was darkened following the fire and less stable. Slopes of 20% or greater that had been burned with most of the vegetation burned were extremely unstable for walking on and slippage occurred easily while walking on these slopes. All the north and northeast/west slopes above Santa Ysabel Creek (on the Julian 7.5" topo, Figure 5) were severely affected by cattle and cattle traffic had significantly loosened and accelerated erosion on these slopes.

A fire line was bulldozed from Santa Ysabel Creek up a slope of 30% or higher. The county has installed erosion fencing at this site and it appears to be effective. The road is being allowed to revegetate naturally according to the rangers.

In other areas where erosion fencing has been installed, it has been effective.

Impacts Exacerbated by the Presence of Large Cattle on the East Ranch

It was not anticipated that this report would require a category of this type but upon arriving to conduct the surveys, a herd of extremely large cattle (Angus?) was found on the preserve and they had done extensive damage. Based on how widely distributed and old the "cow patties" were, it was obvious the cattle had been grazing there illegally for at least a month or longer. The combination of fire and cattle activity can hinder the recovery of an area from fire and this was evident during our surveys.

Cattle exacerbated the following:

- increased erosion on the steeper slopes
- possible assistance in extirpating postfire populations of *Monardella nana leptosiphon*
- streambank erosion on Santa Ysabel Creek
- degradation of wetlands in the valley
- possible displacement of deer from preferred grazing sites

These ecosystems were in the process of recovering from cattle activity since the acquisition of the preserve but have now been "set-back" yet again and without

precipitation and strict protective measures from grazers and non-native noxious grasses, a type conversion from native to non-native ecosystems may occur.

The oaks need a chance to regenerate but with the illegal grazing and possible deer browsing, this may not be possible. Lathrop and Osborne found in a study they conducted at the Santa Rosa Plateau that mortality among Engelmann oak seedlings was 82% when grazing was allowed and 32% when cattle were excluded. "Frequency and density comparisons of oak age/size categories with respect to grazing regime suggest cattle profoundly limit seedling survival on grazed areas within the Santa Rosa Plateau." Their study also found that deer graze on oak seedlings. Other causes of mortality to seedling oaks were drought, rodents, and insects. Drought played a significant role in seedling mortality.

Cattle have and continue to play a critical role in ecosystem management. If timed correctly and strictly monitored, cattle can help control non-native grasses and even the fire danger they present (Pavlik et. al.) but if this not done, they can do serious damage to ecosystems including eating seedlings of young oak trees and compacting soil (Pavlik et.al).

Conclusion

Cattle should be removed then kept off of the preserve so that fire-impacted ecosystems can recover. The Engelmann oak population may drop on the East Ranch so all precautions to protect seedlings should be taken which further reinforces the need to remove the cattle from the preserve. Non-native grasses may have increased their local range on the East Ranch. Wetlands were damaged severely by cattle with the subsequent invasion of a noxious thistle, bull thistle. This thistle should be removed from this wetland area as soon as possible. Portions of the Santa Ysabel creekbed were damaged from cattle and the native wetland vegetation grazed. Weeds often follow this activity.

Conifers are all but eliminated from the East Ranch. The bigcone Douglas fir population may have dropped by 50% and the population on the preserve was not large to begin with (an estimated 100 trees?).

Overall, the East Ranch is recovering from the fires but some permanent changes in species composition are likely (native herbaceous flora displaced by increased non-native grasses, loss of conifers on the east side, some loss of big- cone Douglas fir, *Mondardella* population declines, and Engelmann oak declines). Wetlands in the valley are threatened primarily from illegal grazing activity.

Global warming which is causing extreme climate change may result in permanent changes in precipitation levels thereby prolonging the "drought". This could favor the spread of non-native grasses. The proliferation of these species can continue the fire cycle and cause permanent type conversions of native vegetation to non-native vegetation and thereby permanently affect local biodiversity.

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