Revised

Framework Resource Management Plan for the Greater Crestridge Ecological Reserve Complex









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List of Acronyms

CBI	Conservation Biology Institute
CDFW	California Department of Fish and Wildlife
CER	Crestridge Ecological Reserve
DA	Davison Preserve
EDI	Earth Discovery Institute
EHC	Endangered Habitats Conservancy
F-RMP	Framework Resource Management Plan
GCER	Greater Crestridge Ecological Reserve
GI	Gibson Preserve
I-8	Interstate 8
KE	Kemerko Preserve
MI	Michelsen Preserve
MSCP	Multiple Species Conservation Plan
MSP	Management Specific Plan
MSPA	Management Specific Planning Area
MU	Management Unit
NAFHA	North American Field Herpetology Association
NCCP	Natural Community Conservation Plan
NWR	San Diego National Wildlife Refuge
OD	Odom Preserve
SANDAG	San Diego Association of Governments
SC	South Crest Preserve
SDMMP	San Diego Management and Monitoring Program
TNC	The Nature Conservancy
UL	Ulrich Preserve
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey



Introduction

The Conservation Biology Institute (CBI), partnering with AECOM under a grant from the San Diego Association of Governments (SANDAG), and in consultation with the Wildlife Agencies, San Diego Management and Monitoring Program (SDMMP), and Endangered Habitats Conservancy (EHC), developed a Framework Resource Management Plan (F-RMP) for the Greater Crestridge Ecological Reserve complex (GCER complex) (CBI and AECOM 2017). In this document, we revise the F-RMP to add two additional preserves: Odom and Davison.

The F-RMP aligns preserve-level management and monitoring with the regional Management and Monitoring Strategic Plan (MSP) for conserved lands in San Diego County (SDMMP 2013, SDMMP and TNC 2017). The 2013 MSP focused on management goals and objectives for prioritized species, vegetation communities, and threats. The 2017 MSP Roadmap (MSP Roadmap) expands on the 2013 document by including monitoring and additional species, vegetation communities, and threats such as invasive species, connectivity, and fire elements derived, in part, from other regional planning documents such as the Connectivity Monitoring Strategic Plan (SDMMP 2011) and Invasive Plant Strategic Plan (CBI et al. 2012).

The GCER complex is within an approved Natural Community Conservation Plan (NCCP) – the San Diego Multiple Species Conservation Plan (San Diego MSCP). The MSP Roadmap does not replace existing NCCP obligations or requirements. Rather, it provides a framework for prioritizing, funding, and managing species and vegetation communities on conserved lands in western San Diego County. Priorities, goals, and objectives in the MSP Roadmap are advisory and meant to be consistent with the intent of regional plans, but there may be preserve-level management concerns and NCCP obligations not addressed in the MSP Roadmap that are still important to fulfill (SDMMP and TNC 2017). In preparing the F-RMP, we used the MSP Roadmap to help determine whether any significant occurrences of species occur within the complex, and reviewed the regional goals and objectives for species, vegetation communities, and threats/stressors to develop complex-specific goals, objectives, and implementation tasks.

The F-RMP guides management and monitoring of the GCER complex and will be added to over time. Plan development included (1) identifying priority threats for immediate management action, (2) identifying habitats, priorities, and timelines for focused surveys for MSP priority species,^{1,2} (3) developing area-specific management directives (ASMDs) and a structure for

¹ MSP species include MSCP covered species plus additional species covered or proposed for coverage under other NCCPs in San Diego County (e.g., Quino checkerspot butterfly, Hermes copper butterfly).

² SDMMP prioritizes species for management based on risk of loss and management focus (SDMMP 2013, SDMMP and TNC 2017). In this document, 'MSP priority species' require species-focused management or management of vegetation characteristics.

adding to the plan over time in an adaptive fashion as more is learned about the complex and as new properties are added with preserve build- out, and (4) identifying opportunities to coordinate management between preserves to maximize effectiveness and cost-efficiency.

1 Geographic Setting and Regional Ecological Significance

1.1 Location and Regional Context

The GCER complex is located in south-central San Diego County (Figure 1), at the northern end of Management Unit (MU) 3 of the Management Strategic Planning Area (MSPA) for western San Diego County (Figure 2). The complex is south of the Crestridge Ecological Reserve (CER). The California Department of Fish and Wildlife (CDFW) owns CER while EHC manages CER. We did not include CER in the F-RMP because it has an existing (draft) Habitat Management and Monitoring Plan (CBI and EHC 2009). Nonetheless, EHC manages the GCER complex and CER as a single unit.³

MU3 supports one of the largest cores (Core V) of conserved lands in the MSPA (SDMMP and TNC 2017). The GCER complex and CER are located between conserved lands of the El Capitan Reservoir to the north (Core M) and San Diego National Wildlife Refuge (NWR) to the south (primarily Core U) (Figure 3). Thus, the complex and CER link conserved lands in MUs 3 and 4 and connect populations of MSP species across a large urban matrix within the unincorporated area of the County of San Diego (Figures 2, 3). Core and linkage designations in Figure 3 update earlier designations (Ogden 1996, SDMMP 2011) to consider the broader landscape context of western San Diego County and adjacent areas (SDMMP and TNC 2017).

Interstate-8 (I-8) and La Cresta Road form the northern complex boundary, Mountain View and Dehesa roads form the southern boundary, and Harbison Canyon Road forms the eastern boundary. These roads present major connectivity challenges between conserved lands.

1.2 Preserve Complex Description

This F-RMP addresses 1,699 acres in the GCER complex, including seven properties (preserves) owned and managed by EHC: the South Crest, Michelsen, Odom, and Ulrich preserves south of the community of Crest (South, 1275 ac) and the Kemerko, Gibson, and Davison preserves on Harbison Ridge east of the community of Crest (East, 424 ac) (Table 1, Figure 4). EHC may add additional conserved lands to this F-RMP in the future. The South and East areas of the complex are disjunct and differ somewhat in topography, soils, fire history, and land use (Appendix B).

³ In this document, the terms 'GCER complex' or 'complex' refer to the preserves covered in this F-RMP.





Figure 1. Greater Crestridge Ecological Reserve Complex Location.





Figure 2. Relationship of Greater Crestridge Ecological Reserve Complex to Surrounding Conserved Lands.



Greater Crestridge Ecological Reserve Complex Framework Management Plan



Figure 3. Biological Cores and Linkages.



Preserve	Acres	Land Owner	Land Manager
South Crest (South)	576.9	EHC	EHC
Michelsen (South)	91.6	EHC	EHC
Ulrich (South)	93.3	EHC	EHC
Odom (South)	512.8	EHC	EHC
Gibson (East)	254.2	EHC	EHC
Kemerko (East)	130.3	EHC	EHC
Davison (East)	40.3	EHC	EHC
Total	1,699.4		

Table 1. Preserve Acreage and Responsible Entities.

The complex is topographically diverse, with steep slopes, rocky ridges and peaks, flat to gently sloping areas, and several ephemeral drainages (Figures 5a,b). More than half the slopes are greater than 30 percent (%), including Dehesa Peak on South Crest and Odom. South Crest and Odom include the steep, south-facing slopes north of Dehesa Road, the Dehesa Mountain ridgeline, relatively level terrain in the center of the preserves, and gentle to steep slopes in the north and northwest. Michelsen includes steep northeast-facing slopes and a northwest to southeast-trending drainage along its eastern boundary. Ulrich supports undulating, rocky terrain and a north-south oriented drainage along its eastern boundary. Gibson is dominated by a northwest-southeast trending ridgeline. Kemerko supports steep slopes in the north and east, relatively level terrain below, and an unnamed drainage along the southwestern boundary. Davison includes relatively flat to steeply sloping terrain.

Soils are largely granitic, although gabbroic soils occur on South Crest, Michelsen, Odom, Kemerko, Gibson, and a small corner of Davison, and clay soils occur on South Crest and Odom. Gabbroic and clay soils support rare and endemic plant species. Acid igneous rock land covers about half the Gibson Preserve and most of Davison, and occurs on South Crest and Kemerko (Figures 6a,b).

Most of the complex lies within the Sweetwater River watershed, with only the northwest corner of South Crest and northern portion of Davison in the San Diego watershed (Figure 7). There are no mapped blueline streams on most of the preserves; an unnamed, blueline drainage has its uppermost terminus on Davison. In addition, intermittent drainages on South Crest, Ulrich, and Kemerko receive some urban runoff.

Fire frequency is highest on the South preserves, possibly due to the presence of Dehesa Road as an ignition source. Since 1940, CalFire has recorded 15 fire events on the South preserves compared to 5 fire events on the East preserves (California Department of Forestry and Fire



Greater Crestridge Ecological Reserve Complex Framework Management Plan



Figure 4. Preserves within the Greater Crestridge Ecological Reserve Complex.





Figure 5a. South Preserves: South Crest, Michelsen, Ulrich, and Odom.





Figure 5b. East Preserves: Gibson, Kemerko, and Davison.





Figure 6a. Soils on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).



Greater Crestridge Ecological Reserve Complex Framework Management Plan



Figure 6b. Soils on the East Preserves (Gibson, Kemerko, and Davison).





Figure 7. Hydrology within and surrounding the Greater Crestridge Ecological Reserve Complex.

Protection [CalFire] 2014). Both the 1970 Laguna and 2003 Cedar fires burned the South preserves almost entirely. Most of the East preserves burned in 1940 and the 1970 Laguna Fire, but only small areas burned in the 2003 Cedar Fire or other recent fires.

For the most part, preserves within the complex have not received widespread or intensive use. Exceptions include (1) off-highway vehicle activity on central South Crest (known locally as Skeleton Flats) prior to EHC acquisition in the mid- to late 2000s and (2) vegetation clearing on Ulrich (possibly for fuel breaks or utility construction) in the mid-1900s prior to EHC acquisition. All preserves except Michelsen support a well-developed network of roads and trails. San Diego Gas & Electric (SDG&E) maintains powerlines and dirt access roads on and adjacent to South Crest, Odom, and Kemerko. CalFire maintains Suncrest Boulevard through South Crest as emergency egress for the community of Crest.

Authorized land uses within the complex include management, monitoring, and stewardship activities, road maintenance, powerlines (Odom, Kemerko), scientific research, and volunteer and educational activities (e.g., seed collection, invasive plant control, photomonitoring, field trips). While public use of the GCER complex is not encouraged, recreational uses (e.g., hiking, dog walking, mountain biking, equestrians) occur where there is precedence, such as long-term use by neighbors on South Crest, Odom, and Ulrich. These uses are expected to continue on the South preserves unless monitoring indicates adverse impacts to biological or cultural resources (Sections 4.1, 4.2, 4.3, 4.7). No public access is planned for the East preserves at this time, although we have observed evidence of OHVs, hiking, biking, and old fire pits.

1.3 Regional Ecological Significance

Summary of Key Biological Resources

The South preserves support large core areas of coastal sage scrub that form part of an essential north-south steppingstone linkage (Lakeside Archipelago) for California gnatcatchers (*Polioptila californica californica*) and other coastal sage scrub birds. Foraging golden eagles (*Aquila chrysaetos canadensis*) also use this habitat. The complex supports a geographically important population of Quino checkerspot butterfly (*Euphydryas editha quino*) and potentially, Hermes copper butterfly (*Lycaena hermes*) in the central portion of San Diego County. Mule deer (*Odocoileus hemionus fuliginata*) and mountain lions (*Puma concolor*) move through the complex regularly, between the CER and NWR, and a western burrowing owl (*Athene cunicularia hypugaea*) observation represents one of the few recent sightings of this species between Otay Mesa and Ramona. Native grasslands support key populations of several endemic plant species, including a core population of Dehesa nolina (*Nolina interrata*), a species that occurs in only four other conserved locations within the county, and one of the easternmost

populations of variegated dudleya (*Dudleya variegata*). Grasslands provide foraging habitat for northern harriers (*Circus cyaneus*), along with other raptors and American badgers. San Diego thornmint (*Acanthomintha ilicifolia*) occurs on gabbroic soils on South Crest (and previously, on Odom); this population may differ genetically from more coastal populations (CNLM 2014). The South preserves also support a large population of Parry's tetracoccus (*Tetracoccus dioicus*).

The East preserves are the only location, aside from CER, El Cajon Mountain, and Barona Valley/Wildcat Canyon, that supports Lakeside ceanothus (*Ceanothus cyaneus*) as a dominant component of the chaparral. Harbison Ridge dominates the East preserves and is a documented corridor for large mammals, birds, insects, and plant dispersal (e.g., CBI 2002, WTI 2009). It also supports an Encinitas baccharis (*Baccharis vanessae*) population that is significant due to its size, inland position, and location between occurrences on Otay Mountain to the south and Iron Mountain to the north. Oak woodlands are not common, but occur adjacent to the complex along a tributary to Harbison Creek in Harbison Canyon, and likely provide habitat for nesting raptor species that may forage onsite. Scattered Engelmann oaks (*Quercus engelmannii*) occur on the East preserves, and rock outcrops provide nesting habitat for bats.

Relationship to Management Unit and Regional Goals and Objectives

The GCER complex supports coastal sage scrub, grasslands, and MSP species that are priorities for management within MU3, and connects other conserved lands within and beyond the management unit. The complex will contribute to MU3 goals and objectives by conserving, maintaining, and restoring habitat, and by implementing species-specific monitoring and management objectives identified in the MSP Roadmap (SDMMP and TNC 2017).

Table 2 lists MSP Roadmap regional or MU3 goals (SDMMP and TNC 2017) that are relevant to the GCER complex and addressed in this plan. Table 3 lists MSP Roadmap local (preserve) and regional objectives that are relevant to the complex and addressed in this plan (SDMMP 2013, SDMMP and TNC 2017), along with their location and implementation status within the complex. Implementation of MSP Roadmap objectives at the local level is the responsibility of the land manager. EHC may contribute to regional-level objectives by direct participation or by allowing researchers or other investigators access to preserve lands.

Although not specifically called out as regional objectives in the MSP Roadmap, studies conducted on South Crest to develop Best Management Practices (BMPs) for *Brachypodium* control (SANDAG Environmental Mitigation Program [EMP] grants 5001965 and 5004735) and Dehesa nolina augmentation (SANDAG EMP grant 5001763) have applicability elsewhere in the MSPA. South Crest lands are also included in a regional study to assess soils for edaphic endemic plants under a local assistance grant (LAG) from CDFW (CBI 2018).



Goals, objectives, and actions in the MSP Roadmap that are relevant to the GCER complex are detailed under Area Specific Management Directives (ASMDs, Section 4), as are additional, preserve-specific goals, objectives, and actions identified during development of this document.



Category	Regional or Management Unit Goal ^{1,2}	Preserves ³
Vegetation	<i>Coastal sage scrub</i> : Enhance and restore coastal sage scrub that supports or has the potential to support Vegetation Focus (VF) species (Blainville's horned lizard, California gnatcatcher, golden eagle, black-tailed jackrabbit) to increase their resilience to environmental stochasticity and catastrophic disturbances and long-term persistence (>100 years).	
	<i>Grassland</i> : Enhance and restore native grasslands that support or potentially-support VF species (grasshopper sparrow) and incidentally benefit other species (e.g., Quino checkerspot, burrowing owl, American badger) to increase their resilience to environmental stochasticity and long-term persistence (>100 years).	SC, MI, OD
Species	<i>San Diego thornmint</i> : Maintain and enhance populations or pollinator habitat to buffer against environmental stochasticity, maintain genetic diversity, and promote connectivity to enhance long-term resilience (>100 years).	
	<i>Encinitas baccharis</i> : Maintain large occurrences to increase resilience to environmental and demographic stochasticity, maintain genetic diversity, and ensure long-term persistence (>100 years).	GI, DA
	<i>Variegated dudleya</i> : Maintain large populations to increase resilience to environmental stochasticity, maintain genetic diversity and ensure long-term persistence (>100 years).	SC, MI, OD
	<i>Dehesa nolina</i> : Maintain populations to increase resilience to environmental stochasticity, maintain genetic diversity and ensure long-term persistence (>100 years).	SC, MI, OD
	<i>Parry's tetracoccus</i> : Maintain populations on Las Posas soils in chaparral to increase resilience to environmental and demographic stochasticity, maintain genetic diversity, and improve long-term persistence (>100 years).	SC, MI, OD
	<i>Quino checkerspot butterfly</i> : Protect, restore, and enhance Quino checkerspot habitat in current and historically occupied sites and landscape connections in "Possible Future" Recovery Units to create resilient occurrences and allow for potential reintroduction to ensure long-term persistence (>100 years).	SC
	<i>Golden eagle</i> : Manage scrublands intermixed with open patches to increase prey (especially jackrabbits) for foraging to ensure long-term persistence (>100 years) in the MSPA.	SC, MI, OD

Table 2. Management Strategic Plan (MSP) Goals Relevant to the Greater Crestridge Ecological Reserve Complex.



Category	Regional or Management Unit Goal ^{1,2}	Preserves ³
Altered Fire Regime	<i>Fire management</i> : Maintain the long-term integrity and viability of ecosystems, MSP species, and vegetation communities on Conserved Lands in a cost effective manner by returning the current human altered fire regime to a more natural fire regime, with lower fire frequency and reduced impacts (direct and indirect) to natural resources.	All
Connectivity	<i>Connectivity</i> : Ensure the persistence of species across the preserve system and preserve ecosystem functions across the landscape.	All
Invasive Plants	<i>Invasive plants</i> : Eradicate, control, or manage invasive species that are detrimental to the long-term viability of MSP species on conserved lands or are markedly increasing the costs of species and/or vegetation management needed to meet MSP goals and objectives.	All
Urban Development	<i>Urban edge</i> : Reduce urban edge effects where they are negatively affecting the long-term viability of MSP species on conserved lands or markedly increasing the costs of species and or vegetation community management to meet MSP goals and objectives.	UL, KE

Table 2. Management Strategic Plan (MSP) Goals Relevant to the Greater Crestridge Ecological Reserve Complex.

¹ Table includes only regional or management unit goals applicable to the GCER complex.

² Management Unit 3 goals are provided where available; in all other cases, goals are regional. Wording of goals is tailored to the GCER complex.

³ Preserves: All = goal is relevant to all GCER preserves; SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom, GI = Gibson, KE = Kemerko, DA = Davison.



Tunal	$\mathbf{S} = 1 \mathbf{a}^2$	MSD Objective ³	South ^{4,5}				East ^{4,5}		
туре	Scale Misr Objective		SC	MI	UL	OD	GI	KE	DA
ISV	Local	Conduct baseline surveys ⁶ - San Diego thornmint, Encinitas baccharis, Dehesa nolina, variegated dudleya, Parry's tetracoccus	С	С	С	0	С	С	С
IMG	Local	Inspect occurrences and conduct routine management - San Diego thornmint, Encinitas baccharis, Dehesa nolina, variegated dudleya, Parry's tetracoccus	0	0		0	0		0
		Implement priority management actions - Dehesa nolina, variegated dudleya	IP						
FSP	Local	Implement pre- and post-fire strategic plan actions, as applicable - Quino checkerspot butterfly, Encinitas baccharis, Dehesa nolina, golden eagle, Blainville's horned lizard, coastal sage scrub (and associated VF species)	NS	NS	NS	NS	NS	NS	NS
ISV	Regional	Conduct baseline surveys - Burrowing owl	NS			NS			
		Conduct coastal sage scrub surveys - Coastal California gnatcatcher	NS			NS			
BMPs	Regional	Develop Best Management Practices - Grasslands	C						
GN	Regional	Conduct genetic studies - San Diego thornmint	C						
RS	Regional	Soils studies - San Diego thornmint, Dehesa nolina, Parry's tetracoccus	С	С		С			
SB	Regional	Establish a seed bank - Quino checkerspot butterfly (host and larval plants), San Diego thornmint, Lakeside ceanothus, variegated dudleya, Dehesa nolina, Parry's tetracoccus	NS NS NS NS NS	 NS NS NS	 	 NS NS NS	 NS 	 NS 	 NS

Table 3.	Management Strategic Plan (MSP) Objectives Relevant to the Greater Crestri	idge
Ecologica	al Reserve Complex.	

- ¹ Management Objective Type (per SDMMP 2013, SDMMP and TNC 2017): ISV = Baseline Surveys, IMG = Inspect and Manage, FSP = Fire Strategic Plan; BMP = Best Management Practices, GN = Genetic Studies, RS = Research, SB = Seed Banking.
- ² Scale: The land manager or partners implement local-level objectives at the preserve-level; the land owner/manager may participate in regional objectives directly or provide access to preserve lands for other researchers/biologists to implement these objectives. Regional objectives will occur on GCER complex lands only as determined necessary.
- ³ Objectives are listed per the MSP and updates (SDMMP 2013, SDMMP and TNC 2017) or other regional plans or projects designed to align with MSP objectives, including the San Diego thornmint Framework Management Plan (CBI 2014a), the Dehesa nolina Conservation Vision and Management Strategy (CBI 2015b), and the CDFW Local Assistance Grant (LAG) to assess soils for edaphic endemic plants (CBI in progress).
- ⁴ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.
- ⁵ Status (in preserve): C = completed, O = Ongoing (e.g., long-term monitoring and routine management), IP = In progress but with defined end date, NS = not started. Note that where multiple resources are listed, status refers to one or more of those resources, but not necessarily all resources.
- ⁶ Baseline surveys for Parry's tetracoccus completed only for South Crest and Michelsen preserves.



2 Biological Resources and Threats

CBI and the U.S. Geological Survey (USGS) assessed biological resources, primary threats and stressors, and key management issues within the GCER complex. Results are summarized in Sections 2.2-2.4 and Appendix A. Section 4 outlines ASMDs based on available information, and provides a timeline for conducting necessary surveys and refining ASMDs.

CBI compiled and reviewed existing documentation and spatial datasets, including regional planning documents and studies, biological inventories and reports, research studies, and species and vegetation data. Refer to Appendix C for technical resource documents and data sources used in the assessment process.

CBI conducted reconnaissance surveys in July and September 2015 on the South Crest, Michelsen, Ulrich, Gibson, and Kemerko preserves, and in March, April, and June 2017 on the Odom and Davison preserves (Appendix A). We updated existing invasive plant mapping (CBI 2012a,b, 2014b, 2015a), mapped new invasive plants, assessed potential habitat for MSP species, and identified and mapped priority land management and stewardship issues . See Appendix A for invasive plant and stewardship attribute data. We did not map vegetation or conduct focused species surveys, although MSP plant and animal species were mapped where detected.

USGS, in cooperation with the North American Field Herpetology Association (NAFHA), EHC, and Earth Discovery Institute (EDI) conducted a rapid survey of reptiles and amphibians within and adjacent to the complex on April 16, 2016, and developed a baseline species list (Appendix A). USGS also surveyed for invasive Argentine ants using the regional protocol, established stream sensors (STIC's) to assess aseasonal flow rates in the creeks tied to urban runoff, and conducted standard aquatic surveys for native and invasive species (Appendix A). These assessments extended to other preserve lands in the area, as necessary to the complex. We reference other relevant USGS datasets (i.e., golden eagle, American badger), as appropriate.

2.1 Vegetation

We used the regional vegetation map to identify vegetation within the complex (SANDAG 2014). Table 4 summarizes vegetation by MSP vegetation categories (SDMMP 2013, SDMMP and TNC 2017), cross-walks these to group-level categories depicted on the regional vegetation map, and provides acreages and the contribution of the complex to conserved vegetation in MU3. Figures 8a,b depict association-level vegetation based on the regional vegetation map. Table 5 lists vegetation alliances and associations within the preserves per the San Diego Vegetation Classification (Sproul et al. 2011), and cross-walks these to the revised Holland classification



		So	uth ³	Ea	Total		
Vegetation ¹	Group ²	Conserved (acres) ⁴	Conserved (% of MU) ⁵	Conserved (acres) ⁴	Conserved (% of MU) ⁵	Conserved (acres) ⁴	
Riparian Forest	Forest/Woodland	0.5	< 0.1	0.3	< 0.1	0.8	
Oak Woodland	Forest/Woodland	17.4	2.1	0.6	0.2	18.0	
Eucalyptus Woodland	Forest/Woodland	1.6				1.6	
Chaparral	Chaparral	199.5	0.7	304.7	1.0	504.2	
Coastal Sage Scrub	Scrub	979.9	2.7	118.8	0.4	1098.7	
Native Grassland	Grass/Herb	54.4	0.7 ⁶			54.4	
Nonnative Grassland	Grass/Herb	15.2	0.76			15.2	
Total (acres)			760.3		384.1	1,6937	

Table 4. Vegetation within the Greater Crestridge Ecological Reserve Complex.

¹ Vegetation type follows SANDAG 1995, SDMMP 2013, and SDMMP and TNC 2017.

² Cross-walks SANDAG 1995, SDMMP 2013, and SDMMP and TNC 2017 vegetation categories to group-level vegetation categories on regional vegetation map (SANDAG 2014).

³ South (preserves) = South Crest, Michelsen, Ulrich, Odom; East (preserves) = Gibson, Kemerko, Davison.

⁴ Numbers (acres) from regional vegetation map (SANDAG 2014).

⁵ Numbers represent percent (%) of GCER complex vegetation that contributes to *conserved acreage* within MU.

 6 Combines % conserved in MU for both native and nonnative grassland s.

⁷ Approximately 6 acres on the South and Odom preserves are developed or graded; this acreage is not included in the total.

(Oberbauer et al. 2008). While the regional map is useful for assessing vegetation across the landscape, preserve-level mapping is needed to (1) verify and refine alliances and associations and acreages, (2) correlate species presence with vegetation attributes, and (3) monitor vegetation changes over time (Section 4).

2.2 Management Strategic Plan (MSP) Species

We detected 20 MSP species and identified an additional 16 MSP species with the potential to occur within the complex, based on previous studies and reconnaissance and rapid assessment surveys (Table 6, Figures 9a,b). Table 6 and the discussion below include MSP species that require species-specific management (management categories SL, SO, SS) or management of vegetation characteristics (management category VF). Refer Section 4 for ASMDs and survey needs and Appendix A for additional species information.





Figure 8a. Vegetation on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure 8b. Vegetation on the East Preserves (Gibson, Kemerko, and Davison).



Vegetation Classification ¹				South ^{2,3} East ^{2,3}						Total
Alliance	Association	Cross-walk	SC (ac)	MI (ac)	UL (ac)	OD (ac)	GI (ac)	KE (ac)	DA (ac)	(ac)
Forest/Woodland										
<i>Eucalyptus (globulus, camaldulensis)</i> Semi- Natural Stands	<i>Eucalyptus (globulus, camaldulensis)</i> Semi-Natural Stands	Eucalyptus Woodland				1.6				1.6
Quercus agrifolia	Quercus agrifolia/Toxicodendron diversilobum/Grass	Southern Coast Live Oak Riparian Forest	5.4	2.5	3.8	5.7		0.6		18.0
Quercus agrifolia	Quercus agrifolia/Salix lasiolepis	Southern Coast Live Oak Riparian Forest	0.5							0.5
Salix lasiolepis	Salix lasiolepis	Southern Arroyo Willow Riparian Forest						0.3		0.3
Chaparral										
Adenostoma fasciculatum	Adenostoma fasciculatum- (Eriogonum fasciculatum, Artemisia californica, Salvia mellifera)	Chamise Chaparral	0.1	41.3	55.1	38.0	154.2	29.5	40.0	358.2
Adenostoma fasciculatum	Adenostoma fasciculatum- Ceanothus tomentosus	Southern Mixed Chaparral	0.1			65.0				65.1
Adenostoma fasciculatum-Xylococcus bicolor	Adenostoma fasciculatum- Xylococcus bicolor-Ceanothus tomentosus	Southern Mixed Chaparral					77.2		0.3	77.5
Ceanothus tomentosus	Ceanothus tomentosus	Southern Mixed Chaparral					3.5			3.5
Scrub										
Artemisia californica- Eriogonum fasciculatum	Artemisia californica- Eriogonum fasciculatum- Malosma laurina	Diegan Coastal Sage Scrub	321.0	36.0	33.1	150.7	19.3	95.9		656.0

Table 5. Vegetation Alliances and Associations within the Greater Crestridge Ecological Reserve Complex.



Vegetation Classification ¹				Sou	th ^{2,3}			East ^{2,3}		Total
Alliance	Association	Cross-walk	SC (ac)	MI (ac)	UL (ac)	OD (ac)	GI (ac)	KE (ac)	DA (ac)	(ac)
Bahiopsis laciniata	Bahiopsis laciniata-Artemisia californica-Eriogonum fasciculatum	Diegan Coastal Sage Scrub	158.4	11.1		194.3		3.6		367.4
Nolina interrata	Nolina interrata	Diegan Coastal Sage Scrub	1.1			1.1				2.2
Malosma laurina	Malosma laurina-Lotus scoparius	Coastal Scrub	57.1			15.9				73.0
Grass/Herb										
Nassella pulchra	Nassella pulchra	Native Grassland	31.5	0.6		22.3				54.4
Avena (barbata, fatua) Semi-Natural Stands	Avena (barbata, fatua) Semi- Natural Stands	Non-Native Grassland	0.7			5.6				6.3
Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	Mediterranean California Naturalized Annual and Perennial Grassland Semi- Natural Stands	Non-Native Grassland	0.1		0.8	8.0				8.9
Non-vegetated										
Developed/Disturbed			0.9		0.6	4.5				6.0
Total			576.9	91.5	93.4	512.8	254.2	129.9	40.3	1699

Table 5. Vegetation Alliances and Associations within the Greater Crestridge Ecological Reserve Complex.

¹ Vegetation Classification: Alliance = alliance-level vegetation classification per San Diego Vegetation Classification (Sproul et al. 2011); Association = association-level vegetation classification per San Diego Vegetation Classification (Sproul et al. 2011); cross-walk = equivalent vegetation category in Holland vegetation classification (Oberbauer et al. 2008).

² South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

 3 Numbers = acreage of vegetation association within preserve per regional vegetation mapping (SANDAG 2014).



MSP	MSP S	pecies ²		Sou	uth ³	East ³			
Category ¹	Scientific Name ⁴	Common Name	SC	MI	UL	OD	GI	KE	DA
SL	Clinopodium chandleri	San Miguel savory	Р	Р		Р		Р	
SL	Euphydryas editha quino	Quino checkerspot butterfly	D	Р		Р			
SL	Lycaena hermes	Hermes copper	Р	Р		Р			
SL	Athene cunicularia hypugaea	Western burrowing owl	D			Р			
SL	Antrozous pallidus	Pallid bat	Р	Р	Р	Р	Р	Р	Р
SL	Taxidea taxus	American badger	Р	Р	Р	Р	Р	Р	Р
SL	Puma concolor	Mountain lion	D	Р	Р	Р	Р	D	Р
SO	Acanthomintha ilicifolia	San Diego thornmint	D	Р		D			
SO	Baccharis vanessae	Encinitas baccharis					D	Р	D
SO	Nolina interrata	Dehesa nolina	D	D		D			
SO	Packera ganderi	Gander's ragwort		Р		Р			Р
SO	Aquila chrysaetos canadensis	Golden eagle	D	Р	Р	D	Р	Р	Р
SO	Campylorhynchus brunneicapillus sandiegensis	Coastal cactus wren	Р						
SO	Circus cyaneus	Northern harrier	D			D			
SO	Plecotus townsendii pallescens	Townsend's big-eared bat	Р	Р	Р	Р	Р	Р	Р
SS	Dudleya variegata	Variegated dudleya	D			D			
SS	Tetracoccus dioicus	Parry's tetracoccus	D	D		D	Р	Р	Р
VF	Ceanothus cyaneus	Lakeside ceanothus			Р		D	D	D
VF	Monardella hypoleuca ssp. lanata	Felt-leaved monardella	Р	Р		Р	Р	Р	Р
VF	Quercus engelmannii	Engelmann oak	\mathbf{P}^7	Р	Р	Р	D	D	Р

Table 6. Management Strategic Plan (MSP) Species Detected or Potentially-occurring within the Greater Crestridge EcologicalReserve Complex.



Table 6.	Management Strategic P	'lan (MSP) Species	Detected or Pote	entially-occurring v	within the Greater	Crestridge Ecological
Reserve	Complex.					

MSP	MSP SI	pecies ²	South ³			East ³			
Category ¹	Scientific Name ⁴	Common Name	SC	MI	UL	OD	GI	KE	DA
VF	Spea hammondii	Western spadefoot toad	Р	Р	Р	D	Р	Р	Р
VF	Phrynosoma blainvillii	Blainville's horned lizard	D	D	Р	D	D	Р	Р
VF	Ammodramus savannarum perpallidus	Grasshopper sparrow	Р	Р		Р			
VF	Polioptila californica californica	Coastal California gnatcatcher		Р	Р	D		Р	
VF	Lepus californicus bennettii San Diego black-tailed jackrabbit		D					Р	
VG	Aspidoscelis hyperythra	Orange-throated whiptail		Р	D	D	Р	Р	D
VG	Crotalus ruber ruber	Red-diamond rattlesnake		Р	Р	D	Р	Р	Р
VG	Thamnophis hammondii	Two-striped garter snake	Р	Р	Р	Р		Р	
VG	Accipiter cooperi	Cooper's hawk	D	Р	Р	D	Р	Р	Р
VG	Aimophila ruficeps canescens	Southern California rufous- crowned sparrow	D	Р	Р	D	Р	Р	Р
VG	Amphispiza belli belli	Bell's sage sparrow	Р	Р		Р			
VG	Buteo regalis	Ferruginous hawk	Р	Р		Р			
VG	Buteo swainsoni	Swainson's hawk	Р	Р	Р	Р		Р	
VG	Sialia mexicana	Western bluebird	Р	Р				Р	
VG	Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	Р	Р	Р	Р	Р	Р	Р
VG	Odocoileus hemionus fuliginata	Southern mule deer	D	D	Р	D	D	D	Р

¹ MSP Management Categories:


SL =species at risk of loss from Management Strategic Plan Area (MSPA); SO = species with significant occurrence(s) at risk of loss from MSPA; SS = species stable but still requires species-specific management to persist in MSPA; VF = species with limited distribution in the MSPA or needing specific vegetation characteristics requiring management; VG = species not specifically managed for, but may benefit from vegetation management for VF species

² Per SDMMP 2013 and SDMMP and TNC 2017.

³ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

⁴ Plant species nomenclature generally follows Baldwin et al. 2012.











Figure 9b. Management Strategic Plan (MSP) Species on the East Preserves (Gibson, Kemerko, and Davison).

SL Species: At Risk of Loss from MSPA

<u>Quino checkerspot butterfly</u>. An undetermined number of Quino checkerspot were recorded on South Crest in 2010 (USFWS 2015), and potential habitat occurs on Odom and Michelsen, as well. This occurrence is strategically located between large populations of Quino checkerspot to the south in the NWR and to the north across I-8, and falls within the possible future Central San Diego recovery unit for this species (USFWS 2003, SDMMP 2013, SDMMP and TNC 2017).

<u>Western burrowing owl</u>. EHC staff detected one burrowing owl on South Crest in 2016, which may have been transient. This observation represents one of the few recent burrowing owl sightings between conserved lands to the south in the NWR and Otay Mesa, and conserved lands to the north in Ramona. Although USGS also observed a burrowing owl a few times at night in El Monte Valley to the north of the I-8 Freeway over the last year, it is not known if there is a resident population in that area.

<u>American Badger</u>. Badgers have not been detected within the complex, but this may be due in part to a lack of surveys. The USGS confirmed badger sightings on the Crestridge Ecological Reserve (CER) in 2011 and 2014 and to the south in the Hollenbeck Wildlife Area in 2011 (Brehme et al. 2015; see Figure 3). In 2016, USGS received a photo of a badger within Hollenbeck Canyon demonstrating their continued use of the area. Badgers move widely and the complex is clearly within their movement paths between CER and areas to the east and south. Badgers are also secretive and hard to detect. The use of focal canine scent surveys in the future might detect sign on the properties. They prefer native grasslands, but also occur in scrublands and nonnative grasslands, as well.

<u>Mountain lion</u>. REC Consulting, Inc. (2004) detected mountain lion sign on South Crest prior to the 2003 Cedar Fire and WTI (2009) detected mountain lion sign on South Crest and Kemerko more recently. Burdett et al. (2010) summarizes some of the mountain lion movement data for the region. The complex provides important habitat for this species to move between conserved lands in the south and those in the north across I-8. At least one mountain lion was killed during USGS studies associated with the GCER F-RMP (2017) as it was trying to cross Dehesa Road near Willow Glen Drive, where it was either leaving the complex to the south or heading north into the complex. Burdett et al. (2010) show how lion habitat suitability might change dramatically in this area over time through further development in the east (see Figure 4 *in* Burdett et al. 2010).

SO Species: Significant Occurrences at Risk of Loss from MSPA

San Diego thornmint. San Diego thornmint occurs in two stands on South Crest (ACIL_3SOCR016); EHC manages these stands annually. This occurrence appears relatively stable despite annual fluctuations in population size (1,135 individuals in 2012, 352 plants in 2016). This population may ally genetically more closely with the Wright's Field population than with coastal populations (CNLM 2014). REC Consulting, Inc. (2004) also detected a small stand on Odom in 2003, but recent surveys by CBI have not relocated that stand. Nonnative grasses and forbs now dominate thornmint habitat on Odom.

<u>Encinitas baccharis</u>. The Encinitas baccharis occurrence on Gibson and Davison (BAVA3_3GIHI010) is one of the largest known populations of this species and is located strategically between the southernmost population on Otay Mesa and the northern, inland population on Iron Mountain. This occurrence supports approximately 677 plants, and includes a mix of male and female plants. The majority of plants (672) occur on Gibson.

<u>Dehesa nolina</u>. South Crest, Michelsen, and Odom support the majority of the Dehesa Mountain occurrence (NOIN_3SOCR003), which is one of the three largest occurrences in the U.S., one of only five conserved U.S. occurrences, and the type locality for this species. A number of plants were lost in the 2003 Cedar Fire; CBI and EHC out-planted nursery-grown plants onto restored habitat on South Crest to partially offset these losses (SANDAG Environmental Mitigation Program [EMP] grant 5001763).

<u>Golden eagle</u>. In the early 2000s, 3 golden eagles (1 mature individual and 2 juveniles flying together) were observed flying together over South Crest and Odom (REC Consulting, Inc. 2004), and a pair of sub-adults were observed flying over South Crest in 2014 (Battle pers. obs.). The complex may provide foraging habitat for this species. However, only 4 of 27 eagles radio-tracked through February 2016 passed over the property, and there was no evidence of foraging activities (Tracey et al. 2016). Historically, there were at least 3 and possibly 4 nesting pairs in the complex or vicinity. Development and human use of the landscape likely caused nest abandonment. Although the levels of people on the landscape (e.g., recreational uses, restoration activities) may have limited foraging in the past, eagle activity might increase if trespassing is controlled. In addition, EHC could test potential management actions geared towards nest recovery.

<u>Northern harrier</u>. Northern harriers have been observed flying over South Crest and Odom (REC Consulting, Inc. 2004, Gordon-Reedy and Vinje, pers. obs.), and may forage onsite.



SS Species: Stable but Still Requires Species-Specific Management to Persist in MSPA

<u>Variegated dudleya</u>. South Crest, Michelsen, and Odom support one of the easternmost occurrences of variegated dudleya (DUVA_3_SKFL009). This occurrence was damaged in the 2003 Cedar Fire, but has benefitted from habitat restoration on South Crest as part of the *Brachypodium* control project (SANDAG EMP grants 5001965 and 5004735) and out-planting of nursery-grown individuals from seed collected onsite (SANDAG EMP grant 5001763). We estimate total population size, based on flowering individuals only, at about 620 individuals.

<u>Parry's tetracoccus</u>. Parry's tetracoccus occurs on gabbro soils on South Crest, Michelsen, and Odom (TEDI_3SOCR001). This occurrence burned in the 2003 Cedar Fire, but has recovered well; shrubs are mature and flower and fruit annually. In 2011, 388 plants were mapped within the complex (CBI 2012) compared to 157 plants mapped pre-Cedar Fire (REC Consulting, Inc. 2004).

VF Species: Limited Distribution or Needing Specific Vegetation Characteristics Requiring Management

<u>Lakeside ceanothus</u>. The GCER complex and the adjacent CER support one of the largest – if not the largest – populations of Lakeside ceanothus throughout its range. Lakeside ceanothus is a dominant component of chaparral on Gibson, Kemerko, and Davidson, and is contiguous with the core population on CER. CBI mapped this occurrence on Gibson and Kemerko in 2014 and estimated 100,000 plants over nearly 160 acres on the two preserves (CBI 2014b). We mapped the species on Davidson in 2017, and estimated over 200 additional plants.

<u>Engelmann oak</u>. Scattered Engelmann oaks occur on relatively flat land on the East preserves. We mapped two individuals on Gibson and eight individuals on Kemerko. One Engelmann oak was mapped South Crest prior to the Cedar Fire, but burned and did not recover post-fire (REC Consulting, Inc. 2004).

<u>Western spadefoot toad</u>. This species detected by EHC staff on Odom in 2017, and is likely widespread in habitat patches across the complex. Suitable habitat within the complex varies in quality; however, we did detect viable use areas, including several depressions in compressed (compacted) dirt roads. During rapid assessment surveys, a few pools had limited water.

<u>Blainville's horned lizard</u>. Blainville's horned lizard was observed on South Crest (one individual), Michelsen (one individual), and Gibson (one individual), where it occurs in scrub and chaparral. In addition, REC Consulting, Inc. (2004) reported this species from Odom. Horned lizards should remain widespread in the complex where there is still good scrub and

chaparral cover. They occur also in native grassland but invasive grassland and thatch build-up in particular limit their distribution. The results of the rapid ant assessment showed that most of the complex is currently free of invasive Argentine ants (Appendix A).

<u>Coastal California gnatcatcher</u>. A core population of gnatcatchers occurred on South Crest and Odom prior to the 2003 Cedar Fire. This species has been detected in low numbers recently as habitat has recovered: we observed one male on South Crest in 2014 and one family group just south of South Crest (but on EHC-owned property) in 2015. The GCER complex is located strategically between large populations of gnatcatchers in the NWR to the south and across I-8 to the north.

San Diego black-tailed jackrabbit. REC Consulting, Inc. (2004) detected one San Diego blacktailed jackrabbit on South Crest near Dehesa Road prior to the 2003 Cedar Fire (REC Consulting, Inc. 2004). We have not observed the species post-fire. Although we have not surveyed for this species specifically, we did not observe it during reconnaissance and rapid assessment surveys, and suspect it is absent from much of the complex. Black-tailed jackrabbits are relatively limited in occurrence in dense chaparral, while open/patchy scrub and chaparral provide more suitable habitat.

2.3 Connectivity

In general, roads that may impede wildlife movement or contribute to edge effects include La Cresta Road north of South Crest, Dehesa Road south of South Crest and Odom, Harbison Canyon Road south of Kemerko, and Mountain View Road southwest of Kemerko. Fragmentation within the complex is due largely to a network of dirt roads on all properties.

The complex is part of Core V (Figure 3). There is extreme fragmentation within this core, with CER connected to South Crest across La Cresta Road in the west and to Davison/Gibson/Kemerko across Montana Serena in the north. This northern connection is the only true connection with nearly connected conserved lands. Although Montana Serena is a 20-foot wide paved road, it is private with little traffic. Between these two links, Kemerko connects to the County of San Diego's Stoneridge Preserve across Mountain View Road. For the most part, developed areas in the communities of Crest and Mountain View provide relatively little permeability for many species. At this time, few conserved lands exist east of Harbison Canyon, and creating effective links across this barrier will require acquisition and/or conservation of "anchor" lands to the east.

There are several "near" connections between the complex and conserved lands south of Dehesa Road, including McGinty Mesa (NWR) and the Sycuan Conservation area in Sloane Canyon.



Unfortunately, there is little opportunity to make these connections due to the presence of the Sycuan Golf Resort (formerly Singing Hills Golf Course) and Lake Emma (the water bodies/small lakes directly east of the golf course where the Sweetwater River widens as it turns west from Sloane Canyon to parallel Dehesa Road). While the golf course maintains permeability for many species, it is bounded on its northern edge by houses and parking lots. A small sliver of land between the golf course and the adjacent, smaller lake to the east could serve as a narrow corridor between the complex and McGinty Mesa, as could another small sliver of land just east of this smaller lake. Conservation and preservation areas associated with the proposed Sycuan Natural Resource Management Plan could also facilitate movement between the preserve complex and areas to the south. Habitat east of Lake Emma along the Sweetwater River that provides connectivity to the east and south seems more feasible as a long term solution. Fencing along Dehesa Road and a wildlife underpass could add long-term functionality to this corridor; however, lands adjacent to Dehesa Road are not within the GCER complex.

The USGS has looked at the larger scale of connecting lands within the complex to Core M (to the north) and to other conserved lands in Core V to the south and Core U to the southwest (Appendix A). However, these connections are complex and will require longer-term solutions that address targeted conservation acquisitions and road improvement projects in the region.

The road and trail network within the complex fragments habitat patches to some degree, but does not appear to restrict internal movement for most wildlife species.

2.4 Primary Threats and Stressors

We identified primary threats and stressors within the complex based on survey results, previous onsite observations and reports, and site history. Threats and stressors typically managed at the preserve-level or across preserve boundaries are summarized below and detailed in Appendix A. Regional threats and stressors (e.g., climate change, nitrogen deposition, light pollution, urban runoff) are addressed in the MSP Roadmap (SDMMP and TNC 2017). Table 7 lists primary threats and stressors by preserve. Section 3.3 addresses management priorities to address these threats and stressors.

<u>Altered Fire Regime</u>. Altered fire regimes may impact MSP species and habitats directly through species mortality or indirectly through seed bank reduction, invasive species colonization, and habitat type conversion. Fire suppression results in increased fuel loads and fire intensity, while an increase in fire frequency prevents plants from reaching maturity and contributing to the soil seedbank. Nonnative grass invasion increases fire intensity by introducing (or increasing) fine fuels into the system.



		Sout	h ^{3,4}	East ^{3,4}			
Inreats and Stressors	SC	MI	UL	OD	GI	KE	DA
Altered Fire Regime	Х	Х	Х	Х	Х	Х	
Fuel Modification			Х	Х		Х	
Altered Hydrology/Erosion	Х		Х	Х	Х	Х	
Dumping/Trash	Х		Х			Х	
Herbivory	Х						
Human Use of Preserves							
Management, Monitoring, & Maintenance Activities	X	X	X		Х	Х	
Recreational Use/Unauthorized Trails	Х	Х	Х			Х	
Road Maintenance	Х		Х		Х	Х	
Invasive Animal Species	Х		Х			Х	
Argentine Ants	Х		Х			Х	
Wild Turkeys							
Feral Pigs	Х						
Gold-spotted Oak Borer			Х			Х	
Kuroshio Shot Hole Borer + Fusarium Dieback	Х		X		X	X	
Invasive Plant Species							
Management Level 3	Х		Х		Х	Х	
Management Level 4	Х		Х		Х	Х	
Management Level 5	Х		Х		Х		
Urban Development							
Dumping/Trash	Х		Х			Х	
Edge Effects			Х			Х	

 Table 7. Primary Threats and Stressors.

¹ Table includes only identified preserve- or preserve complex-level threats and stressors, unless otherwise noted.

 2 EHC has primary responsibility for addressing threats and stressors, unless otherwise noted.

³ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

 4 X = threats and stressors identified on preserve; --- = threats and stressors not identified or management not needed at this time.

High fire frequency across the South preserves has resulted in mortality of Dehesa nolina and variegated dudleya, and habitat degradation and conversion to annual grasses. The 2003 Cedar Fire impacted the California gnatcatcher population on South Crest and Odom, and likely reduced populations of other wildlife species, as well. Fire frequency is lower on the East preserves, where some areas have not burned since the 1970 Laguna fire. Current management actions such as habitat restoration, invasive plant control, and species augmentation on South Crest address impacts from past fires (in part).

Fuel modification is a fire-related threat that may impact biological resources. Thinning or eliminating vegetation lessens fuel loads in the event of wildfire, but may remove wildlife habitat, impact rare plant populations, and facilitate the spread of invasive species by creating gaps for their establishment. Vegetation clearing for fuel modification along the urban-preserve boundary is discussed under edge effects (below). However, fuel modification may also occur along roads, near utilities (e.g., powerlines), or as fuel breaks through natural habitat during fire suppression. EHC has not yet implemented fuel modification management actions.

<u>Altered Hydrology/Erosion</u>. Altered hydrology and erosion threaten MSP species and habitats in several locations. Urban runoff from offsite locations into drainages within the complex creates conditions suitable for the establishment and spread of invasive plants, while severe road erosion results in impassable roads and may present a safety hazard.

On South Crest (and to a lesser degree, Odom), urban runoff has increased flows into drainages that normally support oak woodland or scrub, thus allowing more mesic-tolerant species such as palm trees to establish and thrive. Runoff from development adjacent to Ulrich has similarly altered flows, allowing invasion by giant reed (*Arundo donax*), tamarisk (*Tamarix* sp.), Washington fan palm (*Washingtonia robusta*), and other invasive plants. EHC and contractors have removed some invasive plants from drainages on South Crest.

Aseasonal flow meters (STICs) were installed in three locations: one each in Galloway Valley, Harbison Canyon, and the tributary along Mountain View Road (Appendix A). Galloway Valley recorded spiked flows tied to spring rain events. Harbison Canyon showed as almost perennial, while the Mountain View tributary showed a longer surface flow regime then would be expected. Loggers were also put into the Sweetwater River upstream of Lake Emma and the lowest ones remained dry, as expected.

The main, north-south dirt road through South Crest concentrates sheet runoff from upper slopes onto lower slopes, resulting in erosive gullies and sinkholes that undercut native grassland and Dehesa nolina and variegated dudleya plants. CBI and contractors installed erosion control measures to slow flows and minimize further erosion. A permanent solution will require reengineering the dirt road that is funneling water onto lower slopes.

The majority of soils within the complex are erosive, as evidenced on roads or trails where vegetation has been removed. We mapped areas of severe erosion along roads and trails (Figures 10a,b); however, some degree of erosion is present on most roads within the complex. EHC and contractors have improved eroded sections of the access road on Odom, between Sycuan Summit Drive and South Crest, with gravel and sand bags.

<u>Herbivory</u>. Herbivory is a threat when it impacts the ability of a species or occurrence to survive and/or reproduce. We consider insect and possibly, mammal herbivory (e.g., deer, woodrats) a potential threat to Dehesa nolina based on field observations, although we do not yet know the magnitude or long-term consequences of this threat.

Deer and small mammals (possibly, woodrats) consume Dehesa nolina flowering stalks, and insects consume flowers and capsules (CBI 2015b). In many cases, entire inflorescences are destroyed prior to seed formation or seed set. We observed herbivory during periods of low flowering. We do not know if herbivory will be magnified or dampened during a mass flowering event, or whether insect herbivory will intensify under climate change. However, extensive herbivory during mass flowering could potentially affect long-term population persistence.

<u>Human Use of Preserves</u>. Human use of the preserves can unintentionally introduce or spread invasive, nonnative species. Land managers, biologists, volunteers, utility service staff, fire agency personnel, and recreational users may introduce invasive species. For example, two invasive plants, Devil's thorn (*Emex spinosa*) and Saharan mustard (*Brassica tournefortii*), occurred initially along access roads through Odom where they may have been introduced by utility service vehicles. Stinkwort (*Dittrichia graveolens*) was introduced by livestock onto lands adjacent to the East preserves and has since spread onto Gibson along roads.

Monitoring, Management, and Maintenance Activities. Personnel involved in monitoring, management, and maintenance may introduce invasive species, trample sensitive species or habitat, or run over sensitive species while driving through the complex. EHC currently controls invasive plants through herbicide application and hand-pulling. EHC and CBI train new staff to minimize or avoid impacts to species, habitat, and soils during monitoring. Golden eagles are very sensitive to any human activity on the landscape (Spaul and Heath 2016), and shifting non-seasonally dependent activities to periods when eagles are less sensitive might encourage eagle use of the complex, while potential management actions could be tested to see if nest recovery could be accomplished.











Figure 10b. Trash, Erosion, and Access Control on the East Preserves (Gibson, Kemerko, and Davison).



Recreational Use/Unauthorized Trails. Recreational users may (1) introduce or spread invasive species on boots, bike tires, horses, or dogs, (2) inadvertently damage or kill MSP species, (3) trample habitat, and (4) pose a fire risk. Recreationists often collect amphibian and reptile specimens incidentally on trails and roads, and pedestrian, horse, or bike activity through road pools may impact amphibian eggs or larvae. Golden eagles avoid active recreational areas, and historic use of the preserves by humans could be part of the reason why eagles are not foraging within the complex presently (Fisher, unpublished data).

Although public use of the complex is not encouraged, there is a history of recreational use on South Crest, Ulrich, Odom, and Kemerko, including hiking, dog walking, mountain biking, and horseback riding. Fire rings on South Crest and Gibson pose the potential for fire to escape into surrounding natural areas, and we mapped trash on most preserves (Figures 10a,b). In the future, recreational uses will be allowed only if they do not impact biological resources or interfere with preserve management. Regular preserve patrols and access control, including temporary fencing around sensitive resources, would help reduce impacts, including incidental take (Figures 10a,b). Recently, EHC installed a fence at the northern edge of the Odom Preserve, along Suncrest Boulevard. This fence has eliminated OHV access into the complex from the north.

To date, EHC has installed signs within and at either end of Skeleton Flats (South Crest) and at the Sycuan Summit entrance to Odom to inform the public of allowable uses and closed trails. OHV activity is prohibited within the complex, and existing fencing and gates have largely eliminated this threat.

Road Maintenance. Road maintenance is a potential threat where it removes native vegetation, impacts compacted soils where pools form, or impacts MSP species directly. Both Dehesa nolina (South Crest) and Encinitas baccharis (Gibson) occur in or adjacent to dirt roads. All preserves except Michelsen have a network of roads used for preserve management, utility maintenance, emergency egress, and/or residential access. The unpaved portion of Suncrest Boulevard through South Crest is used by land owners along Suncrest Bluff Road and as an emergency evacuation route for the community of Crest in the event of fire. This road is maintained by CalFire under a verbal agreement with EHC (Beck pers. comm.). SDG&E maintains utility roads on Odom and Kemerko. On Odom, SDG&E maintains the road from Sycuan Summit Drive to the last power pole; CalFire has graded the road from this point to Skeleton Flats on South Crest in the past. All other roads are the management responsibility of EHC.

<u>Invasive Animal Species</u>. Various vertebrate and invertebrate invasive animal species may be present on the complex now or in the future. As the SDMMP develops an invasive animal

species management plan, clear next steps for the county will be described. For now, invasive animals can be divided into two categories: aquatic and terrestrial. Aquatic invasives can be further divided into species occurring in ponds/lakes or in moving waters. For the most part, there is not adequate aquatic habitat within the complex to maintain aquatic invasives. Within Harbison Canyon, the water flow is becoming closer to perennial and thus, becoming more suitable for crayfish, invasive fishes, and bullfrogs. Current surveys did not detect these species. Within the Sweetwater River along Dehesa Road, many invasives are present in the ponds/lakes including African clawed frogs (*Xenopus laevis*), bullfrogs, invasive fish, crayfish, and others, but most of these are highly or entirely aquatic; thus, do not directly threaten the complex.

Some terrestrial invasive species are widespread within the urban-wildland interface (e.g., opossums and Argentine ants), some are only successful in habitat patches (e.g., house cats and invasive rodents), and others have spread well into natural lands (e.g., pigs, turkeys, and many invertebrates). Invasive terrestrial species that pose the greatest threats to resources within the complex are discussed below.

Argentine Ants. Argentine ant invasion in natural lands in southern California can result in almost complete loss of the native ant community. The native ant community includes both solitary foragers and swarming types of ants, whereas Argentine ants are swarming ants. Some ant specialists, such as the horned lizard, are tied to solitary foraging ants for food, and do poorly or do not persist in Argentine ant-invaded regions. Other groups, such as spiders, shrews, and other invertebrates, have been shown to decline or become absent in the presence of Argentine ants. Thus, Argentine ants are a primary risk to biodiversity and ecological integrity of southern California reserves. In eastern San Diego County, Argentine ants are more restricted to riparian or artificially wetted areas due to their moisture needs.

USGS conducted rapid invasive ant assessments at urban or other edge areas, and then into the preserve perpendicularly (Appendix A). For the most part, there was no Argentine ant invasion into the preserves away from the urban edge. Focal risk areas of invasion included riparian areas downstream of urban development, such as heading west into South Crest and Odom to the intersection of Suncrest and Orchard, or adjacent to Dehesa Road at either the golf course or the houses (Appendix A). These invasion fronts dropped off rapidly due to the xeric nature of the complex landscape and lack of coastal humidity.

Wild turkeys. Turkeys occur east of the complex along the Sweetwater River; but were not detected onsite. Turkeys impact many small animals and rare plant species; however, the complex may be too open and lacking enough water and woodland for successful invasion.

Feral Pigs. While feral pigs have been eliminated or nearly eliminated from San Diego County (Jones 2016), we include pigs as a potential threat in the event that the pig population increases in the future. Their rooting activities destroy native plant species, including annuals and bulbs, while introducing nonnative invasive species and altering soil properties (CBI 2009, Tremor 2013). Pigs compete with native wildlife for food, destroy nests and eat eggs of reptiles and ground-nesting birds, have high reproduction rates, and spread disease to wildlife, domestic animal, and humans (SDMMP 2013, USDA-APHIS 2016, SDMMP and TNC 2017). Rooting can also disturb cultural sites (USDA-APHIS 2016).

Feral pig activity was documented on South Crest in 2012 near San Diego thornmint and Dehesa nolina occurrences and native grasslands that support geophytes, including chocolate lilies (*Fritillaria biflora*). Because of the lack of water and riparian habitat on South Crest, pig activity was likely transient. The EHC land manager and consulting biologists look for pig signs during management and monitoring activities.

Goldspotted Oak Borer. The goldspotted oak borer (*Agrilus auroguttatus*) (GSOB) is an invasive beetle that attacks mature oak trees, resulting in tree damage and mortality, as well as loss of wildlife foraging and nesting habitat, increased fuel for fires, and possibly, gaps for invasive plant establishment. The species affects coast live oaks (*Quercus agrifolia*) and has been identified in Engelmann oak, but does not appear to adversely affect the latter species (UCANR 2016a). Both oak species occur within the complex.

The complex lies within the GSOB zone of infestation (CalFire 2016) and potential GSOBcaused tree mortality has been detected near Ulrich and Kemerko (UCANR 2014). Coast live oaks within the complex have not been monitored for GSOB, nor has evidence of this species been observed onsite.

Kuroshio Shot Hole Borer + *Fusarium Dieback*. Another invasive beetle, Kuroshio shot hole borer (*Euwallacea* sp.) (KSHB) and its associated fungi were first detected in San Diego County in 2012. This beetle tunnels into host trees and shrubs and deposits the fungi that causes fusarium dieback, a disease that kills many native and nonnative tree and shrub species (Dimson et al. 2014). Known suitable reproductive host trees within or near the complex include California sycamore (*Platanus racemosa*) and coast live oak. This pest complex was detected in 2014 at the Sycuan Golf Course, just south of South Crest and Odom, where it infected an estimated 250 trees (UCANR 2016b). More recently, it was detected in a sycamore tree at Flinn Springs County Park, just north of CER (UANCR 2016b). Trees within the complex have not been monitored for this pest.



Invasive Plant Species. Nonnative, invasive plants pose one of the greatest threats to the biological integrity of preserve lands because of their ability to displace native species, degrade wildlife habitat, and alter ecosystem processes (e.g., Huenneke et al. 1990, Vitousek et al. 1990, D'Antonio and Vitousek 1992, Wilcove et al. 1998, Cox 1999, Evans et al. 2001, Ehrenfeld 2003, Belnap et al. 2005). For example, invasive wetland plants such as giant reed, Pampas grass (Cortaderia sp.), and tamarisk decrease habitat value for wildlife and alter hydrology, fire frequency, and fire intensity. The invasive, annual grass, purple falsebrome (Brachypodium distachyon [referred to as Brachypodium in this document]), forms monotypic stands on clay soils, inhibits germination by native species, eliminates habitat for ground-dwelling insects and reptiles that require openings in scrub or grassland habitats, and possibly alters soil ecology and fire intensity. Artichoke thistle (Cynara cardunculus) displaces native species and alters soil ecology, while stinkwort, long-flowered veldt grass (Ehrharta longiflora), garland chrysanthemum (Glebionis coronaria), and Saharan mustard can spread quickly and degrade sensitive habitats, including wetlands, grasslands, and coastal sage scrub. Long-flowered veldt grass may increase fire intensity and spread (e.g., fine fuels).

We mapped 30 invasive plant species within the GCER complex in 2012 (CBI 2012b) and during reconnaissance surveys (Table 8). Reconnaissance surveys focused on invasive plants recognized as threats at state- and regional levels (Cal-IPC 2006, CBI et al. 2012; Figures 11a,b). We mapped other (non-priority) invasive plants where they potentially impact MSP resources (Figures 11c,d). In general, we did not map naturalized nonnative species (e.g., annual brome grasses). One exception was the large expanse of wild oats (*Avena* spp.) on Odom. In this location, wild oats formed a dense, nearly monotypic stand over a large area with high restoration potential.

EHC currently manages several invasive plants that impact or potentially impact MSP species and habitats, including *Brachypodium*, artichoke thistle, sweet fennel, garland chrysanthemum, Devil's thorn, tamarisk, palms, and Saharan mustard on South Crest and Odom, and stinkwort on Gibson. Of these species, *Brachypodium* and Saharan mustard threaten MSP plants directly or indirectly by altering the fine fuel load and garland chrysanthemum is degrading coastal sage scrub.

<u>Urban Development</u>. Dumping/trash and edge effects are the primary threats to the GCER complex from urban development. Unauthorized dumping occurs near residential areas and impacts biological resources directly or indirectly through habitat degradation, species mortality, or introduction of toxic substances into the soil or water supply. Residential development and roads surround the complex, and disturbance at the urban-preserve boundary (edge effects) threatens resources within the preserves through habitat degradation and introduction of



Scientific Norma ¹	Common Nomo	Invasive Plant Ranking ²		South ^{3,4}				East ^{3,4}		
Scientific Ivallie	Common Name	IPSP	Cal-IPC	SC	MI	UL	OD	GI	KE	DA
IPSP Priority Species ⁵										
Management Level 3 ⁶										
Arundo donax	Giant reed	Very High	High			NS*				
Cortaderia sp.	Pampas grass	High	High					NS*		
Cynara cardunculus	Artichoke thistle	Very High	Moderate	C			NS			
Ehrharta longiflora	Long-flowered veldt grass	Medium	Moderate			NS	NS	NS*	NS	NS
Emex spinosa	Devil's thorn	Medium	Moderate				IP*			
Management Level 4 ⁶										
Brachypodium distachyon	Purple falsebrome	Very High	Moderate	IP*	NS*		NS		NS	
Dittrichia graveolens	Stinkwort	High	Moderate	NS*				NS*	NS*	
Foeniculum vulgare	Fennel	Very High	High	C/M*			IP			
Management Level 5 ⁶										
Glebionis coronaria	Garland chrysanthemum	Medium	Moderate	IP*		NS*	NS	NS*		
Other Invasive Species ⁷										
Acacia baileyana	Bailey acacia					NS	NS		NS	
Ailanthus altissima	Tree of Heaven		Moderate						NS	
Avena sp. ⁸	Wild oats		Moderate				NS			
Brassica tournefortii	Saharan mustard		High	IP*			NS		NS*	
Carduus pycnocephalus	Italian thistle		Moderate							
Carpobrotus sp.	Ice-plant		Moderate-High			NS	NS			
Eucalyptus sp.	Eucalyptus		Limited	NS		NS	NS			
Gazania linearis	Gazania		Moderate				NS			
Melia azedarach	China berry tree								NS	
Melinis repens	Natal grass			NS			NS	NS	NS	NS

Table 8. Invasive Plant Species within the Greater Crestridge Ecological Reserve Complex.



Scientific Norma ¹	Common Name	Invasive Plant Ranking ²		South ^{3,4}				East ^{3,4}		
Scientific Name		IPSP	Cal-IPC	SC	MI	UL	OD	GI	KE	DA
Nicotiana glauca	Tree tobacco		Moderate	C/M			NS			
Oxalis pes-caprae	Bermuda buttercup		Moderate	IP			NS			
Pennisetum setaceum	Fountain grass		Moderate	IP			NS	NS	NS	NS
Phoenix canariensis	Canary Island date palm		Limited	NS						
Ricinus communis	Castor bean		Limited			NS	NS			
Schinus molle	Peruvian pepper tree		Limited	C/M			NS		NS	
Schinus terebinthifolius	Brazilian pepper tree		Limited			NS			NS	
Silybum marianum	Milk thistle		Limited	NS						
Tamarix sp.	Tamarix		High	C/M*		NS				
Vinca major	Big-leaf periwinkle		Moderate						NS	
Washingtonia robusta	Washington fan palm		Moderate	IP		NS	NS			

Table 8. Invasive Plant Species within the Greater Crestridge Ecological Reserve Complex.

Species nomenclature generally follows Baldwin et al. 2012.

² Invasive Plant Ranking:

IPSP = regional management priority based on regional Plant Assessment Form (PAF) score and management feasibility, as defined in the San Diego Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012).

Cal-IPC: statewide priority based on California Invasive Plant Council (Cal-IPC) PAF score (Cal-IPC 2006):

High = Severe ecological impacts on physical processes, plant/animal communities, vegetation structure; reproductive biology, other attributes conducive to moderate-high rates of dispersal/establishment; generally widely distributed ecologically.

Moderate = Substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, vegetation structure; reproductive biology, other attributes conducive to moderate-high rates of dispersal, though establishment generally dependent upon ecological disturbance; ecological amplitude/distribution may range from limited-widespread.

Limited = Invasive but ecological impact minor statewide or not enough information to justify a higher score; reproductive biology, other attributes result in low-moderate rates of invasiveness; ecological amplitude/distribution generally limited, but species may be locally persistent and problematic.

³ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

⁴ Management status and priority: IP = management action currently in progress; C = management action completed C/M = management action completed but monitoring required to ensure invasive species does not re-establish; NS = management action not yet started; * = near-term priority for implementation. **Bolded** entries indicate where treatment across preserve boundaries would improve overall success and reduce potential for reinvasion.



⁵ IPSP priority species per regional Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012).

⁶ Management Levels per regional Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012):

Management Level 1 – Surveillance (none present)

Management Level 2 – Eradication (none present)

Management Level 3 - Containment

Management Level 4 - Directed Management

Management Level 5 – Directed Suppression

⁷ Other invasive species = non-priority invasive plant species.

⁸ Species occurs on other preserves, but mapped only on Odom where it dominates large areas.





Figure 11a. Invasive Plant Strategic Plan (IPSP) Invasive Plant Species on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure 11b. Invasive Plant Strategic Plan (IPSP) Invasive Plant Species on the East Preserves (Gibson, Kemerko, and Davison).





Figure 11c. Other Invasive Plant Species (Non-IPSP) on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure 11d. Other Invasive Plant Species (Non-IPSP) on the East Preserves (Gibson, Kemerko, and Davison).



nonnative species. The impact of roads – particularly on large animal mortality – needs to be addressed regionally. La Cresta, Dehesa, and Harbison Canyon Roads are the largest sources of mortality of species heading into or out of the complex.

Dumping/Trash. We mapped trash along preserve boundaries and in the interior of the South Crest, Ulrich, Odom, and Kemerko preserves, focusing on large piles of potential concern for biological resources or human safety (Figures 10a,b; refer to Section 4 and Appendix A for trash removal priority levels). EHC removed some larger trash piles from South Crest and Kemerko upon acquisition (including some internal fencing on Kemerko), and removes smaller trash as part of routine preserve management actions.

Edge Effects. We identified three categories of edge effects during the site reconnaissance: vegetation clearing, illegal trash dumping, and horticultural plantings. Vegetation clearing reduces foraging and nesting habitat for native species and provides gaps for invasive plant colonization. Trash degrades habitat quality and may pose health or safety risks to wildlife species or humans. Horticultural plantings displace native species and habitat. In addition, nonnative animals and plants have invaded preserves from roads, adjacent developed areas, and undeveloped private lands.

We identified and/or mapped (1) fuel break encroachments on Ulrich and Kemerko, (2) trash dumping at preserve boundaries on Ulrich and Kemerko, and (3) horticultural plantings on Odom and Kemerko.



3 Management and Monitoring Strategy

3.1 Summary and Vision Statement

The GCER complex connects conserved lands in the northern and southern parts of the MSCP area. It supports regionally important populations of MSP priority species and links these populations across the MSCP area. A matrix of urban and rural land uses surrounds these conserved lands; thus, coordinated management and monitoring must (1) focus on edge effects, invasive species, and unauthorized recreational uses, and (2) promote connectivity to the north and south to achieve MSP Roadmap goals for these key resources.

The conservation vision for this complex is to maintain the lands as core areas for selected species and as live-in habitat for species populations that occur north and south of the complex and may use these lands for inter-generational movement (i.e., dispersal). This vision aligns with MSP Roadmap goals and objectives for species, habitats, and connectivity in MU 3.

3.2 Authorized Land Uses

Authorized land uses within the complex include management, monitoring, and stewardship activities, road maintenance, powerlines (Odom, Kemerko), scientific research, and volunteer and educational activities (e.g., seed collection, invasive plant control, photomonitoring, field trips). While public use of the GCER complex is not encouraged, recreational uses (e.g., hiking, dog walking, mountain biking, equestrians) occur where there is precedence, such as long-term use by neighbors on South Crest, Odom, and Ulrich. These uses are expected to continue on the South preserves unless monitoring indicates adverse impacts to biological or cultural resources (Sections 4.1, 4.2, 4.3, 4.7). No public access is planned for the East preserves at this time, although we have observed evidence of OHVs, hiking, biking, and old fire pits.

3.3 Priority Management Actions

Near-term (immediate) priority management actions and longer-term management actions are based on the threats and stressors described in Section 2.4, and are detailed in Section 4. Near-term priority management actions that address biological or cultural resources directly are summarized below; refer to Section 3.4 for near-term management actions that address property stewardship issues.

<u>Fire Management</u>. EHC will implement pre-fire management actions to reduce impacts to MSP species and habitats before, during, and after fire events and promote post-fire recovery per MSP

Roadmap objectives (Section 4.6). These measures will address threats and stressors from altered fire regimes. Priority management actions include:

- Prepare a Resource Avoidance Area map for the complex that identifies (1) no dozer/no retardant areas or hand lines for at-risk MSP species and vegetation and (2) staging areas and dozer lines in less sensitive habitat.
- Coordinate annually (or as-needed) to review or update Resource Avoidance Area map with fire agencies and Local Resource Advisor (once designated).
- Identify strategic locations where road-hardening measures would reduce ignitions.
- Manage thatch every 3-5 years to reduce fire risk to San Diego thornmint, Dehesa nolina, variegated dudleya, and other at-risk MSP species.
- Establish a seed bank for San Diego thornmint and other at-risk MSP species.

<u>Restoration</u>. EHC will continue and expand habitat restoration efforts (Section 4.1), with a focus on grassland and coastal sage scrub, including maintaining Dehesa nolina and variegated dudleya outplantings, to address threats and stressors from altered fire regimes and invasive plants. Near-term priority management actions include:

- Control invasive plants in the South Crest restoration area (ongoing) (Figure 12).
- Monitor restoration effectiveness on South Crest (ongoing).
- Restore additional *Brachypodium*-infested native grassland and coastal sage scrub on South Crest, Odom, and Michelsen that support MSP species (Figure 11a).

<u>Invasive Animals</u>. EHC will address the threat of invasive animals by xerifying preserve boundaries to reduce Argentine ant invasion (Section 4.2), conducting surveys and monitoring for potentially-occurring species (e.g., gold-spotted oak borer, Section 4.2) and implementing biosecurity measures for authorized preserve users (Sections 4.4 and 4.8). Refer to Section 4.5 for property stewardship actions that will also address invasive animals.

<u>Invasive Plants</u>. Invasive plant management within the complex will focus on controlling invasives that pose the greatest threat to MSP species and habitats (SDMMP 2013, SDMMP and TNC 2017). Regional management strategies are defined as follows (CBI et al. 2012):

- Management Level 1 Surveillance
- Management Level 2 Eradication
- Management Level 3 Containment





Figure 12. South Crest Restoration Area.

- Management Level 4 Directed Management
- Management Level 5 Directed Suppression

In prioritizing preserve-level invasive plant management, we assessed regional management level (if assigned), risk to MSP species (per San Diego Plant Assessment Form [SD PAF] score) (CBI et al. 2012), co-occurrence with MSP species and habitats (identified through on-theground mapping), invasive plant population size and distribution, rate of spread, treatment feasibility, and level of effort. Preserve-level management does not always follow regional management levels precisely. For example, very small populations of Management Level 3, 4, or 5 species may be eradicated or controlled at the preserve-level. Invasive plant management priorities include seven IPSP species (Table 8, Sections 4.1, 4.3, 4.6) and two other invasive species, as described in Section 4.1.

Additional near-term management actions related to invasive plants include biosecurity measures (Sections 4.4 and 4.8) and early detection rapid response (EDRR) surveys (Section 4.1). Refer to Section 4.5 for property stewardship actions that also address invasive plants.

<u>Cultural Resources</u>. We describe cultural resources in Appendix B for the original five preserves (South Crest, Michelsen, Ulrich, Gibson, and Kemerko), based on a literature and records search and Native American contacts. In some cases, this information overlaps with the two new preserves (Odom and Davison). Near-term management actions include archaeological surveys of unsurveyed lands, reconnaissance surveys of structures on unsurveyed lands, and follow-up calls to Native American individuals who did not respond to the initial contact letter in May 2016 (Section 4.7). Protection or avoidance of cultural resources will address potential threats from recreation (Section 4.5) or road maintenance (Section 4.5). Longer-term priorities include stabilizing or recovering significant eroding archaeological resources detected during archaeological surveys, developing an historic structure management plan for all eligible or listed structures, and completing evaluations of identified tribal cultural resources (Section 4.7).

3.4 Property Stewardship

Property stewardship status and near-term management actions are described below, summarized in Table 9, and detailed in Sections 4.5 and 4.8.

<u>Access Control</u>. Fencing, gates, and signage control entry into the preserves, inform users of preserve rules and regulations, and protect MSP resources at the following locations:

- Sycuan Summit entrance to Odom (fence and locked gate)
- Suncrest Boulevard entrance to South Crest (motorized gate and step-over gate)

- West South Crest preserve (step-over gate)
- Northern boundary of Odom, along South Lane and Suncrest Boulevard
- Northeast corner of Odom, trailhead off of Eucalyptus Drive
- Urban-preserve interface, Ulrich (fencing along private property)
- Mountain View Road entrance to Kemerko (fencing and locked gate, chain barrier)
- Urban-preserve interface, Kemerko (fencing along private property)
- Montana Serena entrance to Gibson (several fences and locked gates) and Davison (gate)

Management Catagem ¹	South ^{2,3,4}				East ^{2,3,4}			
Management Category	SC	MI	UL	OD	GI	KE	DA	
Access Control								
Fencing	Е			E		NP		
Signage	E, NP	NP	NP	E, NP	NP	NP		
Gates	E, NP		NP	Е		NP	Е	
Site Presence/Enforcement	E, NP	E, NP	E, NP	E, NP	E, NP	E, NP	E, NP	
Unauthorized Roads, Trails	E, NP, LP		NP, LP	E, LP	NP, LP	NP, LP	LP	
Dumping/Trash	E, NP		NP	E, NP		NP		
Erosion	E, NP, LP		LP	E, NP, LP	LP	LP	LP	
Road Maintenance ⁵	E, NP, LP		LP	E, NP, LP	LP	E, NP, LP	LP	
Facilities	Е			Е				
Public Outreach, Education, Research	NP, LP	NP, LP	NP, LP	NP, LP	NP, LP	NP, LP	NP, LP	

 Table 9.
 Property Stewardship Management Actions.

¹ Property stewardship activities are the responsibility of EHC, unless otherwise noted.

² South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

³ Management status: $\mathbf{E} = \text{Existing management, currently conducted by EHC; } \mathbf{NP} = \text{Near-term priority for management, } \mathbf{LP} = \text{Longer-term priority for management.}$

⁴ Sources for management status: CBI Rapid Assessments, Beck pers. comm.

⁵ Road maintenance responsibilities: EHC, SDG&E, and CalFire on South Crest; EHC and SDG&E on Kemerko; EHC on all other preserves.

EHC coordinates access through the motorized gate on Suncrest Boulevard with the Sheriff's Department, CalFire, property owners for in-holdings within the preserve, and the Crest Fire Safe Council. EHC also coordinates with SDG&E and adjacent land owners regarding

maintenance of gates and changes to locks or gate codes. Temporary fencing was installed around restoration areas on South Crest. EHC installed signs on South Crest and Odom to inform users of rules and regulations and to indicate no trespass zones (closed trails, restoration sites), and installed interpretive signs near the South Crest restoration area.

Near-term management priorities include improvements to existing or additional fencing and gates on South Crest, Odom, Ulrich, and Kemerko, additional rules and regulations signs on all preserves, additional interpretive signage on South Crest and Odom, and development of a roads and trails plan (Section 4.5). As mentioned earlier, EHC recently installed fencing along the northern edge of the Odom Preserve, adjacent to Suncrest Boulevard. These management actions will address recreational uses, unauthorized trails, and invasive species.

<u>Site Presence/Enforcement</u>. EHC patrols South Crest once a week and the other preserves infrequently. Patrol activities include inspecting and repairing gates, fences, and signs, identifying trespass or other land management issues, removing trash, and managing biological resources (Section 4.5). EHC coordinates with CDFW wardens and County Sheriff on enforcement issues.

Near-term management priorities include boundary surveys to resolve encroachment from adjacent properties (Ulrich, Odom, Kemerko), regular patrols of all preserves, and removal of high-priority trash on South Crest, Ulrich, Odom, and Kemerko (Sections 4.4 and 4.5). These actions address recreational uses, unauthorized trails, dumping/trash, fuel modification at the urban-preserve boundary, and edge effects.

<u>Erosion</u>. Near-term management priorities to address erosion include maintaining existing erosion control structures on South Crest that protect MSP species habitats and on Odom that protect the access road, and installing new erosion control structures on South Crest, Ulrich, Odom, and Gibson to protect additional MSP resources and public safety (Sections 4.3, 4.5).

<u>Road Maintenance</u>. Road maintenance by EHC, SDG&E, and CalFire is ongoing on South Crest, Odom, and Kemerko. Near-term management priorities include coordination with SDG&E and CalFire to ensure these activities do not impact sensitive resources (Section 4.4), and cultural surveys on Kemerko to ensure that future road maintenance does not disturb cultural sites (Section 4.7). In addition, EHC may maintain the trail on Davison widened by CalFire during the 2017 Jennings Fire. The adjacent property owner (Bob Davison) will maintain the spur road to the north to ensure access for fire personnel and vehicles during future fire events.

<u>Facilities</u>. An illegally constructed house and a large water tank occur on the Odom Preserve. There are no other permanent facilities within the complex. An above-ground, transportable



water storage tank on South Crest is used to irrigate out-planted Dehesa nolina plants. An historic wildlife guzzler on South Crest is heavily damaged and no longer holds water, but does not pose a safety risk and will be left in place.

<u>Public Outreach, Education, Research</u>. EHC will maintain a website and online reporting system, establish protocols for educational and scientific uses (Sections 4.8, 4.9), and promote public stewardship where appropriate. These actions will address unauthorized recreational uses and contribute to management and monitoring of resources at the preserve- and possibly, regional levels.

3.5 Preserve-level and Regional-level Monitoring Strategy

Monitoring strategies for the GCER complex are multi-tiered to accommodate both local (preserve-level) and regional objectives. The F-RMP identifies resources and threats across the complex and prioritizes management actions and stewardship based on MSP Roadmap goals and objectives for priority species and habitats, as well as additional, preserve-specific goals and objectives. Monitoring on the complex contributes preserve-level data to regional monitoring (Section 4).

Preserve-level monitoring generally occurs on a single preserve, but may be coordinated and implemented with other preserves to benefit species that cross preserve boundaries. Preserve-level monitoring informs management needs, priorities, and effectiveness. Monitoring uses standardized data collection methods or protocols, where available (e.g., regional rare plant Inspect and Manage (IMG) monitoring protocol), and results may contribute to regional monitoring efforts. The EHC land manager and contractors are responsible for most preserve-level monitoring actions, although regional support may be available for prioritized objectives identified in the MSP Roadmap. Within the complex, preserve-level monitoring that contributes to regional monitoring efforts includes:

- Vegetation mapping
- Invasive species mapping and monitoring
- Priority MSP species monitoring (e.g., IMG monitoring)
- Focused species surveys using standardized protocols
- Post-fire surveys to assess impacts and recovery
- Threats and habitat assessments to inform management needs and priorities
- Assessments of management effectiveness

Preserve-level monitoring specific to individual preserves or the complex includes:

- Edge effects at the urban-preserve interface
- Public uses (including impacts to key resources)
- Access control measures
- Roads and trails
- Management effectiveness

Regional monitoring includes studies designed to answer questions at a broader geographic scale than preserve-level monitoring, such as status and trend of a species across the region. This monitoring is typically implemented by contracted experts and scientists and is generally not the responsibility of land managers, although land managers may participate in or coordinate with regional efforts. Regional monitoring may occur at the preserve-level where monitoring results would benefit the region or feed into a region-wide monitoring program. Because of its central location and key resources, the complex has contributed to several regional studies designed to further information on species biology, genetics, and management, including:

- San Diego thornmint genetics study (CNLM 2014)
- San Diego thornmint framework management plan (CBI 2014a)
- Dehesa nolina conservation vision and management strategy (CBI 2015b)
- Dehesa nolina augmentation methods (CBI 2016, South Crest)
- *Brachypodium* control project (CBI 2014c, CBI 2017)
- Soils study, edaphic endemic species (CBI 2018)
- U.S. Geological Survey rare plant genetics study (in progress)

Future regional monitoring within the complex may include one or more of the following:

- Community level response to changing environmental conditions
- Species-specific information gaps to guide management across the MSPA
- Fire ignition reduction (e.g., Dehesa Road)
- Early Detection Rapid Response programs for invasive species
- Regional connectivity (e.g., Dehesa Road, Harbison Canyon)



4 Area-Specific Management Directives

Area-specific Management Directives (ASMDs) address management issues at the preserve level and are a requirement for conserved lands within the MSCP. This document provides a framework for preserve complex-level ASMDs in the context of adaptive management. Where management issues have been identified, ASMDs are specific and detailed. Where information is not yet available, generalized ASMDs are provided with the understanding that they will be developed further in the future, depending on need. Thus, this plan provides the framework for current and future management needs, as well as current and future land additions to the complex.

ASMDs are presented as goals, objectives, and implementation tasks, following guidelines in Lewison and Deutschman 2014, Deutschman et al. 2012, Lewison et al. 2011, and Adamcik et al. 1997. Per the USFWS (Adamcik et al. 1997):

Goals are broad, concise, visionary statements that set overall direction for monitoring and management.

Objectives are concise statements of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work (refer to Table 10 for SMART Criteria, which are used to ensure that objectives are adequately detailed and achievable).

Implementation Tasks (*Task*) are specific actions, tools, and techniques – including monitoring – used to meet the objectives.

SMART Objectives	Objective Definition
<u>S</u> pecific	Detailed, clear, concise, and unambiguous
<u>M</u> easurable	Criteria for measuring progress
<u>A</u> chievable	Realistic to achieve
<u>R</u> esults-oriented	Specify an end result
<u>T</u> ime-fixed	Specify and end-point

 Table 10.
 SMART Objective Definitions.¹

¹ From Lewison and Deutschman 2014.

Each ASMD may have one or more goal, objective, and implementation task. Where data exist, objectives and implementation tasks are detailed. Other objectives and tasks will be refined as additional information is collected. In the following sections, ASMDs are grouped into biological, coordination, stewardship, cultural, outreach/education/research, and administrative categories. In many cases, an ASMD in one category may benefit or overlap with an ASMD in

another category (e.g., invasive plant control and fuel management); in these cases, the complementary ASMD (objective and/or task) is referenced. All ASMDs will be implemented by the land manager (or representative), unless otherwise noted.

We refer to regional versus preserve-specific monitoring and management actions in this document. In this context, regional actions are applicable to the broader region and may be conducted by regional entities alone or in cooperation with land managers, or by land managers (or representatives) with results contributing to regional analyses. Preserve actions are specific to a preserve or preserve complex, and are the responsibility of the land manager (or representatives).

We use the terms routine and intensive to differentiate between levels of management effort. In general, routine management is accommodated within annual preserve budgets and work plans, whereas intensive management may require outside funding or partnerships to implement fully.

Finally, we present a structured approach to monitoring and management that includes (1) identification of key resources, (2) monitoring to assess status and threats, (3) prioritization based on threats, feasibility, and funding, (4) directed management, and (5) monitoring to assess management effectiveness. Land managers have the flexibility to address discrete or emerging management issues (e.g., trespass, new invasive species) without going through the entire process, but should (at a minimum) document management actions.

Refer to Section 4.9 (Program Administration and Reporting) for data management and reporting recommendations for ASMDs. Refer to Section 4.10 for a tabular summary of all ASMDs and a schedule for implementation. With a few exceptions, the ASMDs and implementation schedule cover a 5-year monitoring and management period; priorities will be revisited and realigned at the end of each 5-year period. We have included specific dates in the text and Section 4.10 to guide work plans and budgets; however, dates may be adjusted if RMP approval is delayed.

4.1 Vegetation Communities

Vegetation ASMDs address regional and management unit goals specific to coastal sage scrub and native grassland (Table 2), and additional, preserve-specific goals. The vegetation management strategy for the complex includes (1) accurate vegetation and invasive species maps and datasets as tools for identifying and prioritizing management issues and tracking management success, (2) targeted invasive species treatments to protect "at-risk" habitats, and (3) selected restoration to improve habitat quality and connectivity. We use the term "at-risk" to indicate resources (MSP species, habitats) that are most threatened by altered fire regimes per the Altered Fire Regime Element of the Management Strategic Plan (MSP) Roadmap for western San Diego County (SDMMP AND TNC 2017) (see Section 4.6.1). Invasive plants will be a perpetual management issue within the complex. We recommend a phased approach to invasive plant management that prioritizes eradication or control of (1) high priority invasive species and (2) lower priority invasive species where they impact MSP habitats and linkages. Non-priority invasive plant control is part of a comprehensive invasive plant management strategy, but is a lower priority at this time. The phased approach ensures that invasive plants are mapped, prioritized, and treated in an efficient and cost-effective manner that most benefits sensitive resources. High priority invasive species may be targeted alone (e.g., pampas grass, fennel) or as part of a restoration effort (e.g., *Brachypodium*), while lower priority invasive species (e.g., brome grasses, nonnative forbs) will be treated generally during restoration (RS-1, RS-2), MSP species management (PL-5.1), or pre- or post-fire invasive species control (FM-6.3, FM-7.1, FM-8.3).

4.1.1 Natural Vegetation Communities (VEG)

<u>Vegetation Goal</u>: Maintain or enhance natural vegetation communities within the GCER complex to benefit native species and habitats, sustain ecosystem functions, and promote connectivity to other conserved lands.

<u>Objective 1 (VEG-1). Vegetation Mapping</u>. Prepare preserve-level vegetation maps for the complex by 2021 using the Vegetation Classification Manual for western San Diego County (Sproul et al. 2011), preserve-level minimum mapping units (MMUs; 1-5 acres for scrub, chaparral, and nonnative grassland, 0.5-1.0 acre for woodlands, and 0.25-0.50 acre for wetlands, native grasslands, and forblands), and the regional vegetation map (SANDAG 2014) as a guide. Review and update the map at 10-year intervals (if necessary) or more frequently in the event of disturbance or changed conditions, and identify and prioritize management actions for disturbed or degraded habitat.

<u>Task 1.1 (VEG-1.1):</u> Refine Baseline Vegetation Map. Using the regional vegetation map as a baseline, refine vegetation spatial distribution and classification at the alliance and association-levels using preserve-level MMUs, and maintain a spatial dataset of vegetation. Mapped vegetation acreages (alliance/association) will serve as baseline targets for assessing broad-scale vegetation change over time. For disturbed or degraded vegetation, develop type-specific objectives to guide management and monitoring.

<u>Task 1.2 (VEG-1.2): Update Vegetation Map</u>. Review the vegetation map at 10-year intervals in the absence of disturbance or changed conditions or at 5-year intervals following a disturbance event (e.g., fire, intentional or unintentional vegetation clearing). Using the existing vegetation map as a baseline (VEG-1.1), identify and map vegetation changes since the last mapping period, including vegetation loss, type conversion, or
succession. Maintain a spatial dataset of updated vegetation. Determine whether changes are human-related or due to natural succession, and refine vegetation targets.

Task 1.3 (VEG-1.3): Identify and Prioritize Vegetation Management. Where mapping indicates vegetation disturbance or degradation (e.g., semi-natural stands or invasive plant cover estimates), identify and prioritize management actions, including (but not limited to) invasive plant control (INV-3), habitat restoration (RS-1.1), and fencing/signage (PS-1.3). Review historic or pre-fire data for context on pre-disturbance vegetation, if available. Potential sources of pre-disturbance vegetation include historic aerials (https://historicaerials.com), Weislander vegetation data (http://vtm.berkeley.edu), and 1996 MSCP vegetation maps, among others. Vegetation acreage targets based on current regional mapping are presented in Tables 4 and 5; these targets will be updated with refined vegetation maps (VEG-1.1, VEG-1.2).

Refer to INV-3.1, RS-1.1, and RS-1.2 for invasives control and habitat restoration tasks currently in-progress or recommended to control invasive plants and/or restore native species diversity in coastal sage scrub and native grassland communities.

<u>Objective 2 (VEG-2). Vegetation Monitoring</u>. Between 2017 and 2021, provide access to preserve lands (if requested) for entities engaged in regional vegetation monitoring, monitor vegetation within the South Crest restoration site, and monitor newly burned habitat (if any) to assess post-fire vegetation recovery.

Task 2.1 (VEG-2.1): Coordinate with Regional Vegetation Monitoring. Provide access for regional vegetation monitoring efforts that target specific vegetation communities or vegetation-dependent species (e.g., California gnatcatcher) within the complex. SDMMP will be developing monitoring protocols for the coastal sage scrub, chaparral, and grassland mosaic by 2019 and for oak and riparian habitats by 2021.

<u>Task 2.2 (VEG-2.2): Conduct Preserve-level Vegetation Monitoring</u>. Conduct preservelevel vegetation monitoring to assess vegetation response to management or post-fire recovery. Refer to RS-1.2 for vegetation monitoring associated with the South Crest restoration site. In the event of fire, conduct vegetation monitoring or coordinate with regional entities conducting vegetation monitoring within burned habitat to assess postfire vegetation recovery and management needs (FM-8.10).

Select vegetation monitoring methods specific to the objective. Monitoring methods may include previously developed monitoring BMPs (e.g., *Brachypodium* control, grassland restoration) to assess restoration success or regional monitoring protocols (e.g., SDMMP

vegetation monitoring plan [to be developed], modified BAER program) that contribute to regional and local vegetation trend analyses. Monitoring methods may include (but are not limited to):

- Permanent transects (e.g., 50-m transects in coastal sage scrub, 50-m transects and quadrats in grassland)
- Relevés (e.g., 9-m circular relevés)
- Photomonitoring

Record monitoring locations with a Geographic Positioning System (GPS) and mark permanently in the field to facilitate re-location. Collect covariate data (e.g., plant community composition and cover) at monitoring locations. Analyze data for sitespecific trends or provide data to SDMMP or another regional entity to analyze for local or regional trends, including shifts in species composition or richness. Based on results, recommend management actions, including (but not limited to) invasives control or habitat restoration.

Designate one end of the permanent transect or relevé center point as a permanent photopoint and conduct photodocumentation during each monitoring period to provide a visual record of vegetation trends over time.

4.1.2 Invasive Plants (INV)

<u>Invasive Plant Goal</u>: Protect conserved lands within the GCER complex by treating invasive plant species to eliminate or reduce threats to MSP species, habitats, and linkages, using BMPs and the response appropriate to the level of invasiveness. Detect new invasive species and new invasions early on and control them before the plants have a chance to establish and/or spread.

Objective 1 (INV-1). Invasive Plant Mapping. Maintain and update the invasive plant spatial dataset, invasive plant lists, and invasive plant map as tools for management by (1) conducting comprehensive invasive plant surveys every 5 years, (2) mapping invasive plants opportunistically during annual monitoring, management, and stewardship activities, (3) mapping invasive plants post-fire, (4) updating invasive plant lists annually, (5) uploading invasive plant spatial data to a central database annually, and (5) updating the invasive plant map every 5 years or after a fire event.

Task 1.1 (INV-1.1): Conduct Invasive Plant Surveys. Conduct comprehensive invasive plant surveys at 5-year intervals, using the existing invasive plant map as a baseline and focusing on priority invasive plant species. For existing invasive plant occurrences,

update/refine invasive plant attribute data and spatial extent, if necessary. For new invasive plant occurrences, map and collect invasive plant attribute data (e.g., GPS location, visual estimate or exact count of population size or percent cover). Map and collect attribute data for other (non-priority) invasive plant species as funding allows. Maintain a spatial dataset of invasive plant data. Refer to Table 8 for a list of priority and other invasive plant species recorded within the complex and Figures 11a-d for invasive species maps.

Map invasive plants opportunistically during routine preserve activities. Conduct invasive plant surveys within the burn perimeter the first spring after a fire event, regardless of 5-year timeline (FM-6.2).

<u>Task 1.2 (INV-1.2): Update Invasive Plant Lists</u>. Update invasive plant and Early Detection Rapid Response (EDRR) lists for the complex annually based on survey results (INV-1.1). Coordinate annually with the regional invasive plant program regarding invasive species status and emerging (new) invasive species in the region.

<u>Task 1.3 (INV-1.3): Update Invasive Plant Map</u>. Incorporate new invasive plant information into the spatial dataset for the complex as collected, and update the invasive plant map at 5-year intervals or after a fire event. Maintain a spatial dataset of updated invasive plant data.

<u>Objective 2 (INV-2)</u>. Invasive Plant Prioritization. Prioritize invasive plants for treatment and maintenance at 5-year intervals, in coordination with regional invasive plant guidelines (e.g., Invasive Plant Strategic Plan and updates), impacts to MSP species and habitats, and management feasibility.

<u>Task 2.1 (INV-2.1): Update Invasive Plant Management Priorities</u>. Review and refine invasive plant management priorities for the complex based on (1) management effectiveness (INV-3.1), (2) invasive plant distribution (i.e., new or expanding or contracting occurrences) (INV-1.1), (3) invasive plant risk, and (4) co-occurrence of invasive plants with MSP priority species or habitats.

Task 2.2 (INV-2.2): Identify Invasive Plant Priority Treatment and Maintenance Areas. For prioritized invasive plant species (INV-2.1), identify new or continuing management actions, develop or update treatment plans and schedules, and pursue funding to implement treatment as necessary. Table 11 and INV-3 list prioritized invasive plant control management actions for 2017-2021. Refer to Table 8 for additional invasive



Invasive Species	Management Type ¹	Treatment Method	Treatment Timing Recommended Action		Status ²
South Crest					
	Intensive	Herbicide	Prior to flowering (January - early March)	Continue treatments per SANDAG- funded <i>Brachypodium</i> control project.	IP
Brachypodium distachyon (Purple falsebrome)	Routine or Intensive	Herbicide	Prior to flowering (January - early March)	Treat as necessary to maintain Brachypodium at $\leq 10\%$ cover.	NS
	Intensive	Herbicide, mechanical	Prior to flowering (January - early March)	Pursue funding to expand treatment on South Crest.	NS
	Routine	Herbicide	Prior to fruit formation (Winter)	Treat on Skeleton Flats and vicinity; monitor and re-treat, as necessary, until eradicated or controlled.	IP
Brassica tournefortii	Routine	Hand-pulling	After fruit formation	See previous.	IP
(Saharan mustard)	Intensive	Herbicide, other?	Prior to flowering (January - early March)	Coordinate with regional programs to identify potential strategies and feasibility for large-scale treatment.	NS
Dittrichia graveolens (Stinkwort)	Routine	Herbicide	Prior to flowering (July - September)	Treat along Suncrest Boulevard; monitor and re-treat, as necessary, until eradicated.	NS
	Routine	Mechanical	Growing season	See previous.	NS
<i>Foeniculum vulgare</i> (Fennel)	Routine	Herbicide	Spring	Monitor previously treated stands on Skeleton Flats for re-growth and re-treat, as necessary, until eradicated.	IP
<i>Glebionis coronaria</i> (Garland chrysanthemum)	Routine	Herbicide	Prior to fruit formation (Spring)	Treat along Suncrest Boulevard and in adjacent coastal sage scrub; monitor and re-treat, as necessary, until eradicated or controlled.	IP
	Routine	Mechanical	After fruit formation (but before seed set)	See previous.	IP
Oxalis pes-caprae (Bermuda buttercup)RoutineMechanicalFebruary - AprilTreat in coastal Suncrest Boulev Skeleton Flats; n necessary, until		Treat in coastal sage scrub south of Suncrest Boulevard and in the vicinity of Skeleton Flats; monitor and re-treat, as necessary, until contained or suppressed.	IP		

Table 11. Invasive Plant Management Priorities, 2017-2021.



Invasive Species	Management Type ¹	Treatment Method	Treatment Timing	Recommended Action	Status ²
Michelsen					
Brachypodium distachyon (Purple falsebrome)	Intensive	Herbicide, mechanical	Prior to flowering (January – early March)	Pursue funding to treat on Michelsen.	NS
Ulrich					
Arundo donax	Routine	Herbicide	August-November (year-round if leaves are green)	Eradicate giant reed from drainage near urban-preserve boundary.	NS
(Glant feed)	Routine	Mechanical	Apply herbicide to cut stems	See previous.	NS
Glebionis coronaria	Routine	Herbicide	Prior to fruit formation (Spring)	Treat along urban-preserve boundary; monitor and re-treat, as necessary, until eradicated.	NS
(Garland chi ysanthemum)	Routine	Mechanical	After fruit formation (but before seed set)	See previous.	NS
Odom					
<i>Brachypodium distachyon</i> (Purple false-brome)	Intensive	Herbicide, mechanical	Prior to flowering (January - early March)	Pursue funding to initiate treatment on Odom	NS
	Routine or Intensive	Herbicide	Prior to flowering (January - early March)	Treat as necessary (after intensive treatment) to maintain <i>Brachypodium</i> at $\leq 10\%$ cover.	NS
Durani a tauna fartii	Routine	Herbicide	Prior to fruit formation (Winter)	Treat on Skeleton Flats and vicinity; monitor and re-treat, as necessary, until eradicated or controlled.	NS
(Sabaran mustard)	Routine	Hand-pulling	After fruit formation	See previous.	NS
(Sanaran mustaru)	Intensive	Herbicide, other?	Prior to flowering (January - early March)	Coordinate with regional programs to identify potential strategies and feasibility for large-scale treatment.	NS
<i>Cynara cardunculus</i> (Artichoke thistle)	Routine	Herbicide	Prior to flowering (December - March)	Treat on Odom (Skeleton Flats); monitor and re-treat, as necessary, until eradicated or controlled.	NS
			Mechanical	Year-round	Treat on Odom (Skeleton Flats); monitor and re-treat, as necessary, until

Table 11. Invasive Plant Management Priorities, 2017-2021.



Invasive Species	Management Type ¹	Treatment Method	Treatment Timing	Recommended Action	Status ²
				eradicated or controlled.	
Emex spinosa	Doutino	Herbicide	Prior to flowering (January - April)	Treat along access road from Sycuan Summit Drive to South Crest Preserve	IP
(Devil thorn)	Koutine	Mechanical	Year-round	Treat along access road from Sycuan Summit Drive to South Crest Preserve	IP
Glebionis coronaria	Routine	Herbicide	Prior to fruit formation (Spring)	Treat along access road from Sycuan Summit Drive to South Crest Preserve	IP
(Garland chrysanthemum)	Routine	Mechanical	After fruit formation (but before seed set)	Treat along access road from Sycuan Summit Drive to South Crest Preserve	IP
Oxalis pes-caprae (Bermuda buttercup)	Routine	Mechanical	February - April	Treat in and near access road north of Skeleton Flats; monitor and re-treat, as necessary, until contained or suppressed.	IP
Gibson					
<i>Cortaderia</i> sp. (Pampas grass)	Routine	Herbicide	Fall applications are most effective, but can treat year-round	Treat plants along trails; monitor and re- treat, as necessary, until eradicated.	NS
Dittrichia graveolens	Routine	Herbicide	Prior to flowering (July - September)	Remove along trails; monitor and re- treat, as necessary, until eradicated.	NS
(Stinkwort)	Routine	Mechanical	Growing season	See previous.	IP
<i>Ehrharta longiflora</i> (Long-flowered veldt grass)	Routine	Herbicide	Year-round (if leaves are green)	Remove individual plants along trails, focusing initially on plants in vicinity of Encinitas baccharis; monitor and re- treat, as necessary, until controlled or suppressed.	NS
<i>Glebionis coronaria</i> (Garland chrysanthemum)	Routine	Herbicide	Prior to fruit formation (Spring)	Remove small stand along trail; monitor and re-treat, as necessary, until eradicated.	NS
	Routine	Mechanical	After fruit formation (but before seed set)	See previous.	NS
Kemerko					
Brassica tournefortii	Routine	Herbicide	Prior to fruit formation (Winter)	Remove small stand; monitor and re-	NS

Table 11. Invasive Plant Management Priorities, 2017-2021.



Invasive Species	Management Type ¹	Treatment Method	Treatment Timing	Recommended Action	Status ²
(Saharan mustard)				treat, as necessary, until eradicated.	
	Routine	Hand-pulling	After fruit formation	See previous.	NS
Dittrichia graveolens Routine		Herbicide	Prior to flowering (July - September)	Remove along; monitor and re-treat, as necessary, until eradicated.	NS
(Stillkwort)	Routine	Mechanical	Growing season	See previous.	IP
<i>Ehrharta longiflora</i> (Long-flowered veldt grass)	Intensive	Herbicide	Year-round (if leaves are green)	Pursue funding to develop and implement a long-term treatment plan to control or manage long-flowered veldt grass.	NS
Davison					
<i>Ehrharta longiflora</i> (Long-flowered veldt grass)	a bldtRoutineHerbicideYear-round (if leaves are green)Remove individual plants along or n trails, focusing on plants near Encini baccharis or Lakeside ceanothus; monitor and re-treat, as necessary, un controlled or suppressed.		Remove individual plants along or near trails, focusing on plants near Encinitas baccharis or Lakeside ceanothus; monitor and re-treat, as necessary, until controlled or suppressed.	NS	

Table 11.	Invasive Plant Manag	gement Priorities,	2017-2021.
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¹ Management Type: Routine = In general, routine management actions will be accommodated within annual budgets and work plans; Intensive = management actions may require outside sources of funding or partnerships to implement fully.

² Status: IP = In-progress; NS = Not started.



plants that may be controlled during this period (as funding allows) or in a subsequent 5year management period.

<u>Objective 3 (INV-3).</u> Invasive Plant Control. Eradicate, contain, manage, or suppress *Brachypodium*, Saharan mustard, artichoke thistle, stinkwort, Devil's thorn, fennel, garland chrysanthemum, Bermuda buttercup, giant reed, pampas grass, and long-flowered veldt grass within the complex annually or as-needed through herbicide application, mechanical control, or hand-weeding where these species directly or indirectly impact or threaten MSP species or habitats.

<u>Task 3.1 (INV-3.1): Manage Brachypodium</u>. Manage Brachypodium at $\leq 10\%$ total cover on clay or gabbro soils in selected restoration areas on South Crest and Odom through annual herbicide application or mechanical treatment. Brachypodium management will typically occur as part of broader restoration efforts that include other nonnative grass and forb control, dethatching, and possibly, native species augmentation. Refer to RS-1 and RS-2 for specific information on Brachypodium management.

<u>Task 3.2 (INV-3.2): Contain Saharan Mustard</u>. Treat Saharan mustard with herbicide early in the season (winter) or hand-pull plants later in the season, after fruit formation but prior to seed dispersal.

South Crest and Odom. Treat Saharan mustard on and near Skeleton Flats annually to prevent its spread into restored habitat. Saharan mustard is also widespread and extensive on both preserves on slopes above Dehesa Road, and will require a regional strategy, multiple years of treatment across preserve boundaries, and supplemental funding. By 2021, coordinate with regional and state invasive plant programs to identify potential strategies and feasibility for large-scale treatment of this species.

Kemerko. Treat Saharan mustard along trails annually to prevent its spread into adjacent, high-quality coastal sage scrub.

<u>Task 3.3 (INV-3.3)</u>: <u>Eradicate Artichoke Thistle</u>. Treat artichoke thistle with herbicide prior to flowering; may remove mechanically year-round. Monitor treatment areas and re-treat, as necessary, until eradicated.

Odom. Treat artichoke thistle on Skeleton Flats annually to prevent its spread within the complex, including restoration areas on South Crest.

<u>Task 3.4 (INV-3.4)</u>: <u>Eradicate Stinkwort</u>. Stinkwort eradication within the complex is feasible if treatments are applied consistently over a number of years, because

populations are currently small and contained. Treat stinkwort with herbicide prior to flowering or hand-pull plants anytime during the growing season. If plants have formed seed, remove from site after pulling. Monitor treatment areas for re-infestation and re-treat again, as necessary.

South Crest. Treat stinkwort along Suncrest Boulevard annually to prevent its spread into adjacent, high quality coastal sage scrub.

Gibson. Treat stinkwort along roads and trails annually to prevent its spread into adjacent, high quality chaparral.

Kemerko. Treat stinkwort along trails near the western preserve boundary annually to prevent its spread into adjacent, high-quality chaparral.

Task 3.5 (INV-3.5): Eradicate Devil's Thorn. Treat devil's thorn with herbicide prior to flowering or remove mechanically year-round. Monitor treatment areas and re-treat, as necessary, until eradicated.

Odom. Treat devil's thorn along the access road from Sycuan Summit Drive to the South Crest Preserve annually to prevent its spread into South Crest restoration areas.

Task 3.6 (INV-3.6): Eradicate Fennel. Treat fennel with herbicide. Monitor treatment areas and re-treat, as necessary, until eradicated.

South Crest. Monitor the previously-treated fennel stand on Skeleton Flats annually for re-growth and re-treat this stand with herbicide, if necessary, until it is eradicated.

Task 3.7 (INV-3.7): Suppress Garland Chrysanthemum. Treat garland chrysanthemum with herbicide prior to fruit formation or mechanically remove plants after fruit formation but prior to seed set (or prior to seed dispersal if plants are to be removed from the site).

South Crest. Treat garland chrysanthemum along Suncrest Boulevard and in adjacent coastal sage scrub annually until suppressed at less than 10% cover. Because of the extent of this species on South Crest, effective suppression will likely require multiple years of phased treatment.

Ulrich. Treat garland chrysanthemum along the urban-preserve boundary annually while it is still eradicable and prior to its spread into adjacent, high-quality habitat. Eradication efforts may require coordination with adjacent landowners to treat this species on their property to reduce the potential for re-infestation.

Odom. Treat garland chrysanthemum along the access road from Sycuan Summit Drive into South Crest annually while it is still eradicable in this portion of the complex and prior to its spread onto Skeleton Flats.

Gibson. Treat garland chrysanthemum along trails annually while it is still eradicable and prior to its spread into adjacent, high-quality chaparral.

Task 3.8 (INV-3.8): Contain or Suppress Bermuda Buttercup. Treat Bermuda buttercup by mechanically removing plants (including underground bulbs) prior to seed formation. To date, herbicide applications are not known to control this species effectively; however, herbicide may be used in the future if new formulations show good results.

South Crest. Treat Bermuda buttercup in coastal sage scrub south and along Suncrest Boulevard annually until contained or suppressed to protect coastal sage scrub habitat quality.

Odom. Treat Bermuda buttercup along the access road north of Skeleton Flats annually to protect coastal sage scrub and western spadefoot toad habitat.

<u>Task 3.9 (INV-3.9):</u> Eradicate Giant Reed. Treat giant reed with herbicide and mechanical methods. Monitor treated plants and re-treat, as necessary, until dead.

Ulrich. Remove giant reed from the drainage near the western property boundary between 2017 and 2021. Remove other non-priority invasive trees and shrubs in drainages on Ulrich as funding allows.

<u>Task 3.10 (INV-3.10): Eradicate Pampas Grass</u>. Treat pampas grass with herbicide. Monitor treated plants and re-treat, as necessary, until dead.

Gibson. Treat the two pampas grass plants that occur along trails annually until dead to prevent their spread into adjacent habitat.

Task 3.11 (INV-3.11). Contain Long-flowered Veldt Grass. Treat long-flowered veldt grass with herbicide in selected locations. Monitor plants and re-treat, as necessary, until dead.

Gibson. Treat long-flowered veldt grass annually where it occurs within 5-10 feet of Encinitas baccharis plants.

Kemerko. Long-flowered veldt grass is widespread and extensive on Kemerko, and effective treatment will require multiple years of treatment and supplemental funding.

By 2021, coordinate with regional and state invasive plant programs to identify potential strategies and feasibility of large-scale treatment for this species.

Davison. Treat long-flowered veldt grass annually on or near roads or trails where it occurs within 5-10 feet of Encinitas baccharis or Lakeside ceanothus plants.

In general, other invasive species mapped within the complex are a lower priority for treatment at this time unless adequate funding is available. Exceptions include assemblages of priority (e.g., *Brachypodium*) and non-priority invasive plants (e.g., nonnative grasses or forbs) that would be treated during restoration, species-specific management, or post-fire management (see RS-1.1, PL-5.1, FM-6.3, FM-7.1, and FM-8.3). For example, EHC currently treats fountain grass (*Pennisetum setaceum*) in selected locations.

The following recommendations apply to invasive plant treatment on all preserves:

- When selecting invasive plant treatments (type, method, timing), consider potential effects on native species, including sensitive plants and animals.
- Where treatment is phased, focus initial control in or near MSP priority species or habitats, with subsequent control targeting roads, trails, and drainages (conduits for dispersal), upslope areas (for gravity-dispersed species), and outliers.
- Maintain an herbicide log for invasive plant treatments that includes (at a minimum) treatment area, treatment date, treatment type (e.g., name of herbicide, mechanical method such as weed whipping), amount (ounces/gallons) of herbicide used, applicator, and target species; include this log in the annual report (AR-2.2). Applicators should have a state license for herbicide application and follow all label directions for herbicide applications.
- Where large stands of invasive plants are removed, restore gaps with native species (seed, container plantings) if determined necessary to minimize invasive species recolonization. Use genetically appropriate planting materials (e.g., propagules collected onsite or in proximity, using seed zone concept; RS-3.4).

Task 3.12 (INV-3.12): Respond Rapidly to New or Expanding Invasions. Treat new or rapidly expanding infestations of invasive plant species where these species pose a risk to sensitive resources, regardless of IPSP ranking (INV-3.1). Where treatment cannot be accommodated within the annual budget, contact the regional invasive plant program for on-the-ground assistance or apply for regional funding (e.g., EMP land management grants, emergency funding) to control the infestation. Coordinate with adjacent land managers for control beyond complex boundaries.

Task 3.13 (INV-3.13): Reduce Fire Risk from Invasive Plants. Treat selected invasive plant species proactively where they pose a fire risk (e.g., urban-preserve boundary, under or near powerlines) or have the potential to expand rapidly and extensively into natural communities following fire (e.g., *Brachypodium* and other nonnative grasses along trails) (CO-2.2, CO-3.2, FM-5.2).

<u>Task 3.14 (INV-3.14): Monitor Invasive Plant Treatment Effectiveness</u>. Monitor invasive plant treatments qualitatively or semi-quantitatively (e.g., photographs, occupied acreage, counts, estimates of percent cover) to assess effectiveness. Re-treat as necessary per treatment strategy (e.g., eradicate, contain, manage, suppress).

4.1.3 Habitat Restoration (RS)

<u>Restoration Goal</u>: Enhance degraded coastal sage scrub and grassland habitats within the GCER complex to benefit MSP species, improve species diversity (including pollinator habitat) and connectivity, and reduce threats from invasive species.

<u>Objective 1 (RS-1).</u> <u>Maintain Existing Restoration Site</u>. Treat *Brachypodium*, other nonnative grasses, and nonnative forbs with herbicide annually (or at alternative frequencies, depending on cover and/or climatic conditions) within the existing 10-acre South Crest restoration site to maintain invasive plant cover at $\leq 10\%$ of the total vegetative cover.

Task 1.1 (RS-1.1): Treat Invasive Plants in Restoration Sites. Continue *Brachypodium* and other nonnative grass and forb treatments in the existing South Crest restoration site through 2017 per SANDAG EMP grant 5004735. Implement invasives control annually from 2018-2021 and as-needed thereafter as part of routine preserve management or by securing outside funding.

Where nonnative grass or forb cover is >10% of the total vegetative cover, conduct one or more weed control treatments per season, particularly in years of average or above-average rainfall. Adjust treatment frequency based on climatic conditions and corresponding germination and growth of target invasive species. For example, prolonged rain through the growing season may trigger multiple germination events that require multiple treatments.

Treat nonnative grasses with a grass-specific herbicide and nonnative forbs with a systemic herbicide and/or mechanical treatments. Manage invasive plant thatch every 3-5 years (as necessary) through herbicide or mechanical removal to reduce fire risk for atrisk MSP species and habitats (FM-5.2). Refer to CBI (2014c) or more recent work (CBI

2017) for BMPs for *Brachypodium* control. Herbicide must be applied by a registered herbicide applicator following BMPs for application.

Task 1.2 (RS-1.2): Monitor Restoration Effectiveness. Monitor restoration effectiveness annually through 2017 using 10-m radius relevés or a comparable method to determine plant cover and species richness in treatment versus control plots. Analyze data to determine restoration progress. Relevé monitoring is relatively fast (e.g., 10-20 minutes per relevé) and provides a semi-quantitative measure of restoration success adequate for making management decisions. Submit 2016/2017 data to SDMMP for regional analyses of *Brachypodium* treatments.

Conduct photomonitoring annually through 2021 to provide a visual record of progress.

Subsequent to 2021, assess site visually every year (January-February or later in the event of subsequent rainfall) to determine the need for management. Reduce assessment frequency to once every 3 years if nonnative grass and forb cover is less than 10% of total vegetative cover for 3 consecutive years.

<u>Task 1.3 (RS-1.3):</u> Adjust Restoration Management and Monitoring Regime. Some level of perpetual management will be required to maintain the 10-acre South Crest restoration site; however, there are conditions (other than those mentioned in RS-1.1 and RS-1.2) where management and monitoring frequency may be adjusted:

- Decrease management frequency if invasive plants are eradicated or stabilized at a low level (<10% cover) without management intervention, based on at least 10 years of monitoring data or site assessments that include a range of climatic conditions. Under this scenario, continue periodic monitoring or assessments of the restoration site (e.g., every 3-5 years) to ensure that re-colonization or increases in invasive plant cover from the soil seedbank are identified and controlled prior to becoming a management issue.
- Increase management and monitoring frequency after catastrophic events (e.g., fire, FM-6.2, FM-8.2) to prevent or control invasive plant colonization or an increase in invasive plants from the soil seedbank.

<u>Objective 2 (RS-2). Expand the South Crest Restoration Site</u>. Restore an estimated 29 acres of *Brachypodium*-infested coastal sage scrub and native grassland that support edaphic endemic plants on South Crest, Michelsen, and Odom in a phased manner over the next 10 years (2017-2026, subject to funding) through herbicide, mechanical control, and seeding (if necessary).

Identify additional restoration sites (as appropriate) based on vegetation mapping (VEG-1.1, 1.2), invasive plant prioritization (INV-2.2), biological monitoring (AN-5.1, PL-4.1), preserve patrols (PS-5.1), or post-fire assessments (FM-6.1, FM-8.1).

<u>Task 2.1 (RS-2.1): Identify and Prioritize Restoration Sites</u>. Identify and map the extent of potential restoration areas, and document existing habitat conditions, threats, and MSP species prior to implementing restoration actions.

Prioritize restoration areas based on proximity to existing restoration site, topography (e.g., areas upslope of existing restoration site should be treated prior to downslope areas), and presence of MSP priority species or habitats. If necessary, phase restoration to ensure selected areas are treated adequately to control target invasive species (e.g., at least 5 years of treatment per area with subsequent, long-term maintenance).

<u>Task 2.2 (RS-2.2):</u> Pursue Funding for Restoration. Pursue funding for restoration actions that cannot be accommodated through routine preserve management or with existing preserve management budgets. Potential funding sources may include (but are not limited to) local, state, or federal grants. Supplemental funding may be required to:

• Develop and implement an integrated, phased plan to treat *Brachypodium* where it impacts MSP species and habitats on Michelsen (1.2 acres), and untreated areas on South Crest (13 acres) and Odom (ca. 15 acres). Phase I will likely include an estimated 12 acres of contiguous habitat on the 3 preserves; these areas are upslope of previously treated areas and support MSP priority plants (Dehesa nolina, variegated dudleya, Parry's tetracoccus).

Task 2.3 (RS-2.3): Develop and Implement Restoration Plan(s). Develop a restoration plan that describes existing conditions, management goals and objectives, restoration specifications (treatment area size, method(s), and frequency), success criteria, and monitoring methods. Implement restoration actions between 2022-2026 according to the restoration plan and using treatment methods and frequencies described in RS-1.1; document any changes to the plan in annual reports (AR-2.2).

<u>Task 2.4 (RS-2.4): Procure Native Plant Propagules</u>. Procure native species propagules (seed, plants) prior to or during restoration plan implementation, if necessary. Use seed or propagule sources from (1) the restoration site or surrounding preserve, (2) genetically appropriate source populations for rare or restricted species (as determined through genetic testing), or (3) appropriate seed collection zones for more common species. Collect and bulk seed according to approved BMPs (e.g., SDMMP Seed Collection,

Banking, and Bulking Plan [to be developed]). Avoid seed bulking beyond one generation in a nursery setting to minimize the potential for genetic modification *unless* genetic testing indicates that additional generations may be bulked without detrimental effects. Use appropriately-sized plugs or container plantings to maximize success.

Task 2.5 (RS-2.5): Monitor Restoration Effectiveness. Monitor restoration effectiveness per methods and frequency described in the restoration plan (RS-2.3). Native grassland or coastal sage scrub restoration may use semi-qualitative monitoring methods described in RS-1.2; monitoring other habitats may require different or modified methods. Where BMPs are well-defined, semi-qualitative or qualitative monitoring may be adequate to determine restoration success and recommend adaptive management; more intensive monitoring methods may be required for new or untested treatment methods.

Task 2.6 (RS-2.6): Adjust Restoration Management and Monitoring Regime. Adjust the management and monitoring regime per the restoration plan (RS-2.3) or conditions specified in RS-1.3, as needed.

4.2 MSP Animal Species (AN)

We identified MSP and invasive animal species previously detected within the complex through a literature review and incidental field observations. During rapid assessment and reconnaissance surveys, we assessed the *potential* for additional MSP animal species and invasive animal species within the complex based on existing conditions, and mapped some occurrences opportunistically. However, these surveys did not constitute comprehensive baseline surveys, with the exception of USGS Argentine ant surveys. Therefore, we recommend (1) baseline surveys for potentially-occurring MSP priority and invasive animal species to identify presence and extent within the complex, (2) monitoring to track MSP priority and invasive animal status and threats, and assess management effectiveness, (3) management to address threats to MSP priority animal species or threats from invasive animal species and (4) general inventories during surveys, monitoring, management, or patrol events to identify common animal species.

<u>MSP Plant Animal Goal</u>: Maintain or enhance MSP animal populations (including habitat) within the GCER complex to increase resilience to environmental and demographic stochasticity, maintain genetic diversity, and ensure persistence over the long-term (>100 years) within the complex.

4.2.1 Surveys and Inventories

<u>Objective 1 (AN-1). MSP Animal Baseline Surveys</u>. By 2021, conduct baseline surveys for Quino checkerspot butterfly, western spadefoot toad, burrowing owl, and (if threatened by development or management actions) coastal California gnatcatcher in suitable habitat within the complex, using species-specific or SDMMP IMG survey protocols to map occurrences, document status and threats, and identify management actions. Between 2017-2021, facilitate access to preserves (as requested) for regional surveys for Hermes copper butterfly, golden eagle, coastal California gnatcatcher, and pallid and Townsend's big-eared bat.

Task 1.1 (AN-1.1): Conduct Quino Checkerspot Butterfly Surveys. Conduct baseline surveys for Quino checkerspot butterfly on South Crest, Michelsen, and Odom using Quino survey guidelines (USFWS 2014) or IMG survey protocols (if available), and map Quino larval host plants within the survey area. A permitted biologist shall conduct surveys according to the schedule and methods in the survey guidelines.

Task 1.2 (AN-1.2): Facilitate Hermes Copper Butterfly Surveys. Provide access to South Crest, Michelsen, and Odom (as requested) for regional surveys or monitoring, and address any preserve-specific management recommendations that arise from these efforts.

Task 1.3 (AN-1.3): Conduct Western Spadefoot Toad Surveys. Conduct baseline surveys for western spadefoot in potential breeding pools (e.g., depressions in compacted dirt roads or trails) on all preserves within the complex, using methods described in Fisher et al. 2004. Survey each pool at least two times during the field season, inspecting for spadefoot activity, including egg masses and larvae. Where spadefoots are detected, record life stage (e.g., tadpoles, adults), estimate number of individuals, and map pools using a GPS unit.

Task 1.4 (AN-1.4): Facilitate Golden Eagle Surveys. Provide access to all preserves (as requested) for regional surveys or monitoring, and address any preserve-specific management recommendations that arise from these efforts. For example, where regional monitoring identifies nest sites within the complex, monitor nests and/or restrict activities around nest sites seasonally to ensure they are not disturbed.

Task 1.5 (AN-1.5): Conduct Burrowing Owl Surveys. Conduct burrow surveys in potentially suitable burrowing owl habitat on South Crest and Odom per the burrowing owl survey protocol (CBOC 1993, 1997) or regional protocols. If potential burrows are detected, conduct breeding season surveys or, if no burrowing owls are detected during the breeding season, conduct winter surveys to determine presence (CBOC 1993, 1997).

<u>Task 1.6 (AN-1.6):</u> Facilitate or Conduct Coastal California Gnatcatcher Surveys. Provide access to South Crest, Michelsen, Ulrich, Odom, and Kemerko (as requested) for regional gnatcatcher surveys or monitoring, and address any preserve-specific management recommendations that arise from these efforts.

Conduct preserve-specific gnatcatcher surveys if there will be potential coastal sage scrub impacts from infrastructure development, trail construction, or management actions (e.g., restoration/weed management in coastal sage scrub). A permitted biologist shall conduct surveys using the USFWS presence/absence survey guidelines (USFWS 1997).

<u>Task 1.7 (AN-1.7):</u> Facilitate Pallid and Townsend Bat Surveys. Provide preserve access (as requested) in 2017 for regional pallid and Townsend's big-eared bats surveys.

In addition to the tasks listed above, conduct baseline surveys for potentially-occurring MSP animal species on new EHC preserves within the complex by 2021 or the following 5-year management period to determine presence; refer to Appendix A, Table A-8 for potentially-occurring species and their habitat affinities.

For all preserve-level baseline surveys, collect data per species-specific or IMG protocols, as noted above. Count individuals or estimate population size, and record habitat conditions and threats. Use a hand-held sub-meter GPS to record observations. Record survey tracks to provide a visual record of surveyed areas.

Incorporate baseline survey results for at-risk MSP animal species into Resource Avoidance Area map, as appropriate (FM-4.1).

Baseline surveys for at-risk animal species (e.g., Quino checkerspot butterfly, Hermes copper butterfly, western spadefoot toad) serve as pre-fire animal assessments/mapping (FM-7.5).

<u>Objective 2 (AN-2).</u> <u>General Animal Inventories</u>. Develop a standardized, complex-wide system for recording animal species by preserve by 2018 and develop and maintain an animal species list for the complex by 2021 to document animal diversity within preserves.

Task 2.1 (AN-2.1). Develop Animal Inventory System. Develop a standardized system to record species by preserve, habitat, and other attributes identified as important. Include these attributes in the master list of animal species within the complex (AN-2.2, below). Refer to the USGS reptile rapid assessment survey results for the complex as a potential inventory system template (Appendix A).

Task 2.2 (AN-2.2). Develop and Maintain Animal Species List. Develop an animal species list for the complex using the inventory system developed in AN-2.1. Compile species from rapid assessment, baseline (AN-1.1), and post-fire MSP animal surveys (FM-8.4), biological monitoring (AN-4.1), preserve patrols (PS-5.1), research studies (OER-2.1), or volunteer efforts (OER-1.4). Add new species to the list when detected.

<u>Objective 3 (AN-3).</u> Invasive Animal Surveys. Conduct Argentine ant and oak borer surveys within the complex by 2021 to determine location, extent, and threat to MSP species and habitats, and prescribe management recommendations to reduce threats.

Task 3.1 (AN-3.1): Conduct Argentine Ant Surveys. Argentine ant surveys were completed as part of rapid assessment surveys (Appendix A). Refer to AN-6.1 for management recommendations that address Argentine ants.

Task 3.2 (AN-3.2): Conduct Oak Borer Surveys. Assess oak trees or other suitable host trees within the complex for signs of infestation (including exit holes, die-back) from goldspotted oak borer (GSOB) (target species: coast live oak), Kuroshio shot hole borer (KSHB) and its fungal symbiont (target species: California sycamore, coast live oak), or other shot hole borers or fungal pathogens identified as threats in or near the complex. Install traps where appropriate to determine distribution and density of infestations.

Coordinate with regional entities (e.g., University of California Cooperative Extension) for expertise in detecting or verifying infestations, or for field training to conduct assessments or protocol surveys.

Coordinate with regional management strategies (e.g., draft Southern California Shot Hole Borers/Fusarium Dieback Management Strategy for Natural and Urban Landscapes, August 2016) for short- and long-term monitoring and management actions.

4.2.2 Monitoring

<u>Objective 4 (AN-4). MSP Animal Monitoring</u>. Between 2017 and 2021, (1) monitor detected MSP priority animal species within the complex, using species-specific or regional IMG monitoring protocols and frequencies (SDMMP and TNC 2017) to assess status and threats, (2) facilitate access to preserves for regional monitoring, as requested, (3) monitor management action effectiveness (to be determined) qualitatively or quantitatively, and (4) work with regional entities to monitor connectivity at priority locations (to be designated) using IMG assessment methods. Monitor additional (non-MSP) species with monitoring requirements under a Habitat Conservation Plan (HCP) (if any) per Objective 4, as well.

Task 4.1 (AN-4.1): Monitor MSP Priority Animals. MSP priority animal species monitored at the preserve-level (if present within the complex) will include Quino checkerspot butterfly, western spadefoot toad, burrowing owl (burrows), and coastal California gnatcatcher (if impacted by development or disturbance). Record abundance and collect habitat and threat covariate data per regional IMG or other monitoring protocols to determine management needs. Additional preserve-level monitoring may include annual inspections of golden eagle nests or pallid or Townsend's bat roosts, if identified within the complex during regional surveys and monitoring.

In the event of fire or other catastrophic disturbance, implement contingency monitoring for at-risk MSP animal species (FM-8.5, AR-4).

Provide access to preserve lands for entities involved in regional monitoring of MSP priority animals. Detected or potentially-occurring MSP priority animal species monitored regionally include Hermes copper butterfly, golden eagle, coastal California gnatcatcher, pallid bat, and Townsend's big-eared bat.

Task 4.2 (AN-4.2): Monitor MSP Animal Management Effectiveness. Monitor speciesspecific management action effectiveness (AN-5, AN-6.1, FM-8.5), and manage adaptively based on results (e.g., refine, expand, extend management). In general, the level of monitoring effort will be greater with intensive versus routine management.

Effectiveness monitoring addresses management action success in achieving the stated objective (e.g., invasive species removal, population size increase), and provides recommendations to increase management effectiveness. Effectiveness monitoring may include qualitative methods that compare pre- and post-treatment variables or quantitative methods where more detailed data are needed to draw conclusions.

Identify effectiveness monitoring methods in annual work plans or management plans prior to management implementation.

Task 4.3 (AN-4.3): Monitor or Facilitate Monitoring of Wildlife Connectivity. Work with SDMMP and other regional entities to implement qualitative IMG assessment methods for priority wildlife choke points within the GCER complex, if determined appropriate. Potential chokepoints include (1) La Cresta Road between South Crest and CER, (2) Dehesa Road between South Crest, Odom, and conserved lands to the south, and (3) Mountain View and Harbison Canyon Roads between Gibson/Kemerko and conserved lands to the south and east, respectively. Identify and rank connectivity issues, and identify management actions that would increase the function of these chokepoints.

4.2.3 Management

<u>Objective 5 (AN-5).</u> <u>Management Prioritization</u>. Prioritize management for MSP priority animal species detected within the complex annually (routine management) and at 5-year intervals (intensive management) based on species status and threats (as determined through surveys and monitoring), management feasibility, and available funding.

Task 5.1 (AN-5.1): Prioritize MSP Animal Management Actions. For MSP priority animals detected within the complex (AN-1), determine whether management actions are routine or intensive. For routine management, identify methods, timing, frequency, schedule, and costs in annual work plans. For intensive management, develop management plans and pursue funding prior to implementation. Examples of routine management include fencing or trail closures. Examples of intensive management include habitat restoration or species augmentation.

Refer to INV-3.1, RS-1.1, PS-1, PS-3, PS-4, and FM-5-8 for additional management actions that will benefit MSP animals.

<u>Objective 6 (AN-6). Management Implementation</u>. Implement BMPs annually or as-needed to control Argentine ants or oak borers (if detected) within the complex. Between 2017 and 2021 or the subsequent 5-year management period, augment MSP priority animal populations or restore their habitat *if* determined appropriate through baseline or regional surveys and monitoring, and improve internal connectivity for MSP priority animals through selected road and trail closures (to be detailed in the Roads and Trails Plan [PS-3]).

Task 6.1 (AN-6.1): Treat Invasive Animals. Work with adjacent land owners to eliminate or reduce landscaping and watering adjacent to South Crest, Ulrich, Odom, and Kemerko to lessen the risk of Argentine ant invasion into core areas of the preserves.

If oak borer infestations are identified within the complex (AN-3.2), treat using BMPs, including (but not limited to) a combination of solarization, wood chipping, and removal of infected limbs (for composting), and monitor for re- infestation (AN-4.2). Pesticide treatment of trees with low levels of infestation has shown some preliminary success, and may be an option unless future studies show it to be ineffective or harmful.

Task 6.2 (AN-6.2): Augment MSP Animal Populations. This task is a placeholder in case augmentation is determined necessary to offset losses or increase genetic diversity of MSP priority animals in the future, based on surveys and monitoring (e.g., AN-4.1, AN-4.3, FM-8.5, FM-8.9). Note that preserve-level augmentation should coordinate with regional efforts and may require supplemental funding.



Task 6.3 (AN-6.3): Restore Wildlife Habitat. This task is a placeholder in case restoration is determined necessary to improve habitat for MSP priority animals, based on surveys and monitoring (e.g., AN-4.1, AN-4.3, FM-8.5).

Task 6.4 (AN-6.4): Improve Connectivity. Connectivity issues between the GCER complex and other conserved lands will require regional or local solutions that address targeted conservation acquisitions and road improvement projects, or depend on adjacent land owners or regional entities to implement management actions in the complex vicinity. Potential regional or complex-level actions to improve connectivity include:

- Acquire additional lands to improve connectivity between preserves within the complex (primarily, between Ulrich and the other preserves).
- Coordinate with adjacent land owners (e.g., Sycuan Tribal Development Corporation) and/or the County of San Diego to improve connectivity between South Crest and conserved lands to the south by installing fencing along Dehesa Road to reduce road kills and a wildlife underpass to add long-term functionality to this corridor. Note that the complex does not currently border Dehesa Road.

Preserve-level actions to maintain or enhance internal connectivity include closing selected dirt roads or trails to reduce internal fragmentation, particularly on South Crest, Ulrich, and Odom. Detail road or trail closures in the Roads and Trails Plan (PS-3).

Other than roads and trails, there are few barriers to inhibit wildlife movement within preserves or between adjacent preserves. Ulrich is the only preserve within the complex that is currently isolated from other preserves; improving connectivity between Ulrich and other conserved lands within or adjacent to the complex would require additional conservation acquisitions by EHC or others, as indicated above.

4.2.4 Research

<u>Objective 7 (AN-7). Research Studies</u>. Coordinate with SDMMP or other entities annually or as-requested to facilitate research within the complex that informs species-specific monitoring and management, including development of BMPs.

<u>Task 7.1 (AN-7.1): Facilitate MSP Animal Research Studies</u>. Provide preserve access to researchers conducting connectivity, distribution, genetics, translocation, or breeding studies to better inform management of MSP animals and their habitat (e.g., American badger, mountain lion, bats).

4.3 MSP Plant Species (PL)

We conducted baseline surveys for a number of MSP plant species within the complex between 2011 and 2015, and assessed the *potential* for additional MSP plant species to occur within the complex during reconnaissance surveys. We recommend (1) baseline surveys for potentially-occurring MSP plant species to identify presence and extent within the complex, (2) monitoring to track MSP plant status and threats, and assess management effectiveness, (3) management to address threats to MSP priority plant species, and (4) general inventories during surveys, monitoring, management, or patrol events to identify common plant species.

<u>MSP Plant Species Goal</u>: Maintain or enhance MSP plant populations (including pollinator habitat) within the GCER complex to increase resilience to environmental and demographic stochasticity, maintain genetic diversity, and ensure persistence over the long-term (>100 years) within the complex.

4.3.1 Surveys and Inventories

<u>Objective 1 (PL-1). MSP Plant Baseline Surveys</u>. Conduct baseline surveys for San Miguel savory, Gander's ragwort, Parry's tetracoccus, Lakeside ceanothus, felt-leaved monardella, and Engelmann oak within the complex by 2021 to determine species presence, map population extent, assess status and threats, and identify appropriate management actions.

<u>Task 1.1 (PL-1.1): Conduct San Miguel Savory Surveys</u>. Conduct baseline surveys for San Miguel savory on gabbroic soils in chaparral on South Crest, Michelsen, and Odom in 2018 or 2020, in conjunction with IMG monitoring. Although San Miguel savory is a perennial species that can be surveyed year-round, we recommend surveying during the flowering period to facilitate detection.

<u>Task 1.2 (PL-1.2): Conduct Gander's Ragwort Surveys</u>. Conduct baseline surveys for Gander's ragwort on gabbroic soils in chaparral on Michelsen and Odom in 2018 or 2020, in conjunction with IMG monitoring. Gander's ragwort is most visible when flowering, but can be detected from vegetative growth. While it is possible to survey for Gander's ragwort in the absence of a recent fire, mapping population extent (if present) will be easier and more accurate post-fire.

<u>Task 1.3 (PL-1.3): Conduct Parry's Tetracoccus Surveys</u>. Conduct baseline surveys for Parry's tetracoccus on gabbroic soils in chaparral and scrub on Odom, Gibson, Kemerko, and Davison in 2019, in conjunction with IMG monitoring. This species can be surveyed year-round.

<u>Task 1.4 (PL-1.4): Conduct Lakeside Ceanothus Surveys</u>. Conduct baseline surveys for Lakeside ceanothus on or near acid igneous rock land in chaparral on Ulrich by 2021. Although this is a perennial species that can be surveyed year-round, we recommend surveying during the flowering period to facilitate detection.

Task 1.5 (PL-1.5): Conduct Felt-leaved Monardella Surveys. Conduct baseline surveys for felt-leaved monardella in chaparral or woodlands on South Crest, Michelsen, Odom, Gibson, Kemerko, and Davison by 2021. Although this is a perennial species that can be surveyed year-round, we recommend surveying during the flowering period to facilitate detection.

<u>Task 1.6 (PL-1.6): Conduct Engelmann Oak Surveys</u>. Conduct baseline surveys for Engelmann oak on Michelsen and Ulrich in 2021, in coordination with regional IMG monitoring. Engelmann oak surveys can occur year-round.

Conduct baseline surveys for potentially-occurring MSP plants on new EHC preserves within the complex by 2021 or in the subsequent 5-year management period; refer to Appendix A, Table A-8 for potentially-occurring species and their habitat affinities.

Baseline surveys should be conducted in conjunction with regional rare plant IMG monitoring, to the degree feasible. Collect data per the IMG monitoring protocol and data form. Key covariate data include vegetation composition and cover (alliance and association-level mapping), invasive plants and other threats, and a visual estimate of population size or percent cover. Map the perimeter of the population for all detected MSP species and the extent of suitable habitat (e.g., clay lens), where applicable. Baseline surveys may be more time-intensive than IMG monitoring because of the mapping element.

Incorporate baseline survey results for at-risk MSP plant species into Resource Avoidance Area map, as appropriate (FM-4.1).

<u>Objective 2 (PL-2).</u> <u>General Plant Inventories</u>. Develop a standardized, complex-wide system for recording plant species by preserve by 2018 and develop, maintain, and update a plant species list for the complex by 2021 to document plant diversity within preserves.

Task 2.1 (PL-2.1). Develop Plant Inventory System. Develop a standardized system to record species by preserve, habitat, and other attributes identified as important. Include these attributes in the master list of plant species for the complex (PL-2.2, below).

Task 2.2 (PL-2.2). Develop and Maintain Plant Species List. Develop a plant species list for the complex, using the inventory system developed in PL-2.1. We do not recommend

focused or comprehensive plant inventory surveys at this time. Rather, compile species from reconnaissance surveys, vegetation mapping (VEG-1.1), baseline and post-fire MSP plant surveys (PL-1, FM-8.4), biological monitoring (PL-3.1), preserve patrols (PS-5.1), research studies (OER-2.1), and volunteer efforts (OER-1.4).

Update the list annually or as additional species are collected. Review and revise taxonomy every 5 years, as appropriate.

4.3.2 Monitoring

<u>Objective 3 (PL-3). MSP Plant Monitoring</u>. Monitor MSP priority plants within the complex annually, biannually or at 3-5 year intervals using the regional rare plant IMG monitoring protocol or updates to assess species status and threats, and monitor species-specific management action effectiveness at frequencies specified in annual work plans or management plans. Monitor additional (non-MSP) species with monitoring requirements under a Habitat Conservation Plan (HCP) (if any) per Objective 4, as well.

<u>Task 3.1 (PL-3.1): Monitor MSP Priority Plants</u>. Inspect MSP priority plants using IMG monitoring protocol frequencies and schedules in Table 12 and the IMG monitoring protocol or updates to record abundance (and for Dehesa nolina, map perimeters) and collect habitat and threat covariate data to determine management needs.

For additional MSP priority species detected during baseline surveys (PL-1), inspect occurrences according to the schedule and frequencies in the MSP Roadmap (SDMMP AND TNC 2017), using the IMG monitoring protocol described above.

In the event of fire or other catastrophic disturbance, implement contingency monitoring for MSP priority plant species and other MSP plant species (FM-8.5, AR-4).

<u>Task 3.2 (PL-3.2): Monitor MSP Plant Management Effectiveness</u>. Monitor the effectiveness of species-specific management actions (PL-5, FM-8.5), and manage adaptively based on results (e.g., refine or expand management). In general, the level of monitoring effort will be greater with intensive versus routine management.

Identify monitoring methods in annual work plans or management plans prior to management implementation. Monitoring methods may include qualitative, semiquantitative, or quantitative measures, including (but not limited to) photomonitoring, direct counts or estimates, relevés, quadrats, or transects. Potential monitoring targets include (1) plant growth (2) direct counts or estimates of population size, (3) species diversity or richness, and (4) vegetative cover.

Species	Preserve ¹	Frequency	5-Year Monitoring Schedule	Contingency Monitoring
San Diego thornmint	SC	Annually	2017-2021	See FM-8.5
Encinitas baccharis	GI, DA	2-year intervals	2019, 2021	See FM-8.5
Variegated dudleya	SC, MI, OD	2-year intervals	2018, 2020	See FM-8.5
Dehesa nolina	SC, MI, OD	5-year intervals	2017, 2021	See FM-8.5
Parry's tetracoccus	SC, MI, OD	3-5-year intervals	2019	See FM-8.5

Table 12. 5-year Monitoring Schedule for MSP Priority Plant Species.

Preserve: SC = South Crest, MI = Michelsen, OD = Odom, GI = Gibson, DA = Davison.

To date, effectiveness monitoring includes Dehesa nolina and variegated dudleya augmentation on South Crest (PL-5.4).

4.3.3 Management

<u>Objective 4 (PL-4). Management Prioritization</u>. Prioritize management for MSP priority plant species within the complex annually (routine management) and at 3-5-year intervals (intensive management) based on species status and threats (as determined through surveys and monitoring), management feasibility, and available funding.

<u>Task 4.1 (PL-4.1): Prioritize MSP Plant Management Actions</u>. Determine whether prioritized management actions for MSP priority plant species are routine or intensive. For routine management, identify management methods, timing, frequency, schedule, and costs in annual work plans. For intensive management, develop management plans and secure funding prior to implementation. Examples of routine management include fencing or trail closures. Examples of intensive management include large-scale invasives control and possibly, habitat restoration or species augmentation.

Refer to Table 13 for MSP plant-specific routine and intensive management actions discussed in this section. Additional management actions that will benefit MSP plants are detailed in PS-1 (access control), PS-3 (roads and trails), and PS-4 (erosion control).

<u>Objective 5 (PL-5). Management Implementation</u>. Continue routine invasive plant control annually or as-needed to protect MSP plants from habitat degradation and competition. Coordinate with regional entities to establish offsite propagule sources for MSP priority

plants by 2021. Maintain caging and irrigation for outplanted Dehesa nolina and variegated dudleya plants on South Crest through 2017; continue weeding outplantings through 2021.

Task 5.1 (PL-5.1): Treat Invasive Plants. Control invasive plants and manage thatch in the South Crest restoration site through herbicide application or mechanical removal from 2017-2021, as outlined in INV-3.1, RS-1.1, RS-2, and FM-5.2, as needed. Additional, ongoing invasive plant control measures specific to MSP plants include:

- San Diego thornmint (South Crest): Hand-weed occupied habitat annually unless monitoring indicates less frequent weeding is appropriate. Target invasives are *Brachypodium distachyon* and *Sonchus* sp. in the large stand. Other species, if problematic, should be hand-pulled, as well. We do not recommend weeding the entire clay lens (large stand) since it's on a slope and could impact the population (e.g., trampling, erosion). We recommend hand-weeding the entire clay lens for the small stand.
- Variegated dudleya (South Crest): Continue weed control (e.g., hand weeding, dethatching, herbicides), as necessary, to reduce thatch and invasives in occupied habitat outside the *Brachypodium* control area.

Control invasive plants on Gibson, Kemerko, and Davison where they threaten MSP plant occurrences (e.g., INV-3.14).

Task 5.2 (PL-5.2): Establish Seed Bank. Coordinate with SDMMP, the San Diego Zoo, San Diego Botanic Garden, or other entities developing conservation and propagation seed banks for MSP plant species at-risk from fire. Identify whether seed collections exist for at-risk MSP plant species within the complex at local, regional, or national seed banks. Where collections do not exist, are not available for propagation, or are not genetically appropriate for use within the complex, collect seed or provide access for other entities to collect seed. The San Diego Zoo is currently collecting seeds for MSP rare plants in the region, including San Diego thornmint, and may have the ability to collect other MSP species as part of the San Diego Rare Plant Rescue Initiative (Anderson pers. comm.).

Refer to the MSP Seed Collection, Banking, and Bulking Plan (to be prepared by 2019) for seed collection, documentation, processing, viability testing, and long-term storage protocols.



Greater Crestridge Ecological Reserve Complex Framework Management Plan

MSP Spacios	Management	Task	Pacommonded Action	Schedule Status ²		atus ² Preserve ³						
wisr species	Type ¹	I dSK	Recommended Action	Schedule	Status	SC	MI	UL	OD	GI	KE	DA
	Routine	Treat Invasive Plants	Hand-weed occupied habitat.	Annually	IP	Х						
Acanthomintha	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.	2019-2021	NS	X						
(San Diego thornmint)	Intensive	Treat Invasive Plants	Pursue funding to control nonnative grasses and forbs in previously occupied habitat and augment thornmint occurrence.	2018-2021	NS				X			
Baccharis vanessae	Routine	Treat Invasive Plants	Remove long-leaved veldt grass in proximity to Encinitas baccharis.	2017-2021	NS					X		X
(Encinitas	Intensive	Treat Invasive Plants	Control long-leaved veldt grass.	2017-2021	NS					Χ	Х	Х
baccharis)	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.	2018-2021	NS					X		X
<i>Ceanothus cyaneus</i> (Lakeside ceanothus)	Intensive	Treat Invasive Plants	Pursue funding to develop and implement a management plan to control long-leaved veldt grass.	2017-2021	NS					X	Х	X
	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.	2019-2021	NS					X	Х	X
	Intensive	Treat Invasive Plants	Continue <i>Brachypodium</i> treatment.	2017	С	X						
	Routine	Treat Invasive Plants	Maintain <i>Brachypodium</i> treatment areas per BMPs.	2018-2021	IP	X						
Dudleya variegata	Intensive	Treat Invasive Plants	Pursue funding to expand <i>Brachypodium</i> treatments.	2018-2021	IP	X			Х			
dudleya)	Routine	Treat Invasive Plants	Control invasives outside <i>Brachypodium</i> treatment areas.	2017-2021	IP	X			Х			
	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.	2019-2021	NS	X	Х		X			
	Intensive	Augment Species Populations	Augment existing population.	2017-2021	IP	X						

Table 13. Management Strategic Plan (MSP) Plant Priority Management Actions, 2017-2021.



Greater Crestridge Ecological Reserve Complex Framework Management Plan

MCD Sussian	Management	Tasl	December 1.1 Action	Calcada 1	Status ²	Preserve ³						
MSP Species	Type ¹	T ask	Recommended Action	Schedule	Status	SC	MI	UL	OD	GI	KE	DA
	Intensive	Treat Invasive Plants	Continue <i>Brachypodium</i> treatment per SANDAG grant.	2017	С	X						
	Routine	Treat Invasive Plants	Maintain <i>Brachypodium</i> treatment areas per BMPs.	2018-2021	IP	X						
<i>Nolina interrata</i> (Dehesa nolina)	Intensive	Treat Invasive Plants	Pursue funding to expand <i>Brachypodium</i> treatment.	2018-2021	IP	X	Х		X			
	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.		NS	X	Х		X			
	Intensive	Augment Species Populations	Augment existing population.	2017-2021	IP	X						
<i>Quercus</i> <i>engelmannii</i> (Engelmann oak)	Intensive	Treat Invasive Plants	Pursue funding to develop and implement a management plan to control long-leaved veldt grass.	2017-2021	NS					X	X	
	Other ⁴	Establish <i>Ex Situ</i> Nursery Stands	Work with SDMMP or other entities to develop <i>ex situ</i> nursery stands, if appropriate.	2019-2021	NS					X	Х	
<i>Tetracoccus</i> <i>dioicus</i> (Parry's tetracoccus)	Intensive	Treat Invasive Plants	Pursue funding to expand <i>Brachypodium</i> treatment.	2018-2021	NS	X	X		Х			
	Other ⁴	Establish Seed Bank	Work with SDMMP or other entities to develop a seed bank.	2019-2021	NS	X	X		Х			

Table 13.	Management Strategic	Plan (MSP) Plant Priority	v Management Actions	. 2017-2021.
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¹ Management Type: Routine = management actions accommodated within annual management budgets; Intensive = management actions that may require outside funding sources.

² Status: IP = In-progress; NS = Not started.
³ Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich; OD = Odom; GI = Gibson; KE = Kemerko; DA = Davison.

⁴ Other = management action will be conducted by outside entities, with preserve-specific involvement including field coordination and access.



Seed collections for long-term storage are appropriate for the following MSP at-risk plants within the complex:

- San Diego thornmint (South Crest)
- Encinitas baccharis (Gibson, Davison)
- Lakeside ceanothus (Gibson, Kemerko, Davison)
- Variegated dudleya (South Crest, Michelsen, Odom)
- Dehesa nolina (South Crest, Michelsen, Odom)
- Parry's tetracoccus (South Crest, Michelsen)

Of these species, San Diego thornmint, Encinitas baccharis, Dehesa nolina, and Parry's tetracoccus will be higher priorities initially for seed banking than Lakeside ceanothus and variegated dudleya, due to threats and fire risk. Collect seed for all species except Dehesa nolina prior to a fire event. Dehesa nolina mass-flowers following fire, so collect seed in the 1-3 years following fire. Collect Encinitas baccharis seed post-fire if the species flowers profusely after a fire event. Seeds of some Asteraceae species are relatively short-lived in storage, depending on storage conditions; thus, Encinitas baccharis seeds should be stored at an appropriately low temperature (e.g., -18°C) to retain long-term viability. EHC established a long-term seed collection for Lakeside ceanothus on CER; seed is stored at the San Diego Zoo, Rancho Santa Ana Botanic Garden, and the National Center for Genetic Preservation in Ft. Collins, Colorado. Initial viability testing indicated this seed was highly viable (>95%) with some physical dormancy (CBI 2010) (FM-7.2, FM-8.7).

Task 5.3 (PL-5.3): Establish *Ex Situ* Nursery Stands. Coordinate with the SDMMP or other entities to establish *ex situ* (off-site) nursery stands (if appropriate) to provide a source of living seeds and genetic material for at-risk MSP plants with recalcitrant seed (i.e., seed cannot be stored long-term due to desiccation sensitivity). Coordination may include collecting seed or facilitating access for other entities to collect seed.

Engelmann oak (Gibson, Kemerko) is a candidate for *ex situ* nursery stands. At this time, we do not recommend *ex situ* nursery stands for Lakeside ceanothus or Parry's tetracoccus due to seed biology, space and cost requirements, and the potential for genetic modifications in a nursery setting. Both species are relatively short-lived shrubs with orthodox seed (i.e., seeds survive drying and freezing and are expected to retain long-term viability in storage) and thus, are good candidates for seed banking.

Task 5.4 (PL-5.4): Augment MSP Plant Populations. Where monitoring or research indicate the need for augmentation to offset plant losses or increase genetic diversity, develop and implement species-specific augmentation plans that identify propagule type (e.g., seed, container plants) and source, propagation methods, outplanting methods, and a post-planting management and monitoring plan. Incorporate species augmentation BMPs (where available), provide supplemental watering and weed control, and include 3-5 years of monitoring to document success and manage adaptively.

Where nursery-grown plants or seed bulking are required, grow plants and bulk seed at a qualified facility using seed from genetically appropriate donor accessions in the regional seed bank (PL-5.2) or from seed collected onsite. Augmentation materials may also come from *ex situ* nursery stands (PL-5.3, FM-7.3). In general, propagate and outplant Encinitas baccharis, Dehesa nolina, and Engelmann oak as container plants, outplant San Diego thornmint from seed, and propagate and outplant variegated dudleya as pre-flowering or dormant plants. Outplant Lakeside ceanothus and Parry's tetracoccus as seed or container plants, depending on topography and number of plants required. Lakeside ceanothus is an obligate seeder (i.e., seed germinates after fire), so outplanting seed would be a long-term restoration strategy to bolster the natural seed bank. For all species, use propagation and outplanting BMPs, where available (e.g., Dehesa nolina and variegated dudleya; CBI 2016, Dodero pers. comm.).

We augmented Dehesa nolina and variegated dudleya on South Crest from 2013-2016 per SANDAG EMP grant 5001763 (CBI 2016). Augmentation efforts included (1) seed collection, (2) nursery propagation, (3) outplanting of container plants (Dehesa nolina) and flats (variegated dudleya) into restored habitat, (4) plant protection, supplemental watering, and weed control, and (5) survival monitoring. To ensure continued outplanting success, we recommend the following management actions:

Dehesa nolina:

- Protect outplanted individuals with wire cages and/or "treepees" through 2017 to minimize herbivory and maximize survivorship.
- Provide supplemental water through 2017.
- Weed planting basins through 2021, as needed.



Variegated dudleya:

- Maintain caging to protect variegated dudleya plants from herbivory, but modify the cages in 2017 to accommodate plant growth and maintenance activities.
- Continue hand-weeding nonnative grasses and other emergent invasive species within and around planting cages through 2021, as needed.
- Provide supplemental irrigation during drought or low rainfall years only for plants that emerge naturally to allow them to survive.

In addition, we recommend enhancing the small, naturally-occurring variegated dudleya population on the western slope of Skeleton Flats with nursery-grown plants as resources and funding are available.

We also recommend introducing San Diego thornmint seed into the previously documented thornmint location on Odom after suitable habitat is restored (e.g., invasive plant control, dethatching) and if soil sampling indicates conditions are still suitable to support this species in this location (see CBI 2018 for suitable soil conditions).

4.3.4 Research

<u>Objective 6 (PL-6).</u> Research Studies. Coordinate with SDMMP or other entities annually or as-requested to facilitate research within the complex that informs species-specific monitoring and management, including development of BMPs.

<u>Task 6.1 (PL-6.1):</u> Facilitate Pollinator Studies. Provide preserve access to researchers conducting pollinator studies to better inform post-fire management of at-risk MSP plant species and their habitat (FM-7.4). Pollinator studies would be beneficial for:

- San Diego thornmint (South Crest)
- Variegated dudleya (South Crest, Michelsen, Odom)
- Dehesa nolina (South Crest, Michelsen, Odom)

<u>Task 6.2 (PL-6.2):</u> Facilitate Regional Soils Studies. Provide preserve access in 2017 for field research into soils and habitat relationships for San Diego thornmint, Dehesa nolina, and Parry's tetracoccus on South Crest and Michelsen to better understand habitat requirements and identify and prioritize geographic areas important for connectivity, restoration, and range shifts due to climate change and other threats.

4.4 Coordination (CO)

Preserves within the GCER complex are adjacent to or near rural residences and communities at several locations. Developing and sustaining strong positive relationships with adjacent landowners/managers can be beneficial in maintaining the integrity and conservation values of the complex. Experience at other preserves has shown that an engaged, local community often provides an 'extra set of eyes' in monitoring unauthorized preserve uses. In addition, the complex is in a high wildfire threat area (SDMMP AND TNC 2017); thus, coordination with local fire agencies is necessary for both public safety and resource protection. Finally, coordination with authorized preserve users (e.g., SDG&E, contractors, researchers) will help avoid or minimize impacts to key resources during access, management, or research activities (e.g., invasive species introductions, trampling or clearing vegetation).

<u>Coordination Goal (CO)</u>: Communicate and coordinate regularly with adjacent landowners/managers and authorized users of the GCER complex to protect and enhance preserve resources while allowing for other necessary uses.

4.4.1 Adjacent Landowners

<u>Objective 1 (CO-1). Landowner Coordination</u>. Establish contact with adjacent landowners by 2021 and maintain contact as-needed thereafter to (1) update landowners on preserve regulations, (2) resolve and/or assist with boundary encroachment or fuel management issues, and (3) provide technical expertise on management issues that affect preserves and/or adjacent lands (e.g., invasive species control).

<u>Task 1.1 (CO-1.1): Contact Landowners</u>. Contact resident landowners adjacent to preserves to inform them of preserve establishment, boundaries, rules and regulations, and discuss preserve access (PS-1.2), encroachment, and management issues that may affect their lands. After the initial contact, meet with landowners on an as-needed basis.

<u>Task 1.2 (CO-1.2):</u> Develop and Maintain Landowner Contact List. Develop and maintain a list of adjacent landowners (including phone numbers) for contact in the event of preserve management issues, access needs, or wildfire. Review the list annually to ensure that contact information is updated, as necessary.

Task 1.3 (CO-1.3): Develop and Maintain Landowner Reporting System. Provide adjacent landowners with a staff cell phone number and/or online website for reporting incidents or emergencies related to preserves, including (but not limited to) unauthorized access, OHV activity, dumping, shooting, or wildfire. Include an EHC land manager cell phone number on rules and regulations signs (PS-1.3) to further facilitate reporting.

<u>Objective 2 (CO-2). Edge Effects</u>. Coordinate with adjacent landowners by 2021 to reduce or eliminate identified edge effects at the urban-preserve boundary that impact or potentially impact MSP species and habitats or impede connectivity to other preserve lands, and maintain contact as-needed thereafter to prevent further edge effects.

Task 2.1 (CO-2.1): Resolve Encroachment Issues. Contact landowners to resolve encroachment issues at the urban-preserve boundary. We identified potential encroachment issues (vegetation clearing, dumping, illegal structure) along (1) the western boundary of Ulrich (boundary between Ulrich Assessor's Parcel Number [APN] 509-010-51 and private parcels), (2) the southern border of Odom (APN 516-02-002), (3) the western boundary of Kemerko (APN 399-030-22), and (4) the southern boundary of Kemerko (APN 399-030-29). Specific actions may include:

• Conduct boundary surveys and work with landowners to re-locate fencing, install signage (as necessary), and remove structures or horticultural plantings, as determined necessary; horticultural plantings of greatest concern are those that have the potential to naturalize and spread, are a high-fire risk, degrade wildlife habitat, provide habitat for nonnative animals, or require irrigation.

An additional issue is the occurrence of an illegally constructed house in the northwest portion of the Odom Preserve (Odom APN 513-011-12), just south of Suncrest Boulevard.

<u>Task 2.2 (CO-2.2): Coordinate Fuel Modification</u>. Coordinate with adjacent landowners (CO-1.1, FM-5.1), fire agencies (CO-3.2), and other preserve users (CO-4.1) annually to (1) identify fuel modification needs, limits, and responsibilities and (2) minimize impacts to natural vegetation and MSP species during fuel modification, to the degree feasible.

4.4.2 Fire Agencies

<u>Objective 3 (CO-3).</u> Fire Agency Coordination. Establish contact with appropriate fire agencies by 2018 and maintain contact annually or bi-annually thereafter to ensure (1) all parties have up-to-date contact information and gate/lock codes, (2) fuel modification at the urban-preserve boundary is implemented in accordance with fire agency standards and with minimal impacts to sensitive biological resources, and (3) roads used for fire suppression or emergency egress are identified and maintained by the designated parties.

<u>Task 3.1 (CO-3.1):</u> Contact Fire Agencies. Contact fire agencies to develop and maintain a list of fire agency contacts in the event of fire, and ensure that fire personnel have access to the preserve through designated gates. Where new gates are installed, contact fire agencies regarding installing their locks on the gate (PS-1.2).

Task 3.2 (CO-3.2): Identify Fuel Modification Needs. Contact fire agencies to review fuel modification requirements and locations at the urban-preserve boundary or within preserves (e.g., powerlines). Coordination may occur in conjunction with adjacent land owner/managers (CO-2-2) or utility companies (CO-4.1).

<u>Task 3.3 (CO-3.3)</u>: <u>Maintain Roads</u>. Meet with the appropriate (preserve-specific) fire agency (FM-1.4) to identify preserve roads to be used for fire suppression activities or emergency egress and determine road maintenance responsibilities and schedules. Meet with fire agencies bi-annually thereafter to ensure that roads are maintained sufficiently to allow designated use during a fire event (PS-3.3).

Suncrest Boulevard through South Crest is identified as an emergency fire egress road with a locked gate for the community of Crest (County of San Diego 2011); CalFire maintains this road periodically (Beck pers. comm.). Montana Serena Road adjacent to Gibson and Davison may also serve as an emergency fire egress road (County of San Diego 2011). EHC and adjacent homeowners may maintain dirt roads for access by fire crews on or near the Davison Preserve.

4.4.3 Other Preserve Users

<u>Objective 4 (CO-4). Other Preserve Users Coordination</u>. Coordinate with other preserve users (e.g., SDG&E, contractors, and researchers) on an annual or as-needed basis to establish (1) road maintenance and fuel management responsibilities and schedules, (2) preserve access protocols, and (3) biosecurity measures.

<u>Task 4.1 (CO-4.1): Contact Utilities</u>. Establish email and cell phone contacts with SDG&E personnel responsible for utility maintenance within the complex, and coordinate annually regarding preserve access (e.g., gates/locks) (PS-1.2), fuel modification (CO-3.2), biosecurity measures (CO-4.2), and road maintenance (PS-3.3).

<u>Task 4.2 (CO-4.2):</u> Provide Biosecurity Measures. Provide all preserve users with written biosecurity measures to be implemented when working within the complex to prevent the introduction and spread of invasive species, pests, or pathogens (OER-1.2, 2.2). Biosecurity measures include (but are not necessarily limited to):

- Clean dirt, vegetation, or seeds off vehicles and vehicle tires, equipment, personal gear (e.g., boots), and domestic animals prior to entering the preserve.
- Inspect plant stock to be outplanted onto the preserve for insects or disease prior to planting, and eliminate infected individuals from outplantings.

- Inspect animals for disease prior to introduction to the preserve (e.g., Quino checkerspot butterfly), and eliminate infected individuals from introduced stock.
- Inspect wood brought into the preserve for wildlife structures or fences for signs of infestation by pests or pathogens, and prevent the importation of infested wood.

4.5 Property Stewardship (PS)

Property stewardship includes long-term, routine management designed to protect preserves and maintain biological values, while allowing for non-impactive, authorized preserve uses. Property stewardship activities include the following general maintenance and routine habitat management actions:

- Secure the preserves through strategically placed gates, fencing, and signage.
- Remove trash that poses a threat to wildlife, plants, or humans, or is an attractive nuisance.
- Maintain or enhance roads or trails used for site access for preserve and utility management, recreation, and emergency egress.
- Close roads or trails that are redundant, traverse or are in proximity to sensitive resources, or pose a safety risk due to erosion.
- Install and maintain erosion control measures to protect MSP species or habitats, ensure access, or protect safety.
- Patrol preserves and enforce preserve rules and regulations to protect resources and ecological functions.

<u>Property Stewardship Goal (PS)</u>: Maintain the physical condition of preserves through stewardship actions that allow for authorized preserve uses while protecting the biological and cultural resources and ecological functions of the GCER complex.

4.5.1 Access Control

<u>Objective 1 (PS-1).</u> Access Control. Install at least 1 new fence and 1 new gate on South Crest, and at least 14 signs throughout the complex (as specified below) by 2021 to restrict access or activities that may impact natural resources, and inspect and maintain existing and newly installed structures monthly, quarterly, or annually (as specified below) to protect resources from intentional and unintentional impacts.

Task 1.1 (PS-1.1): Install and Maintain Fencing. Install and maintain fencing to (1) restrict unauthorized access or activities, (2) discourage off-trail use that may impact MSP species or habitats or cultural resources, and (3) protect habitat restoration or species augmentation efforts. Select fencing that allows for wildlife movement, where feasible. Install access control fencing strategically to minimize the amount (length) of fencing necessary. For example, interior fencing may consist of three- to five-strand barbed or smooth wire, while boundary fencing may include 5- to 6-foot high chain link fencing at access points only. Specific measures include:

South Crest:

- Inspect existing fencing around South Crest restoration site quarterly to ensure it is intact and undamaged. Replace or repair damage sections, as needed.
- Install fencing selectively at the northwest preserve boundary to ensure that OHVs do not drive around the recommended gate at this location (PS-1.2).
- Install and/or maintain fencing as determined necessary to protect MSP plant and animal populations from recreational or OHV uses. Existing fencing protects variegated dudleya and Dehesa nolina in the South Crest restoration site. Fencing needs for Quino checkerspot butterfly or San Diego thornmint will be determined through baseline surveys or monitoring, respectively.

Kemerko:

• Enhance or replace the existing chain barrier with a sturdier fence to restrict access from Mountain View Road into the preserve along a secondary dirt road (Appendix A). Note that EHC recently enhanced access control at this location, which appears to have controlled entry by motorcycles and other OHVs.

Odom:

• Inspect existing fencing at the southern preserve entrance (Sycuan Summit Drive) and along the northern property boundary (Suncrest Boulevard and South Lane) to ensure it is intact and undamaged. Replace or repair damaged sections, as needed. Fence inspections are currently conducted weekly by EHC land managers.
Gibson:

• Inspect existing fencing at northern preserve entrance (dirt road south of Montana Serena) quarterly to ensure it is intact and undamaged. Replace or repair damaged sections, as needed.

Task 1.2 (PS-1.2): Install and Maintain Gates. Install new gates and maintain all gates annually to restrict unauthorized access into preserves and ensure authorized users can access preserves, as needed.

South Crest:

- EHC recently installed a gate with walk-through at the northwest preserve boundary to allow pedestrian and horse access, while restricting OHV access. Inspect and maintain this gate annually to ensure it functions and provides effective access control.
- EHC installed a gate in the northwest corner of the preserve complex to limit access and reduce trail erosion. Inspect and maintain this gate annually to ensure it functions and provides effective access control.
- Inspect existing electronic gate along Suncrest Boulevard monthly, as-needed, to ensure that it is functioning properly. If gate code is changed, inform preserve users, including adjacent landowners, fire agencies, utilities, and contractors of the new code (CO-3.1, CO-4.1, CO-1.1).

Odom:

- Inspect and maintain existing gate at southern preserve entrance (Sycuan Summit Drive) monthly to ensure that both the gate and EHC lock are intact and undamaged. Replace or repair gate or lock, as needed.
- Inspect and maintain emergency vehicle gate along Suncrest Boulevard/South Lane monthly to ensure the gate is intact and undamaged.

Gibson:

• Inspect gate at northern end of preserve (dirt road south of Montana Serena) quarterly to ensure that both the gate and EHC lock are undamaged and functioning properly. Replace or repair gate or lock, as needed.



Kemerko:

• Coordinate with SDG&E annually to ensure that the SDG&E-maintained gate into preserve is undamaged and functioning properly. Inspect gate weekly to ensure that the EHC lock is intact and undamaged; replace lock, as needed.

Davison:

• Inspect gate at southeast corner of preserve (dirt road north of Montana Serena) quarterly to ensure that gate is undamaged and functioning properly. Replace or repair gate or lock, as needed.

<u>Task 1.3 (PS-1.3):</u> Install and Maintain Signage. Install and maintain signage to indicate (1) preserve rules and regulations, (2) road and trail closures (PS-3.2), and (3) habitat restoration, species augmentation, or erosion control areas that are closed to the public. Install *No Trespassing* signs for preserves that are off-limits to the public. Install interpretive signs to educate the public about preserve conservation values and biological resources, habitat or species restoration efforts, cultural resources (if deemed appropriate) and user-specific guidelines to protect preserve resources (e.g., biosecurity to restrict invasive species, dogs on-leash to protect wildlife) (OER-1.2).

Include preserve name, preserve hours, EHC land manager contact phone number, and CDFW code(s) (as applicable) on rules and regulation signs, and list unauthorized activities, including (but not necessarily limited to) OHV activity, shooting, campfires, camping, and dumping. On some preserves, or select areas within preserves, restrict additional activities (e.g., hiking, mountain biking, horses, dogs) to protect sensitive resources, if needed.

South Crest:

- Inspect and maintain existing preserve rules and regulations signage in the vicinity of Skeleton Flats quarterly, and replace or repair missing or damaged signs.
- Install rules and regulations signs along roads or trails in the northwestern and southern portions of the preserve (e.g., near Suncrest Boulevard).
- Inspect and maintain existing trail closure signs in the vicinity of Skeleton Flats quarterly, and replace or repair missing or damaged signs.

- Install and maintain new trail closure signs, as designated in the future roads and trails plan (PS-3.2).
- Install and maintain signage as-needed to protect MSP species from impacts, including (but not limited to) Quino checkerspot butterfly (if determined present onsite) and San Diego thornmint.

Michelsen:

• Install 2 rules and regulations signs at the northern and southwestern preserve boundaries, respectively where unauthorized trails enter the preserve. Inspect and maintain signs quarterly, and replace or repair missing or damaged signs.

Ulrich:

• Install *No Trespassing* signs if no public access is allowed. If some level of public access is allowed, install 4-5 rules and regulations signs along the western preserve boundary, where unauthorized trails enter the preserve or where adjacent private property owners are entering/using the preserve illegally. Inspect and maintain signs quarterly, and replace or repair missing or damaged signs.

Odom:

- Inspect and maintain existing preserve rules and regulations signage along preserve boundaries (e.g., Sycuan Summit Drive, Suncrest Boulevard/South Lane, Eucalyptus Drive) quarterly, and replace or repair missing or damaged signs
- Update the signage at the preserve boundary along Descanso Lane.
- Install rules and regulations signs at selected locations along the southern preserve boundary (e.g., north of Dehesa Road).
- Install rules and regulations signs along the north-south access road, north of Skeleton Flats, where unauthorized bike trails intersect with the access road.

Gibson:

• Install a *No Trespassing* <u>or</u> a rules and regulations sign at the northern preserve boundary. Inspect and maintain sign quarterly, and replace or repair sign if missing or damaged.



Kemerko:

• Install 3-4 *No Trespassing* <u>or</u> rules and regulations signs along the southern and southwestern preserve boundaries. Inspect and maintain signs quarterly, and replace or repair missing or damaged signs.

Davison:

• Install a *No Trespassing* <u>or</u> a rules and regulations sign at the southeast corner of the preserve. Inspect and maintain sign quarterly, and replace or repair sign if missing or damaged.

4.5.2 Trash Control

<u>Objective 2 (PS-2). Trash Removal</u>. Remove priority trash on South Crest, Ulrich, Odom, and Kemerko to a landfill or offsite disposal container by 2021, and remove other (non-priority) trash within the complex to an offsite disposal container during routine stewardship patrols.

Task 2.1 (PS-2.1): Remove Trash. Remove all Priority Levels 1 and 2 trash and other trash on a case-by-case basis (Appendix A); pick up litter or newly disposed of trash during preserve patrols. Priority trash removal includes:

South Crest:

• Remove Priority 1 trash in the southwest portion of the preserve, in and near the fire ring on a hill top (Figure 10a; Appendix A). In addition, consider closing the trail to the hilltop (PS-3.1) and patrol this area regularly (PS-5.1) to discourage further dumping.

Ulrich:

• Remove Priority 2 trash at the urban-preserve boundary (Figure 10a; Appendix A) or engage adjacent landowners to assist in trash removal.

Odom:

- Remove Priority 1 trash (e.g., rusted car parts) on slopes adjacent to dirt access road from Sycuan Summit Drive into the preserve (Figure 10a; Appendix A).
- Remove Priority 1 and 2 trash and other trash at the water tank in the northern portion of the preserve (Figure 10a; Appendix A).



Kemerko:

- Remove Priority 1 trash in the southwest corner of the preserve and the southern portion of the preserve (Figure 10b; Appendix A).
- Remove Priority 2 trash in the southwest and southern portions of the preserve as funding and resources allow; this includes all other trash mapped on the preserve during reconnaissance surveys (Figure 10b; Appendix A).

4.5.3 Roads and Trails

<u>Objective 3 (PS-3). Roads and Trails</u>. Develop a roads and trails plan for the complex by 2021 that (1) includes a roads and trails map, (2) designates road and trail uses, closures, and re-routes, (3) identifies sensitive areas to be avoided or protected during road maintenance activities (e.g., cultural resources), and (4) identifies short- and long-term management and restoration needs, locations, and funding requirements.

Task 3.1 (PS-3.1): Conduct Roads and Trails Inventory. Map roads and trails in the field using a GPS, and record trail width, use type(s) and frequency, and current status (authorized, unauthorized, open, closed). In coordination with fire agencies, SDG&E, and biologists, identify and prioritize roads and trails for continued use (including emergency egress), closure, or re-routing, and target areas for erosion control and revegetation. Use information to develop a roads and trails map for inclusion in the roads and trails plan (PS-3.2).

Task 3.2 (PS-3.2): Develop Roads and Trails Plan. Using the roads and trails map, develop a roads and trails plan for the complex that includes the following elements:

- Determine if existing roads and trails impact MSP species or habitats. Based on findings, identify road or trail closures or re-routes necessary to protect resources.
- Identify seasonal (temporary) road and trail closures required during the rainy season to protect western spadefoot toad eggs and tadpoles from vehicular traffic through road depression pools (if species is determined present within the complex).
- Identify permanent road and trail closures required to improve internal wildlife connectivity.
- Identify all roads used for emergency egress.

- EHC does not plan any new trails within the complex at this time. However, the Harbison Canyon Community Trails and Pathway Plan (County of San Diego 2011) identifies a number of potential trails through South Crest, Ulrich, Odom, Gibson, and Kemerko. Some of these follow existing roads or trails, while others would require new construction through biologically sensitive areas, steep terrain, or preserve areas closed to the public. EHC will determine potential trail alignments based on (1) compatibility with preserve goals and objectives, (2) avoidance of new construction and sensitive biological and archaeological resources, (3) trail installation and maintenance costs and responsibilities, and (4) liability or other legal issues.
- Identify short- and long-term management needs for roads and trails to remain open, including management actions and responsibilities, timeline for implementation, and funding gaps. Management actions may include (but are not limited to) scraping or blading so that designated roads remain passable, and installation of erosion control measures (e.g., gravel or gravel bags, hay bales, water bars, PS-4).
- Identify whether closures require active or passive habitat restoration and signage (PS-1.3). Natural barriers (e.g., rocks, brush) may be effective trail closures in some cases.
- Develop a habitat restoration plan for road or trail closures that require active restoration. Plan elements include seed source, seed palette, seeding method and timing, weed control, and monitoring (RS-2).
- For trail re-routes, conduct appropriate surveys (e.g., California gnatcatcher surveys, archaeological surveys) and determine if any permits are required. Following any necessary permitting, coordinate with volunteer groups (e.g., San Diego Mountain Biking Association) to assist with trail re-routing.
- For new trail construction (if any), refer to the County of San Diego's Community Trails Master Plan (County of San Diego 2005) for guidelines on trail structure (e.g., design, safety, signage).
- Prioritize management actions for implementation. Roads used for preserve management, utility servicing, fire suppression, and emergency egress have the highest priority for maintenance. Roads or trails that currently impact MSP species or habitat have the highest priority for closure/restoration/re-routing.

<u>Task 3.3 (PS-3.3)</u>: Implement Roads and Trails Plan. Implement roads and trails plan according to prioritized tasks and schedules (PS-3.2). Pursue funding to implement those tasks that are beyond the scope of routine management. Based on existing uses and surveys, roads identified to-date that will require ongoing management include:

South Crest:

• Suncrest Boulevard through the preserve (maintenance responsibility: CalFire).

Odom:

• The north-south dirt road through the preserve (southern terminus at Sycuan Summit Drive) (maintenance responsibilities: EHC and SDG&E).

Gibson:

• Maintain the main dirt road through the Gibson Preserve if determined necessary to accommodate management activities (maintenance responsibility: EHC).

Kemerko:

• Dirt roads to service SDG&E utilities (maintenance responsibility: SDG&E).

Davison:

• Maintain the main dirt road through the Davison Preserve if determined necessary to accommodate access for fire fighters or for management activities (maintenance responsibility: CalFire, EHC).

4.5.4 Erosion Control

<u>Objective 4 (PS-4). Erosion Control</u>. Reduce or eliminate erosion that impacts MSP species or habitats, access, or safety by repairing erosion and/or installing erosion control measures on South Crest, Ulrich, Gibson, and Kemerko by 2021 or the subsequent 5-year management period, and maintaining erosion control in all locations as-needed.

Task 4.1 (PS-4.1): Prioritize Erosion Control. Assess erosion control issues previously identified on South Crest, those mapped on South Crest, Ulrich, Odom, Gibson, Kemerko, and Davison during reconnaissance surveys, and any new erosion control issues detected through regular preserve patrols (PS-5.1) or post-fire monitoring (FM-8.4). Prioritize management actions and timelines based on impacts and funding

requirements. Implement routine erosion control measures on a prioritized basis by need and pursue funding for intensive erosion control, as addressed in PS-4.2.

<u>Task 4.2 (PS-4.2): Install and Maintain Erosion Control</u>. Install erosion control devices (gravel or gravel bags, hay bales, water bars) in select locations to reduce or eliminate adverse effects from erosion. Priority locations for erosion control will be (1) adjacent or in proximity to MSP species or habitat where erosion has been identified as a threat, (2) on designated access roads to ensure they remain passable (PS-3.2), and (3) on trails used by the public (e.g., hiking, equestrian activity) where severe erosion poses a potential safety issue (PS-3.2). In addition, erosion control may be required following a fire event (FM-8.12). Erosion control actions identified to date include:

South Crest:

Erosion control has been undertaken at two locations on South Crest: (1) Skeleton Flats (including a moderate-sized gully that traverses Dehesa nolina habitat and a larger gully that was funneling water and creating sinkholes with resultant loss of native grassland habitat, Dehesa nolina, and variegated dudleya) and (2) the access road into the preserve from Sycuan Summit Drive. Ongoing management of these areas includes:

- Inspect erosion control bags on Skeleton Flats annually (prior to winter rains) and replace, as needed. We estimate that the burlap bags now in place in gullies on Skeleton Flats should last several years. These measures protect Dehesa nolina and variegated dudleya from erosion impacts.
- Smooth and contour gully slopes on Skeleton Flats as-needed where soil is falling away. Install erosion control blankets (e.g., jute mesh or Coir mat) to stabilize the smoothed slopes, prevent further erosion, and provide suitable conditions for shrub germination and establishment.
- Develop and fund a long-term erosion control plan to re-engineer/grade the northsouth dirt access road north of Skeleton Flats to redirect water flow from upslope areas so that it is dispersed rather than funneled onto downslope areas.

Ulrich:

- Install gravel bags at trail edge and water bars in adjacent trail to slow runoff into drainage and reduce bank erosion (Figure 10a; Appendix A).
- Install water bars in roads or trails to slow and divert runoff and reduce erosion; fill deep gullies with gravel (Figure 10a; Appendix A).



Odom:

SDG&E placed gravel in eroded areas just beyond the gate at Sycuan Summit Drive to improve vehicle traction along the dirt access road into the Odom Preserve. However, EHC removed most of this gravel to facilitate entry by water trucks to fill the tank at Skeleton Flats. Ongoing management includes:

• Annual inspections and maintenance of this area to ensure that vehicles can access the preserve for monitoring and maintenance activities.

Gibson:

• Install gravel bags in rills and gullies in the dirt access road adjacent to and upslope of Encinitas baccharis to prevent further erosion and possible loss of plants from undercutting (Figure 10b; Appendix A).

Kemerko:

- Work with SDG&E to address erosion issues along the SDG&E-maintained eastwest access road through the preserve (Figure 10b; Appendix A).
- Install erosion control devices to reduce runoff from the highway into the preserve that is eroding habitat (Figure 10b; Appendix A).

4.5.5 Patrol and Enforcement

<u>Objective 5 (PS-5).</u> Patrol Preserves and Enforce Rules and Regulations. Patrol preserves weekly to identify and address stewardship issues, including (but not limited to) access control, trash, erosion, invasive species, unauthorized land uses, and fuel modification for fire suppression.

<u>Task 5.1 (PS-5.1): Conduct Routine Patrols</u>. Patrol each preserve at a frequency adequate to identify and address stewardship issues in a timely fashion (PS-5.2). Where issues are identified (e.g., repeated, unauthorized access), increase patrol frequency until the issue is resolved. For South Crest and Odom, rotate patrol locations so that preserve managers visit all areas of the preserve at a frequency commensurate with management issues.

• Maintain a patrol log that includes preserve, date, location, management issue(s) identified, and management actions taken.

Task 5.2 (PS-5.2): Enforce Rules and Regulations. Enforce preserve rules and regulations by implementing management, engaging adjacent landowners/managers or the public directly, and coordinating with law enforcement agencies.

- Install and maintain signage at preserve boundaries and other key locations to ensure that preserve rules and regulations are visibly displayed (PS-1.3).
- Engage with the public during preserve patrols (as appropriate) to explain rules and regulations and stop unauthorized activities.
- Contact law enforcement agencies (e.g., San Diego County Sheriff's Department) to assist with unlawful or unauthorized activities where the land manager judges that it is not safe to approach the offender or in the event of repeated, destructive activities (e.g., OHV activity).
- Maintain an incident log of all encounters with the public regarding unauthorized activities.

4.6 Fire Management (FM)

Fire management measures for the GCER complex align with the Altered Fire Regime Element of the MSP Roadmap (SDMMP and TNC 2017), and focus on both regional coordination and preserve-level management actions. Measures detailed or outlined in this section provide the foundation for a comprehensive GCER complex fire management plan.

The Altered Fire Regime Element addresses a number of "at-risk" MSP species and vegetation communities within the complex (SDMMP and TNC 2017). At-risk resources are threatened by post-fire expansion of invasive species, thatch buildup, short fire return intervals, or proximity to ignition sources or flashy fuels. Species within the complex with a medium to high fire risk include San Diego thornmint, Encinitas baccharis, Lakeside ceanothus, variegated dudleya, Dehesa nolina, Engelmann oak, Parry's tetracoccus, Quino checkerspot butterfly, western spadefoot toad (high potential for occurrence), coastal California gnatcatcher, red diamond rattlesnake, and mountain lion. High risk vegetation includes coastal sage scrub and chaparral.

Fire management measures are categorized as general or species-specific. Within each category, measures are either regional (i.e., address regional issues, implemented by regional entities or land managers with regional or preserve funding) or preserve-specific (addressed by land managers at the preserve-level with preserve funding). EHC may contribute to regional measures directly (e.g., monitoring data), through coordination with regional entities, or by allowing regional entities access to the complex. EHC is responsible for preserve-specific



measures; in some cases, preserve-specific management may require additional funding (e.g., grants).

General fire management measures should be implemented as part of the overall fire management plan for the complex, where applicable and with adequate funding. General fire management measures that require regional coordination are outlined in FM-1, below. Table 14 summarizes all fire management tasks for at-risk MSP species.

We include species-specific fire management measures from the Altered Fire Regime Element of the MSP Roadmap (SDMMP and TNC 2017) that are relevant to the complex. While the majority of these measures are preserve-level responsibilities, we also list regional responsibilities where they may involve coordination and/or assistance from the land manager. Table 15 summarizes pre- and post-fire management tasks for at-risk MSP species.

As noted in the introduction to the ASMDs, some monitoring and management actions occur in multiple categories. We included these redundancies per the Altered Fire Regime Element of the MSP Roadmap and to provide a checklist or 'flag' for land managers; however, we provide details only where we reference the action first (or most appropriately).

Implementation of post-fire management is dependent on the severity of fire impacts, as identified through post-fire surveys.

<u>Fire Management Goal (FM)</u>: Maintain the long-term integrity and viability of MSP species and habitats within the complex through regional and preserve-level actions to lower fire frequency and intensity and reduce direct and indirect fire impacts to preserve resources.

4.6.1 Regional and Local Coordination

<u>Objective 1 (FM-1): Pre-Fire Coordination</u>. Coordinate with regional programs and local, state, or federal fire agencies annually or as-needed to ensure that pre-fire management actions within the complex minimize impacts to MSP species and habitats, while providing effective fire risk management.

<u>Task 1.1 (FM-1.1): Coordinate with Wildland Fire Resource Advisor Program</u> (WFRAP). Coordinate with local Resource Advisors (when designated and trained) annually or as-needed to clarify fire management roles and responsibilities, become familiar with fire management procedures, and familiarize Resource Advisors with sensitive resources and approved fire suppression areas and activities on the preserves.



Species ¹	Fire	Fire Management	Task Description ³	Timing ⁴	Primary Management			Р	reserv	res ⁶		
Species	Risk ² Tasks		R	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA	
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	Х			X			
		FM-7.1	Treat invasive plants that increase fire risk.	Pre	Preserve	X			X			
		FM-7.1	Manage thatch every 3-5 years.	Pre	Preserve	Х			Х			
		FM-7.2	Establish seed bank.	Pre	Regional, Preserve	Х						
Acanthomintha ilicifolia		FM-7.4	Facilitate pollinator studies.	Pre	Regional, Preserve	X						
(San Diego thornmint)	FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	X			Х				
		FM-7.1, 8.3	Identify/prioritize/treat invasives post-fire.	Post	Preserve	X			X			
		FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х			Х			
		FM-8.5	Monitor population recovery.	Post	Preserve	Х			Х			
		FM-8.6	Map gabbroic soils.	Post	Preserve	Х			Х			
		FM-8.8	Augment population (if necessary).	Post	Preserve	Х			Х			
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve					X		Х
Baccharis vanessae		FM-7.1	Treat invasive plants that increase fire risk.	Pre	Preserve					Х		X
(Encinitas	High	FM-7.2	Establish seed bank.	Pre	Regional					Χ		X
baccharis)	ris)	FM-8.1	Assess/map fire suppression impacts.	Post	Preserve					X		X
		FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve					Χ		Х

 Table 14.
 Summary of Fire Management Tasks for At-Risk MSP Species within the Greater Crestridge Ecological Reserve.



Species ¹ Fire $B \rightarrow 1^2$ Mar		Fire Management	nent Task Description ³ Ti		Primary Management			P	reserv	ves ⁶		
species	Risk ²	Tasks	Tusk Description	Tining	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA
		FM-8.4	Conduct post-fire surveys.	Post	Preserve					Х		X
		FM-8.5	Monitor population recovery.	Post	Preserve					Х		X
		FM-8.7	Establish seed bank.	Post	Regional, Preserve					X		X
		FM-8.8	Augment population (if necessary).	Post	Regional, Preserve					Х		X
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve					X	X	X
		FM-7.1	Treat invasive plants that increase fire risk.	Pre	Regional, Preserve					X	X	X
<i>Ceanothus cyaneus</i> (Lakeside	High	FM-7.2	Establish seed bank.	Pre	Regional					Х	Х	X
Ceanothus)	mgn	FM-8.4	Conduct post-fire surveys.	Post	Preserve					Х	Х	X
		FM-8.5	Monitor population recovery.	Post	Preserve					Х	X	X
		FM-8.8	Augment population (if necessary).	Post	Regional, Preserve					X	X	X
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	X	Х		X			
Dudleya variegata	Uch	FM-7.1	Treat invasive plants that increase fire risk and manage thatch every 3- 5 years.	Pre	Preserve	X	X		X			
(variegated dudleya)	High	FM-7.2	Establish seed bank.	Pre	Regional	Х	Х		X			
			Facilitate pollinator studies.	Pre	Regional	X	X		X			
		FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	X	Х		X			

 Table 14.
 Summary of Fire Management Tasks for At-Risk MSP Species within the Greater Crestridge Ecological Reserve.



Species ¹	Fire	Fire Management	Task Description ³	Timing ⁴	Primary Management			Р	reserv	res ⁶		
Species	Risk ²	Tasks	rusk Description	Timing	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA
		FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve	Х	Х		Х			
		FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х	Х		Х			
		FM-8.5	Monitor population recovery.	Post	Preserve	Х	Х		Х			
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	Х	Х		X			
		FM-7.1	Treat invasive plants that increase fire risk and manage thatch every 3- 5 years.	Pre	Preserve	X	X		х			
		FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	Х	Х		Х			
Nolina interrata	High	FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve	Х	Х		Х			
(Dehesa nolina)	mgn	FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х	Х		Х			
		FM-7.4	Facilitate pollinator studies.	Post	Regional	Х	Х		Х			
		FM-8.5	Monitor population recovery.	Post	Preserve	Х	Х		Х			
		FM-8.7	Establish seed bank.	Post	Regional	Χ	Х		Х			
		FM-8.8	Augment population (if necessary).	Post	Regional Preserve	X	Х		Х			
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve					X	Х	
Quercus engelmannii (Engelmann oak)	Medium	FM-5.1	Manage fuels along roads; implement road hardening measures.	Pre	Regional, Preserve					X	X	
		FM-7.1	Treat invasive plants that increase fire risk.	Pre	Regional, Preserve					X	Х	

Table 14.	Summary	of Fire Management	Tasks for A	t-Risk MSP Speci	ies within the Great	er Crestridge	Ecological Reserve
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Species ¹	Fire	Fire Management	Task Description ³	Timing ⁴	Primary Management			P	reserv	es ⁶		
Species	Risk ²	Tasks	rask Description	Thing	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA
		FM-7.3	Establish ex situ nursery stands.	Pre	Regional					Х	Х	
		FM-7.1	Monitor for oak pests.	Pre	Regional. Preserve					X	Х	
		FM-7.1 8.3	Identify/prioritize/treat invasives.	Post	Preserve					Х	Х	
		FM-8.4	Conduct post-fire surveys.	Post	Preserve					X	Х	
		FM-8.5	Monitor population recovery.	Post	Preserve					Х	Х	
		FM-8.8	Augment population (if necessary).	Post	Regional. Preserve					Х	Х	
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	Х	Х		Х			
		FM-7.2	Establish seed bank.	Pre	Regional	Х	Х		Х			
Tetracoccus dioicus		FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	X	X		Х			
(Parry's	Medium	FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve	Х	Х		Х			
tetracoccus)		FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х	Х		Х			
		FM-8.5	Monitor population recovery.	Post	Preserve	Х	Х		Х			
		FM-8.8	Augment population (if necessary).	Post	Regional, Preserve	Х	Х		Х			

 Table 14.
 Summary of Fire Management Tasks for At-Risk MSP Species within the Greater Crestridge Ecological Reserve.



Species ¹	Fire	Fire Management	Task Description ³	Timing ⁴	Primary Management	Preserves ⁶								
Species	Risk ²	Tasks	Tusk Description	Thing	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA		
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	Х			Х					
		FM-7.1	Treat invasive plants that increase fire risk and manage thatch every 3- 5 years.	Pre	Preserve	X								
Euphydryas editha		FM-7.5	Assess/map existing populations.	Pre	Preserve	Х								
<i>quino</i> (Quino checkerspot	High	FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	Х								
butterfly)		FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve	Х								
		FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х								
		FM-8.5	Monitor population recovery.	Post	Preserve	Х								
		FM-8.9	Augment population (if necessary).	Post	Regional, Preserve	Х								
Smog harmondi: ⁷		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	X	Х	X	X	X	X	Х		
(Western spadefoot	High	FM-8.11	Conduct hydrology studies (if necessary).	Post	Regional	X	Х	X	X		X			
(oad)		FM-8.12	Install erosion control (if necessary).	Post	Preserve	Х	Х	Х	Х	X	X	Х		
Crotalus ruber ruber (Red diamond rattlesnake)	High	FM-8.13	Provide temporary habitat.	Post	Preserve	X			X					

 Table 14.
 Summary of Fire Management Tasks for At-Risk MSP Species within the Greater Crestridge Ecological Reserve.



Species ¹ Fire		Fire Management	Task Description ³	Description ³ Timing ⁴	Timing ⁴ Primary		Preserves ⁶								
species	Risk ² Tasks		Tusk Description	Thing	Responsibility ⁵	SC	MI	UL	OD	GI	KE	DA			
		FM-4.1	Prepare Resource Avoidance Area map.	Pre	Preserve	X			X						
		FM-5.1	Reduce fire ignition probability	Pre	Regional, Preserve	Х			Х						
Polioptila		FM-7.5	Assess/map existing population.	Pre	Regional, Preserve	Х			Х						
californica californica	Medium	FM-8.1	Assess/map fire suppression impacts.	Post	Preserve	Х			Х						
(Coastal California		FM-8.4	Conduct post-fire surveys.	Post	Preserve	Х			Х						
gliateatener)		FM-8.5	Monitor population recovery.	Post	Regional, Preserve	X			X						
		FM-7.1, 8.3	Identify/prioritize/treat invasives.	Post	Preserve	Х			Х						
		FM-8.10	Revegetate habitat (if necessary).	Post	Regional, Preserve	X			Х						
<i>Puma concolor</i> (Mountain lion)	Medium	FM-8.3, 8.10, 8.14	Manage vegetation.to promote foraging habitat	Post	Preserve	X					X				

Table 14. Summary of Fire Management Tasks for At-Risk MSP Species within the Greater Crestridge Ecological Reserve.

¹ Plant species nomenclature generally follows Baldwin et al. 2012.

² Fire Risk per SDMMP and TNC 2017.

³ Management task is per the Altered Fire Regime Element of the MSP Roadmap (SDMMP and TNC 2017). Refer to Sections 4.6.2-4.6.4 for detailed descriptions of management tasks.

⁴ Timing: Pre = pre-fire management measure; post = post-fire management measure.

⁵ Management Responsibility: Regional = measure will be implemented by regional entity with preserve-level cooperation or involvement, or at the preserve-level; Preserve = measure will be implemented at the preserve-level and with preserve funding (although additional funding sources may supplement preserve funding).

⁶ Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; GI = Gibson, KE = Kemerko; DA = Davison.

⁷ Potentially-occurring species; fire management measures apply if species is detected within the complex.



Table 15. Summary of Pre- and Post-fire Management Tasks for At-Risk MSP Species within	1
the Greater Crestridge Ecological Reserve Complex.	

Management Task	Task Description ¹	Species	Timing ²
FM-4.1	Prepare Resource Avoidance Area map	 All High and Medium at-risk MSP plant species Quino checkerspot butterfly Western spadefoot toad Coastal California gnatcatcher 	Pre
FM-5.2, 7.1	Treat invasive plants that increase fire risk	 San Diego thornmint Encinitas baccharis Variegated dudleya Dehesa nolina Quino checkerspot butterfly 	Pre
FM-5.2, 7.1	Manage thatch every 3-5 years	San Diego thornmintVariegated dudleyaQuino checkerspot butterfly	Pre
FM-5.2, 7.1	Monitor for oak pests	• Engelmann oak	Pre
FM-7.2	Establish seed bank	 San Diego thornmint Encinitas baccharis Lakeside ceanothus Engelmann oak Parry's tetracoccus 	Pre
FM-7.3	Establish ex situ nursery stands	• Engelmann oak	Pre
FM-7.4	Facilitate pollinator studies	San Diego thornmintVariegated dudleyaDehesa nolina	Pre
FM-7.5	Assess/map existing populations	 Quino checkerspot butterfly Coastal California gnatcatcher	Pre
FM-8.1	Assess/map fire suppression impacts	 San Diego thornmint Encinitas baccharis Variegated dudleya Dehesa nolina Parry's tetracoccus Quino checkerspot butterfly Coastal California Gnatcatcher 	Post
FM-8.2	Identify/prioritize invasive plants	 San Diego thornmint Encinitas baccharis Variegated dudleya Dehesa nolina 	Post



Table 15. Summary of Pre- and Post-fire Management Tasks for At-Risk MSP Species within
the Greater Crestridge Ecological Reserve Complex.

Management Task	Task Description ¹	Species	Timing ²
		Quino checkerspot butterflyCoastal California gnatcatcherMountain lion	
FM-8.3	Treat invasive plants	• See above	Post
FM-8.4	Conduct post-fire surveys	 High and Medium at-risk MSP plants Quino checkerspot butterfly Coastal California gnatcatcher 	Post
FM-8.5	Monitor population recovery	 High and Medium at-risk MSP plants Quino checkerspot butterfly Coastal California gnatcatcher 	Post
FM-8.6	Map gabbroic soils	• San Diego thornmint	Post
FM-8.7	Establish seed bank	Encinitas baccharisDehesa nolina	Post
FM-8.8	Augment at-risk MSP plant populations (if necessary)	 San Diego thornmint Encinitas baccharis Lakeside ceanothus Dehesa nolina Engelmann oak Parry's tetracoccus 	Post
FM-8.9	Augment at-risk MSP animal populations (if necessary)	• Quino checkerspot butterfly	Post
FM-8.10	Restore wildlife habitat (if necessary)	Coastal California gnatcatcher	Post
FM-8.11	Conduct hydrology studies (if necessary)	• Western spadefoot toad	Post
FM-8.12	Install erosion control (if necessary)	• Western spadefoot toad	Post
FM-8.13	Provide temporary habitat	• Red diamond rattlesnake	Post
FM-8.14	Manage vegetation to promote foraging habitat	Mountain lion	Post

¹ Management task is per the Altered Fire Regime Element of the MSP Roadmap (SDMMP and TNC 2017). Refer to Sections 4.6.2-4.6.4 for detailed descriptions of management tasks.

² Timing: Pre = pre-fire management measure; post = post-fire management measure.

<u>Task 1.2 (FM-1.2):</u> Participate in Fire Safety Organizations. Participate in local fire safety organizations (e.g., California Wildland Fire Coordination Group) as appropriate to foster coordination with fire management personnel and learn from the experience and expertise of fire management personnel.

Coordinate with the Crest Fire Safe Council annually or as-needed to ensure the community of Crest has current information on evacuation routes through the complex. The Fire Safe Council is a forum for providing landowners adjacent to the preserves with information on fuel modification actions along the urban-preserve boundary.

Task 1.3 (FM-1.3): Participate in a Modified Burn Area Emergency Response (BAER) <u>Program</u>. Between 2018-2022, participate in regional meetings and workshops to establish a modified BAER program for non-federal lands, including (1) action plans for at-risk resources that can be implemented immediately post-fire and (2) funding mechanisms and procedures for post-fire response and recovery efforts. The BAER program may be delayed until the 2022-2026 MSP Roadmap update (SDMMP AND TNC 2017).

<u>Task 1.4 (FM-1.4):</u> Coordinate with Fire Agencies. Meet with appropriate fire agencies on preserves by 2018 to review and finalize Resource Avoidance Area maps (FM-4.1), including fire staging areas and fire suppression activities. Meet with fire agencies annually or bi-annually thereafter to review and update Resource Avoidance Area maps.

Fire Agency	Preserve	Contact (Phone Number)
California Department of	All^1	619-590-3100
Forestry and Fire Protection		(Unit Headquarters)
(CalFire)		
San Miguel Fire Protection	South Crest,	619-670-0500
District	Michelsen, Ulrich,	(Spring Valley)
(San Miguel Fire Station 28)	Odom	
San Diego County Rural Fire	Gibson, Kemerko,	619-445-5001
Protection District	Davison	
(Harbison Canyon Station 24)		

Fire agencies with jurisdiction within the complex include:

¹ Status to be reviewed; dependent on agreements with local fire agencies.

<u>Objective 2 (FM-2).</u> Fire Suppression Coordination. Coordinate with local Resource Advisor(s) or fire agencies during a fire event (if needed) to ensure fire suppression actions

within the complex avoid or minimize impacts to MSP species and habitats, while allowing for effective event response and emergency egress.

Task 2.1 (FM-2.1): Coordinate with Local Resource Advisor. Provide local Resource Advisor with spatial data, hardcopy maps, or access codes to gates during a fire event, if this information was not provided prior to the fire event (FM-1.1).

<u>Objective 3 (FM-3): Post-fire Coordination</u>. Coordinate with regional programs within 3-6 months of a significant fire event within the complex to identify post-fire monitoring targets and data collection protocols.

<u>Task 3.1:</u> Coordinate with Modified BAER Program. Coordinate with the modified BAER program and SDMMP (as appropriate) following a significant fire event (and prior to monitoring) to ensure that preserve-level, post-fire monitoring targets and protocols align with regional monitoring targets and protocols (FM-6.1, FM-8.1, FM-8.4).

4.6.2 Environmentally Sensitive Areas

<u>Objective 4 (FM-4). Resource Avoidance Area Map</u>. Develop a Resource Avoidance Area map for the complex by 2019 that includes pre-approved fire suppression staging areas, approved fire suppression activities (e.g., equipment staging, dozer line construction, retardant drops), avoidance areas to protect sensitive resources, and roads used for emergency egress, and update the map annually or as-needed to incorporate additional MSP species or habitats to be avoided during fire suppression activities.

<u>Task 4.1 (FM-4.1): Prepare Resource Avoidance Area Map</u>. Develop a Resource Avoidance Area map in coordination with the appropriate fire agencies and in a format compatible with the Fire Management Agency GIS Wildland Decision Support System. Use existing spatial data to identify sensitive avoidance areas (e.g., MSP species and habitats, restoration sites) (AN-1.1, PL-1.1). Specific recommendations include:

- Designate medium to high at-risk MSP animal occurrences or habitat (as detected through baseline surveys) as *no dozer/no retardant* areas or otherwise restrict fire suppression activities in key habitats.
- Designate San Diego thornmint, variegated dudleya, and Dehesa nolina occurrences as *no dozer/no retardant* areas (PL-1.1).
- Work with fire agencies to map *no dozer* areas for Encinitas baccharis to avoid impacts and reduce post-fire erosion risk.



• Work with fire agencies to pre-identify potential dozer/hand line areas in Lakeside ceanothus habitat.

4.6.3 General Fire Management Measures

<u>Objective 5 (FM-5). Pre-fire Management</u>. Implement general fire management actions (e.g., road hardening. invasive plant control) between 2017-2021 to reduce fire ignition probability and intensity within the complex. Finalize a fire management plan for the complex by 2021.

<u>Task 5.1 (FM-5.1): Reduce Fire Ignition Probability</u>. Implement or work with responsible agencies in 2019-2021 to implement priority actions identified in the regional Fire Ignition Reduction Plan to reduce catastrophic wildfire ignitions in the complex. Actions may include:

- Harden roads through paving or gravel installation, clear vegetation selectively, or install signage to reduce fire ignition probability at identified "hotspots" and priority locations with at-risk MSP resources.
- Contact adjacent landowners directly or through the Crest Fire Safe Council to educate them on the dangers of using power equipment at or near the urban-preserve edge during high fire risk conditions (CO-1.2, FM-1.2).
- Work with the Crest Fire Safe Council or other local Fire Safe Councils to establish a volunteer "Fire Watch Program" to assist in wildfire prevention during red flag events (FM-1.2).

<u>Task 5.2 (FM-5.2): Reduce Fire Intensity</u>. Reduce fire risk for at-risk MSP resources by treating selected invasive plants. Existing invasive plant treatments that reduce fire intensity include *Brachypodium* and Saharan mustard control in and near the South Crest restoration site (INV-3.1, RS-1.1, PL-5.1, FM-7.1); treatments benefit Dehesa nolina and variegated dudleya. Expanding *Brachypodium* treatments to Michelsen and the Odom Preserve will benefit these species and Parry's tetracoccus.

Manage invasive plant thatch every 3-5 years (as needed) through herbicide or mechanical removal to reduce fire risk to at-risk MSP species and habitats from flashy fuels. Target invasive species for thatch removal include *Brachypodium* (South Crest, Michelsen, and Odom) and long-flowered veldt grass (Kemerko) (PL-5.1). Reducing veldt grass thatch on Kemerko will benefit Lakeside ceanothus and Engelmann oak.

Monitor and manage invasive animal species (e.g., gold-spotted oak borer) that kill oaks and other trees, thereby increasing available fuel for fires (AN-3.2).

<u>Task 5.3 (FM-5.3)</u>: Finalize Fire Management Plan. Finalize a fire management plan for the complex. Fire management plan elements detailed or identified as action items in the F-RMP include:

- Prioritized at-risk MSP resources
- Regional and local coordination (FM-1-3)
- Resource Avoidance Area map (FM-4)
- Pre-fire, suppression, and post-fire management actions (FM-5-8)

<u>Objective 6 (FM-6)</u>. Post-fire Management. Assess post-fire impacts the spring following a fire event, develop rehabilitation, invasives control, and species augmentation plans within 1 year of a fire event, and implement these plans within 1-5 years of a fire event (subject to funding) to protect at-risk MSP species and habitats.

Task 6.1 (FM-6.1): Implement Post-fire Modified BAER Program. Assess and map damage to at-risk MSP species and habitats from fire suppression activities the spring following a fire event (FM-3.1, FM-8.1, FM-8.4). Impacts may include (but are not limited to) hand/dozer lines, off-road vehicle use, staging areas, fire retardant drops, burn severity, erosion, and sedimentation.

Based on impacts, develop and implement a remediation plan for MSP species and habitats within 1 year of the fire event; monitor habitat rehabilitation efforts adaptively. Seek additional funding or cooperative partnerships for remediation, if needed.

<u>Task 6.2 (FM-6-2):</u> Identify and Prioritize Invasive Plants. Conduct invasive plant surveys the first 1-2 years after a fire event, focusing on IPSP invasive plants (Levels 1-4) and other priority invasives identified by the regional invasive plant program. Prioritize invasive plant control based on threat to MSP species and habitats (FM-8.2).

Task 6.3 (FM-6.3): Treat Invasive Plants. Treat prioritized invasive plants at burn sites using BMPs (if available) for 2-5 years post-fire or until invasive plants are eradicated or controlled at low levels (e.g., <10% total cover). See INV-3.1 and RS-1.1 for treatment methods for priority invasives currently known from the complex and FM-8.3 for at-risk MSP species and habitats of concern.

4.6.4 Species-specific Fire Management Measures

<u>Objective 7 (FM-7). Pre-Fire Management</u>. Between 2017-2021, reduce fire impacts and promote post-fire recovery of at-risk MSP species within the complex through invasive plant control, seed or propagule collection, pollinator research, and MSP priority animal baseline surveys.

Task 7.1 (FM-7.1): Identify and Treat Invasive Species and Thatch. See Tasks INV-3.1, RS-1.1, AN-3.2, PL-5.1, FM-5.2.

Task 7.2 (FM-7.2): Establish Seed Bank. See Task PL-5.2, FM-8.7.

Task 7.3 (FM-7.3): Establish Ex Situ Nursery Stands. See Task PL-5.3, FM-8.8.

Task 7.4 (FM-7.4): Facilitate Pollinator Studies. See Task PL-6.1.

Task 7.5 (FM-7.5): Assess/Map MSP Animals. See AN-1.1.

<u>Objective 8 (FM-8).</u> Post-Fire Management. Implement post-fire monitoring and management after a fire event to (1) assess at-risk MSP species, invasive species, and sensitive habitat in the first year following the fire, (2) monitor MSP species and habitat recovery for up to 5 years post-fire, (3) augment species or restore habitat if determined necessary through post-fire monitoring, and (4) protect species and habitats from altered hydrology and/or post-fire erosion, if determined necessary through post-fire studies.

Task 8.1 (FM-8.1): Assess/Map Fire Suppression Impacts. See FM-6.1.

Task 8.2 (FM-8.2): Identify/Prioritize Invasive Plants. See FM-6.2.

Task 8.3 (FM-8.3): Treat Invasive Plants. See INV-3.1, RS-1.1, FM-6.3.

Invasive plant control will target invasives that impact the following MSP species, as determined necessary through post-fire surveys and monitoring:

- San Diego thornmint (South Crest)
- Encinitas baccharis (Gibson, Davison)
- Variegated dudleya (South Crest, Michelsen, Odom)
- Dehesa nolina (South Crest, Michelsen, Odom)
- Engelmann oak (Gibson, Kemerko)
- Parry's tetracoccus (South Crest, Michelsen, Odom)

- Quino checkerspot butterfly (South Crest)
- Coastal California gnatcatcher (South Crest, Odom)

This task will also apply to at-risk MSP habitats, including native grassland (South Crest, Odom), and coastal sage scrub and chaparral (all preserves).

<u>Task 8.4 (FM-8.4): Conduct Post-fire Surveys</u>. Conduct post-fire surveys within and adjacent to the fire perimeter for 1-3 years following a fire event to map the extent and status of known populations of at-risk MSP species and identify new occurrences or refugia within the complex-wide fire perimeter (FM-8.4).

This task applies to all detected high and medium at-risk MSP species affected by fire.

Task 8.5 (FM-8.5): Monitor Population Recovery. Monitor at-risk MSP species quantitatively or qualitatively to assess post-fire recovery, identify threats, and determine management needs, including (but not limited to) invasives control, erosion control, and species augmentation. This task will apply to all high and medium at-risk MSP plant species affected by fire. Monitor species using regional IMG monitoring protocols (or updates) or other plant or animal protocols recommended by regional entities specifically for post-fire monitoring (FM-3.1).

Supplement post-fire rare plant IMG monitoring with the following, species-specific measures:

- Record post-fire recovery mechanisms for Encinitas baccharis (e.g. resprouter versus obligate seeder) on Gibson and Davison.
- Monitor Dehesa nolina recovery on South Crest, Michelsen, and Odom quantitatively, beginning 2-3 months post-fire, and assess the need for augmentation. Note that resprouting from underground stems may be influenced by climatic conditions.
- Assess/map Engelmann oak tree survival and recruitment (resprouting, seedlings) on Gibson and Kemerko in the 1-2 years post-fire, and assess the need for augmentation.
- Install photo-points to document post-fire recovery of selected shrubs and trees, including:
 - Encinitas baccharis (Gibson, Davison)
 - Engelmann oak (Gibson, Kemerko)

• Parry's tetracoccus (South Crest, Michelsen, Odom)

Photograph species recovery at photo-points annually for 3-5 years following fire, and then at 5-year intervals until shrubs or trees are well-established and/or threats reduced or eliminated.

Where monitoring indicates an increase in threats (e.g., invasive plants) or lack of recovery, implement management measures including (but not limited to) invasive plant control (FM-6.3, 8.3) or species augmentation (FM-8.8).

• Assess Quino checkerspot butterfly recovery (if determined present prior to fire) for the first 3 years after fire using a standardized post-fire protocol to document the butterfly's distribution and abundance over time and characterize habitat recovery and threats (SDMMP AND TNC 2017).

Post-fire monitoring of at-risk MSP animal species may occur at the regional or preservelevel, using standardized protocols.

<u>Task 8.6 (FM-8.6): Map Gabbroic Soils</u>. Take advantage of post-fire vegetation removal to map the extent of clay lenses within gabbroic soils in the 1-2 years following a fire event to guide future survey or translocation efforts for San Diego thornmint on South Crest and Odom.

<u>Task 8.7 (FM-8.7):</u> Establish Seed Bank. Collect seed during post-fire mass-flowering events and establish or contribute to an established seed bank that includes conservation and propagation collections (PL-5.2) for:

- Encinitas baccharis (Gibson, Davison)
- Dehesa nolina (South Crest, Michelsen, Odom)

Task 8.8 (FM-8.8): Augment MSP Plant Populations. See PL-5.4 for guidelines on augmenting at-risk MSP plants impacted by fire, if determined necessary through post-fire monitoring (FM-8.5).

<u>Task 8.9 (FM-8.9):</u> Augment MSP Animal Populations. This task is a placeholder pending results of baseline surveys for Quino checkerspot butterfly.

<u>Task 8.10 (FM-8.10): Restore Wildlife Habitat</u>. Revegetate previously occupied California gnatcatcher habitat from genetically appropriate container stock and/or seed if

monitoring indicates natural revegetation is not sufficient to restore suitable habitat (FM-6.1, FM-8.1, FM-8.5).

<u>Task 8.11 (FM-8.11): Conduct Hydrology Studies</u>. Coordinate with regional program(s) or pursue funding to conduct hydrology studies to inform post-fire erosion control actions for western spadefoot toad (South Crest, Michelsen, Ulrich, Odom, Kemerko), if determined necessary through post-fire site assessments (FM-6.1) and monitoring (FM-8.5).

<u>Task 8.12 (FM-8.12): Install Erosion Control</u>. Install erosion control measures upstream of detected western spadefoot toad populations on South Crest, Michelsen, Ulrich, Odom, and Kemerko, if determined necessary through post-fire site assessments (FM-6.1), monitoring (FM-8.5), or hydrology studies (FM-8.11).

<u>Task 8.13 (FM-8-13): Provide Temporary Habitat</u>. Provide cover boards or other shelter until habitat structure (e.g., vegetation, dead fall) provides natural cover for MSP at-risk species, including red-diamond rattlesnake (South Crest, Odom)

<u>Task 8.14 (FM-8-14): Manage Vegetation to Promote Foraging Habitat</u>. Manage vegetation for wildlife species by treating invasive plants (FM-6.3, FM-8.3) and possibly, restoring habitat (FM-8.10), if determined necessary through post-fire monitoring. These actions would protect and enhance foraging habitat for mountain lion (South Crest, Kemerko), and other MSP and non-MSP animal species.

4.7 Cultural Resources (CUL)

AECOM conducted a records search and contacted Native American groups for the original five preserves in the complex: South Crest, Michelsen, Ulrich, Gibson, and Kemerko (CBI and AECOM 2017). These efforts indicated that (1) both historic and prehistoric resources are present in these areas and (2) no cultural resource surveys exist for approximately 30% of these preserves. Existing surveys likely included portions of the Odom and Davison preserves, although we do not know the degree of overlap. As such, we recommend several cultural ASMDs. Refer to Appendix B for a summary of cultural resources.

<u>Cultural Resources Goal (CUL)</u>: Identify and protect archaeological and architectural resources eligible for or listed in the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), and/or other local registers, as appropriate, and identify and protect tribal cultural resources important to the local Native American community.

4.7.1 Archaeological Resources

<u>Objective 1 (CUL-1).</u> Resource Surveys, Stabilization, and Recovery. Undertake investigations between 2018-2020 to identify, stabilize, and recover important archaeological resources within the complex *if* ground disturbance is planned.

<u>Task 1.1 (CUL-1.1): Conduct Archaeological Surveys</u>. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in archaeology) by 2018 to complete archaeological surveys of unsurveyed lands within the complex *where* ground disturbance is planned.

<u>Task 1.2 (CUL-1.2):</u> Stabilize/Recover Archaeological Resources. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in archaeology) by 2020 to conduct appropriate stabilization techniques and/or data recovery efforts if determined necessary based on (1) archaeological surveys (CUL-1.1) and (2) planned ground disturbance. Consult with the State Historic Preservation Officer (SHPO) and other stakeholders (e.g., local agencies, tribes), as necessary.

4.7.2 Architectural Resources

<u>Objective 2 (CUL-2).</u> Resource Surveys and Management. Undertake investigations between 2018-2020 to identify important structures within the complex and develop a management plan for those structures.

<u>Task 2.1 (CUL-2.1): Conduct Architectural Surveys</u>. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in architectural history) by 2018 to complete reconnaissance surveys of structures on unsurveyed parcels within the complex. The only potentially historic structure identified to date within the complex is a wildlife guzzler on South Crest.

<u>Task 2.2 (CUL-2.2): Develop Historic Structure Management Plan</u>. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in architectural history) by 2020 to complete a historic structure management plan, if determined necessary (CUL-2.1). Consult with the SHPO, as necessary.

4.7.3 Tribal Cultural Resources

<u>Objective 3 (CUL-3).</u> Resource Identification and Evaluation. Undertake investigations between 2018-2021 to identify and survey tribal cultural resources within the complex.

<u>Task 3.1 (CUL-3.1): Identify Tribal Cultural Resources</u>. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in archaeology) by 2018 to conduct follow-up calls and solicit information from the Native American individuals who did not respond to the initial contact letter in May 2016.

Task 3.2 (CUL 3.2): Evaluate Tribal Cultural Resources. Bring in a qualified professional (i.e., meets Secretary of the Interior's standards in archaeology) by 2021 to complete evaluations of all identified tribal cultural resources (CUL-3.1). Invite interested Native American individuals to attend field checks and/or consult with appropriate Native American individuals and tribes, as necessary.

4.8 Public Outreach, Education, and Research (OER)

Although there is limited public access within the complex, targeted outreach, education, and research is important for (1) protecting biological resources, (2) fostering appreciation for open space areas in general and preserve lands and resources specifically, (3) involving citizens in stewardship activities ("citizen science"), and (4) furthering our understanding of adaptive management, species, habitats, and ecosystem processes.

<u>Public Outreach, Education, and Research Goal (OER)</u>: Sustain strong positive relationships with preserve users (including but not limited to adjacent landowners/managers, utility companies, recreationalists, volunteers, biologists, and researchers) through direct communications, informational materials, and educational, volunteer, and research opportunities.

4.8.1 Public Outreach and Education

<u>Objective 1 (OER-1).</u> <u>Public Outreach and Education</u>. Conduct public outreach monthly, quarterly, annually, or at other frequencies specified below to educate the public on preserve rules, regulations, and resources, and provide volunteer opportunities for citizen science.

<u>Task 1.1 (OER-1.1):</u> Promote Public Stewardship. Engage with the public as appropriate during regular (monthly or quarterly) patrols (PS-5.1) to ensure that preserve users follow preserve rules and regulations and avoid impacts to sensitive biological resources, and to provide educational information on preserve resources and activities.

Task 1.2 (OER-1.2): Provide Informational Materials. Prepare and disseminate informational and educational materials (or provide links to these materials) as-needed to adjacent landowners and the public on (1) preserve establishment, rules, regulations, and resources, (2) invasive species and biosecurity measures, and (3) fire safety. Information will also be presented on signage (PS-1.3, CO-4.2).

<u>Task 1.3 (OER-1.3):</u> Attend Community Meetings. Attend community meetings annually (or more frequently, if needed) to educate local communities on (1) preserve rules, regulations, and resources, (2) invasive species and biosecurity measures, (3) fire safety and emergency egress, and other issues that affect the preserves (FM-1.2).

<u>Task 1.4 (OER-1.4):</u> Coordinate or Lead Tours and Site Visits. Work with the California Native Plant Society and other interested user groups to coordinate and/or lead field trips or site tours on an annual or bi-annual basis (or as-requested) to promote an understanding and appreciation for resources and landscapes within the complex.

<u>Task 1.5 (OER-1.5):</u> Coordinate or Lead Volunteer Projects. Coordinate and lead volunteer projects, or work with partners to oversee projects that benefit species and habitats within the preserves (e.g., seed collection, invasives control, habitat enhancement, plant or animal surveys).

4.8.2 Research

<u>Objective 2 (OER-2). Research</u>. Coordinate with researchers annually or as-requested to facilitate research within the complex that increases our understanding of adaptive management, biological resources, linkages, and ecosystem processes at regional or preserve-levels.

<u>Task 2.1 (OER-2.1):</u> Review and Prioritize Research Requests. Review research requests and provide researcher(s) with a verbal or written response of approval or denial within 2 months of the request. Prioritize requests that develop or refine BMPs or improve our understanding of species, habitats, linkages, or ecosystem processes. As a condition of research, researcher(s) should provide EHC with a digital copy of their final report (CO-4.2).

<u>Task 2.2 (OER-2.2): Provide Researcher Access</u>: For approved research requests, provide researcher(s) with a right-of-entry letter, gate codes, and biosecurity protocols (CO-4.2). Accompany researchers in the field initially to orient them to the site, if needed.

Task 2.3 (OER-2.3). Maintain Research Log. Maintain a log of all research activities within the complex, including research subject, status, timeline, key personnel, and report(s) received.



4.9 Program Administration and Reporting (AR)

Administration and reporting provide the foundation for preserve management by maintaining and sharing data used to manage adaptively, demonstrating progress in achieving goals and objectives, and supporting staff and funding allocations.

<u>Program Administration and Reporting Goal</u>: Establish, implement, and maintain a data management and reporting system for the GCER complex to (1) organize, analyze, and share data, (2) identify management needs, (3) track management progress, and (4) allocate staff and funding appropriately.

4.9.1 Data Management

<u>Objective 1 (AR-1).</u> Data Entry, Storage, and Review. Establish a data management and reporting system for the complex by 2019, and maintain this system annually by uploading or editing spatial data, preserve documents, and other relevant complex information.

<u>Task 1.1 (AR-1.1): Create and Maintain Website</u>. Create a website or identify an existing online platform for the complex. This can be a stand-alone website, an expansion of an existing website that describes the CER and includes an incident reporting system (<u>http://earthdiscovery.org/crestridge-reserve/</u>), or a dedicated group on CBI's Data Basin website (<u>https://databasin.org/</u>).

<u>Task 1.2 (AR-1.2): Create and Maintain Data Management System</u>. Using CBI's Data Basin website or another online data management system, maintain spatial datasets, reports, and other preserve documents in a central location for access by EHC staff, contractors, and other conservation practitioners. Spatial data and reports for other EHC-owned or managed preserves (e.g., CER) and existing data for the GCER complex are currently stored on Data Basin, under the San Diego Conservation group (https://databasin.org/groups/92c7bce8d88d43b3a800dd686195007e):

<u>Task 1.3 (AR-1.3)</u>: <u>Manage Data</u>. Upload spatial data (including attribute data) to CBI's Data Basin website or another data management system annually. Spatial datasets may include (but are not limited to):

- Vegetation
- Invasive Species
- Restoration Sites
- MSP Species



- Roads and Trails
- Resource Avoidance Areas

Review spatial data annually to ensure that (1) recent data is uploaded and available, (2) out-of-date datasets are removed, (3) datasets are in the appropriate locations, and (4) datasets are labelled consistently to facilitate use. At a minimum, dataset labels should include the subject (e.g., species, species group, management issue) and date.

Update MSP plant and animal maps with new MSP species occurrences and Resource Avoidance Area map with new MSP at-risk species occurrences annually or as collected.

Maintain records for collected seed to document donor sites, and collection dates and amounts. Maintain records of donor and receptor sites for outplantings as part of augmentation efforts.

Review, analyze, and summarize monitoring data at the preserve-level and include results in Annual Report (AR-2.2). Submit data to SDMMP for regional analyses and/or data sharing (AR-2.3) annually or at the completion of a monitoring project.

Review, analyze, and summarize management data at the preserve-level and include results and recommendations in the Annual Report (AR-2.2). Submit management data to SDMMP annually or at the completion of a management project (AR-2.3).

Upload annual work plans, annual reports, monitoring and management reports, and research studies to the online data management system annually or as-produced.

4.9.2 Reporting

<u>Objective 2 (AR-2). Reporting</u>. Prepare annual work plans and reports to (1) ensure RMP implementation is consistent with goals and objectives, (2) demonstrate management progress in achieving goals and objectives, (3) assess management needs and effectiveness, and (4) establish budgets and schedules for implementation.

<u>Task 2.1 (AR-2.1): Prepare Annual Work Plan</u>. Based on RMP priorities and subsequent monitoring and management, develop a list of proposed management actions prioritized by resource. Allocate funding and prepare an annual work plan that includes monitoring and management actions, staff, contractor, and equipment budgets, and an implementation schedule. Finalize the work plan by January 31st so monitoring and management can begin immediately.

Task 2.2 (AR-2.2): Prepare Annual Report. Prepare an annual report summarizing ASMDs implemented during the calendar year and management recommendations. Reporting should follow the general ASMD format (e.g., Vegetation, Animals, Plants, Coordination, Property Stewardship, Fire Management, Outreach, Education, and Research) and reference specific objectives and tasks. Include herbicide logs, patrol logs, incident report logs, and research activity logs as attachments to the annual report.

Submit the annual report by December 31st to the County of San Diego Department of Planning and Land Use for use in their annual MSCP report submitted to USFWS and CDFW.

Final reports associated with intensive management, grants, or research projects will be produced as stand-alone documents under the respective task; however, include a summary of these works in annual reports.

<u>Task 2.3 (AR-2.3):</u> Share Data. Submit project metadata, spatial data, data forms, invasives treatment data, Resource Avoidance Area map (and updates), reports, and management recommendations to the MSP Web Portal annually or upon project completion.

Submit seed collection, bulking, and storage data to the MSP Web Portal annually or as collected (if collected by EHC or representatives).

Attend regional meetings (e.g., SDMMP monthly meetings, South County land manager meetings) (as feasible), coordinate with other land managers to review survey results and management effectiveness (as appropriate), and explore opportunities for collaboration on management issues.

4.9.3 Resource Management Plan Updates

<u>Objective 3 (AR-3). Resource Management Plan Updates</u>. Review and update the RMP at 5-year intervals if necessary to ensure that objectives and implementation tasks (1) reflect current or changed conditions and newly detected resources, (2) align with regional MSP Roadmap updates, and (3) incorporate new preserves, as appropriate.

Task 3.1 (AR-3.1): Review and Refine Existing ASMDs/Tasks. Review and refine existing objectives and tasks based on survey or monitoring data, align tasks with MSP Roadmap updates, and revise task status and schedule, as appropriate.

Task 3.2 (AR-3.2): Develop New ASMDs/Tasks. Develop new objectives and tasks based on survey or monitoring data, addition of new preserves, or changed conditions due to fire or other catastrophic event.

4.9.4 Contingency Measures

<u>Objective 4 (AR-4).</u> Contingency Measures. Implement contingency measures annually (as needed) to address unanticipated or severe management issues that cannot be accommodated within the annual budget in a timely fashion to prevent or minimize impacts to preserve resources or public safety.

Task 4.1 (AR-4.1: Identify and Implement Contingency Measures. Contingency measures provide a short-term solution to prevent severe damage or impacts, while recognizing that longer-term solutions and funding sources may be required to address the management issue(s) comprehensively. Identify contingency tasks as needed, and implement tasks to minimize impacts. Contingency tasks may address fire impacts, new or rapidly spreading invasive species, unauthorized vegetation clearing and subsequent erosion, or species die-offs due to severe drought or climate change, among other potential management issues.

Include a contingency line item and budget in annual work plans, with flexibility to use the funding if needed, or roll-over the funding into the next year's budget if unused.

4.10 Summary of ASMDs

Refer to Table 16 for a summary of all ASMDs, along with a schedule for implementation. Appendix D includes the 5-year budget for the original five preserves within the GCER complex (South Crest, Michelson, Ulrich, Gibson, and Kemerko), as well as budget notes and assumptions. We based the 5-year budget on ASMDs and other operating costs.



Section ¹		Objective		Task	Task Description	Preserve ²	Schedule ³	Status ⁴
4.1	Vegetation Communities (VEG, INV, RS)							
4.1.1	Natural Vegetation Communities	VEG-1	Vegetation Mapping	VEG-1.1	Refine Baseline Vegetation Map	All	By 2021	NS
				VEG-1.2	Update Vegetation Map	All	2026 or 2031	NS
				VEG-1.3	Identify/Prioritize Vegetation Management	All	By 2021	NS
		VEG-2	Vegetation Monitoring	VEG-2.1	Coordinate with Regional Vegetation Monitoring	All	2017, 2019	NS
				VEG-2.2	Conduct Preserve-level Vegetation Monitoring	SC	2017-2021	IP
		INV-1	Invasive Plant Mapping	INV-1.1	Conduct Invasive Plant Surveys	All	2021	IP
				INV-1.2	Update Invasive Plant Lists	All	Annually	IP
	Invasive Plants			INV-1.3	Update Invasive Plant Map	All	2021	NS
4.1.2		INV-2	Invasive Plant Prioritization	INV-2.1	Update Invasive Plant Management Priorities	All	2021	IP
				INV-2.2	Identify Invasive Plant Priority Treatment/Maintenance Areas	All	2021	IP
		INV-3	Invasive Plant Control	INV-3.1	Manage Brachypodium	SC, OD	Annually (as needed)	IP, NS
				INV-3.2	Contain Saharan Mustard	SC, OD, KE	Annually (as needed)	IP
				INV-3.3	Eradicate Artichoke Thistle	OD	Annually (as needed)	NS
				INV-3.4	Eradicate Stinkwort	SC, GI, KE	Annually (as needed)	IP
				INV-3.5	Eradicate Devil's Thorn	OD	Annually (as needed)	IP
				INV-3.6	Eradicate Fennel	SC	Annually (as needed)	IP
				INV-3.7	Suppress Garland Chrysanthemum	SC, UL, OD, GI	Annually (as needed)	IP, NS
				INV-3.8	Contain/Suppress Bermuda Buttercup	SC, OD	Annually (as needed)	IP, NS
				INV-3.9	Eradicate Giant Reed	UL	Annually	IP

Table 16.	Summary of Area-specif	ic Management Directives	(ASMDs) for the Greater	Crestridge Ecological Reserve	Complex.
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Section ¹		Objective		Task	Task Description	Preserve ²	Schedule ³	Status ⁴
							(as needed)	
				INV-3.10	Eradicate Pampas Grass	GI	Annually (as needed)	IP
				INV-3.11	Contain Long-flowered Veldt Grass	GI, KE, DA	Annually (as needed)	IP, NS
				INV-3.12	Respond Rapidly to New or Expanding Invasions	All	Annually (as needed)	NS
				INV-3.13	Reduce Fire Risk from Invasive Plants	All	Annually (as needed)	IP
				INV-3.14	Monitor Invasive Plant Treatment Effectiveness	All	Annually (as needed)	IP
		RS-1	Maintain Existing Restoration Site	RS-1.1	Treat Invasive Plants in Restoration Sites	SC	2017-2021	IP
				RS-1.2	Monitor Restoration Effectiveness	SC	2017-2021	IP
	Habitat Restoration			RS-1.3	Adjust Restoration Management/Monitoring Regime	SC	2021	NS
				RS-2.1	Identify/Prioritize Restoration Sites	SC, MI, OD	By 2021	NS
4.1.3				RS-2.2	Pursue Funding for Restoration	SC, MI, OD	By 2021	NS
		RS-2	Expand Restoration	RS-2.3	Develop/Implement Restoration Plan(s)	SC, MI, OD	2022-2026	NS
				RS-2.4	Procure Native Plant Propagules	SC, MI, OD	2022-2024	NS
				RS-2.5	Monitor Restoration Effectiveness	SC, MI, OD	2022-2026	NS
				RS-2.6	Adjust Restoration Monitoring/Management Regime	SC, MI, OD	2027	NS
4.2	MSP Animal Species (AN)							
4.2.1	Surveys and Inventories	AN-1	MSP Animal Baseline Surveys	AN-1.1	Conduct Quino Checkerspot Butterfly Surveys	SC, MI, OD	By 2021	NS
				AN-1.2	Facilitate Hermes Copper Butterfly Surveys	SC, MI, OD	By 2021 (as requested)	NS
				AN-1.3	Conduct Western Spadefoot Toad Surveys	All	By 2021	NS
				AN-1.4	Facilitate Golden Eagle Surveys	All	By 2021 (as requested)	NS
				AN-1.5	Conduct Burrowing Owl Surveys	SC, OD	By 2021	NS

Table 16.	Summary of Area	-specific Management	t Directives (ASMDs)) for the Greater	Crestridge Ecological Reser	ve Complex.
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	Section ¹		Objective	Task	Task Description	Preserve ²	Schedule ³	Status ⁴
				AN-1.5	Facilitate/Conduct Coastal California Gnatcatcher Surveys	SC, MI, UL, OD, KE	By 2021 (as requested or needed)	NS
				AN-1.7	Facilitate Pallid and Townsend Bat Surveys	All	By 2021 (as requested)	NS
			General Animal	AN-2.1	Develop Animal Inventory System	All	2018	IP
		AIN-2	Inventories	AN-2.2	Develop/Maintain Animal Species List	All	2017-2021	IP
			Invasive Animal	AN-3.1	Conduct Argentine Ant Surveys	All		С
		AN-3	Surveys	AN-3.2	Conduct Oak Borer Surveys	SC, UL, OD, KE	2017-2020	NS
		onitoring AN-4	AN-4 MSP Animal Monitoring	AN-4.1	Monitor MSP Priority Animals	All	2017-2021	NS
4.2.2	Monitoring			AN-4.2	Monitor MSP Animal Management Effectiveness	All	2019-2021 (as needed)	NS
				AN-4.3	Monitor/Facilitate Monitoring of Wildlife Connectivity	SC, OD, GI, KE	2019-2021 (as needed)	NS
		AN-5	Management Prioritization	AN-5.1	Prioritize MSP Animal Management Actions	All	Annually	NS
				AN-6.1	Treat Invasive Animals	SC	2018-2021	IP
4.2.3	Management		Management	AN-6.2	Augment MSP Animal Populations	All	2022-2026 (as needed)	NS
		AN-0	Implementation	AN-6.3	Restore Wildlife Habitat	TBD	2022-2026 (as needed)	IP
				AN-6.4	Improve Connectivity	SC, UL, OD	2017-2021	NS
4.2.4	Research	AN-7	Research Studies	AN-7.1	Facilitate Animal Research Studies	All	2017-2021 (as requested)	IP
4.3	MSP Plant Species (PL)							
4.3.1	Surveys and Inventories	PL-1	MSP Plant Baseline	PL-1.1	Conduct San Miguel Savory Surveys	SC, MI, OD	2018 or 2020	NS

 Table 16.
 Summary of Area-specific Management Directives (ASMDs) for the Greater Crestridge Ecological Reserve Complex.



Section ¹ Object		Objective	Task	Task Description	D reservo ²	Schedule ³	Status ⁴	
	Section			Task	Task Description	Fleserve	Schedule	Status
			Surveys	PL-1.2	Conduct Gander's Ragwort Surveys	MI, OD	2018 or 2020	NS
				PL-1.3	Conduct Parry's Tetracoccus Surveys	OD, GI, KE, DA	2019	NS
				PL-1.4	Conduct Lakeside Ceanothus Surveys	UL	By 2021	NS
				PL-1.5	Conduct Felt-leaved Monardella Surveys	SC, MI, OD, GI, KE, DA	By 2021	NS
				PL-1.5	Conduct Engelmann Oak Surveys	MI, UL	2021	NS
		DI 2	General Plant	PL-2.1	Develop Plant Inventory System	All	2018	IP
		PL-2	Inventories	PL-2.2	Develop/Maintain Plant Species List	All	By 2021 NS DA A By 2021 NS 2021 NS 2021 NS 2018 IP 2017-2021 IP DA 2017-2021 IP 2017-2021 DA 2017 C DA Annually IP, NS DA 2017-2021 IP, NS DA 2018-2019 NS 2019 NS	IP
4.3.2 Monitoring	DI 2	PL-3 MSP Plant	PL-3.1	Monitor MSP Priority Plant Species	SC, MI, OD, GI, DA	2017-2021	IP	
	FL-3	Monitoring	PL-3.2	Monitor MSP Plant Management Effectiveness	SC	2017	С	
		PL-4	Management Prioritization	PL-4.1	Prioritize MSP Plant Management Actions	SC, MI, OD, GI, KE, DA	Annually	IP, NS
			-5 Management	PL-5.1	Treat Invasive Plants	SC, MI, OD, GI, KE, DA	2017-2021	IP, NS
4.3.3	Management	PL-5		PL-5.2	Establish Seed Bank	SC. MI, OD, GI, KE, DA	2018-2019	NS
			Implementation	PL-5.3	Establish Ex Situ Nursery Stands	GI, KE	2019	NS
				PL-5.4	Augment MSP Plant Populations	SC, OD	2017-2021	IP, NS
4.3.4	Research	PL-6	Research Studies	PL-6.1	Facilitate Pollinator Studies	SC, MI, OD	2017-2021 (as requested)	NS
		120		PL-6.2	Facilitate Regional Soils Studies	SC, MI	2017	С
4.4	Coordination (CO)							
4.4.1	Adjacent Landowners	CO-1	Landowner	CO-1.1	Contact Landowners	All	2017-2021	IP
4.4.1 Aujac	Aujacent Landowners CC	0-1	¹ Coordination	CO-1.2	Develop/Maintain Landowner Contact	All	Annually	IP

Table 16.	Summary of Area-	specific Managemen	t Directives (ASMDs)	for the Greater	Crestridge Ecological Reserve	e Complex.
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	Section ¹		Objective	Task	Task Description	Preserve ²	Schedule ³	Status ⁴
				CO-1.3	List Develop/Maintain Landowner Reporting System	All	2017-2021	IP
		CO-2	Edge Effects	CO-2.1	Resolve Encroachment Issues	UL, OD, KE	2017-2020	NS IP
			Fire Agency	CO-3.1	Contact Fire Agencies	All	2018 and then annually or bi- annually	IP
4.4.2	Fire Agencies	CO-3	Coordination	CO-3.2	Identify Fuel Modification Needs	All	2018	IP
				CO-3.3	Maintain Roads	SC, DA	2017 and then bi-annually	IP
	CO 4	Other Preserve	CO-4.1	Contact Utilities	SC, OD, KE	Annually (as needed)	IP	
4.4.3	4.4.3 Other Preserve Users	CO-4	Users Coordination	n CO-4.2 Provide Biosecurity Measures	Provide Biosecurity Measures	All	Annually (as needed)	NS
4.5	Property Stewardship (PS)							
				PS-1.1	Install/Maintain Fencing	SC, OD, KE, GI	2017-2021	IP
4.5.1	Access Control	PS-1	Access Control	PS-1.2	Install/Maintain Gates	SC, OD, GI, KE, DA	2017-2021	IP
				PS-1.3	Install/Maintain Signage	All	2017-2021	IP
4.5.2	Trash Control	PS-2	Trash Removal	PS-2.1	Remove Trash	SC, UL, OD, KE	2017-2021	IP
				PS-3.1	Conduct Roads/Trails Inventory	All	2017-2020	NS
4.5.3	Roads and Trails	PS-3	Roads and Trails	PS-3.2	Develop Roads/Trails Plan	All	2017-2021	NS
				PS-3.3	Implement Roads/Trails Plan	All	2017-2027	IP, NS
154	Fresion Control			PS-4.1	Prioritize Erosion Control	SC, UL, OD, GI, KE, DA	2018	IP, NS
4.3.4		г э -4		PS-4.2	Install/Maintain Erosion Control	SC, UL, OD, GI, KE	2017-2021	IP

Table 16.	Summary of Area	-specific Management	t Directives (ASMDs)	for the Greater	Crestridge Ecological Reserv	ve Complex.
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	Section ¹		Objective	Task	Task Description	Preserve ²	Schedule ³	Status ⁴
4.5.5		DQ 5	Patrol Preserves and	PS-5.1	Conduct Routine Patrols	All	2017-2021	IP
4.5.5	Patrol and Enforcement	PS-5	Regulations	PS-5.2	Enforce Rules and Regulations	All	2017-2021	IP
4.6	Fire Management (FM)							
				FM-1.1	Coordinate with Wildlife Fire Resource Advisor Program (WFRAP)	All	Annually (as needed)	NS
		FM-1	Pre-fire	FM-1.2	Participate in Fire Safety Organizations	All	Annually (as needed)	IP
4.61	Regional and Local		Coordination	FM-1.3	Participate in a Modified Burn Area Emergency Response (BAER) Program	All	2018-2020 ⁵	NS
4.0.1	4.6.1 Coordination			FM-1.4	Coordinate with Fire Agencies	All	2017-2018	IP
		FM-2	Fire Suppression Coordination	FM-2.1	Coordinate with Local Resource Advisor	All	During fire event	NS
	F	FM-3	Post-fire Coordination	FM-3.1	Coordinate with Modified BAER Program	All	3-6 months after a fire event ⁵	NS
4.6.2	Environmentally Sensitive Areas	FM-4	Resource Avoidance Area Map	FM-4.1	Prepare Resource Avoidance Area Map	All	By 2019 (with annual updates)	IP
				FM-5.1	Reduce Fire Ignition Probability	All	Annually (as needed)	IP
		FM-5	Management	FM-5.2	Reduce Fire Intensity	SC, MI, OD, KE	Annually (as needed)	IP, NS
4.6.3	General Fire Management Measures			FM-5.3	Finalize Fire Management Plan	All	2021	IP
	Wanagement Weasures	EM 6	Post-fire	FM-6.1	Implement Post-fire Modified BAER Program	All	Post-fire	NS
		LINI-0	Management	FM-6.2	Identify/Prioritize Invasive Plants	All	Post- fire	NS
				FM-6.3	Treat Invasive Plants	All	Post-fire	NS
	Species specific Fire		Dra fira	FM-7.1	Identify/Treat Invasive Species and Thatch	SC, MI, OD, KE	Annually (as needed)	IP, NS
4.6.4	Management Measures	FM-7	Management	FM-7.2	Establish Seed Bank	SC. MI, OD, GI, KE, DA	2019	NS
				FM-7.3	Establish Ex Situ Nursery Stands	GI, KE	2019	NS

 Table 16.
 Summary of Area-specific Management Directives (ASMDs) for the Greater Crestridge Ecological Reserve Complex.



	Section ¹ Objective		Task	Task Description	Preserve ²	Schedule ³	Status ⁴	
				FM-7.4	Facilitate Pollinator Studies	SC, MI, OD	2017-2021 (as requested)	NS
				FM-7.5	Assess/Map MSP Animals	All	2017-2020	NS
				FM-8.1	Assess/Map Fire Suppression Impacts	All	Post-fire	NS
				FM-8.2	Identify/Prioritize Invasive Plants	All	Post-fire	NS
				FM-8.3	Treat Invasive Plants	All	Post-fire	NS
				FM-8.4	Conduct Post-fire Surveys	All	Post-fire	NS
				FM-8.5	Monitor Population Recovery	All	Post-fire	NS
				FM-8.6	Map Gabbroic Soils	SC, OD	Post-fire	NS
				FM-8.7	Establish Seed Bank	SC, MI, OD, GI, DA	, Post-fire	NS
		FM-8	FM-8Post-fire ManagementFM-8.8Augment MSP PIFM-8.9Augment MSP AFM-8.10Restore Wildlife I	FM-8.8	Augment MSP Plant Populations	SC, MI, OD, GI, KE, DA	Post-fire (as needed)	NS
				FM-8.9	Augment MSP Animal Populations	SC	Post-fire (as needed)	NS
				Restore Wildlife Habitat	SC, OD	Post-fire (as needed)	NS	
				FM-8.11	Conduct Hydrology Studies	SC, MI, UL, OD, KE	Post-fire (as needed)	NS
				FM-8.12	Install Erosion Control	SC, MI, UL, OD, KE	Post-fire (as needed)	NS
				FM-8.13	Provide Temporary Habitat	SC, OD	Post-fire	NS
				FM-8.14	Manage Vegetation to Promote Foraging Habitat	SC, KE	Post-fire (as needed)	NS
4.7	Cultural Resources (CUL)							
471	Archaeological	CIII 1	Resource Surveys,	CUL-1.1	Conduct Archaeological Surveys	All	2018 (as needed)	NS
4./.1	Resources	CUL-I	Recovery	CUL-1.2	Stabilize/Recover Archaeological Resources	All	2020 (as needed)	NS
			Resource Surveys	CUL-2.1	Conduct Architectural Surveys	All	2018	NS
4.7.2	Architectural Resources	CUL-2	and Management	CUL-2.2	Develop Historic Structure Management Plan	All	2020 (as needed)	NS

 Table 16.
 Summary of Area-specific Management Directives (ASMDs) for the Greater Crestridge Ecological Reserve Complex.



	Section ¹		Objective	Task	Task Description	Preserve ²	Schedule ³	Status ⁴
4.5.0	Tribal Cultural		Resource	CUL-3.1	Identify Tribal Cultural Resources	All	2018	NS
4.7.3	Resources	CUL-3	Evaluation	CUL-3.2	Evaluate Tribal Cultural Resources	All	2021	NS
4.8	Public Outreach, Education, and Research (OER)							
				OER-1.1	Promote Public Stewardship	All	Monthly	IP
				OER-1.2	Provide Information Materials	All	Annually (as needed)	IP
4.8.1	Public Outreach and	OER-1	Public Outreach and	OER-1.3	Attend Community Meetings	All	Annually	IP
4.8.1 Education	Education	o Litt i	Education	OER-1.4	Coordinate/Lead Site Tours/Visits	All	Annually or Bi- annually	IP
				OER-1.5	Coordinate/Lead Volunteer Projects	All	Annually (as requested)	IP
				OER-2.1	Review/Prioritize Research Requests	All	Annually (as requested)	IP
4.8.2	Research	OER-2	Research	OER-2.2	Provide Researcher Access	All	Annually (as requested)	IP
				OER-2.3	Maintain Research Log	All	Annually	NS
4.9	Program Administration and Reporting (AR)							
				AR-1.1	Create/Maintain Website	All	2019	IP
4.9.1	Data Management	AR-1	Data Entry, Storage, and Review	AR-1.2	Create/Maintain Data Management System	All	2019	IP
				AR-1.3	Manage Data	All	Annually	IP
				AR-2.1	Prepare Annual Work Plan	All	Annually	IP
4.9.2	Reporting	AR-2	Reporting	AR-2.2	Prepare Annual Report	All	Annually	IP
				AR-2.3	Share Data	All	Annually	IP
40.5	Resource Management		Resource	AR-3.1	Review/Refine Existing ASMDs/Tasks	All	2022	NS
4.9.3	Plan Updates	AR-3	Management Plan Updates	AR-3.2	Develop New ASMDs/Tasks	All	2022	NS
4.9.4	Contingency Measures	AR-4	Contingency Measures	AR-4.1	Identify/Implement Contingency Measures	All	Annually (as needed)	NS

Table 16.	Summary of Area-spe	ecific Management D	Pirectives (ASMDs) for the	Greater Crestridge Ecological Rese	erve Complex.
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- ¹ Section: Refers to Section 4.0 (ASMDs) of the Framework Resource Management Plan (F-RMP) for the Greater Crestridge Ecological Reserve Complex (GCER complex).
- ² Preserves: SC= South Crest, MI = Michelsen, UL = Ulrich, OD = Odom, GI = Gibson, KE = Kemerko, DA = Davison, All = All preserves within GCER complex.

Schedule: Indicates estimated implementation schedule within current (2017-2021) or subsequent 5-year management periods. Note that schedule may be (1) dependent on completion of other regional or preserve-level objectives, so is subject to change, (2) implementation may occur more quickly than noted, and (3) implementation of some tasks (e.g. post-fire management) may or may not occur within the current 5-year management period or may or may not be warranted based on surveys or monitoring.

⁴ Status: IP = In-progress, NS = Not started, C = Complete.

⁵ Current schedule assumes BAER program will be implemented in the 2017-2021 period; however, implementation may be delayed until the 2022-2026 MSP Roadmap update (SDMMP AND TNC 2017).



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Greater Crestridge Ecological Reserve Complex Framework Resource Management Plan Appendices A-D

- A Rapid Assessment/Site Reconnaissance Results
- B Land Use History and Physical Characteristics
- C Technical Resource Documents and Data Sources
- D Budget (2017-2021)*

*Budget does not include Odom and Davison preserves.

Appendix A

Reconnaissance and Rapid Assessment Results

- A-1 Management Strategic Plan Species Summaries
- A-2 Invasive Plant Attribute Data
- A-3 Property Stewardship Attribute Data
- A-4 Update on Aseasonal Flows at Harbison Canyon, 2015-2016
- A-5 Threats Worksheet

Appendix A

Reconnaissance and Rapid Assessment Results

Appendix A presents results of the background review, literature search, and reconnaissance and rapid assessment surveys for biological resources within the Greater Crestridge Ecological Reserve Complex (GCER complex).

This document currently addresses 1,699 acres of the complex, including seven preserves owned and managed by the Endangered Habitats Conservancy (EHC): South Crest, Michelsen, Ulrich, and Odom preserves south of the community of Crest (South, 1,245 ac) and Kemerko, Gibson, and Davison preserves on Harbison Ridge east of the community of Crest (East, 424 ac) (Figure A-1). The two areas that currently comprise this complex – South and East – are disjunct from one another and differ somewhat in topography, soils, fire history, and land use (Appendix B).



Figure A-1. Preserves within the Greater Crestridge Ecological Reserve Complex.

Biological Inventory

CBI and the U.S. Geological Survey (USGS) worked jointly to assess biological resources, primary threats and stressors, and key management issues within the GCER complex. Results of these efforts are detailed below. Refer to Appendix B for cultural resources. The F-RMP outlines Area-specific Management Directives (ASMDs) for resource and stewardship issues, based on available information, and provides a timeline for conducting necessary surveys and refining ASMDs.

Methods

Background Review

CBI compiled and reviewed existing documentation and spatial datasets, including regional planning documents and studies, biological inventories and reports, research studies, and species and vegetation data. Refer to Appendix C for a complete list of technical resource documents and data sources used in the assessment process. Key documents and datasets included:

- Management Strategic Plan (SDMMP 2013 and SDMMP and TNC 2017)
- Invasive Plant Strategic Plan (CBI et al. 2012)
- Connectivity Monitoring Strategic Plan (SDMMP 2011)
- Biological Reports
- California Natural Diversity Database, SDMMP Master Occurrence Matrix (SDMMP 2016), SanBios, California Consortium of Herbaria records, and regional and preserve-specific invasive plant datasets.
- Regional Vegetation Map (SANDAG 2014)

CBI and USGS conducted a site visit with the EHC director and land manager prior to the site reconnaissance and rapid assessment surveys to discuss GCER complex boundaries, access protocols, complex history, stewardship issues and biological concerns, management and monitoring history, and existing projects. We obtained keys and/or lock combinations to ensure we could access the complex. Subsequent to the site reconnaissance, CBI followed up with EHC staff regarding specific land management issues and responsibilities, management practices, and site history.

Reconnaissance Surveys

CBI conducted reconnaissance surveys over 7-days in July and September 2015 on the South Crest, Michelsen, Gibson, and Kemerko preserves, and over 8-days in March, April, and June

2017 on the Odom and Davison preserves. We had previously mapped MSP plants on South Crest, Michelsen, Gibson, and Kemerko (CBI 2012a,b, CBI 2014a) and invasive plants on South Crest (CBI 2012a,b), and have monitored MSP plants on South Crest since 2014 (CBI 2014b, 2015a,b, 2016). Thus, the focus of reconnaissance surveys was to update invasive plant mapping, map new invasive plants, assess potential habitat for MSP species, and identify and map priority land management and stewardship issues (e.g., fencing, gates, and signage needs, trash, and erosion). Attribute data for invasive plants are included in the spatial datasets. We did not map vegetation or conduct focused species surveys, although MSP plant and animal species were mapped where detected.

Prior to reconnaissance surveys, we created a Geographic Information System (GIS) project geodatabase that allowed us to rapidly and accurately collect various types of spatial data, focusing on threats and stressors. We used the following spatial data layers to create the geodatabase:

- San Diego Monitoring and Management Program (SDMMP) 50-m² survey grid
- GCER complex preserve boundaries
- Aerial imagery
- Invasive species (point and polygons)
- MSP-covered plants and animals (points and polygons)
- Stewardship issues (points only)

Invasive species, MSP-covered plants and animals, and stewardship issue attributes are listed in Table A-1 and defined in Table A-2.

We also reviewed MSP plant and animal datasets (San Diego Management and Monitoring Programs [SDMMP] Master Occurrence Matrix [MOM] dataset [SDMMP 2016]), but did not include these data in the project geodatabase because these datasets were too large and slowed Geographic Positioning System (GPS) performance. SDMMP printed MSP plant and animal species maps for our use.

We used a sub-meter GPS running ArcPAD 10.2 loaded with the project geodatabase to conduct the site reconnaissance. Two surveyors walked and surveyed each 50-m² grid within the entire complex, remaining approximately 10-15 meters apart. We activated the GPS receiver to keep track of surveyed grids, data collection, and to remain in-line with the other surveyor. Our goal was to survey all grids as rapidly as possible, but in some cases we used binoculars to survey grids that were inaccessible (i.e., cliffs and rock faces).



Attribute	IPSP/EDRR ¹	MSP Plants ²	MSP Animals ³	Stewardship ⁴
Species	Х	Х	Х	
Occurrence Identification	Х	Х	Х	Х
Category				Х
Number of Individuals (Exact or estimated)	Х	Х	Х	
Percent Cover	Х			
Phenology	X	X		
Location	Х	Х	Х	Х
Date	Х	Х	Х	Х
Aspect	Х	Х		
Preserve	X	Х	X	X
Preserve Owner and Manager	Х	Х	Х	Х
Observer and Affiliation	Х	Х	Х	Х
Site Quality	Х			
Notes	Х	Х	Х	Х
Trash Priority				Х
Sensitive Species/Habitats	Х			
Vegetation Alliance/Association	X	X	X	

Table A-1. Site Reconnaissance Attribute Collection.

¹ IPSP/EDRR = Invasive Plant Strategic Plan and Early Detection Rapid Response invasive plants.

² MSP Plants = Management Strategic Plan plants.

³ MSP Animals = Management Strategic Plan animals.

⁴ Stewardship = Stewardship issues (e.g., access control, trash, erosion).

During the site reconnaissance, we collected the following information within each 50-m² grid (if present): Invasive Plant Strategic Plan (IPSP) or Early Detection Rapid Response (EDRR) invasive plants (invasive plants), MSP plants and animals (if previously unmapped), and stewardship issues (trash, erosion, and access control issues/needs). We mapped IPSP invasive plants and San Diego County EDRR invasive species (Table A-3) during reconnaissance surveys, and mapped these species where present. We mapped other invasive plants only where



Attribute	Definition
Species	Record the target species using four or six letter codes.
Occurrence Identification	Provide unique identification for each occurrence (e.g., KE_IP_ehrlon_09 = Kemerko_Invasive Plant_Ehrharta longiflora_#09 occurrence; GI_SP_bacvan_61= Gibson_Sensitive Plant_Baccharis vanessae_#61 occurrence; KE_TR_#11 = Kemerko_Trash_#11 occurrence).
Category	Record the stewardship category (trash, erosion, fencing, gates).
Number of Individuals (Exact or estimated)	Record the exact or estimated number of target individuals (for MSP and IPSP/EDRR species only ¹).
Percent Cover	Record a visual percent (%) cover value for IPSP/EDRR species. We recorded exact percent cover values, but cover categories can be used if desired. The percent cover value by species refers to the cover in the entire grid, not just at the point or polygon location.
Phenology	Record the phenology (e.g., vegetative, flowering, fruiting, dead) of IPSP, EDRR and MSP plants, if desired.
Location	Provide a descriptive location for IPSP/EDRR and MSP-covered species, if applicable.
Date	Record the site reconnaissance date.
Aspect	Provide the species locational aspect, if desired.
Preserve	Record the preserve name.
Preserve Owner and Manager	Record the preserve owner and manager.
Observer and Affiliation	Record the observer name and affiliation.
Site (Habitat) Quality	Record site quality when mapping invasive plants. Site quality refers to the overall habitat quality of the grid and is only recorded once. Use the following site quality categories: very poor, poor, fair to good, very good to excellent (Table A-4).
Notes	Record any pertinent notes. For stewardship issues record the type of trash encountered to ensure that trash can be categorized and prioritized for cleanup. Record any best management practices, remedial actions, or preserve/management recommendations in the notes section.
Trash Priority	Record trash priority level. Use the following priority levels: Priority 1, Priority 2, and Priority 3. Priority levels can be assigned back in the office using GIS software.
Sensitive Species/Habitats	Record any sensitive species and/or habitats that occur with IPSP and EDRR plants, if applicable.
Vegetation Alliance/Association	Record the vegetation alliance/association if vegetation mapping exists for the preserve.

Table A-2. Attribute Definitions.

Scientific Name	Common Name
Euphorbia virgata*	Leafy spurge
Heliotropium supinum	Dwarf heliotrope
Limonium duriusculum*	European sea lavender
Limonium ramosissimum*	Algerian sea lavender
Senecio quadrdentatus*	Cotton burnweed
Sesbania punicea*	Rattlebox
Volutaria tubuliflora*	Egyptian knapweed

 Table A-3.
 Additional Early Detection Rapid Response (EDRR) Target Species.

¹ MSP = Management Strategic Plan; IPSP = Invasive Plant Strategic Plan; EDRR = Early Detection Rapid Response.

they impacted or potentially impacted MSP species and habitats. We recorded invasive plant attribute information for each invasive plant species we encountered in each grid (Table A-1). In some cases, we recorded multiple species per grid (point locations); however, we recorded a species only once (point location) where it occurred throughout a gird. For large infestations, we mapped polygons. Some of the information listed in Table A-1 must be recorded in the field (e.g., percent cover) while other information (e.g., preserve name, owner and manager) can be entered in the office using GIS software.

For each occurrence, we also mapped site (habitat) quality (Table A-4). Site quality provided a rapid, qualitative assessment of habitat quality per grid. Site quality was recorded only in grids that supported target invasive species, and not for the entire complex. Assessing habitat quality may help guide future management efforts such as habitat restoration, weed control or eradication, and erosion control.

Although we did not conduct focused surveys for MSP species, we did record these species and collect relevant attribute data if detected within a 50-m² grid (Table A-1). We also used existing MSP species spatial datasets (e.g., MOM dataset) to guide survey efforts and augment survey results.

During reconnaissance surveys, we focused on identifying and/or mapping stewardship issues such as erosion, trash, trespass, encroachments, recreational use, and off-highway vehicle (OHV) use. We mapped erosion if significant (i.e., large, deep gullies) and a potential threat to MSP resources or public safety, and recorded the attributes listed in Table A-1. We also photographed some (not all) erosion locations and labeled the photographs using the same occurrence identification system that we used for the spatial location (GPS point) (Table A-2).



Rating	Definition
Very Good to Excellent	 80 – 100% native flora composition Vegetation structure intact or nearly so Cover/abundance of weeds <5% No or minimal signs of disturbance
Fair to Good	 50 – 80% native flora composition Vegetation structure modified or somewhat modified Cover/abundance of weeds 5 – 20% any number of individuals Possible minor signs of disturbance
Poor	 20 – 50% native flora composition Vegetation structure modified Cover/abundance of weeds 20 – 60% any number of individuals Disturbance incidence high
Very Poor	 0 – 20% native flora composition Vegetation structure disappeared Cover/abundance of weeds 60 – 80% any number of individuals Disturbance incidence very high

Table A-4. Modified Trudgen & Keighery Vegetation Condition Scale (Habitat Quality).

We mapped all observed trash and collected the data listed in Table A-1 (under Stewardship) for each trash location in a 50-m^2 grid. We also recorded the items that comprised each trash location and prioritized the trash into three levels for management consideration (i.e., removal) based on threat (i.e., dangerous or toxic) to MSP resources or public safety. We photographed some (not all) trash locations and labeled the photographs using the same occurrence identification system that we used for the spatial location (GPS point) (Table A-2).

Access control issues (e.g., trespass, recreation, and OHV use) are common on open space areas and if excessive or inappropriate, can be detrimental to preserve resources and sensitive species. When we encountered illegal trails (hiking, biking, or OHVs) and improper preserve uses (i.e., fire rings), we mapped the locations and collected attribute information (Table A-1).

Rapid Assessment Surveys

Argentine Ant Surveys

USGS conducted rapid invasive ant surveys based on a statistical design implemented countywide to determine covariates describing Argentine ant invasion risk (Matsuda et al. 2016). We added additional sampling sites to the complex to fill in some gaps. Surveys were conducted along urban or other edge areas, and then into the preserve perpendicularly, with sampling locations every 50 meters. Sampling continued until Argentine ants were not detected.

Herpetological Surveys

The USGS, North American Field Herpetology Association (NAFHA), Endangered Habitats Conservancy (EHC), and Earth Discovery Institute (EDI) collected herpetological data in and near the complex on April 16, 2016. The focus was to conduct a rapid survey of reptiles and amphibians and develop a baseline species list for the preserves as quickly as possible. Four areas were visited: Gibson A, Gibson B, Skeleton Flats, and Orchard. Gibson A includes portions of the Crestridge Ecological Reserve and Davison Preserve. Gibson B includes the Gibson Preserve. Skeleton Flats includes portions of South Crest and Odom. Orchard is located in the western portion of South Crest. Table A-5 presents survey personnel and teams for the rapid assessments; Table A-6 documents hours expended by site.

Results

Background Review and Reconnaissance Surveys

Vegetation

Figures A-2a,b depict association-level vegetation for the South and East preserves, respectively, based on the regional vegetation map for San Diego County (SANDAG 2014). Table A-7 details vegetation alliances and associations for each preserve per the San Diego Vegetation Classification (Sproul et al. 2011), and cross-walks these to the revised Holland classification (Oberbauer et al. 2008). Chaparral, coastal sage scrub, and grasslands are the dominant habitats within the preserve complex.

Near-term management priorities for vegetation communities include:

- Map vegetation (all preserves): verify and refine vegetation alliances/associations and acreages, correlate species presence with vegetation attributes, and monitor vegetation changes over time.
- Control invasive plants (all preserves): focus on high priority invasive species and other invasive species that impact or potentially impact MSP species and habitats.
- Restore habitat (South Crest, Michelsen): focus on areas where restoration would benefit MSP species (Dehesa nolina, variegated dudleya) and grassland habitats.



Organization	Personnel	Field Survey Team
USGS	Robert Fisher	GPS4/Team4 (Gibson A)
USGS	Carlton Rochester	GPS4/Team4 (Gibson A,B; Skeleton Flats, Orchard)
USGS	Jon Richmond	GPSSAH2/TeamSAH2
USGS	Maxi Richmond	GPSSAH2/TeamSAH2
USGS	Lizzie Grolle	GPS16/Team16
NAFHA	Brain Hinds	GPS3/Team3
NAFHA	Julianne Boardman	GPS3/Team3
NAFHA	Mathew Gruen	GPS1/Team1
NAFHA	Nathan Smith	GPS17/Team17
NAFHA	Rich Rang	GPS18/Team18
NAFHA	Jared Rang	GPS18/Team18
NAFHA	Daniel Smith	GPS17/Team17
NAFHA	Dave Zeldin	GPS1/Team1
NAFHA	Chris Patnaude	GPS1/Team1
NAFHA	Keith Condon	GPS15/Team15
NAFHA	Stacy Schenkel	GPS15/Team15
EHC	Michael Beck	GPS4/Team4 (Gibson A,B)
EDI	Cathy Chadwick	
EDI	Mary Duffy	GPS16/Team16

Table A-5.	Survey Personnel	and Teams for	Herpetological	Rapid Assessments.
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 Table A-6.
 Survey Sites and Hours.

Survey Sites	Start Time	End Time	Time	Total Survey Time (Hours)
Gibson A	0845	0945	1 hour	18
Gibson B	1030	1130	1 hour	17
Skeleton Flats	1345	1445	1 hour	16
Orchard	1545	1645	1 hour	16





Figure A-2a. Vegetation on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure A-2b. Vegetation on the East Preserves (Gibson, Kemerko, and Davison).



Vegetation Classification ¹				Sou	th ^{2,3}			Total		
Alliance	Association	Cross-walk	SC (ac)	MI (ac)	UL (ac)	OD (ac)	GI (ac)	KE (ac)	DA (ac)	(ac)
Forest/Woodland										
<i>Eucalyptus (globulus, camaldulensis)</i> Semi- Natural Stands	<i>Eucalyptus (globulus, camaldulensis)</i> Semi-Natural Stands	Eucalyptus Woodland				1.6				1.6
Quercus agrifolia	Quercus agrifolia/Toxicodendron diversilobum/Grass	Southern Coast Live Oak Riparian Forest	5.4	2.5	3.8	5.7		0.6		18.0
Quercus agrifolia	Quercus agrifolia/Salix lasiolepis	Southern Coast Live Oak Riparian Forest	0.5							0.5
Salix lasiolepis	Salix lasiolepis	Southern Arroyo Willow Riparian Forest						0.3		0.3
Chaparral										
Adenostoma fasciculatum	Adenostoma fasciculatum- (Eriogonum fasciculatum, Artemisia californica, Salvia mellifera)	Chamise Chaparral	0.1	41.3	55.1	38.0	154.2	29.5	40.0	358.2
Adenostoma fasciculatum	Adenostoma fasciculatum- Ceanothus tomentosus	Southern Mixed Chaparral	0.1			65.0				65.1
Adenostoma fasciculatum-Xylococcus bicolor	Adenostoma fasciculatum- Xylococcus bicolor-Ceanothus tomentosus	Southern Mixed Chaparral					77.2		0.3	77.5
Ceanothus tomentosus	Ceanothus tomentosus	Southern Mixed Chaparral					3.5			3.5

Table A-7. Vegetation Alliances and Associations within the Greater Crestridge Ecological Reserve Complex.



Vegetation Classification ¹					th ^{2,3}			Total		
Alliance	Association	Cross-walk	SC (ac)	MI (ac)	UL (ac)	OD (ac)	GI (ac)	KE (ac)	DA (ac)	(ac)
Scrub										
Artemisia californica- Eriogonum fasciculatum	Artemisia californica- Eriogonum fasciculatum- Malosma laurina	Diegan Coastal Sage Scrub	321.0	36.0	33.1	150.7	19.3	95.9		656.0
Bahiopsis laciniata	Bahiopsis laciniata-Artemisia californica-Eriogonum fasciculatum	Diegan Coastal Sage Scrub	158.4	11.1		194.3		3.6		367.4
Nolina interrata	Nolina interrata	Diegan Coastal Sage Scrub	1.1			1.1				2.2
Malosma laurina	Malosma laurina-Lotus scoparius	Coastal Scrub	57.1			15.9				73.0
Grass/Herb										
Nassella pulchra	Nassella pulchra	Native Grassland	31.5	0.6		22.3				54.4
Avena (barbata, fatua) Semi-Natural Stands	Avena (barbata, fatua) Semi- Natural Stands	Non-Native Grassland	0.7			5.6				6.3
Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	Mediterranean California Naturalized Annual and Perennial Grassland Semi- Natural Stands	Non-Native Grassland	0.1		0.8	8.0				8.9
Non-vegetated										
Developed/Disturbed			0.9		0.6	4.5				6.0
Total			576.9	91.5	93.4	512.8	254.2	129.9	40.3	1699

Table A-7. Vegetation Alliances and Associations within the Greater Crestridge Ecological Reserve Complex.



- ¹ Vegetation Classification: **Alliance** = alliance-level vegetation classification per San Diego Vegetation Classification (Sproul et al. 2011); **Association** = association-level vegetation classification per San Diego Vegetation (Sproul et al. 2011); cross-walk = equivalent vegetation category in Holland vegetation classification (Oberbauer et al. 2008).
- ² South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.
 ³ Numbers = acreage of vegetation association within preserve per regional vegetation mapping (SANDAG 2014).

Near-term management priorities for vegetation communities include:

- Map vegetation (all preserves): verify and refine vegetation alliances/associations and acreages, correlate species presence with vegetation attributes, and monitor vegetation changes over time.
- Control invasive plants (all preserves): focus on high priority invasive species and other invasive species that impact or potentially impact MSP species and habitats.
- Restore habitat (South Crest, Michelsen): focus on areas where restoration would benefit MSP species (Dehesa nolina, variegated dudleya) and grassland habitats.

Management Strategic Plan (MSP) Species

We detected 20 MSP species and identified an additional 16 MSP species that could occur within the complex (Table A-8, Figures A-3a,b). The SDMMP categorized and prioritized MSP species based on risk of loss within the Management Strategic Planning Area (MSPA), as follows (SDMMP 2013, SDMMP and TNC 2017):

- SL = Species at risk of loss from Management Strategic Plan Area (MSPA)
- SO = Species with significant occurrences at risk of loss from MSPA
- SS = Species stable but still requires species-specific management to persist in MSPA
- VF = Species with limited distribution in the MSPA or needing specific vegetation characteristics requiring management
- VG = Species not specifically managed for, but may benefit from vegetation management for VF species

We summarize MSP species that may require species-specific management (management categories SL, SO, SS) or management of vegetation characteristics (management category VF) in Section 2.2 of the F-RMP and in Appendix A-1 to this document.

Invasive Plants

We mapped thirty invasive plants within the GCER complex previously (CBI 2012b) and during reconnaissance surveys (Table A-9). Reconnaissance surveys focused on invasive species identified as statewide or regional threats (Cal-IPC 2006, CBI et al. 2012) and additional EDRR species (Figures A-4a,b). Other (non-priority) invasive plants were mapped where they potentially impact MSP species and habitats (Figures A-4c,d). Refer to Appendix A-2 for attribute data for invasive plant species. We detail near-term and longer-term management actions for priority invasive plants in Section 4 of the F-RMP.



Table A-8.	. Detected and Potentially-occurring Management Strategic Plan (MSP) Species	within the Greater Crestridge Ecological
Reserve Con	omplex.	

Species ¹	MSP Management	Habitat ³		South ^{4,5}				East ^{4,}	.5	Source ⁶	
species	Category ²	Haonat		MI	UL	OD	GI	KE	DA	Source	
Plants											
Acanthomintha ilicifolia (San Diego thornmint)	SO	CHP, CSS, GL; clay, gabbro soils	D	Р		D*				4,5,6,14	
Baccharis vanessae (Encinitas baccharis)	SO	CmWld, CHP					D	Р	D	6,8,25	
<i>Ceanothus cyaneus</i> (Lakeside ceanothus)	VF	CHP; acid igneous rock land?			Р		D	D	D	2,3,6,9,25	
<i>Clinopodium chandleri</i> (San Miguel savory)	SL	CmWld, RW, CHP, CSS, GL; gabbro, metavolcanic soils	Р	Р		Р		Р		9,14	
Dudleya variegata (Variegated dudleya)	SS	CHP, CSS, GL; clay soils	D			D				2,3,5,6,9,14	
<i>Monardella hypoleuca</i> ssp. <i>lanata</i> (Felt-leaved monardella)	VF	CmWld, CHP; metavolcanic soils, acid igneous rock land	Р	Р		Р	Р	Р	Р	9	
Nolina interrata (Dehesa nolina)	SO	CHP; gabbro, metavolcanic soils	D	D		D				2,3,5,6,7,9,14	
Packera ganderi (Gander's ragwort)	SO	CHP; burns, gabbro soils		Р		Р			Р	9	
<i>Quercus engelmannii</i> (Engelmann Oak)	VF	CmWld, RW, CHP, GL	\mathbf{P}^7	Р	Р	Р	D	D	Р	3,6,9,14	
<i>Tetracoccus dioicus</i> (Parry's tetracoccus)	SS	CHP, CSS; gabbro soils	D	D		D	Р	Р	Р	3,5, 9,14	
Animals											
Euphydryas editha quino (Quino checkerspot butterfly)	SL	Hilltops and areas with <i>Plantago</i> sp.	D	Р		Р				14,19	



Table A-8.	. Detected and Potentially-occurring Management Strategic Plan (MSP) Species	within the Greater Crestridge Ecological
Reserve Con	omplex.	

Species ¹	MSP Management	Habitat ³		South ^{4,5}				East ^{4,}	5	Source ⁶	
Species	Category ²	Habitat	SC	MI	UL	OD	GI	KE	DA	Boulee	
Lycaena hermes (Hermes copper)	SL	Spiny redberry (<i>Rhamnus crocea</i>)	Р	Р		Р				14,16	
Spea hammondii (Western spadefoot)	VF	CHP, CSS, GL, possibly OW	Р	Р	Р	D	Р	Р	Р	24, 26	
Phrynosoma blainvillii (Blainville's horned lizard)	VF	CHP, CSS	D	D	Р	D*	D	Р	Р	5,14,27	
Aspidoscelis hyperythra (Orange-throated whiptail)	VG	CHP, CSS	D	Р	D	D	Р	Р	D	5,7,14,27	
Crotalus ruber ruber (Red diamond rattlesnake)	VG	CHP, CSS	D	Р	Р	D	Р	Р	Р	10,14,27	
<i>Thamnophis hammondii</i> (Two-striped garter snake)	VG	OW, CHP, CSS; near water sources	Р	Р	Р	Р		Р		15	
Athene cunicularia hypugaea (Western burrowing owl)	SL	GL, rodent burrows	D			Р				13	
Campylorhynchus brunneicapillus sandiegensis (Coastal cactus wren)	SO	CSS, cactus scrub	Р								
<i>Circus cyaneus</i> (Northern harrier)	SO	CSS (open), GL (foraging)	D			D*				11,14	
Aquila chrysaetos canadensis (Golden eagle)	SO	CHP, CSS, GL (foraging)	D	Р	Р	D*	Р	Р	Р	1,14	
Buteo regalis (Ferruginous hawk)	VG	GL (winter; foraging)	Р	Р		Р					
Buteo swainsoni (Swainson's hawk)	VG	RW (nesting); entire property (foraging)	Р	Р	Р	Р		Р			
Accipiter cooperi (Cooper's hawk)	VG	OW (nesting); entire property (foraging)	D*	Р	Р	D*	Р	Р	Р	14	



Table A-8.	Detected and Potentially-occurring Management Strategic Plan (MSP) Species within the Greater Crestridge Ecological
Reserve Con	plex.

Species ¹	MSP Management	Habitat ³	South ^{4,5}					East ^{4,}	5	Source ⁶	
species	Category ²	Habitat	SC	MI	UL	OD	GI	KE	DA	Source	
Ammodramus savannarum perpallidus (Grasshopper sparrow)	VF	GL	Р	Р		Р				18	
Polioptila californica californica (Coastal California gnatcatcher)	VF	CSS	D	Р	Р	D		Р		1,12,14,21	
Aimophila ruficeps canescens (Southern California rufous- crowned sparrow)	VG	CHP, CSS; steep, rocky, and/or recently burned slopes	D*	Р	Р	D*	Р	Р	Р	14	
Amphispiza belli belli (Bell's sage sparrow)	VG	CHP, CSS	Р	Р		Р				14	
Sialia mexicana (Western bluebird)	VG	OW/GL	Р	Р				Р		14, 23	
Antrozous pallidus (Pallid bat)	SL	CmWld, CSS, , GL; outcrops, cliffs, mines, buildings, bridges	Р	Р	Р	Р	Р	Р	Р	14,17,20	
Plecotus townsendii pallescens (Townsend's big-eared bat)	SO	OW/RW (foraging); caves (roosting), open surface water	Р	Р	Р	Р	Р	Р	Р	17,20	
Lepus californicus bennettii (San Diego black-tailed jackrabbit)	VF	CHP (open), CSS (open), GL	D*					Р		14	
<i>Chaetodipus fallax fallax</i> (Northwestern San Diego pocket mouse)	VG	Sparse or open CHP, CSS, GL; sandy soils	Р	Р	Р	Р	Р	Р	Р	14	
Taxidea taxus (American badger)	SL	CHP (open), CSS, GL; sandy loam soils	Р	Р	Р	Р	Р	Р	Р	14,20	



Table A-8. Detected and Potentially-occurring Management Strategic Plan (MSP) Species within the Greater Crestridge Ecological Reserve Complex.

Species ¹	MSP Management	Habitat ³	South ^{4,5}				East ^{4,5}			Source ⁶
species	Category ²	Habitat	SC	MI	UL	OD	GI	KE	DA	bource
Puma concolor (Mountain lion)	SL	Riparian corridors and adjacent uplands	D	Р	Р	Р	Р	D	Р	14,22
<i>Odocoileus hemionus fuliginata</i> (Southern mule deer)	VG	OW, CHP, CSS, GL	D	D	Р	D	D	D	Р	10,12,21,22

¹ Plant species nomenclature generally follows Baldwin et al. 2012.

² Species are listed according to Management Strategic Plan (MSP) management category. VG species are included in this table but are not a MSP management priority.

³ Habitat: CmWld = cismontane woodland, OW = oak woodland, RW = riparian woodland, OW/RW = Oak/riparian woodland, OW/GL = oak woodland/grassland, CHP = chaparral; CSS = coastal sage scrub; GL = grassland.

⁴ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

⁵ D = species detected onsite; P = species considered potentially-occurring due to suitable habitat and/or known occurrence in the vicinity.

⁶ Source: indicates surveys, reports, or databases used to determine species occurrence. Refer to Appendix A references for full citation. Note that information in the MOM database is derived, in part, from reports or databases (e.g., CNDDB) that are not necessarily cited here. Refer to the MOM database for additional source information.

Sources:

1. Battle pers. obs.	9. CNPS 2016	17. Stokes et al. 2005	25. CBI 2017
2. CBI 2012a	10. County of San Diego 2009	18. Unitt 2012	26. EHC 2017
3. CBI 2012b	11. Gordon-Reedy and Vinje pers. obs.	19. USFWS 2015	27. USGS 201
4. CBI 2014a	12. Gordon-Reedy pers. obs.	20. Brehme et al. 2012	
5. CBI 2014b	13. Piazza pers. comm.	21. Vinje pers. obs.	
6. CBI 2015a	14. REC Consultants, Inc. 2004	22. WTI 2009	
7. CBI 2015b	15. REC Consultants, Inc. 2010	23. County of San Diego 2013	
8. CNDDB 2016	16. SDMMP 2015	24. Fisher, pers. comm.	

* Detected only pre-Cedar fire (REC Consulting, Inc. 2004).

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Figure A-3a. Sensitive Plant Species on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure A-3b. Sensitive Plant Species on the East Preserves (Gibson, Kemerko, and Davison).


Scientific Norrol	Common Nome	Invasive I	South ^{3,4}				East ^{3,4}			
Scientific Ivallie	Common Name	IPSP	Cal-IPC	SC	MI	UL	OD	GI	KE	DA
IPSP Priority Species ⁵										
Management Level 3 ⁶										
Arundo donax	Giant reed	Very High	High			NS*				
Cortaderia sp.	Pampas grass	High	High					NS*		
Cynara cardunculus	Artichoke thistle	Very High	Moderate	С			NS			
Ehrharta longiflora	Long-flowered veldt grass	Medium	Moderate			NS	NS	NS*	NS	NS
Emex spinosa	Devil's thorn	Medium	Moderate				IP*			
Management Level 4 ⁶										
Brachypodium distachyon	Purple falsebrome	Very High	Moderate	IP*	NS*		NS		NS	
Dittrichia graveolens	Stinkwort	High	High Moderate					NS*	NS*	
Foeniculum vulgare	Fennel	Very High	Very High High							
Management Level 5 ⁶										
Glebionis coronaria	Garland chrysanthemum	Medium	um Moderate			NS*	NS	NS*		
Other Invasive Species ⁷										
Acacia baileyana	Bailey acacia					NS	NS		NS	
Ailanthus altissima	Tree of Heaven		Moderate						NS	
Avena sp. ⁸	Wild oats		Moderate				NS			
Brassica tournefortii	Saharan mustard		High	IP*			NS		NS*	
Carduus pycnocephalus	Italian thistle		Moderate							
Carpobrotus sp.	Ice-plant		Moderate-High			NS	NS			
Eucalyptus sp.	Eucalyptus		Limited	NS		NS	NS			
Gazania linearis	Gazania		Moderate				NS			
Melia azedarach	China berry tree								NS	
Melinis repens	Natal grass			NS			NS	NS	NS	NS

Table A-9. Invasive Plant Species within the Greater Crestridge Ecological Reserve Complex.



Scientific Norrol	Common Nome	Invasive I	South ^{3,4}				East ^{3,4}			
Scientific Name	Common Name	IPSP	Cal-IPC	SC	MI	UL	OD	GI	KE	DA
Nicotiana glauca	Tree tobacco		Moderate	C/M			NS			
Oxalis pes-caprae	Bermuda buttercup		Moderate	IP			NS			
Pennisetum setaceum	Fountain grass		Moderate				NS	NS	NS	NS
Phoenix canariensis	Canary Island date palm		Limited	NS						
Ricinus communis	Castor bean		Limited			NS	NS			
Schinus molle	Peruvian pepper tree		Limited	C/M			NS		NS	
Schinus terebinthifolius	Brazilian pepper tree		Limited			NS			NS	
Silybum marianum	Milk thistle		Limited	NS						
Tamarix sp.	Tamarix		High C			NS				
Vinca major	Big-leaf periwinkle		Moderate						NS	
Washingtonia robusta	Washington fan palm		Moderate			NS	NS			

Table A-9. Invasive Plant Species within the Greater Crestridge Ecological Reserve Complex.

Species nomenclature generally follows Baldwin et al. 2012.

² Invasive Plant Ranking:

IPSP = regional management priority based on regional Plant Assessment Form (PAF) score and management feasibility, as defined in the San Diego Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012).

Cal-IPC: statewide priority based on California Invasive Plant Council (Cal-IPC) PAF score (Cal-IPC 2006):

High = Severe ecological impacts on physical processes, plant/animal communities, vegetation structure; reproductive biology, other attributes conducive to moderate-high rates of dispersal/establishment; generally widely distributed ecologically.

Moderate = Substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, vegetation structure; reproductive biology, other attributes conducive to moderate-high rates of dispersal, though establishment generally dependent upon ecological disturbance; ecological amplitude/distribution may range from limited-widespread.

Limited = Invasive but ecological impact minor statewide or not enough information to justify a higher score; reproductive biology, other attributes result in low-moderate rates of invasiveness; ecological amplitude/distribution generally limited, but species may be locally persistent and problematic.

³ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East (preserves): GI = Gibson, KE = Kemerko, DA = Davison.

⁴ Management status and priority: IP = management action currently in progress; C = management action completed C/M = management action completed but monitoring required to ensure invasive species does not re-establish; NS = management action not yet started; * = near-term priority for implementation. **Bolded** entries indicate where treatment across preserve boundaries would improve overall success and reduce potential for reinvasion.



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⁵ IPSP priority species per regional Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012).

⁶ Management Levels per regional Invasive Plant Strategic Plan (IPSP) (CBI et al. 2012):

Management Level 1 – Surveillance (none present)

Management Level 2 – Eradication (none present)

Management Level 3 - Containment

Management Level 4 - Directed Management

Management Level 5 - Directed Suppression

⁷ Other invasive species = non-priority invasive plant species.

⁸ Species occurs on other preserves, but mapped only on Odom where it dominates large areas.





Figure A-4a. Invasive Plant Strategic Plan (IPSP) Invasive Plant Species on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure A-4b. Invasive Plant Strategic Plan (IPSP) Invasive Plant Species on the East Preserves (Gibson, Kemerko, and Davison).





Figure A-4c. Other Invasive Plant Species (Non-IPSP) on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure A-4d. Other Invasive Plant Species (Non-IPSP) on the East Preserves (Gibson, Kemerko, and Davison).

Stewardship Issues

We mapped areas of severe erosion along roads and trails, and trash along preserve boundaries and in the interior of preserves, focusing on large piles of potential concern for biological resources or human safety (Figures A-5a,b). We prioritized trash for removal based on criteria in Table A-10. We also noted areas where additional fencing and/or signage would control access and reduce threats from authorized and unauthorized users. Priority 1 fencing/signage identifies areas where signs might prevent catastrophic impacts from unauthorized activities (e.g., campfires that could result in wildfire ignition; Figure A-5b). Refer to Figures A-6a-c and A-7ad for representative photographs of erosion, trash, and access control issues within the complex and Appendix A-3 for attributes associated with access control, erosion, and trash issues.

Rapid Assessment Surveys

Argentine Ant Surveys

For the most part, there was no Argentine ant invasion into the preserves once away from the urban edge. Focal risk areas of invasion included riparian areas downstream of urban development, such as heading west into the reserve to the intersection of Suncrest and Orchard, or adjacent to Dehesa Road at either the golf course or the houses (Figures A-8-10). These invasion fronts tend to drop off rapidly due to the xeric nature of the complex landscape and lack of coastal humidity.

Herpetological Surveys

Across the four survey sites and all eight survey teams, we documented 189 reptile observations covering a total of 15 species (10 lizard species and 5 snake species; Table A-11). The most common species was the side-blotched lizard (n=64), followed by the granite night lizard (n=29). The teams found orange-throated whiptail, western fence lizard, side-blotched lizard, and granite night lizard across all four survey sites. The least frequently found species were the southern alligator lizard and horned lizard; each was detected only once. There were also many lizard observations where the species could not be determined, but was likely one of the other identified species. Red diamond rattlesnake was the most frequently reported snake. Gibson B and Skeleton Flats each had 11 confirmed species, while Gibson A and Orchard each had seven confirmed species.









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Figure A-5b. Trash, Erosion, and Access Control on the East Preserves (Gibson, Kemerko, and Davison).



Priority Level	Description	Removal Priority
1	May contain hazardous components, function as a potential fire	Highest priority for
	hazard, provide a breeding ground or nest sites for pests, or	removal
	otherwise threaten wildlife.	
	Examples: tires, large appliances, automobile parts (e.g., batteries,	
	engines), plastics in or near wetlands or drainages, asbestos,	
	electrical wiring, loose barbed wire or other fencing wire.	
2	May degrade habitat, function as an 'attractive nuisance' (e.g., old	Remove as funding
	furniture), and have a slow decomposition rate, but is not expected	and resources allow
	to contain hazardous components.	
	Examples: asphalt, plumbing fixtures, roofing shingles, plastics	
	away from wetlands or drainages, concrete, bricks, glass, tin or	
	aluminum cans.	
3	May provide (temporary) habitat for some wildlife species and have	Remove on a case-by-
	a faster decomposition rate than Priority 2 debris; not expected to	case basis
	contain hazardous components.	
	Examples: wood piles, soil, landscape waste (note that if landscape	
	waste is not removed, it may require control measures to stop the	
	spread of invasive propagules).	

Table A-10.Trash Removal Priority Levels.

We overlaid GPS tracks of each survey team on the San Diego County grid system to further document survey locations, but no species were observed. San Diego County has been divided into a 50 meter grid system, where each grid cell is 50 meters on each side. Identifying grid cells that were surveyed with no results documents survey efforts and provides a frame of reference for results. At Gibson A, the combined survey teams covered 48 50x50 grid cells, 25 of which had no species observations. At Gibson B, 54 grid cells were covered; no species were observed in 24 cells. At Skeleton Flats, 49 out of 76 grid cells had no documented species. In 54 of the 75 grid cells surveyed at Orchard, no animals were observed. Many of the grid cells were visited by more than one survey team, especially near the start and end of the survey effort at each site. Not all grid cells received the same level of survey effort based on the length of the GPS track passing through it. Species observations that are not associated with a GPS track may be species observed before or after the designated search time.



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Figure A-6a-c. Examples of (a) erosion on Ulrich, (b) erosion on Gibson, and (c) trash on Kemerko.



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Figure A-7a-d. Examples of (a-c) trash and (d) access control issue on Kemerko.





Figure A-8. Argentine Ant Survey Results in and near the southern edge of the South Crest and Odom Preserves.





Figure A-9. Argentine Ant Survey Results on the South Crest, Odom, and Ulrich Preserves.





Figure A-10. Argentine Ant Survey Results on and near the Kemerko Preserve.



Table A-11.	Reptile	Observations	on	or	near	the	Greater	Crestridge	Ecological	Reserve
Complex.										

Tuno	Species	Common Nomo	Scientifie Nome		Total			
Type	Code	Common Name	Scientific Name	GI A	GI B	SF	OR	Total
Lizard	CNHY	Orange-throated	Aspidoscelis hyperythra	3	4	4	5	16
		Whiptail						
	CNSP	Whiptail	Aspidoscelis spp.	1	2		1	4
	CNTI	Tiger Whiptail	Aspidoscelis tigris	1	2	1		4
	COVA	Western Banded Lizard	Coleonyx variegatus			2		2
	ELMU	Southern Alligator Lizard	Elgaria multicarinata			1		1
	EUSK	Western Skink	Plestiodon skiltonianus		2	1	1	4
	EUSP	Skink	Plestiodon spp.			1		1
	PHCO	Blainville's Horned	Phrynosoma blainvillii		1			1
		Lizard						
	SCOC	Western Fence Lizard	Sceloporus occidentalis	4	3	2	3	12
	SCOR	Granite Spiny Lizard	Sceloporus orcutti	5	2		1	8
	SCSP	Unknown spiny lizard	Sceloporus spp.	3		2		5
	UNLI	Unknown lizard	Unknown lizard	6	6	7	8	27
	UTST	Side-Blotched Lizard	Uta stansburiana	9	27	16	12	64
	XAHE	Granite Night Lizard	Xantusia henshawi	13	11	2	3	29
Snake	CRRU	Red Diamond	Crotalus ruber		2	1		3
		Rattlesnake						
	CRSP	Unknown Rattlesnake	Crotalus spp.			1		1
	HYTO	Coast Nightsnake	Hypsiglena ochrorhyncha		`1			1
	LEHU	Western Threadsnake	Rena humilis			1	1	2
	MALA	Striped Racer	Coluber lateralis			2		2
	TAPL	California Black-headed	Tantilla planiceps	1	1			2
		Snake						
Total				46	64	44	35	189

¹ Site: GI A = Gibson A, GI B = Gibson B, SF = Skeleton Flats, OR = Orchard.

With the equivalent of nearly 2 days' worth of effort at each site, a first pass has been made at developing a species list for each of these four sections of the GCER complex and surrounding, conserved lands. Undoubtedly, there are many more reptile and amphibian species using this landscape, which may require additional survey efforts to document fully.

Connectivity Priorities

Connectivity priorities for the GCER complex include connecting South Crest to the Crestridge Ecological Reserve across La Cresta Road, connecting Gibson and Davison to potential EHC acquisitions or CER to the north and then to the east across I-8, and connecting South Crest and Odom to conserved lands south of Dehesa Road, including SDNWR lands. Most of these connections will require land acquisitions and/or regional efforts to provide safe passage across

or under roads to reduce animal mortality. Preserve-level actions for maintaining or enhancing connectivity may include closing some dirt roads or trails to reduce internal fragmentation, particularly on South Crest, Odom, and Ulrich.

Hydrologic Processes

Aseasonal flow meters (STICs) were installed in three locations: one each in Harbison Canyon, the Harbison Canyon tributary along Mountain View Road, and Galloway Valley (Appendix A-4). Harbison Canyon showed as almost perennial, while the Mountain View tributary showed a longer surface flow regime then would be expected (Appendix A-4). Galloway Valley recorded spiked flows tied to spring rain events (Appendix A-4). Loggers were also put into the Sweetwater River upstream of Lake Emma and the lowest ones remained dry, as expected.

Primary Threats and Stressors

We identified primary threats and stressors within the GCER complex based on reconnaissance and rapid assessment surveys, previous onsite observations and reports, and site history. Threats and stressors that are typically managed at the preserve-level or across preserve boundaries are summarized below. Regional threats and stressors (e.g., altered fire regime, climate change, nitrogen deposition, light pollution, urban runoff) are addressed in the MSP (SDMMP 2013, SDMMP and TNC 2017). Primary threats and stressors are listed in Table A-12 and discussed below. Appendix A-5 documents all threats considered in the assessment process.

<u>Altered Fire Regime</u>. Altered fire regimes may impact MSP species and habitats directly through species mortality or indirectly through seed bank reduction, invasive species colonization, and habitat type conversion. Fire suppression results in increased fuel loads and fire intensity, while an increase in fire frequency may prevent plants from reaching maturity and contributing to the soil seedbank. Habitat invasion by nonnative grasses may increase fire intensity by introducing (or increasing) fine fuels into the system.

High fire frequency across the South preserves has resulted in mortality of Dehesa nolina and variegated dudleya, and habitat degradation or conversion to annual grasses. In addition, the 2003 Cedar Fire impacted the California gnatcatcher population on South Crest and Odom, and likely reduced populations of other wildlife species, as well. Fire frequency is lower on the East preserves, where some areas have not burned since the 1970 Laguna fire. Habitat restoration, invasive plant control, and species augmentation on the South preserves currently address impacts from past fires (in part).



Table A-12.	Primary	Threats	and	Stressors	on	the	Greater	Crestridge	Ecological	Reserve
Complex.										

		Sout	h ^{3,4}	East ^{3,4}			
Threats and Stressors	SC	MI	UL	OD	GI	KE	DA
Altered Fire Regime							
High Fire Frequency	Х	Х	Х	Х	Х	Х	Х
Fuel Modification			Х			Х	
Altered Hydrology/Erosion	X		Х	Х	Х	Х	
Dumping/Trash	X		Х	Х		Х	
Herbivory	X			Х			
Human Use of Preserves							
Management, Monitoring, & Maintenance Activities	X	Х	Х	Х	Х	Х	Х
Recreational Use/Unauthorized Trails	X	Х	Х	Х		Х	Х
Road Maintenance	Х		X	X	X	Х	
Invasive Animal Species							
Argentine Ants	Х		X	X		Х	
Wild Turkeys							
Feral Pigs	Х						
Gold-spotted Oak Borer			X			Х	
Kuroshio Shot Hole Borer + Fusarium Dieback	X		Х		Х	Х	
Invasive Plant Species							
Management Level 3	Х		X	X	X	Х	Х
Management Level 4	Х		X	X	X	Х	
Management Level 5	Х		X	X	X		Х
Urban Development							
Dumping/Trash	X		Х	Χ		Х	Х
Edge Effects			Х	Х		Х	Х

¹ Table includes only preserve- or preserve complex-level threats and stressors, unless otherwise noted.

² EHC has primary responsibility for addressing preserve-level threats and stressors, unless otherwise noted.

³ South (preserves): SC = South Crest, MI = Michelsen, UL = Ulrich; East (preserves): GI = Gibson, KE = Kemerko.

 4 X = threats and stressors identified on preserve; --- = threats and stressors not identified or management not needed at this time.

Fuel modification is a fire-related threat that may impact biological resources. Thinning or eliminating vegetation lessens fuel loads in the event of wildfire, but may remove wildlife habitat, impact rare plant populations, and facilitate the spread of invasive species by creating gaps for their establishment. Fuel modification along the urban-preserve boundary is discussed under edge effects (below). However, fuel modification may also occur along roads, near utilities (e.g., powerlines), or as fuel breaks through natural habitat during fire suppression. EHC has not yet implemented fuel modification management actions.

<u>Altered Hydrology/Erosion</u>. Altered hydrology and erosion threaten MSP species and sensitive habitats in several locations within the complex. Urban runoff from offsite locations into drainages creates conditions suitable for the establishment and spread of invasive plants, while severe road erosion results in impassable roads and may present a safety hazard.

On South Crest, urban runoff has increased flows into drainages that normally support oak woodland or scrub, thus allowing more mesic-tolerant species such as palm trees to establish and thrive. Runoff from development adjacent to Ulrich has similarly altered flows, allowing invasion by giant reed (*Arundo donax*), Bailey acacia (*Acacia baileyana*), castor bean (*Ricinis communis*), tamarisk (*Tamarix* sp.), and Washington fan palm (*Washingtonia robusta*). EHC and contractors have removed some invasive plants from drainages on the South Crest preserve.

The main, north-south dirt road through South Crest concentrates sheet runoff from upper slopes onto lower slopes, resulting in erosive gullies and sinkholes that undercut native grasslands and Dehesa nolina and variegated dudleya plants. CBI and contractors installed erosion control measures to slow and eventually stop the volume and intensity of flows, thereby minimizing further erosion. A permanent solution will require re-engineering the dirt road that is funneling water onto lower slopes.

The majority of soils within the preserve complex are erosive, as evidenced on roads or trails where vegetation has been removed. EHC and contractors have improved eroded sections of the access road from Sycuan Summit Drive into the South Crest Preserve with gravel and sand bags. Areas of severe erosion were mapped during reconnaissance surveys.

The USGS installed aseasonal flow meters (STICs) in three locations: one each in Galloway Valley, Harbison Canyon, and the tributary along Mountain View Road (Appendix A-4). Galloway Valley recorded spiked flows tied to spring rain events. Harbison Canyon showed as almost perennial, while the Mountain View tributary showed a longer surface flow regime then would be expected. Loggers were also put into the Sweetwater River upstream of Lake Emma and the lowest ones remained dry, as expected.



<u>Herbivory</u>. Herbivory is a threat when it impacts the ability of a species, population, or occurrence to survive and/or reproduce. We consider herbivory a potential threat to Dehesa nolina based on field observations, although we do not yet know the magnitude or long-term consequences of this threat.

During field studies on South Crest, we observed herbivory on flowering Dehesa nolina plants. Flowering stalks were eaten by deer and small mammals (possibly, woodrats), and insects consumed flowers and capsules (CBI 2015b). In many cases, entire inflorescences or all flowers and capsules on an individual were destroyed prior to seed formation or seed set. These observations were made during periods of low flowering within the population. We do not know if the effects of herbivory will magnify or dampen during a mass flowering event, or whether insect herbivory will intensify under climate change; however, extensive herbivory during mass flowering could potentially affect long-term population persistence. Dehesa nolina also occurs on Michelsen and Odom, and we assume similar levels of plant herbivory on those preserves.

We bagged flowering inflorescences as a small-scale, short-term management action to protect flowers from herbivory, with mixed success. Although some protection was afforded, seed set was generally low in the absence of a stimulating event such as fire or other disturbance.

<u>Human Use of Preserves</u>. Human use of the preserves can unintentionally introduce or spread invasive, nonnative species. Land managers, biologists, volunteers, utility service staff, fire agency personnel, and recreational users may introduce invasive species on boots or equipment, vehicle tires, and domestic animals. For example, utility service vehicles likely introduced the invasive plants Devil's thorn (*Emex spinosa*) and Saharan mustard (*Brassica tournefortii*) along access roads through Odom. Stinkwort (*Dittrichia graveolens*) was introduced by livestock onto lands adjacent to the East preserves and has since spread onto Gibson along roads.

Monitoring, Management, and Maintenance Activities. Personnel involved in monitoring, management, and maintenance within the complex may introduce invasive species or trample sensitive species or habitat. EHC currently controls invasive species through herbicide application and hand-pulling, and will continue these efforts in the future. EHC also works with CBI to train new staff to minimize or avoid impacts to species, habitat, and soils during monitoring.

Recreational Use/Unauthorized Trails. Recreational users can also introduce or spread invasive species on boots, bike tires, horses, or dogs. In additional, recreational uses may inadvertently damage or kill MSP species, trample habitat, and pose a fire risk. Although public use of the preserve complex is not encouraged, there is a history of recreational use on South Crest, Ulrich, Odom, and Kemerko. Hiking, dog walking, and mountain biking are

most prevalent on South Crest and Odom, while horseback riding and hiking occur on Ulrich. Fire rings on South Crest and Gibson pose the potential for fire to escape into surrounding natural areas. In the future, recreational uses will continue only if they do not impact biological resources or interfere with preserve management. Regular preserve patrols and access control, including temporary fencing around sensitive resources, would help reduce impacts, including incidental take.

To date, EHC has installed signs within and at either end of Skeleton Flats (South Crest) to inform the public of allowable uses and closed trails. OHV activity is prohibited within the preserve complex, and existing fencing and gates have largely eliminated this threat.

Road Maintenance. Road maintenance is a potential threat where it removes native vegetation or impacts MSP species. For example, Dehesa nolina occurs in and adjacent to the dirt access road into South Crest, and Encinitas baccharis occurs at the edge of a dirt road on Gibson. All preserves except Michelsen have a network of roads used for preserve management, utility maintenance, emergency egress, and/or residential access. The unpaved portion of Suncrest Boulevard through the South Crest Preserve is used by land owners along Suncrest Bluff Road and as an emergency evacuation route for the community of Crest in the event of fire. This road is maintained by CalFire under a verbal agreement with EHC (Beck pers. comm.). SDG&E maintains utility roads on Odom and Kemerko. On Odom, SDG&E maintains the road from Sycuan Summit Drive to the last power pole; CalFire has graded the road from this point into the South Crest Preserve (Skeleton Flats) in the past. All other roads are the management responsibility of EHC.

<u>Invasive Animal Species</u>. Various vertebrate and invertebrate invasive animal species may be present on the complex now or in the future. As the SDMMP develops an invasive animal species management plan, clear next steps for the county will be described. For now, invasive animals can be divided into two categories, aquatic and terrestrial. Aquatic invasives can be further divided into species occurring in ponds/lakes or in moving waters. For the most part, there is not adequate aquatic habitat within the complex to maintain aquatic invasives. Within Harbison Canyon, the water flow is becoming closer to a perennial flow and thus, becoming more suitable for crayfish, invasive fishes, and bullfrogs. Current surveys did not detect these species. Within the Sweetwater River along Dehesa Road, many invasives are present in the ponds/lakes including African clawed frogs (*Xenopus laevis*), bullfrogs, invasive fish, crayfish, and others, but most of these are highly or entirely aquatic thus, do not directly threaten the complex.

Some terrestrial invasive species are widespread within the urban-wildland interface (e.g., opossums and Argentine ants), some are only successful in habitat patches (e.g., house cats and



invasive rodents), and others have spread well into natural lands (e.g., pigs, turkeys, and many invertebrates). Invasive terrestrial species that pose the greatest threats to resources within the complex are discussed below.

Argentine Ants. These ants have a variety of impacts in natural lands in southern California, including almost complete loss of the native ant community when present. The native ant community includes both solitary foragers and swarming types of ants, whereas Argentine ants are swarming ants. Some ant specialists, such as the horned lizard, are tied to solitary foraging ants for food, and do poorly or do not persist in Argentine ant-invaded regions. Other groups, such as spiders, shrews, and other invertebrates, have been shown to decline or become absent in the presence of Argentine ants. Thus, Argentine ants are a primary risk to biodiversity and ecological integrity of southern California reserves. Within the eastern areas of the county, Argentine ants are more restricted to riparian or artificially wetted areas due to their moisture needs.

USGS conducted rapid invasive ant assessments at urban or other edge areas, and then into the preserve perpendicularly. For the most part, there was no Argentine ant invasion into the preserves once away from the urban edge. Focal risk areas of invasion included riparian areas downstream of urban development, such as heading west into the reserve to the intersection of Suncrest and Orchard, or adjacent to Dehesa Road at either the golf course or the houses. These invasion fronts tend to drop off rapidly due to the xeric nature of the complex landscape and lack of coastal humidity.

Based on Argentine ant rapid assessment surveys, invasion risk is not too high into the core areas of the complex at this time. However, removal or landscaping and watering adjacent to the complex would help reduce the invasion overall.

Wild turkeys. Although not seen during these surveys, wild turkeys occur to the east of the complex along the Sweetwater River. Turkeys can impact many small animals and various rare plant species; however, the complex may be too open and lacking enough water and woodland for their successful invasion.

Feral Pigs. While feral pigs have been eliminated or nearly eliminated from San Diego County (Jones 2016), we include pigs as a potential threat in the event that the pig population increases in the future. Their rooting activities destroy native plant species, including annuals and bulbs, while introducing nonnative invasive species and altering soil properties (CBI 2009, Tremor 2013). Pigs compete with native wildlife for food, destroy nests and eat eggs of reptiles and ground-nesting birds, have high reproduction rates, and spread disease to

wildlife, domestic animal, and humans (SDMMP 2013, USDA-APHIS 2016). Rooting can also disturb cultural sites (USDA-APHIS 2016).

Feral pig activity was documented on South Crest in 2012 in proximity to populations of San Diego thornmint and Dehesa nolina, and near native grasslands that support several bulb species, including chocolate lilies (*Fritillaria biflora*). Because of the lack of water and riparian habitat on this site, pig activity was likely transient. The EHC land manager and consulting biologists look for pig signs during management and monitoring activities.

Goldspotted Oak Borer. The goldspotted oak borer (*Agrilus auroguttatus*) (GSOB) is an invasive beetle that attacks mature oak trees, resulting in tree damage and mortality, as well as loss of wildlife foraging and nesting habitat, increased fuel for fires, and possibly, gaps for invasive plant establishment. The species affects coast live oaks (*Quercus agrifolia*) and has been identified in Engelmann oak, but does not appear to adversely affect the latter species (UCANR 2016a). Both oak species occur within the complex.

The complex lies within the GSOB zone of infestation (CalFire 2016) and tree mortality potentially resulting from GSOB has been detected near Ulrich and Kemerko (UCANR 2014). Coast live oaks within the complex have not been monitored for GSOB, nor has evidence of this species been observed onsite.

Kuroshio Shot Hole Borer + *Fusarium Dieback*. Another invasive beetle, Kuroshio shot hole borer (*Euwallacea* sp.) (KSHB) and its associated fungi were first detected in San Diego County in 2012. This beetle tunnels into host trees and shrubs and deposits the fungi that causes fusarium dieback, a disease that kills many native and nonnative tree and shrub species (Dimson et al. 2014). Known suitable reproductive host trees within or near the complex include California sycamore (*Platanus racemosa*) and coast live oak. This pest complex was detected in 2014 at the Sycuan Golf Course, just south of South Crest, where it infected an estimated 250 trees (UCANR 2016b). More recently, it was detected in a sycamore tree at Flinn Springs County Park, just north of CER (UANCR 2016b). Trees within the complex have not been monitored for this pest.

<u>Invasive Plant Species</u>. Nonnative, invasive plants pose one of the greatest threats to the biological integrity of preserve lands because of their ability to displace native species, degrade wildlife habitat, and alter ecosystem processes (e.g., Belnap et al. 2005, Ehrenfeld 2003, Evans et al. 2001, Cox 1999, Wilcove et al. 1998, D'Antonio and Vitousek 1992, Huenneke et al. 1990, Vitousek et al. 1990). For example, invasive wetland plants such as giant reed, Pampas grass (*Cortaderia* sp.), and tamarisk decrease habitat value for wildlife and alter hydrology, fire frequency, and fire intensity. The invasive, annual grass, purple falsebrome (*Brachypodium*

distachyon [referred to as *Brachypodium* in this document]), forms monotypic stands on clay soils, inhibits germination by native species, eliminates habitat for ground-dwelling insects and reptiles that require openings in scrub or grassland habitats, and possibly alters soil ecology and fire intensity. Artichoke thistle (*Cynara cardunculus*) displaces native species and alters soil ecology, while stinkwort, long-flowered veldt grass (*Ehrharta longiflora*), garland chrysanthemum (*Glebionis coronaria*), and Saharan mustard can spread quickly and degrade sensitive habitats, including wetlands, grasslands, and coastal sage scrub. Long-flowered veldt grass may increase fire intensity and spread (e.g., fine fuels).

EHC currently manages invasive plants that impact or potentially impact MSP species and habitats, including *Brachypodium*, artichoke thistle, sweet fennel, garland chrysanthemum, tamarisk, palms, and Saharan mustard on South Crest, Devil's thorn on Odom, and stinkwort on Gibson. Of these species, *Brachypodium* and Saharan mustard threaten MSP plants directly (e.g., San Diego thornmint, Dehesa nolina, variegated dudleya) or indirectly by altering the fine fuel load and garland chrysanthemum is displacing native plant species and degrading coastal sage scrub.

<u>Urban Development</u>. Dumping/trash and edge effects are the primary threats to the GCER complex from urban development. Unauthorized dumping occurs near residential areas and impacts biological resources directly or indirectly through habitat degradation, species mortality, or introduction of toxic substances into the soil or water supply. The complex is surrounded by residential development and roads, and disturbance at the urban-preserve boundary (edge effects) threatens resources within the preserves through habitat degradation and introduction of nonnative species. The impact of roads – particularly on large animal mortality – needs to be addressed regionally. La Cresta, Dehesa, and Harbison Canyon Roads are the largest sources of mortality of species heading into or out of the complex.

Dumping/Trash. Unauthorized dumping impacts biological resources directly or indirectly through habitat degradation, species mortality, or introduction of toxic substances into the soil or water supply.

EHC removed some larger trash piles from South Crest and Kemerko upon acquisition (including some internal fencing on Kemerko), and removes smaller trash as part of routine preserve management actions. We mapped and prioritized trash for removal during reconnaissance surveys.

Edge Effects. We identified three categories of edge effects during the site reconnaissance: vegetation clearing, illegal trash dumping, and horticultural plantings. Vegetation clearing reduces foraging and nesting habitat for native species and provides gaps for invasive plant



colonization. Trash degrades habitat quality and may pose health or safety risks to wildlife species or humans. Horticultural plantings displace native species and habitat. In addition, nonnative species have invaded the preserves from roads, adjacent developed areas, and undeveloped private lands.

We identified and/or mapped (1) fuel break encroachments on the Ulrich and Kemerko preserves, (2) trash dumping at preserve boundaries on Ulrich and Kemerko, and (3) horticultural plantings on Kemerko during reconnaissance surveys.



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Appendix A-1

Management Strategic Plan Species Summaries

We detected 20 Management Strategic Plan (MSP) species and identified an additional 16 MSP species with the potential to occur within the complex, based on previous studies and reconnaissance and rapid assessment surveys. We summarize detected MSP species that may require species-specific management (management categories SL, SO, SS) or management of vegetation characteristics (management category VF) below by management category.

SL Species: At Risk of Loss from Management Strategic Plan Area (MSPA)

<u>Quino checkerspot butterfly</u>. An undetermined number of Quino checkerspot were recorded on South Crest in 2010 (USFWS 2015), and potential habitat for the species occurs on Odom and Michelsen, as well. This occurrence is strategically located between large populations of Quino checkerspot to the south in the NWR and to the north across I-8, and falls within the possible future Central San Diego recovery unit for this species (USFWS 2003, SDMMP 2013, SDMMP and TNC 2017).

<u>Western burrowing owl</u>. EHC staff detected one burrowing owl on South Crest in 2016, which may have been transient. This observation represents one of the few recent burrowing owl sightings between conserved lands to the south in the NWR and Otay Mesa, and conserved lands to the north in Ramona. Although USGS also observed a burrowing owl a few times at night in El Monte Valley to the north of the I-8 Freeway over the last year, it is not known if there is a resident population in that area.

<u>American Badger</u>. Although badgers have not been detected within the complex, this may be due in part to a lack of surveys. The USGS confirmed badger sightings on the Crestridge Ecological Reserve (CER) in 2011 and 2014 and to the south in the Hollenbeck Wildlife Area in 2011 (Brehme et al. 2015; see Figure 3). In 2016, USGS received a photo of a badger within Hollenbeck Canyon demonstrating their continued use of the area. Badgers move widely and the complex is clearly within their movement paths between CER and areas to the east and south. Badgers are also secretive and hard to detect. The use of focal canine scent surveys in the future might detect sign on the properties. They prefer native grasslands, but also occur in scrublands and nonnative grasslands, as well.

<u>Mountain lion</u>. REC Consulting, Inc. (2004) detected mountain lion sign on South Crest prior to the 2003 Cedar Fire and WTI (2009) detected mountain lion sign on South Crest and Kemerko more recently. Burdett et al. (2010) summarizes some of the mountain lion movement data for

the region. The complex provides important habitat for this species to move between conserved lands in the south and those in the north across I-8. At least one mountain lion was killed during USGS studies associated with the GCER F-RMP (2017) as it was trying to cross Dehesa Road near Willow Glen Drive, where it was either leaving the complex to the south or heading north into the complex. Burdett et al. (2010) show how lion habitat suitability might change dramatically in this area over time through further development in the east (see Figure 4 *in* Burdett et al. 2010).

SO Species: Significant Occurrences at Risk of Loss from MSPA

<u>San Diego thornmint</u>. San Diego thornmint occurs in two stands on South Crest (ACIL_3SOCR016); EHC manages these stands annually. This occurrence appears relatively stable despite annual fluctuations in population size (1,135 individuals in 2012, 352 plants in 2016). This population may ally genetically more closely with the Wright's Field population than with coastal populations (CNLM 2014). REC Consulting, Inc. (2004) also detected a small stand on Odom in 2003, but recent surveys by CBI have not relocated that stand. Nonnative grasses and forbs now dominate thornmint habitat on Odom.

<u>Encinitas baccharis</u>. The Encinitas baccharis occurrence on Gibson and Davison (BAVA3_3GIHI010) is one of the largest known populations of this species and is located strategically between the southernmost population on Otay Mesa and the northern, inland population on Iron Mountain. This occurrence supports approximately 677 plants, and includes a mix of male and female plants. The majority of plants (672) occur on Gibson.

<u>Dehesa nolina</u>. South Crest, Michelsen, and Odom support the majority of the Dehesa Mountain occurrence (NOIN_3SOCR003), which is one of the three largest occurrences in the U.S., one of only five conserved U.S. occurrences, and the type locality for this species. A number of plants were lost in the 2003 Cedar Fire; CBI and EHC out-planted nursery-grown plants onto restored habitat on South Crest to partially offset these losses (SANDAG Environmental Mitigation Program [EMP] grant 5001763).

<u>Golden eagle</u>. In the early 2000s, 3 golden eagles (1 mature individual and 2 juveniles flying together) were observed flying together over South Crest and Odom (REC Consulting, Inc. 2004), and a pair of sub-adults were observed flying over South Crest in 2014 (Battle pers. obs.). The complex may provide foraging habitat for this species. However, only 4 of 27 eagles radio-tracked through February 2016 passed over the property, and there was no evidence of foraging activities (Tracey et al. 2016). Historically, there were at least 3 and possibly 4 nesting pairs in the complex or vicinity. Development and human use of the landscape likely caused nest abandonment. Although the levels of people on the landscape (e.g., recreational uses, restoration

activities) may have limited foraging in the past, eagle activity might increase if trespassing is controlled. In addition, EHC could test potential management actions geared towards nest recovery.

<u>Northern harrier</u>. Northern harriers have been observed flying over South Crest and Odom (REC Consulting, Inc. 2004, Gordon-Reedy and Vinje, pers. obs.), and may forage onsite.

SS Species: Stable but Still Requires Species-Specific Management to Persist in MSPA

<u>Variegated dudleya</u>. South Crest, Michelsen, and Odom support one of the easternmost occurrences of variegated dudleya (DUVA_3_SKFL009). This occurrence was damaged in the 2003 Cedar Fire, but has benefitted from habitat restoration on South Crest as part of the *Brachypodium* control project (SANDAG EMP grants 5001965 and 5004735) and out-planting of nursery-grown individuals from seed collected onsite (SANDAG EMP grant 5001763). We estimate total population size, based on flowering individuals only, at about 620 individuals.

<u>Parry's tetracoccus</u>. Parry's tetracoccus occurs on gabbro soils on South Crest, Michelsen, and Odom (TEDI_3SOCR001). This occurrence burned in the 2003 Cedar Fire, but has recovered well; shrubs are mature and flower and fruit annually. In 2011, 388 plants were mapped within the complex (CBI 2012) compared to 157 plants mapped pre-Cedar Fire (REC Consulting, Inc. 2004).

VF Species: Limited Distribution or Needing Specific Vegetation Characteristics Requiring Management (VF) in the MSPA

<u>Lakeside ceanothus</u>. The GCER complex and the adjacent CER support one of the largest – if not the largest – populations of Lakeside ceanothus throughout its range. Lakeside ceanothus is a dominant component of chaparral on Gibson, Kemerko, and Davidson, and is contiguous with the core population on CER. CBI mapped this occurrence on Gibson and Kemerko in 2014 and estimated 100,000 plants over nearly 160 acres on the two preserves (CBI 2014b). We mapped the species on Davidson in 2017, and estimated over 200 additional plants.

<u>Engelmann oak</u>. Scattered Engelmann oaks occur on relatively flat land on the East preserves. We mapped two individuals on Gibson and eight individuals on Kemerko. One Engelmann oak was mapped South Crest prior to the Cedar Fire, but burned and did not recover post-fire (REC Consulting, Inc. 2004).

Western spadefoot toad. This species detected by EHC staff on Odom in 2017, and is likely widespread in habitat patches across the complex. Suitable habitat within the complex varies in



quality; however, we did detect viable use areas, including several depressions in compressed (compacted) dirt roads. During rapid assessment surveys, a few pools had limited water.

<u>Blainville's horned lizard</u>. Blainville's horned lizard was observed on South Crest (one individual), Michelsen (one individual), and Gibson (one individual), where it occurs in scrub and chaparral. In addition, REC Consulting, Inc. (2004) reported this species from Odom. Horned lizards should remain widespread in the complex where there is still good scrub and chaparral cover. They occur also in native grassland but invasive grassland and thatch build-up in particular limit their distribution. The results of the rapid ant assessment showed that most of the complex is currently free of invasive Argentine ants (Appendix A).

<u>Coastal California gnatcatcher</u>. A core population of gnatcatchers occurred on South Crest and Odom prior to the 2003 Cedar Fire. This species has been detected in low numbers recently as habitat has recovered: we observed one male on South Crest in 2014 and one family group just south of South Crest (but on EHC-owned property) in 2015. The GCER complex is located strategically between large populations of gnatcatchers in the NWR to the south and across I-8 to the north.

San Diego black-tailed jackrabbit. REC Consulting, Inc. (2004) detected one San Diego blacktailed jackrabbit on South Crest near Dehesa Road prior to the 2003 Cedar Fire (REC Consulting, Inc. 2004). We have not observed the species post-fire. Although we have not surveyed for this species specifically, we did not observe it during reconnaissance and rapid assessment surveys, and suspect it is absent from much of the complex. Black-tailed jackrabbits are relatively limited in occurrence in dense chaparral, while open/patchy scrub and chaparral provide more suitable habitat.



Appendix A-2

Invasive Plant Attribute Data

Table A-2.1. Invasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge EcologicalReserve Complex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Cortaderia selloana	Gibson	R	1	Exact	Very Good to Excellent		GI_IP_corsel_01
Dittrichia graveolens	Gibson	R	565	Exact	Very Good to Excellent		GI_IP_ditgra_03
Dittrichia graveolens	Gibson	R	1	Exact	Very Good to Excellent		GI_IP_ditgra_02
Dittrichia graveolens	Gibson	R	1	Exact	Very Good to Excellent		GI_IP_ditgra_01
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_20
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_19
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_01
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_02
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_23
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_22
Ehrharta longiflora	Gibson	R	Trace	Percent	Very Good to		GI_IP_ehrlon_21


Table A-2.1 .	nvasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	ex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover	Excellent		
Ehrharta longiflora	Gibson	R	2	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_24
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_25
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_26
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_03
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_18
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_17
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_16
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_27
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_11
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_15
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_07
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_09
Ehrharta longiflora	Gibson	R	Trace	Percent	Very Good to		GI_IP_ehrlon_10



Table A-2.1 .	Invasive Plant Strategic Plan (IP	PSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecolo	ogical
Reserve Com	plex.		

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover	Excellent		
Ehrharta longiflora	Gibson	R	20	Exact Count	Very Good to Excellent		GI_IP_ehrlon_05
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_14
Ehrharta longiflora	Gibson	R	5	Exact Count	Very Good to Excellent		GI_IP_ehrlon_28
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_08
Ehrharta longiflora	Gibson	R	6	Exact Count	Very Good to Excellent		GI_IP_ehrlon_04
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_06
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_12
Ehrharta longiflora	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_ehrlon_13
Glebionis coronaria	Gibson	R	35	Exact Count	Very Good to Excellent		GI_IP_Glecor_01
Brachypodium distachyon	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_bradis_02
Brachypodium distachyon	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_bradis_01
Dittrichia graveolens	Kemerko	R			Very Good to Excellent		KE_IP_ditgra_01
Ehrharta longiflora	Kemerko	R	Trace	Percent	Very Good to		KE_IP_ehrlon_03



Table A-2.1 .	nvasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	lex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover	Excellent		
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_04
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_05
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_30
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_34
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_06
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_17
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_31
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_07
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_08
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_10
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_11
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_12
Ehrharta longiflora	Kemerko	R	3	Percent	Fair to Good		KE_IP_ehrlon_13



Table A-2.1 .	nvasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	lex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_15
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_14
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_01
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_02
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_16
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_19
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_20
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_18
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_21
Ehrharta longiflora	Kemerko	R	10	Percent Cover	Fair to Good		KE_IP_ehrlon_27
Ehrharta longiflora	Kemerko	R	10	Percent Cover	Fair to Good		KE_IP_ehrlon_28
Ehrharta longiflora	Kemerko	R	10	Percent Cover	Fair to Good		KE_IP_ehrlon_22
Ehrharta longiflora	Kemerko	R	10	Percent	Fair to Good		KE_IP_ehrlon_26



Table A-2.1 .	Invasive Plant Strategic Plan ((IPSP) Invasive Pl	lant Points	and Polygons	within the C	Greater Crestr	idge Ecological
Reserve Com	plex.						

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Ehrharta longiflora	Kemerko	R	5	Percent Cover	Fair to Good		KE_IP_ehrlon_23
Ehrharta longiflora	Kemerko	R	15	Percent Cover	Fair to Good		KE_IP_ehrlon_25
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_29
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_24
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_32
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_33
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_35
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_36
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_37
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_38
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_39
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_40
Ehrharta longiflora	Kemerko	R	1	Percent	Very Good to		KE_IP_ehrlon_50



Table A-2.1 .	nvasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	lex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover	Excellent		
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_53
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_54
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_55
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Poor		KE_IP_ehrlon_56
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_57
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_58
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_59
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_60
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_61
Ehrharta longiflora	Kemerko	R	10	Percent Cover	Fair to Good		KE_IP_ehrlon_62
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_63
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_64
Ehrharta longiflora	Kemerko	R	1	Percent	Fair to Good		KE_IP_ehrlon_44



Table A-2.1 .	Invasive Plant Strategic Plan ((IPSP) Invasive Pl	lant Points	and Polygons	within the C	Greater Crestr	idge Ecological
Reserve Com	plex.						

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_65
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_66
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_67
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_68
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_69
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_70
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_47
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_71
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_72
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_73
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_74
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_48
Ehrharta longiflora	Kemerko	R	Trace	Percent	Fair to Good		KE_IP_ehrlon_46



Table A-2.1 .	vasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecologica	l
Reserve Com	ex.	

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_75
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_76
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_77
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_49
Ehrharta longiflora	Kemerko	R	3	Percent Cover	Fair to Good		KE_IP_ehrlon_78
Ehrharta longiflora	Kemerko	R	3	Percent Cover	Fair to Good		KE_IP_ehrlon_79
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_43
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_42
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_45
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_80
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_81
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_41
Ehrharta longiflora	Kemerko	R	Trace	Percent	Fair to Good		KE_IP_ehrlon_51



Table A-2.1 .	nvasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	ex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_82
Ehrharta longiflora	Kemerko	R	5	Percent Cover	Fair to Good		KE_IP_ehrlon_85
Ehrharta longiflora	Kemerko	R	5	Percent Cover	Fair to Good		KE_IP_ehrlon_84
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_52
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_86
Ehrharta longiflora	Kemerko	R	1	Percent Cover	Fair to Good		KE_IP_ehrlon_87
Ehrharta longiflora	Kemerko	R	2	Percent Cover	Fair to Good		KE_IP_ehrlon_88
Ehrharta longiflora	Kemerko	R	5	Percent Cover	Fair to Good		KE_IP_ehrlon_89
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_90
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Very Good to Excellent		KE_IP_ehrlon_91
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_92
Ehrharta longiflora	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_ehrlon_09
Ehrharta longiflora	Kemerko	R					KE_IP_ehrlon_83



Table A-2.1 .	Invasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	lex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Brachypodium distachyon	South Crest	R	Trace	Percent Cover	Fair to Good		SC_IP_bradis_01
Brachypodium distachyon	South Crest	R	1	Percent Cover	Very Good to Excellent		SC_IP_bradis_02
Brachypodium distachyon	South Crest	R	Trace	Percent Cover	Very Good to Excellent		SC_IP_bradis_03
Brachypodium distachyon	South Crest	R	1	Percent Cover	Fair to Good		SC_IP_bradis_04
Brachypodium distachyon	South Crest	R	Trace	Percent Cover	Fair to Good		SC_IP_bradis_05
Brachypodium distachyon	South Crest	R	Trace	Percent Cover	Very Good to Excellent		SC_IP_bradis_06
Brachypodium distachyon	South Crest	R	35	Percent Cover	Very Poor		SC_IP_bradis_07
Brachypodium distachyon	South Crest	R	25	Percent Cover	Fair to Good		SC_IP_bradis_08
Brachypodium distachyon	South Crest	R	Trace	Percent Cover	Very Good to Excellent		SC_IP_bradis_09
Brachypodium distachyon	South Crest	R	30	Percent Cover	Poor		SC_IP_bradis_10
Brachypodium distachyon	South Crest	Р				51.62	SC_BRDI_01
Cynara cardunculus	South Crest	Р	14	Exact Count	Fair-Good	0.05	SC_CYCA_01
Dittrichia graveolens	South Crest	R	1	Exact Count	Fair to Good		SC_IP_ditgra_01
Foeniculum vulgare	South Crest	R	1	Exact Count	Poor		SC_IP_Foevul_01



Table A-2.1 .	Invasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological
Reserve Com	plex.

Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Foeniculum vulgare	South Crest	R	1	Exact Count	Poor		SC_IP_Foevul_02
Foeniculum vulgare	South Crest	R	1	Exact Count	Poor		SC_IP_Foevul_03
Foeniculum vulgare	South Crest	R	4	Exact Count	Poor		SC_IP_Foevul_04
Glebionis coronaria	South Crest	R	3	Exact Count	Very Good to Excellent		SC_IP_Glecor_01
Glebionis coronaria	South Crest	Р			Fair to Good		SC_CHCO_01
Glebionis coronaria	South Crest	Р			Very Poor		SC_CHCO_02
Glebionis coronaria	South Crest	Р			Fair to Good		SC_CHCO_03
Glebionis coronaria	South Crest	Р			Poor		SC_CHCO_04
Glebionis coronaria	South Crest	Р			Fair to Good		SC_CHCO_05
Glebionis coronaria	South Crest	Р			Very Poor		SC_CHCO_06
Glebionis coronaria	South Crest	Р			Very Poor		SC_CHCO_07
Glebionis coronaria	South Crest	R	10	Percent Cover	Poor	0.10	SC_IP_Glecor_01
Glebionis coronaria	South Crest	Р			Fair-Good	3.7	SC_CHCO_01
Glebionis coronaria	South Crest	Р			Very Poor	0.01	SC_CHCO_02
Glebionis coronaria	South Crest	Р			Fair-Good	0.14	SC_CHCO_03
Glebionis coronaria	South Crest	Р			Poor	0.01	SC_CHCO_04
Glebionis coronaria	South Crest	Р			Fair-Good	0.01	SC_CHCO_05



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Glebionis coronaria	South Crest	Р			Very Poor	0.18	SC_CHCO_06
Glebionis coronaria	South Crest	Р			Very Poor	0.64	SC_CHCO_07
Silybum marianum	South Crest	Р			Very Poor	0.01	SC_SIMA_01
Silybum marianum	South Crest	Р	1	Exact Count	Very Poor		SC_SIMA_02
Arundo donax	Ulrich	R	80	Percent Cover	Fair to Good	0.22	UL_IP_arudon_01
Ehrharta longifolia	Ulrich	R	1	Percent Cover	Very Good to Excellent		UL_IP_ehrlon_01
Ehrharta longifolia	Ulrich	R	20	Estimated Number	Very Good to Excellent		UL_IP_ehrlon_01
Glebionis coronaria	Ulrich	R	25	Exact Count	Very Good to Excellent		UL_IP_Glecor_01
Glebionis coronaria	Ulrich	R	20	Percent Cover	Poor	0.07	UL_IP_Glecor_01
Foeniculum vulgare	Odom	R	1	Exact			OD_IP_FOVU_01
Glebionis coronaria	Odom	R	Trace	Percent Cover			OD_IP_GLCO_01
Ehrharta longiflora ⁴	Davidson	R	N/A	Estimated Count	Poor to Excellent		

Table A-2.1. Invasive Plant Strategic Plan (IPSP) Invasive Plant Points and Polygons within the Greater Crestridge EcologicalReserve Complex.

¹ R = Site reconnaissance surveys (2015, 2017); P = Previous surveys (CBI 2012b).

² Exact Count = population fully counted; Estimated Number = population number estimated; Percent Cover = visual percent cover of target species collected within a survey grid.

³ <u>Very Good to Excellent</u> = 80 - 100% native flora composition, vegetation structure intact or nearly so, cover/abundance of weeds <5%, and no or minimal signs of disturbance; <u>Fair to Good</u> = 50 - 80% native flora composition, vegetation structure modified or somewhat modified, cover/abundance of weeds 5 - 100% native flora composition, vegetation structure modified or somewhat modified, cover/abundance of weeds 5 - 100% native flora composition, vegetation structure modified or somewhat modified, cover/abundance of weeds 5 - 100% native flora composition, vegetation structure modified or somewhat modified or somewha



20% any number of individuals, and possible minor signs of disturbance; $\underline{Poor} = 20 - 50\%$ native flora composition, vegetation structure modified, cover/abundance of weeds 20 - 60% any number of individuals, and disturbance incidence high; $\underline{Very Poor} = 0 - 20\%$ native flora composition, vegetation structure disappeared, cover/abundance of weeds 60 - 80% any number of individuals, and disturbance incidence very high.

⁴ Combines all mapped locations on Davidson; refer to map for locations.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
<i>Melinis repens</i> ⁴	Davidson	R	>250	Estimated Count	Very Poor to Excellent		
Olea europaea	Davidson	R	1	Exact Count	Poor		
Pennisetum setaceum ⁴	Davidson	R	>720	Estimated, Exact Count	Very Poor to Excellent		
Melinis repens	Gibson	R	Trace	Percent Cover	Very Good to Excellent		GI_IP_melrep_01
Melinis repens	Gibson	R	40	Exact Count	Very Good to Excellent		GI_IP_melrep_04
Melinis repens	Gibson	R	2	Exact Count	Very Good to Excellent		GI_IP_melrep_05
Melinis repens	Gibson	R	2	Exact Count	Very Good to Excellent		GI_IP_melrep_02
Melinis repens	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_melrep_03
Melinis repens	Gibson	R	10	Exact Count	Very Good to Excellent		GI_IP_melrep_06
Pennisetum setaceum	Gibson	R	25	Estimated Number	Very Good to Excellent		GI_IP_penset_22
Pennisetum setaceum	Gibson	R	1		Very Good to Excellent		GI_IP_penset_11
Pennisetum setaceum	Gibson	R	10		Very Good to Excellent		GI_IP_penset_03
Pennisetum setaceum	Gibson	R	1		Very Good to Excellent		GI_IP_penset_01
Pennisetum setaceum	Gibson	R	2		Very Good to Excellent		GI_IP_penset_02

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Pennisetum setaceum	Gibson	R	3		Very Good to Excellent		GI_IP_penset_12
Pennisetum setaceum	Gibson	R	10	Estimated Number	Very Good to Excellent		GI_IP_penset_19
Pennisetum setaceum	Gibson	R	2	Estimated Number	Very Good to Excellent		GI_IP_penset_21
Pennisetum setaceum	Gibson	R	50	Estimated Number	Very Good to Excellent		GI_IP_penset_20
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_13
Pennisetum setaceum	Gibson	R	2	Exact Count	Very Good to Excellent		GI_IP_penset_08
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_09
Pennisetum setaceum	Gibson	R	45	Exact Count	Very Good to Excellent		GI_IP_penset_10
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_17
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_18
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_06
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_14
Pennisetum setaceum	Gibson	R	1	Exact Count	Very Good to Excellent		GI_IP_penset_07
Pennisetum setaceum	Gibson	R	3	Estimated Number	Very Good to Excellent		GI_IP_penset_16

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Pennisetum setaceum	Gibson	R	10	Estimated Number	Very Good to Excellent		GI_IP_penset_15
Pennisetum setaceum	Gibson	R	2	Exact Count	Very Good to Excellent		GI_IP_penset_05
Pennisetum setaceum	Gibson	R	10	Exact Count	good		GI_IP_penset_04
Acacia baileyana	Kemerko	R	1	Exact Count	Very Good to Excellent		KE_IP_acabai_01
Acacia baileyana	Kemerko	R	1	Exact Count	Very Good to Excellent		KE_IP_acabai_02
Acacia baileyana	Kemerko	R	3	Exact Count	Poor		KE_IP_acabai_03
Ailanthus altissima	Kemerko	R	7	Exact Count	Poor		KE_IP_ailalt_01
Brassica tournefortii	Kemerko	R	10	Exact Count	Fair to Good		KE_IP_bratou_01
Melia azedarach	Kemerko	R	3	Exact Count	Poor		KE_IP_china_01
Melinis repens	Kemerko	R	25	Estimated Number	Fair to Good		KE_IP_melrep_01
Melinis repens	Kemerko	R	100	Estimated Number	Fair to Good		KE_IP_melrep_02
Melinis repens	Kemerko	R	30	Estimated Number	Very Good to Excellent		KE_IP_melrep_03
Melinis repens	Kemerko	R	50	Estimated Number	Very Good to Excellent		KE_IP_melrep_04
Melinis repens	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_melrep_05
Melinis repens	Kemerko	R	Trace	Percent Cover	Fair to Good		KE_IP_melrep_06
Pennisetum setaceum	Kemerko	Р	500/20	Estimated Number/Percent	Fair to Good	1.38	KE_IP_penset_09

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Cover			
Pennisetum setaceum	Kemerko	R	5		Fair to Good		KE_IP_penset_08
Pennisetum setaceum	Kemerko	R	100	Estimated Number	Fair to Good		KE_IP_penset_07
Pennisetum setaceum	Kemerko	R	60	Estimated Number	Fair to Good		KE_IP_penset_04
Pennisetum setaceum	Kemerko	R	1	Exact Count	Very Good to Excellent		KE_IP_penset_01
Pennisetum setaceum	Kemerko	R	5	Estimated Number	Very Good to Excellent		KE_IP_penset_11
Pennisetum setaceum	Kemerko	R	1	Exact Count	Fair to Good		KE_IP_penset_03
Pennisetum setaceum	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_penset_06
Pennisetum setaceum	Kemerko	R	20	Estimated Number	Fair to Good		KE_IP_penset_09
Pennisetum setaceum	Kemerko	R	1	Exact Count	Fair to Good		KE_IP_penset_02
Pennisetum setaceum	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_penset_10
Pennisetum setaceum	Kemerko	R	12	Exact Count	Fair to Good		KE_IP_penset_18
Pennisetum setaceum	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_penset_14
Pennisetum setaceum	Kemerko	R	1	Exact Count	Fair to Good		KE_IP_penset_16
Pennisetum setaceum	Kemerko	R	10	Exact Count	Fair to Good		KE_IP_penset_15
Pennisetum setaceum	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_penset_12
Pennisetum setaceum	Kemerko	R	5	Exact Count	Fair to Good		KE_IP_penset_13

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Pennisetum setaceum	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_penset_17
Pennisetum setaceum	Kemerko	R	6	Exact Count	Fair to Good		KE_IP_penset_05
Pennisetum setaceum	Kemerko	R	11	Exact Count	Fair to Good		KE_IP_penset_19
Pennisetum setaceum	Kemerko	R	9	Exact Count	Fair to Good		KE_IP_penset_20
Pennisetum setaceum	Kemerko	R	300/10	Estimated Number/Percent Cover	Fair to Good	1.62	KE_IP_penset_01
Pennisetum setaceum	Kemerko	R	325/5	Estimated Number/Percent Cover	Fair to Good	3.18	KE_IP_penset_04
Pennisetum setaceum	Kemerko	R	500/20	Estimated Number/Percent Cover	Fair to Good	1.38	KE_IP_penset_05
Schinus molle	Kemerko	R	2	Exact Count	Fair to Good		KE_IP_schmol_05
Schinus molle	Kemerko	R	1	Exact Count	Fair to Good		KE_IP_schmol_06
Schinus molle	Kemerko	R	1	Exact Count	Fair to Good		KE_IP_schmol_01
Schinus molle	Kemerko	R	4	Exact Count	Poor		KE_IP_schmol_02
Schinus molle	Kemerko	R	2	Exact Count	Poor		KE_IP_schmol_04
Schinus molle	Kemerko	R	3	Exact Count	Fair to Good		KE_IP_schmol_03
Vinca major	Kemerko	R	Trace	Percent Cover	Poor		KE_IP_vinmaj_01
Brassica tournefortii	South Crest	R	10		Very Good to Excellent		SC_IP_bratou_04
Brassica tournefortii	South Crest	R	25	Estimated	Very Good to		SC_IP_bratou_02

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
				Number	Excellent		
Brassica tournefortii	South Crest	R	10	Estimated Number	Very Good to Excellent		SC_IP_bratou_01
Brassica tournefortii	South Crest	R	50	Estimated Number	Very Good to Excellent		SC_IP_bratou_03
Brassica tournefortii	South Crest	R	5		Fair to Good		SC_IP_bratou_12
Brassica tournefortii	South Crest	R	10		Fair to Good		SC_IP_bratou_13
Brassica tournefortii	South Crest	R	10		Fair to Good		SC_IP_bratou_11
Brassica tournefortii	South Crest	R	5		Fair to Good		SC_IP_bratou_23
Brassica tournefortii	South Crest	R	60		Fair to Good		SC_IP_bratou_24
Brassica tournefortii	South Crest	R	500	Estimated Number	Fair to Good		SC_IP_bratou_21
Brassica tournefortii	South Crest	R	50	Estimated Number	Fair to Good		SC_IP_bratou_22
Brassica tournefortii	South Crest	R	300	Estimated Number	Poor		SC_IP_bratou_17
Brassica tournefortii	South Crest	R	100		Fair to Good		SC_IP_bratou_16
Brassica tournefortii	South Crest	R	10		Poor		SC_IP_bratou_14
Brassica tournefortii	South Crest	R	2		Poor		SC_IP_bratou_15
Brassica tournefortii	South Crest	R	100	Estimated Number	Very Good to Excellent		SC_IP_bratou_18
Brassica tournefortii	South Crest	R	500	Estimated Number	Very Good to Excellent		SC_IP_bratou_19

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Brassica tournefortii	South Crest	R	150	Estimated Number	Very Good to Excellent		SC_IP_bratou_20
Brassica tournefortii	South Crest	R	Trace				SC_BRTO_01
Brassica tournefortii	South Crest	R	Trace				SC_BRTO_02
Brassica tournefortii	South Crest	R	1000/2	Estimated Number/Percent Cover	Poor	0.10	SC_IP_bratou_01
Carduus pycnocephalus	South Crest	Р			Fair-Good	0.02	SC_CAPY_01
Eucalyptus sp.	South Crest	Р			Poor	0.01	SC_EUSP_01
Marrubium vulgare	South Crest	Р	1	Exact Count	Very Poor		SC_MAVU_01
Marrubium vulgare	South Crest	Р	1	Exact Count	Very Poor		SC_MAVU_02
Melinis repens	South Crest	Р			Fair-Good	0.10	SC_MERE_04
Melinis repens	South Crest	Р	1	Exact Count	Fair to Good		SC_MERE_01
Melinis repens	South Crest	Р	3	Exact Count	Fair to Good		SC_MERE_02
Melinis repens	South Crest	Р	3	Exact Count	Fair to Good		SC_MERE_03
Melinis repens	South Crest	R	1	Exact Count	Poor		SC_IP_melrep_01
Oxalis pes-caprae	South Crest	Р			Very Poor		SC_OXPE_01
Pennisetum setaceum	South Crest	Р	2	Exact Count	Very Good to Excellent		SC_PESE_01
Pennisetum setaceum	South Crest	Р	1	Exact Count	Very Good to Excellent		SC_PESE_02
Pennisetum setaceum	South Crest	Р	1	Exact Count	Very Good to Excellent		SC_PESE_03

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Pennisetum setaceum	South Crest	Р	2	Exact Count	Poor		SC_PESE_09
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_08
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_07
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_06
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_05
Pennisetum setaceum	South Crest	Р	1	Exact Count	Very Good to Excellent		SC_PESE_04
Pennisetum setaceum	South Crest	Р	3	Exact Count	Fair to Good		SC_PESE_13
Pennisetum setaceum	South Crest	Р	3	Exact Count	Fair to Good		SC_PESE_14
Pennisetum setaceum	South Crest	Р	1	Exact Count	Fair to Good		SC_PESE_16
Pennisetum setaceum	South Crest	Р	1	Exact Count	Fair to Good		SC_PESE_20
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_10
Pennisetum setaceum	South Crest	Р	1	Exact Count	Fair to Good		SC_PESE_11
Pennisetum setaceum	South Crest	Р	1	Exact Count	Fair to Good		SC_PESE_12
Pennisetum setaceum	South Crest	Р	1	Exact Count	Poor		SC_PESE_22
Pennisetum setaceum	South Crest	Р	1	Exact Count	Fair to Good		SC_PESE_23
Pennisetum setaceum	South Crest	Р	2	Exact Count	Fair to Good		SC_PESE_24
Pennisetum setaceum	South Crest	Р	3	Exact Count	Fair to Good		SC_PESE_25
Pennisetum setaceum	South Crest	Р	80	Estimated Number	Fair-Good	0.23	SC_PESE_15

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Pennisetum setaceum	South Crest	Р	16	Exact Count	Fair-Good	0.01	SC_PESE_17
Pennisetum setaceum	South Crest	Р	6	Exact Count	Fair-Good	0.00	SC_PESE_18
Pennisetum setaceum	South Crest	Р	12	Exact Count	Fair-Good	0.03	SC_PESE_19
Pennisetum setaceum	South Crest	Р	20	Exact Count	Fair-Good	0.01	SC_PESE_21
Pennisetum setaceum	South Crest	Р			Fair-Good	0.33	SC_PESE_17a
Pennisetum setaceum	South Crest	Р			Fair-Good	0.04	SC_PESE_26
Pennisetum setaceum	South Crest	R	1	Exact Count	Very Good to Excellent		SC_IP_penset_01
Pennisetum setaceum	South Crest	R	1	Exact Count	Fair to Good		SC_IP_penset_02
Schinus molle	South Crest	Р	1	Exact Count	Poor		SC_SCMO_01
Tamarix sp.	South Crest	R	1	Exact Count	Fair to Good		SC_TASP_01
Washingtonia sp.	South Crest	Р	1	Exact Count	Fair to Good		SC_WASP_01
Washingtonia sp.	South Crest	Р	3	Exact Count	Fair to Good		SC_WASP_02
Acacia baileyana	Ulrich	R	1		Fair to Good		UL_IP_acabai_02
Acacia baileyana	Ulrich	R	1		Fair to Good		UL_IP_acabai_01
Carpobrotus sp.	Ulrich	R			Poor		UL_IP_Carpob_01
Carpobrotus sp.	Ulrich	R			Poor		UL_IP_Carpob_02
Eucalyptus sp.	Ulrich	R	25/40	Estimated Number/Percent Cover	Very Good to Excellent	0.44	UL_IP_Eucsp_01
Ricinus communis	Ulrich	R	10	Exact Count	Poor		UL_IP_riccom_02

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.



Species	Preserve	Survey ¹	Count	Count Type ²	Site Quality ³	Area (acres)	Occurrence ID
Ricinus communis	Ulrich	R	10	Estimated Number	Very Good to Excellent		UL_IP_riccom_03
Ricinus communis	Ulrich	R	2	Estimated Number	Very Good to Excellent		UL_IP_riccom_01
Schinus terebinthifolius	Ulrich	R	1	Exact Number	Very Good to Excellent		UL_IP_schter_01
Washingtonia robusta	Ulrich	R	1	Exact Number	Fair to Good		UL_IP_wasrob_01
Brassica tournefortii	Odom	R	Trace	Percent Cover	Excellent		OD_IP_BRTO_01
Oxalis pes-caprae	Odom	R	Trace	Percent Cover	Excellent		OD_IP_OXPE_01
Oxalis pes-caprae	Odom	R	Trace	Percent Cover	Excellent		OD_IP_OXPE_02
Oxalis pes-caprae	Odom	R	Trace	Percent Cover	Excellent		OD_IP_OXPE_03
Pennisetum setaceum	Odom	R	50-60	Estimated Count	Excellent		OD_IP_PESE_01

Table A-2.2. Other (Non-IPSP) Invasive Plant Points and Polygons within the Greater Crestridge Ecological Reserve Complex.

¹ R = Site reconnaissance surveys (2015); P = Previous surveys (CBI 2012b).

² Exact Count = population fully counted; Estimated Number = population number estimated; Percent Cover = visual percent cover of target species collected within a survey grid.

³ <u>Very Good to Excellent</u> = 80 - 100% native flora composition, vegetation structure intact or nearly so, cover/abundance of weeds <5%, and no or minimal signs of disturbance; <u>Fair to Good</u> = 50 - 80% native flora composition, vegetation structure modified or somewhat modified, cover/abundance of weeds 5 - 20% any number of individuals, and possible minor signs of disturbance; <u>Poor</u> = 20 - 50% native flora composition, vegetation structure modified, cover/abundance of weeds 20 - 60% any number of individuals, and disturbance incidence high; <u>Very Poor</u> = 0 - 20% native flora composition, vegetation structure disappeared, cover/abundance of weeds 60 - 80% any number of individuals, and disturbance incidence very high.

⁴ Combines all mapped locations on Davidson; refer to map for locations.



Appendix A-3

Property Stewardship Attribute Data

 Table A-3.1.
 Fencing, Signage, Trash, and Erosion Issues within the Greater Crestridge Ecological Reserve Complex.

Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
South Crest	07/09/15	Fencing, Gates, Signage	32°48'21.0524"	116°53'04.9585"	Consider installing gate with step-over (horses) to allow some access but limit OHVs.	
South Crest	07/09/15	Fencing, Gates, Signage	32°48'21.5847"	116°52'59.3529"	Some erosion, well-used trail; consider closing trail or gating to limit access.	
South Crest	07/09/15	Trash	32°48'05.8119"	116°53'13.4421"	Dumping, fire ring at top of hill; CAGN; consider closing trails to OHVs.	
South Crest		Erosion			Large gully from Skeleton Flats Road down into Nolina and Dudleya habitat	
Ulrich	07/09/15	Erosion	32°48'17.5641"	116°51'44.7856"	Erosion in drainage.	SC_UL_ER_01
Ulrich	07/09/15	Erosion	32°48'13.9223"	116°51'33.6644"	Trail erosion.	
Ulrich	07/09/15	Erosion	32°48'09.8612"	116°51'22.1573"	Trail erosion.	
Ulrich	07/09/15	Erosion	32°48'08.6736"	116°51'41.6702"	Trail erosion.	



Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
Ulrich	07/09/15	Erosion	32°48'16.4005"	116°51'39.3140"	Trail erosion.	SC_UL_ER_02
Ulrich	07/09/15	Trash	32°48'08.7235"	116°51'46.6208"	Dumping at preserve boundary (from adjacent properties).	SC_UL_TR_01
Odom	03/26/17	Erosion	32°46'55"	116°52'41"	Large gully on inside berm of road.	OD_ER_01
Odom	03/26/17	Erosion	32°46'55"	116°52'31"	SDG&E-built water bar to funnel water off road, but erosion still an issue.	OD_ER_03
Odom	03/26/17	Erosion	32°46'53"	116°52'26"	Deep gully on side of road.	OD_ER_04
Odom	03/26/17	Trash	32°46'53"	116°52'27"	Old rusty car or washing machine.	OD_TR_01
Odom	03/26/17	Erosion	32°46'53"	116°52'27"	SDG&E is funneling water off road, causing gully alongside road.	
Odom	03/26/17	Erosion	32°46'57"	116°52'39"	Large gully through preserve caused by water funneling off dirt access road.	OD_ER_05
Odom	03/26/17	Erosion	32°47'1"	116°52'47"	Erosion on side of road; road will eventually erode away. Needs repair: install additional gravel and other erosion BMP control	OD_ER_06, OD_ER_07

Table A-3.1.	Fencing, Signage,	, Trash, and Erosion	Issues within the Grea	ter Crestridge Ecological l	Reserve Complex.
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Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
					measures.	
Odom	03/26/17	Erosion	32°46'58"	116°52'9"	Erosion on side of road; road will eventually wash away. Needs repair: install rock and/or other erosion BMP control measures.	OD_ER_08
Odom	03/26/17	Trash	32°46'58"	116°52'9"	Old car parts in gully; erosion.	OD_TR_02 OD_TR_03
Odom	03/26/17	Erosion	32°46'50"	116°52'35"	Roadside erosion; road could eventually wash away. Install gravel and/or other erosion BMP control measures.	OD_ER_09
Odom	03/26/17	Erosion	32°47'28"	116°52'60"	Large gully through this area to main drainage; gully due to road runoff and could wash away Nolina plants. Install erosion BMP control measures.	OD_ER_10
Odom	03/26/17	Erosion	32°47'33"	116°52'11"	Road funneling water down to major gully. Install erosion BMP control measures	OD_ER_11
Odom	03/26/17	Erosion	32°47'35"	116°52'60"	Old motorcycle track. Consider installing erosion	OD_ER_12

 Table A-3.1.
 Fencing, Signage, Trash, and Erosion Issues within the Greater Crestridge Ecological Reserve Complex.



Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
					BMP control measures or repair as part of a long-term restoration project.	
Odom	03/26/17	Erosion	32°47'48"	116°51'55"	Massive erosion on old access road; needs full restoration with soil import and grading to repair.	OD_ER_13
Odom	03/26/17	Trespass	32°47'35"	116°51'47"	Play/hangout area: tire swing, climbing, some trash, BMX track, old treehouses.	OD_TP_01
Odom	03/26/17	Erosion	32°47'57"	116°51'51"	Erosion in road.	OD_ER_14
Odom	03/26/17	Trash	32°48'50"	116°52'80"	Old water tank. Party spot; trash inside and adjacent to tank (couches, wire, cans, computer parts).	OD_TR_04 OD_TR_05 OD_TR_06
Odom	03/26/17	Erosion	32°47'29"	116°52'11"	Road erosion: gully and hills (similar to other areas).	
Odom	3/31/2017	Erosion	32°47'948"	116°52'252"	Road erosion: gullies and rills; bedrock showing in many places on this old road.	OD_ER_16
Odom	3/31/2017	Trash	32°47'890"	116°52'340"	Many water bottles.	OD_TR_07 OD_TR_08
Odom	3/31/2017	Vandalism	32°47'890"	116°52'340"	Graffiti on rocks.	see above

Table A-3.1.	Fencing, Signage,	Trash, and Erosion	Issues within the Greate	r Crestridge Ecological	Reserve Complex.
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Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
Odom	3/31/2017	Erosion	32°47'640"	116°52'205"	Old trail; rills in trail.	OD_ER_17
Odom	3/31/2017	Trespass	32°47'670"	116°52'247"	Mountain bike trail and old tire tracks on road.	
Odom	3/31/2017	Erosion	32°47'675"	116°52'118"	Mountain bike trail with deep gullies and rills.	OD_ER_18
Odom	3/31/2017	Erosion	32°47'667"	116°52'078"	Small gully from old illegal trail.	OD_ER_19
Odom	3/31/2017	Erosion	32°47'600"	116°52'193"	Old road with gullies and rills.	OD_ER_20
Odom	3/31/2017	Fencing, Signage	32°47'947"	116°51'903"	Consider moving fence to real property boundary to protect rest of property.	OD_FS_01
Odom	3/31/2017	Trespass	32°48'010"	116°52'132"	Old BMX bike jumps.	OD_TP_03
Gibson	07/06/15	Fencing, Gates, Signage	32°49'49.7009"	116°49'32.3850"	Campfire ring with blackened ash, trash; patrol, sign to indicate no fires allowed.	
Gibson	07/10/15	Erosion	32°50'11.9562"	116°50'10.3744"	Trail erosion; same location as MSP rare plant monitoring form.	SC_GI_ER_01
Gibson	07/10/15	Erosion	32°50'14.2056"	116°50'10.0981"	Trail erosion.	SC_GI_ER_02
Gibson	07/10/15	Erosion	32°50'13.6891"	116°50'07.5173"	Trail erosion.	

Table A-3.1.	Fencing, Signage,	, Trash, and Erosion	Issues within the Gre	eater Crestridge Ecological	Reserve Complex.
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Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
Gibson	07/10/15	Erosion	32°50'11.6751"	116°50'03.3597"	Trail erosion.	
Gibson	07/10/15	Erosion	32°50'07.9961"	116°49'55.2039"	Trail erosion; adjacent to Encinitas baccharis plants.	
Kemerko	09/09/15	Erosion	32°49'37.7434"	116°50'07.3883"	Erosion from highway runoff.	SC_KE_ER_01
Kemerko	09/09/15	Fencing, Gates, Signage	32°49'29.6852"	116°49'42.6788"	Encroachment (clearing) into preserve from adjacent private properties. Existing wooden stakes do not correspond with GPS property boundary (note: photo does not correspond to GPS point exactly, but shows general encroachment along southern boundary). Install signage, survey boundaries, contact homeowners.	SC_KE_FS_02
Kemerko	09/09/15	Fencing, Gates, Signage	32°49'29.4453"	116°49'43.1542"	See above.	SC_KE_FS_02
Kemerko	09/09/15	Fencing, Gates, Signage	32°49'29.5252"	116°49'46.3143"	See above.	SC_KE_FS_01
Kemerko	09/09/15	Fencing, Gates, Signage	32°49'37.7434"	116°50'07.3883"	Barrier exists but motorcycles can get around it and into preserve (tracks evident). Consider signage and stronger barrier.	SC_KE_FS_03 -04

Table A-3.1. Fencing, Signage, Trash, and Erosion Issues within the Greater Crestridge Ecological Reserve Complex.



Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
Kemerko	09/09/15	Trash	32°49'30.9206"	116°49'52.7204"	Metal and plumbing fixtures.	
Kemerko	09/09/15	Trash	32°49'31.6885"	116°49'54.9664"	Old rusted cans (historic?).	SC_KE_TR_04 -05
Kemerko	09/09/15	Trash	32°49'35.8857"	116°49'54.5362"	Rusted metal interior of old couch or foldout couch bed.	SC_KE_TR_06
Kemerko	09/09/15	Trash	32°49'35.2637"	116°49'51.8348"	Rusted metal car door.	
Kemerko	09/09/15	Trash	32°49'43.0201"	116°50'10.8300"	PVC pipe.	
Kemerko	09/09/15	Trash	32°49'38.1545"	116°50'06.4915"	Bricks, metal, glass.	
Kemerko	09/09/15	Trash	32°49'41.2157"	116°50'03.3011"	Rusted metal, part of car.	
Kemerko	09/10/15	Trash	32°49'39.4501"	116°50'04.3072"	Metal car fender.	
Kemerko	09/10/15	Trash	32°49'36.3943"	116°50'11.6508"	White upholstered chair, misc. scattered trash.	
Kemerko	09/10/15	Trash	32°49'36.4622"	116°50'11.9953"	Broken porcelain, glass bottles.	
Kemerko	09/10/15	Trash	32°49'38.6120"	116°50'10.7683"	Shopping cart.	
Kemerko	07/07/15	Erosion	32°49'42.8265"	116°50'07.9622"	Erosion issues along graded SDGE road; address with SDGE?	
Kemerko	07/07/15	Fencing, Gates, Signage	32°49'30.0451"	116°49'58.8771"	Recommend road closure from main road into preserve; road currently has a chain along main entrance, but motorcycles and other OHVs can bypass; recommend a sturdier barrier	

Table A-3.1. Fencing, Signage, Trash, and Erosion Issues within the Greater Crestridge Ecological Reserve Complex.



Preserve	Date	Management Issue	N Coordinates	W Coordinates	Notes	Photo ¹
					+ signage.	
Kemerko	07/07/15	Trash	32°49'30.4525"	116°49'55.9492"	Trash in and adjacent to gully; recommend cleanup and signing to prevent dumping.	SC_KE_TR_01 -03
Davison	4/14/17	Erosion			Road erosion; see Databasin.org and map	
Davison	4/14/17	Erosion			Road erosion; see Databasin.org and map	
Davison	4/14/17	Erosion			Road erosion; see Databasin.org and map	
Davison	4/14/17	Erosion			Road erosion; see Databasin.org and map	

Table A-3.1. Fencing, Signage, Trash, and Erosion Issues within the Greater Crestridge Ecological Reserve Complex.

¹ Management issues photos are stored at CBI and are available on request.

Appendix A-4

Update on Aseasonal Flow Surveys at Harbison Canyon, 2015-2016

Introduction

Nonnative plants and animals with associated changes to ecological processes cause threats to native plants and animals. The San Diego Management and Monitoring Program's Management Strategic Plan (MSP) identifies these threats and stressors, and presents goals and objectives for monitoring their effects. The MSP has prioritized the study of the impacts of urban aseasonal flow on local and regional stream systems.

The issue of seasonal wetlands in urbanizing landscapes has received varying amount of attention. The runoff can create a range of results from increased soil moisture levels to geomorphic changes in creeks and perennial flows in xeric landscapes. USGS is working with SDMMP and their partners in the Management Strategic Plan Area (MSPA) to determine GIS covariates of land cover/land use that might correlate with field measurements of the phenology of water presence in small watersheds. This will help to identify where urban runoff is providing habitat for aquatic nonnative problem species in areas inhabited by arroyo toads, western pond turtles and vernal pool areas.

Study Area

There are 56 aseasonal flow study sites (ASF) throughout coastal San Diego County (Figure A-4.1). The aseasonal flow monitoring sites add to the network of 64 previously established USGS surface water monitoring stations for the arroyo toad.

Sweetwater River Watershed

The Sweetwater River Watershed encompases 59,570 hectares from the coast to the Cuyamaca and Laguna mountians. In addition to riparian habitats, this long, narrow watershed contains oak and pine woodlands, grasslands, chaparral, and coastal sage scrub. There are 11 surface water monitoring sites predominately in city, county, and CDFW preserves.

Harbison Canyon (ASF-41, ASF-42, and ASF-43)

Three aseasonal flow study sites occur in the vicinity of the Greater Crestridge Ecological Reserve complex on lands owned and managed by the County of San Diego Park and Recreation Department and the Endangered Habitats Conservancy (Figure A-4.2). These conserved lands are surrounded by a low to medium density rural comunity. Predominately riparian and chaparral, these small creeks range from 40 to 60% developed.



Figure A-4.1. Stream surface water study sites, San Diego, CA.

Methods

Site Selection

The STIC placement locations were chosen in ArcGIS 10.3 using the SanGIS Conserved Lands (downloaded February 2016) database intersected with the National Hydrologic Dataset (NHD) flow line in San Diego County. The sites were chosen manually to get an equal representation of watershed sizes and the percent of urban area covering each watershed.

Following the USGS aquatic species and habitat assessment protocols for the South Coast Region (USGS 2006a, 2006b), the selected monitoring locations were mapped and placed into the USGS Stream Survey Database as predefined sites.



Figure A-4.2. USGS stream monitoring sites in the vicinity of the Greater Crestridge Ecological Reserve Complex: Harbison Canyon Tribuatry (ASF-41), Harbison Canyon (ASF 42), and Galloway Valley (ASF-43).

Visual Surveys

The predefined sites were downloaded to handheld GPS units (Trimble Juno SB, Garmin eTrex 20, or Pro GPS for iPhone). We navigated to the coordinate using GPS, preferring to get as close to the survey start point as possible. If the selected coordinate was off channel, we moved to the channel and collected a coordinate by GPS to use as the survey start point. Geotagged site photos were taken using either a Canon PowerShot D30 or Apple iPhone.

Visual surveys were conducted at all predefined ASF sites to determine presence of water and aquatic species (both native and nonnative) following USGS Stream Survey Protocols (USGS 2006a, 2006b). Data were also collected on stream morphology, riparian habitat, upland habitat, and water quality (when present). Field data, including actual survey and species coordinates, were collected into a Trimble Juno SB and uploaded to the USGS Stream Survey Database upon returning from the field.

Stream Temperature, Intermittency, and Conductivity Loggers (STICs)

Stream Temperature, Intermittency, and Conductivity loggers (STICs) are Onset Hobo Pendant temperature and light data loggers (Model UA-002-64) that have been modified to collect relative conductivity when submerged (Chapin et al. 2014). The modification, launch, deployment, and data upload were conducted according to the USGS STIC Protocol (see page A-4.15).

STICs were launched in the lab to record data at 15 minute intervals. The data collected included temperature and a relative measure of conductivity. Since the units are converted temperature and light data loggers, the recorded unit is in lumens per square foot ranging from 0 to 35,000. The value 0 represents no conductivity and high values (2,000 and higher) represent high conductivity (clear presence of water). Values in between the two extremes appear as the STIC's become exposed to air but are still moist or have water on the contacts.

Prior to deployment, the STIC number and coordinate were recorded into the Trimble Juno SB for upload to the USGS Stream Survey Database. A photo of the STIC number, serial number, and current GPS reading was also taken.

STICs were placed as close to the predefined location as possible. When the predefined location was outside of the stream channel, a new location in the stream channel adjacent to the predefined site was selected and the coordinate taken. Two STICs were deployed when uncharacteristic stream features were present, such as large bedrock pools within a typically sandy wash. This allowed for collection of surface water data characteristic of the stream system and also to test for the presence of permanent pooling water which could facilitate persistence of nonnative aquatic species within the system.

GIS Analysis

A USGS Digital Elevation Model (DEM) from the National Elevation Dataset was used to create flow direction and flow accumulation rasters using the model below (Figure A-4.3). This DEM has a horizontal spatial resolution of 10m and was created in 2013.



Figure A-4.3. GIS flow accumulation model.

Using ArcGIS and the created flow rasters, each STIC location was snapped to the stream line, using snap pour points at a distance of 250 ft. Several locations were manually snapped where 250 ft was too large of a movement. For each STIC location, a watershed was delineated and converted to a polygon. Using the SanGIS Land use layer from 2012, zonal statistics were calculated for percent urban, percent agriculture, and percent open space for each watershed. The total area of each watershed was calculated using GIS (Figure A-4.4, Table A-4.1).



Figure A-4.4. GIS landcover statistics model.
			Acres of Land Coverage for Watershed											
Site	Latitude	Longitude	RIPARIAN	CHAPARRAL	CSS	GRASS	CONIFER	MONT_HW	OAK	Other	AG	URBAN	PercUrban	Grand Total
ASF01	32.70071783330	-117.06692900000				1.60						122.68	99%	124.28
ASF02	32.58712166670	-117.01943833300		68.28	230.77	79.40				6.41		164.00	30%	548.87
ASF03	32.65768450000	-117.04455050000	1,564.50	54,573.12	15,135.36	4,419.87	1,893.09	2,597.38	3,463.26	2,622.57	2,904.26	43,333.47	33%	132,506.89
ASF04	32.6740900000	-117.00071550000	4.94	5.57	339.25	287.83				8.24	41.88	626.71	48%	1,314.42
ASF05	32.64253250000	-117.03137350000		0.60	180.78	11.47						669.77	78%	862.62
ASF06	32.63866500000	-117.02973500000		0.60	164.39	0.00				8.55		515.21	75%	688.75
ASF07	32.63775000000	-117.03901100000	0.00	1.37	455.50	11.47				8.55		1,271.57	73%	1,748.46
ASF08	32.65525000000	-117.00304050000	2.73	0.48	222.39	15.10				11.57		646.71	72%	898.99
ASF09	32.5910900000	-117.05475000000	957.99	24,800.20	22,478.19	11,194.76	2,828.21		1,036.77	1,515.81	3,601.59	16,690.05	20%	85,103.56
ASF10	32.59070450000	-117.04156550000	895.20	24,744.19	22,252.65	10,930.15	2,828.21		1,036.77	1,471.44	3,154.57	14,317.02	18%	81,630.19
ASF11	32.59100500000	-117.06692200000	1,001.99	24,810.15	22,507.78	11,194.82	2,828.37		1,037.18	1,545.85	3,602.36	19,313.01	22%	87,841.51
ASF13	32.61848500000	-116.94392350000	15.42	158.47	491.44	140.17				11.99	557.97	1,603.06	54%	2,978.51
ASF14	32.60798100000	-116.94555133300	21.70	159.02	726.25	150.02				12.49	557.63	1,602.83	50%	3,229.94
ASF15	32.71190800000	-117.07208800000			13.51	0.57				1.14	0.36	3,127.58	100%	3,143.16
ASF16	32.71925100000	-117.08081450000			103.16	17.64				15.67		1,753.19	93%	1,889.66
ASF17	32.73445000000	-117.08956900000	7.72	0.42	49.91	8.49				0.21		2,839.28	98%	2,906.03
ASF18	32.77647500000	-117.18585266700	79.70	151.45	502.68	50.09			70.73	66.36		4,768.78	84%	5,689.79
ASF19	32.83910500000	-117.22371800000	252.74	3,795.85	1,628.87	762.62			124.80	109.82		5,099.50	43%	11,774.19
ASF20	32.84631700000	-117.23401200000	90.42	1,252.67	1,379.02	684.57			6.48	80.74		5,551.73	61%	9,045.63
ASF21	32.90616750000	-117.20263150000	83.15	274.75	239.77	150.02				36.56		1,883.48	71%	2,667.74
ASF22	32.96829650000	-117.22526250000	36.96	429.23	59.21	24.02			2.44	10.50	314.25	461.29	34%	1,337.89
ASF23	32.99927733330	-117.09929833300	3.59	33.30	198.09	7.11				5.13		841.83	77%	1,089.06
ASF24	33.00503500000	-117.14900433300	66.55	574.79	698.43	1,122.70				49.69	291.16	1,962.25	41%	4,765.57
ASF25	33.08567600000	-117.26967600000	206.27	444.38	388.21	225.88	0.61		0.03	34.21	30.68	3,273.27	71%	4,603.52
ASF27	33.17256650000	-117.27756900000	39.93	94.59	24.00	48.78			1.44	0.61	125.50	1,741.08	84%	2,075.91
ASF28	33.24519050000	-117.25795250000	17.66		27.60	29.69			6.98		176.25	730.69	74%	988.86
ASF29	33.26560650000	-117.23595050000	5,358.54	115,109.72	22,406.73	22,126.58	1,861.59	23,403.71	14,657.62	11,152.39	54,542.60	60,971.51	18%	331,590.99
ASF30	33.26937600000	-117.30651150000	338.20		4,131.18	411.15			45.70	1,021.69	383.75	1,595.26	20%	7,926.93
ASF31	33.09890000000	-117.12938350000	131.09	7,659.19	1,041.18	286.06			1,928.65	783.78	3,158.23	16,297.25	52%	31,285.43
ASF33	33.16826150000	-117.04802850000	34.38	890.82	50.36	103.36			399.50	67.13	160.11	113.42	6%	1,819.08
ASF36	32.93460750000	-116.93892500000		693.38	475.66	2.63			8.11	18.52	1.49		0%	1,199.79
ASF37	32.89912400000	-117.17314850000	21.82	47.95	15.49	0.45			10.01	26.93		1,048.60	90%	1,161.24
ASF38	33.28922650000	-117.09912500000	189.99	404.46	576.61	337.37			12.91	15.61	4,851.45	3,254.56	34%	9,642.96
ASF39	33.03433800000	-116.94638550000	1.14	391.86	100.00	/2.31			6.61	96.60	89.06	853.14	56%	1,510.73
ASF40	33.01/14/00000	-116.99836200000	8.27	458.83	188.22	0.02			66.54	257.40	596.25	685.81	30%	2,261.33
ASF41	32.82595966670	-116.83584066700	0.38	155.68	43.10	0.83			5.81	2.02	42.22	270.96	5/%	476.77
ASF42	32.82342100000	-116.82658933300	21.24	907.90	136.99	17.94			28.00	3.83	12.33	774.57	41%	1,902.80
ASF43	32.83353750000	-110.81838325000	10.09	1 057 54	52.51	17.94			02.84	3.83	12.04	1 066 24	38%	1,398.20
A3F44	32.74925550000	-110.85455000000		1,057.54	3.04	49.24	200 04		92.64	576.05	12.04	1,000.24	40%	2,000.55
A3F45 ASE47	22.05690400070	-116.70506050000	56.28	4 020 02	278.04	27 70	209.94		245 12	126.08	115 52	2 126 16	28%	7 512 04
ASE 47	22 50167800000	-116.00478250000	1 26	4,030.92	220.62	646.24			243.12	430.08	250.05	2,120.10	18%	1 542 20
ASE50	22.11162266670	-110.33478230000	1.20	161 669 04	56 979 99	21 721 20	182.10	5 192 60	0 507 78	17 680 56	20 200 26	78 204 02	20%	295 991 16
ASI 50 ASE51	22 /2070750000	-117.23728500700	4,554.25	224 54	30,828.88	21,731.29	402.45	3,183.00	3,337.78	1/,089.30	29,309.30	78,394.93	20%	303,881.10
A3F51 ASE52	33.43979750000	-117.37772000000	54.36	534.54	8 30	117.88			25.68	149.09	17/ 11	6 351 55	87%	7 290 95
ASE53	33.10303900000	-117 17181650000	5 29	162 20	130 66	117.00			23.00	10.45	174.11	6/ 70	15%	1,290.95
ASI 55 ASE54	22 2006150000	-117.17181050000	10.09	528.62	5.62	/19 11			24.02	19.46	120.02	1 051 12	72%	2 706 97
ASE55	32 701/18500000	-116 86128800000	14 04	719 50	185.65	40.11			7 24.32	10.40	183.05	1 /08 /0	55%	2,700.97
ASE57	32.70144750000	-116 81873850000	11 21	715.55	257 8/	13.07			/.21 //7 38	16 50	45 55	2/19 27		2,505.07
ASE58	32 6895520000	-116 913031350000	10 5/	Fa7 na	1 /67 01	275 71			2 /17	<u>10.50</u> ΔΩ 1Λ	1 2/	287 16	41/0	2,007.00
ASE59	32 54660066670	-117 0080/822200	10.34	15/ 90	507.07	505 79			5.42	40.14	228 04	537.40	1370 75%	2,003.02
ASE60	32 91231750000	-117 20594655500	608 73	7 886 21 A 886 21	6 541 79	1 417 76			25 57	2 በ//ጸ 1ዩ	<u></u> <u></u> <u></u>	18 592 72	23% 5 <u>/</u> %	34 544 64
ASE61	32.51251750000	-116 9140460000	10 5/	697 20	1 501 87	280 60			3 40	2,040.10 <u>/</u> 0.11	1 3/	288 12	12%	2 973 28
ASE62	32,5909140000	-117.05224400000	10.34	057.50	17 02	0.46			5.40	7 93	1.54	851.65	97%	877.06
ASF63	32.59183400000	-117.06676150000	1,001.99	24,810.15	22,507.78	11,194.82	2,828.37		1,037.18	1,545.85	3,602.36	19,313.01	22%	87,841.51

Table A-4.1. La	nd cover per watershed	for each of the Urban A	Aseasonal Flow study	y sites with p	percent urban cover and	total watershed size.
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¹ ASFs 41-43 are in the vicinity of the Greater Crestridge Ecological Reserve Complex.

Results

Refer to Figure A-4.5 for a summary of flow intermittency data for the Harbison Canyon Study area, which includes sites in the vicinity of the Greater Crestridge Ecological Reserve complex. Harbison Canyon (ASF-42) data recorded the most consecutive days with surface water, followed by the Harbison Canyon Tributary (ASF-41). Galloway Valley (ASF-43) had the fewest recorded days with surface water, however, the start was also set at a later date.

Refer to Figure A-4.6 for Stream Temperature and Relative Conductivity Data at the Harbison Canyon Tributary (ASF-41) and Figure A-4-7a,b for photos of habitat in this tributary on 26 January 2016 and 27 July 2016, respectively.

Refer to Figure A-4.8 for Stream Temperature and Relative Conductivity Data at Harbison Canyon (ASF-42) and Figure A-4.9a,b for photos of habitat in Harbison Canyon on 17 February 2016 and (b) 25 August 2016. Aquatic species observed at this site include crayfish (*Procambarus clarkii*).

Refer to Figure A-4.10 for Stream Temperature and Relative Conductivity Data at Galloway Valley (ASF-42) and Figure A-4.11a,b for photos of habitat in Galloway Valley on 4 December 2015 and (b) 27 July 2016.



Figure A-4.5. Flow Intermittency Data Summary at Harbison Canyon Study Area. Days with surface water at Harbison Canyon Tributary, Harbison Canyon, and Galloway Valley sites between the months of December 2015 and July 2016 are indicated in this graph. Days with recorded values indicating the presence of surface water, are shown by the corresponding green, blue, and red marks; dry days are indicated by no mark. The deployment dates are indicated by the black asterisks



Figure A-4.6. Relative Conductivity and Stream Temperature Graph of Harbison Canyon Tributary (ASF 41).



Figure A-4.7. Habitat in Harbison Canyon Tributary (ASF 41): (a) 26 January 2016 and (b) 27 July 2016.



Figure A-4.8. Relative Conductivity and Stream Temperature Graph of Harbison Canyon (ASF 42).



Figure A-4.9. Habitat in Harbison Canyon (ASF 42): (a) 17 February 2016 and (b) 25 August 2016.



Figure A-4.10. Relative Conductivity and Stream Temperature Graph of Galloway Valley (ASF 43).





Figure A-4.11. Habitat in Galloway Valley (ASF 43): (a) 4 December 2015 and (b) 27 July 2016.

Stream Temperature, Intermittency, and Conductivity Logger (STIC) Protocol

How to make a STIC:

Equipment: Onset Hobo Pendant waterproof temperature and light data logger (Model UA-002-64) 100mm 24 gauge male-male jumper wires with chrome plated brass machine pin heads (Digikey #438-1074-ND) Marine epoxy (slow set) Silicon grease

Tools:

Jeweler's Philips screwdriver Jeweler's flat tip screwdriver Drill 0.65mm drill bit Soldering iron with small tip Solder Small pliers Alligator clip Electrical tape Vise Piece of rubber (cut piece of bicycle inter tube)

<u>Data Logger Modification:</u> Remove cap off data logger by removing the two screws and save for reassembly.

Drill two 0.65 mm holes through cap. Place the holes on opposite sides and as far apart as possible.

Place the 24 gauge male-male jumper wires into the holes so that the tips are completely inserted and protruding on the outside of the cap. Pliers may be needed.

Carefully bend the wires (bending them too quickly can break them off).









Apply marine epoxy inside the cap, just enough to seal the holes and create a water tight fit. Do not fill epoxy to top of cap. Allow to dry overnight.



Remove the circuit board from the plastic housing. Remove the desiccant bags and save for reassembly. Remove the battery from the circuit board. Keep the batteries individually separated. Do not stack the batteries as this will cause them to discharge.

Place the circuit board gently in the vise with the light sensor facing up, using the rubber strip as padding.





Once the soldering iron is hot, place the iron in one hand and the jeweler's flat tip screw driver in the other. Place the tip of the iron on one side of the light sensor for about 2-4 seconds. Then use the screw driver to pry up the sensor once the solder begins to melt. This will take some practice. Don't let the iron burn the board by leaving it in contact for more than 20-30 seconds. Make sure that the entire sensor is removed not just the top layer peeled off. Once the sensor is properly removed, you should see two metal contacts that were connecting the light sensor to the board.



With the marine epoxy dry, cut the wire loop into two separate wires. Then you will need to cut each wire to the appropriate length so that when the logger is put together, the wires are long enough to reach over the board but not so long that they impede the cap from sealing properly. If you have one to use as an example it will help. Once the wires are cut to the correct length, splice approximately 2 mm of the insulation off. A 24 gauge wire splicer works well.



Using an alligator clip that has been insulated with electrical tape, hold one of the wires in place on one of the contacts. Place the alligator clip as far away from the contact as possible. If the clip is close, the heat from the soldering iron will melt the wire insulation. Place the hot soldering iron so that it is in contact with both the wire and the contact. It will take a few seconds to heat to the correct temperature that will allow the solder to be melted onto the connection. You should only use about a 3 mm of solder for each connection. Solder both wires to the separate contacts.



The data logger is now ready to be reassembled. Flatten out the desiccant bag and slide one into each plastic housing on the same side as the battery, opposite side from the slot that the circuit board slides into. Label, with a Sharpie, the identifying number on the housing for the battery. Replace the battery, then slide the circuit board into the housing.



Apply a thin layer of silicon grease to the rubber O-ring on the cap. Firmly press the cap into the plastic housing and replace the two set screws. The data logger has now been transformed into a STIC.





Housing Construction: Equipment: 3/4" PVC unions

Tools: Saw (band saw works well) Drill & drill bit

<u>Housing Construction:</u> Remove the rubber gaskets under each threaded cap. Cross cut the PVC union in half.



Drill a hole slightly larger than the cable that will be used to mount the STIC, through both sides of the PVC. The hole should be drilled on the opposite side of the threaded cap approximately $\frac{1}{4}$ " from the end. A drill press works great for this.

The STIC should fit inside the PVC but not be able to be pushed through it. Then screw the cap on.







How to install the STIC:

Equipment:

STIC's - Hobo Pendant Temp/Light, 64K – retrofitted **HOBOware** Pro software Copper cable (green coat vinyl 1/16") Crimper tool and crimps (ferrule 3/32") 3 foot and 2 foot steel anchored stakes w/holes drilled (square ones from Home Depot, round ones for rocky areas only at Lowe's) Mallet/sledge hammer Conductance meter (to be taken at each installation & reading) Thermometer (to be taken at each installation & reading) Orange spray paint Camera GPS **PDA** Fiberglass window screen (precut into squares) PVC protective casing (3/4 " pipe coupler cut in half, make sure it fits STIC, holes drilled in bottom for cable) Flagging Sharpie Cable cutters Launch STIC (at the office): Open HOBOware Pro software and launch STIC using the USB Optic Base Station by selecting "Device". In HOBOware you may get a warning that the loggers power has been reset, press OK. Label data logger with SiteNameLoggerNumber_SerialNumber. e. g. CPEND01_1234567 (the serial number is the number already in the description). Log every 30 minutes. Start Logging. Now (if you are heading out soon). On Date/Time (if you know when you will be putting out the logger, you can always just put in a

time early in the morning of the day you will be putting out the logger). Press Start/Delayed Start.

Field Placement:

STIC will be placed at beginning of each permanent block site or at designated locations.

Take picture of STIC number and serial number.

Take picture of GPS with waypoint name and coordinates visible.

Label waypoint as Reach STIC (number).

Place in thalweg – below larger boulder if one is present.

Hammer in stakes until only top hole is left out of ground, try to keep hole pointing upstream.

If stream bed is sandy use 3 foot rectangular stake.

If stream bed is rocky try the 2 foot rectangular stake.

If stream bed is really rocky use round 2 foot stake from Lowe's.

If stream bed is not stable, wrap cable around a tree or other solid object. Make cable long enough to place STIC in thalweg.

If no trees are present, place stake on bank and thread in cable long enough to reach thalweg. Note anchor type in Notes field of PDA.

Spray paint top of stake orange.

Put cable through holes in PVC.

Insert STIC into PVC with screen on bottom. Screw on top of PVC with screen over top of STIC.





Run cable through hole in stake.

Use crimp to attach both sides of cable fairly tightly to stake. Make sure that the STIC is on the downstream side of the stake.

Secure crimp with crimper tool.

Mark where it is placed for future data downloading (e.g. pictures all around site (upstream, downstream, left and right), flagging at edges of stream channel, pick a place that is memorable). Place flagging on either side of the creek, preferably on tall vegetation that is not in flood zone. PDA

Use Stream Survey form to fill out site and block.

Take a temperature and conductance reading at each installation and download. Record under Water data field. Note if there is no water present.

Click "show all" to get the "TemperatureLogg" data field.

Logger type should be filled out as STIC.

Put in Logger number.

Fill in Latitude and Longitude.

In the Notes field write down any relevant information about placement to make it easier to find (e.g. which side of the stream STIC was placed, a major landmark, etc.).



Field Data Download:

Follow the same steps as outlined in (14) above.

If site has changed a lot, take another picture and add in Notes field of PDA.

Take temperature and conductance if there is water, make note if dry.

When checking STIC's bring screen to replace.

Remove the STIC from the PVC housing. A wrench may be needed in order to unscrew the cap. Data download

a. Use HOBO waterproof shuttle with COUPLER2-A to download data. Place STIC into coupler and press lever towards the shuttled. The yellow "Transfer" light should begin to flash. Once the download is complete, the green "OK" light will illuminate. The shuttle is capable of holding multiple downloads.

References

Chapin, T.P., A.S. Todd, and M.P. Zeigler. 2014. Robust, low-cost data loggers for stream temperature, flow intermittency, and relative conductivity monitoring, Water Resources Research 50, 6542–6548, doi:10.1002/2013WR015158.



Appendix A-5 Threats Worksheet

Main Threat ¹	Threat Subcategory			Pre	eserve	es^2			Fuidence
Iviani Tineat	Threat Subcategory	SC	MI	UL	OD	GI	KE	DA	Evidence
	Crops/Orchards				X				Remnants of old orchard (nonnative trees) on Odom, as determined through aerial imagery, reconnaissance surveys
Agriculture	Grazing (current)								No evidence of grazing, as determined through aerial imagery, reconnaissance surveys, land manager interview
	Grazing (historic)								See above
	Logging								See above
Altered Fire	Frequent Fires	Х	Х		Х				CalFire (2014), reconnaissance surveys
Regime	Fire Suppression								No evidence
	Flood Control								No evidence
	Groundwater Pumping								No evidence
Altarad	Hydrological Alteration	Х		Х	Х				Urban runoff into drainages
Hydrology	Inundation								No evidence
nyurology	Water Diversion								No evidence
	Waterway Channelization								No evidence
Border Patrol Activities	Vehicle Impacts								Not in Border Patrol activity area
Competition	Native Species								No evidence
Climate Change									Regional impact; presumed to impact all preserves
Energy	Pipelines								No visible pipelines or pipeline easements
Energy	Powerlines	Х			Χ		Χ		Transmission towers, spur roads



Appendix A-5 Threats Worksheet

Main Threat ¹	Throat Subcatagory			Pr	eserv	es^2			Evidence
	Threat Subcategory	SC	MI	UL	OD	GI	KE	DA	Evidence
	Substations								No facilities
	Wind Facilities								No facilities or structures
Erosion	Roads and trails	Х	Х	Х	Х	Х	Х	Х	Evident on erodible soils
Genetics	Small Population(s)	Х			Х				Possibly San Diego thornmint
Consequences (MSP Species)	Isolated Population(s)	Х			Х	Х		Х	Possibly San Diego thornmint, Encinitas baccharis
	Hybridization					X	X	X	Possible hybrids between <i>C. cyaneus</i> and <i>leucodermis</i> have been noted in literature (e.g., Fross and Wilken 2006); however, no visible evidence of hybridization observed to date within GCER complex.
Herbivory and Predation		X			X				Dehesa nolina flower, fruit herbivory (deer, woodrats, insects)
Horticultural Collecting									No evidence
	Dumping/Trash	Х		Х	Х	Х	Х		Mapped during reconnaissance surveys
	Illegal Encampments								No evidence
Human Haa of	Off-road Vehicles	Х	Х		Х		Х		Direct observation, tracks
Dreserve	Recreation	Х	Х	Х	Х	Х		Х	Direct observation, tracks, fire pits
	Shooting								Not observed
	Trail Use	Х	Х	Х	Х	Х	Х	Х	Trails evident
	Trampling	Х			Х				No evidence, but potential threat
Invasive	Aquatic Species								Not detected within GCER complex



Appendix A-5

Threats Worksheet

Main Throat ¹	Threat Subastagory			Pr	eserve	es^2			Evidence
	Threat Subcategory	SC	MI	UL	OD	GI	KE	DA	Evidence
Animal Species	Argentine Ants	Х		Х	Х		Х		Detected
	Brown-headed Cowbird								Not detected
	Feral Pigs	Х							Evidence detected in 2012; eradicated in county
	Gold-spotted Oak Borer								Detected in vicinity (Crestridge Ecological Reserve)
	Polyphagous/Kuroshio Shot-hole Borer								Recorded from adjacent Sycuan Golf Course
Invasive Plant	Level 1 Invasive Plants								Not detected
Species	Level 2 Invasive Plants								Not detected
	Level 3 Invasive Plants	x		x	x	x	x	x	Mapped during 2011-2012 invasive plant surveys
									and reconnaissance surveys
	Level 4 Invasive Plants	Х	Х		Х	Х	Х		Mapped during 2011-2012 invasive plant surveys
									and reconnaissance surveys
	Level 5 Invasive Plants	Х		Х	Х	Х		Х	Mapped during 2011-2012 invasive plant surveys
									Monned during 2011 2012 investive plant surveys
	Uncategorized Species	Х		Х	Х	Х	Х		and reconnaissance surveys
	Roads	Х			Х		Х		Dehesa Road, Harbison Canyon Road
Loss of Connectivity	Development	X			X				Rural residential development adjacent to most preserves, but densest next to South Crest and Ulrich; additional development proposed adjacent to South Crest
Military	Training Activities								No military activities in vicinity
Activities	Vehicle Impacts								No military activities in vicinity



Appendix A-5

Threats Worksheet

Main Threat ¹	Threat Subcategory			Pro	eserve	es^2			Fyidence
Main Theat	Threat Subcategory	SC	MI	UL	OD	GI	KE	DA	Lvidence
Mining	Gravel								Not within GCER complex
	Sand								Not within GCER complex; Sloan Canyon sand mining/pit occurs within Sweetwater River, south of South Crest Preserve (Mineral Resources Data System spatial dataset)
	Other	Х							Record of unknown operation type (stone resources) on South Crest and surface mine (iron) adjacent to Gibson Preserve (Mineral Resources Data System spatial dataset)
Parasitism and Disease	(Specify if Detected)								No evidence
Pesticides, Rodenticides, and Herbicides	(Specify if Detected)	X							No evidence; herbicide used in South Crest Preserve restoration area and to treat invasive plants
	Construction								No new construction
Roads	Maintenance	X			X	Х	Х		Road maintenance for emergency egress and utility service
	Widening								No evidence
Urban	Artificial Lighting						X		Possible along southern boundary of Kemerko Preserve; however, rural residential
Development	Edge Effects	X		X	X	X	X	X	Vegetation clearing, dumping, encroachment, Argentine ants
	Nitrogen Deposition	Х	Χ	Χ	Χ	Χ	Χ	Χ	Regional impact; moderate levels per nitrogen



Appendix A-5 **Threats Worksheet**

Main Threat ¹	Threat Subcategory			Pre	eserve	es^2			Evidence
Iviani Tineat		SC	MI	UL	OD	GI	KE	DA	Evidence
									deposition model (Tonnesen et al. 2002)
	Pollution	X	X	X	X	Х	X	X	Regional impact; unknown but inferred to be moderate based on nitrogen deposition levels

¹ All threats are preserve-level unless otherwise indicated. Regional threats are not addressed directly in Framework Resource Management Plan. ² Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom, GI = Gibson, KE = Kemerko, DA = Davison.

Appendix B

Land Use History and Physical Characteristics



Appendix B

Land Use History and Physical Characteristics

Appendix B presents results of the background review and literature search for the Greater Crestridge Ecological Reserve Complex (complex) Framework Management Plan (F-RMP), and incorporates information from reconnaissance and rapid assessment surveys (detailed in Appendix A) and land manager interviews, as appropriate.

The complex currently includes 1,699 acres of conserved lands, including seven preserves owned and managed by the Endangered Habitats Conservancy (EHC): South Crest, Michelsen, Ulrich, and Odom south of the community of Crest (South, 1,275 ac) and Gibson, Kemerko, and Davison on Harbison Ridge east of the community of Crest (East, 424 ac) (Figure B-1). The two areas that currently comprise this complex – South and East – are disjunct from one another and differ somewhat in land use, fire history, topography, and soils.

Onsite Land Uses

Previous Land Uses

The majority of the complex is relatively intact and mostly unaffected by previous uses. Exceptions include Skeleton Flats (the relatively flat, center portion of South Crest) and surrounding areas on South Crest and Odom, the northwest corner of Odom, and a series of dirt roads on Ulrich, Gibson, Kemerko, and Davison. Refer to Table B-1 for land use history within or adjacent to the complex.

Off-road vehicle (OHV) recreationalists used Skelton Flats historically and evidence of this use is still visible in the form of dirt roads and trails. Heavy OHV use no longer occurs on these roads and trails as gates and heavy erosion now prevent most access, but motorcyclists and OHV users occasionally trespass in and near this area. Most of South Crest was part of the proposed Singing Hills Estates residential development (REC Consultants, Inc. 2004) prior to EHC acquisition and conservation. Likewise, the Odom Preserve was included in the Singing Hills property boundary (REC Consultants, Inc. 2005). On Odom, there is evidence of agriculture (e.g., orchards) dating to at least the early 1950s and OHV use from the 1960s.





Figure B-1. Greater Crestridge Ecological Reserve Complex Preserves.

Current Land Uses

Conserved open space is the primary current land use, and management of conserved resources is the primary activity within the complex, as addressed in the next section. Additional land uses include recreation, utility maintenance/access, and maintenance and use of roads for emergency egress.

Although public use of the complex is not encouraged, the public uses South Crest and Odom for hiking, dog walking, mountain biking, and horseback riding. Much of this use may come from the community of Crest, which has a history of accessing these lands for recreational uses. Access is primarily via the main north-south dirt access road; usage of other historic roads and trails is uncommon. Likewise, public use on Ulrich – presumably largely from adjacent property



Table B-1. Land Use History within or adjacent to the Greater Crestridge Ecological Reserve Complex.

Land Use ¹		Sou	$th^{2,3}$			East ^{2,3}	
Land Use	SC	MI	UL	OD	GI	KE	DA
Agriculture				1953 ³			
Powerlines				pre-1994		1981	
Dirt Roads	1953	1971- 1981	1953 ³	1953 ³	1980s	1981	1953 ³
Off-highway Vehicles	1970s			1966		1994	ca. 1996
Vegetation Clearing ⁴			1994- 1996	1953 ³			ca. 1996
Rural Residential (adjacent) ⁵	1953 ³	1960s	1953 ³	1953 ³	1996- 2002	1953 ³	ca. 1996

¹ Land use history in table was determined primarily through aerial imagery.

² South Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East Preserves: GI = Gibson, KE = Kemerko, DA = Davison.

³ Date indicates when activity was first noted on aerial imagery. Because aerial imagery was available only back to 1953 and the aerial image record is not complete, activity may have preceded date noted. A date range indicates that the activity first occurred sometime within the range. Aerial imagery was reviewed from the following years: 1953, 1966, 1968, 1971, 1981, 1989, 1994, 1996, 2002, 2003, 2005, 2009, 2010, and 2012.

⁴ Large-scale vegetation clearing, possibly for a fuel break or utility.

⁵ According to historical accounts, the first residences adjacent to the Ulrich property were established in the mid-1920s (Crest Historical Society 2015).

During the mid-1990's, native vegetation was cleared on large portions of the Ulrich preserve, possibly for fuel break or utility construction purposes.

owners – includes hiking, biking, dog walking, and horseback riding. Public use of Ulrich appears to be less common than on South Crest. There are few roads on Michelsen, and we observed no use of this preserve during the site reconnaissance. On the East preserves, Gibson and Davison receive very little public use, although we did see evidence of hiking and biking (i.e., tracks) and several old fire pits. We observed evidence of OHV use, hiking, and biking on Kemerko, but as with Ulrich, these uses appear uncommon.

San Diego Gas and Electric (SDG&E) has powerlines on Odom (adjacent to South Crest). They maintain a dirt road to their facilities and beyond to the southern edge of Skeleton Flats. This dirt road, which is an extension of Sycuan Summit Drive, is the main entrance into the south preserves from Dehesa Road. In addition, SDG&E has a utility access/maintenance easement on the Kemerko preserve for access road and powerline infrastructure maintenance.

The California Department of Forestry and Fire Protection (CalFire) maintains Suncrest Boulevard through South Crest as emergency egress for the community of Crest in case of fire.

Management History

Preserves within the complex contribute to regional and Management Unit 3 goals and objectives by maintaining connectivity with conserved lands north and south of the complex, and protecting MSP species (see Appendix A). EHC and partners manage and monitor resources in accordance with MSP protocols (where available) and provide access to preserve lands for biologists and others engaged in conservation-related research. Refer to Table B-2 for a history of management actions within the complex.

Management		Sout	$h^{1,2}$			East ^{1,2}	
Action	SC	MI	UL	OD	GI	KE	DA
Erosion Control	Х						
Fencing, Gates, Signage	Х			Х		Х	
Habitat Restoration	Х			Х			
Invasives Control	Х			Х	Х		
Preserve Enforcement	Х	Х		Х	Х	Х	Х
Species Management and Monitoring	Х			Х			Х
Trail Maintenance, Realignment, or Closure	Х			Х			
Trash Removal	Х			X		Х	

Table B-2. Management History of the Greater Crestridge Ecological Reserve Complex.

¹ South preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East preserves: GI = Gibson, KE = Kemerko, DA = Davison.

 2 X = management action implemented (action may be completed or ongoing); --- = no management action implemented to date.

Preserves retain the name of the previous landowner, with the exception of South Crest. EHC first acquired properties within the complex in 2007, and acquisition is ongoing. Management activities begin after purchase, and most management to-date has occurred on South Crest.

EHC has managed South Crest since 2010, with assistance from the Conservation Biology Institute (CBI) (Table B-2). CBI obtained grant funding from the San Diego Association of Government (SANDAG) Environmental Mitigation Program (EMP) for the following management actions on South Crest (Skeleton Flats and surrounding areas):



EMP Grant 5001586 (2011-2012))

- Installed fencing and signage (including interpretive signs)
- Mapped sensitive and invasive plants

EMP Grant 5001965 (2012-2014)

- Initiated *Brachypodium* control (Phase I)
- Restored native grassland and scrub restoration
- Installed erosion control devices

EMP Grant 5001763 (2013-2016)

- Mapped Dehesa nolina (*Nolina interrata*) and variegated dudleya (*Dudleya variegata*)
- Collected Dehesa nolina and variegated dudleya seed
- Propagated Dehesa nolina and variegated dudleya from seed collected onsite
- Outplanted nursery-grown Dehesa nolina and variegated dudleya plants
- Developed a range-wide Dehesa nolina Conservation Vision and Management Strategy

EMP Grant 5004735 (2015-2017)

- Continued *Brachypodium* control (Phase II)
- Assessed *Brachypodium* monitoring methods

EHC assisted with several of the tasks referenced above. The Earth Discovery Institute (EDI) prepared and installed interpretive signs on South Crest, and collected seed for restoration as part of these grant agreements.

CBI and EHC also removed invasive species in occupied San Diego thornmint (*Acanthomintha ilicifolia*) (2012-2017), variegated dudleya (*Dudleya variegata*) (2016-2017), and Dehesa nolina (*Nolina interrata*) (2016-2017) habitat outside the *Brachypodium* restoration areas.

EHC preserve managers patrol South Crest, collect trash, repair fences and signs, identify unauthorized access and install access control measures, initiate public contact, and treat invasives. EHC, CBI, and EDI conduct public outreach/education and scientific research on South Crest through guided nature hikes, volunteer events, and targeted research projects.

EHC also conducts patrol events (preserve enforcement) on other preserves within the complex to assess preserve integrity, identify unauthorized access, and make public contact when necessary (Table B-2). EHC cleared some trash from Kemerko upon acquisition (including



some internal fencing on Kemerko). CBI hand-pulled the invasive plant, stinkwort (*Dittrichia graveolens*) along trails on Gibson in 2015.

CBI and EHC mapped MSP plants on Odom, Michelsen, Gibson, Kemerko, and Davison from 2014-2017 (CBI 2014, 2015a,b, 2016, CBI et al. 2017). CBI and EHC monitor MSP plants on South Crest, Odom, and Gibson annually or according to regional monitoring schedules. MSP species mapped and/or monitored within the complex include San Diego thornmint, Encinitas baccharis (*Baccharis vanessae*), Lakeside ceanothus (*Ceanothus cyaneus*), Dehesa nolina, and variegated dudleya.

Existing Facilities and Fencing, Gates, and Signage

No permanent facilities are within the complex at this time. An above-ground, transportable water storage tank on South Crest provides water to irrigate transplanted Dehesa nolina plants. A damaged, historic wildlife guzzler on South Crest no longer holds water. This guzzler does not pose a safety threat and there are no plans to remove it at this time.

Fencing occurs on South Crest, Ulrich, Odom, Gibson, Kemerko, and Davison. In some cases, fencing is not adequate to prevent unauthorized uses. On South Crest, fencing protects restoration sites from OHV and recreational impacts on Skeleton Flats. Fencing controls access between private properties and the western Ulrich boundary, and at the northeastern and southwestern Odom boundaries. Fencing along the northern Gibson boundary delineates private lands from preserve lands. Fencing controls access to Kemerko along the southern boundary, adjacent to private property, and along Mountain View Road.

Gates are located on the South Crest, Odom, Kemerko, Gibson, and Davison preserves. As with fencing, the number of gates is insufficient and does not prevent unauthorized uses within the complex. Gates are located along the southern Odom boundary and western and one northern entrance to South Crest. The other northern South Crest entrance is not gated at this time and OHV access is possible via this route. Several gates on the northern Gibson boundary prevent entry to this preserve. On Kemerko, one gate along Mountain View Road and another gate just west of the property along a SDG&E access road prevent entry to the preserve.

Currently, signage is located on South Crest in the vicinity of Skeleton Flats, and on South Crest and Odom in several strategic locations along the main north-south access road. The signs in the Skeleton Flats area discuss the restoration project and indicate that OHV use is not permitted. Several other signs are installed in front of historic roads or trails that are not open for public use. There are no signs on the Michelsen, Ulrich, Gibson, Kemerko, or Davison preserves.

Adjacent Land Uses and Parcelization

Adjacent Land Uses

The complex includes three disjunct areas (South Crest-Michelsen-Odom, Ulrich, and Gibson-Kemerko-Davison) separated by private undeveloped land, rural residential development, and public conserved open space. Conservation easements occur on private lands adjacent to South Crest, Michelsen, Ulrich, and Odom. Rural residential development, including the communities of Crest and Harbison Canyon, is adjacent to the complex (Figures B-2a,b).

Adjacent conserved lands are owned and managed by the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and County of San Diego (Figure B-3), and include San Diego National Wildlife Refuge (NWR) lands adjacent to South Crest and Odom, CDFW properties adjacent to South Crest, the Crestridge Ecological Reserve (CER) north of South Crest and Davison, and the Stoneridge Preserve adjacent to Kemerko.

Parcelization

All preserves within the complex except for Michelsen and Gibson consist of multiple parcels (Table B-3). In some cases, parcels within a preserve were acquired by EHC at various times. Refer to Figures B-2 and B-3 for the location of these parcels.

Fire History

The complex has burned multiple times over the last 75 years, although fire frequency and interval varies across the complex. We obtained burn data from the CalFire fire perimeter database (CalFire 2014), which covers the period from 1878 to 2013. There are no fires recorded for this complex prior to 1940, although unrecorded fires may have occurred during the period of record. With a few exceptions, the CalFire database reports only brush fires greater than 50 acres, grass fires greater than 300 acres, and fires that destroy three or more residential dwellings or commercial structures.¹ Some fires may be missing because historical records were lost or damaged, had inadequate documentation, or have not yet been incorporated into the database (CalFire 2014). Nonetheless, this spatial dataset provides a relative comparison of burn history on the preserves. Burn data include boundary, size, and year of individual fire events, but do not provide information on fire intensity or complete records of fire season; these factors can influence post-fire vegetation recovery.

¹ Exceptions include fires on National Park Service, Bureau of Land Management, and U.S. Forest Service lands.





Figure B-2a. South Preserves (South Crest, Michelsen, Ulrich, and Odom).





Figure B-2b. East Preserves (Gibson, Kemerko, and Davison).





Figure B-3. Conserved Lands in Vicinity of Greater Crestridge Ecological Reserve Complex.



Preserve ¹	Assessor Parcel Number	Land Owner ²	Land Manager ²
South Crest	50808008	EHC	EHC
	50808043		
	51212016		
	51212013		
	51301038		
	51212015		
	51201036		
	51313012		
	51601026		
Ni-halaar	51001030	EUC	EUC
Michelsen	51313019	EHC	EHC
Ulrich	50901051	EHC	EHC
0.1	51001012	FUG	FUG
Odom	51301112	EHC	EHC
	51301035		
	51313001		
	51304001		
	51313011		
	51306226		
	51602001		
	51602002		
	51601047		
	51601057		
	51001052		
	51202604		
	50032401		
	50932401		
Gibson	39902113	FHC	FHC
Kemerko	39903025	FHC	FHC
Kenierko	39903023	Life	Life
	39903022		
	39903023		
	39903030		
	39903029		
	39904011		
Davison	39902042	EHC	EHC
	39902048	_	_
	39902111		
	39902114		

Table B-3	Parcelization	with the (Greater	Crestridge	Ecological	Reserve (Complex
Table D-3.	1 arcenzation	with the C	JICater	Cicsuluge	Leological	ICOULAC C	Joinpies.

 39902114

 ¹ South preserves = South Crest, Michelsen, Ulrich, Odom; East preserves = Gibson, Kemerko, Davison.

 ² EHC = Endangered Habitats Conservancy.
CalFire recorded twenty fire events within the complex (CalFire 2014, Table B-4). In general, fire frequency has been lowest on the East preserves and on north-facing slopes in the northwest corner of the South preserves (South Crest), and highest in the central portion of the South preserves, particularly on slopes adjacent to and upslope of Dehesa Road (South Crest, Odom) where Dehesa Road may serve as a point of ignition. The most recent burns (2003 Cedar and Dehesa fires) affected over 90 percent (%) of the South preserves but less than 5% of the East preserves.

The influence of fire on vegetation is apparent at a number of locations within the complex. For example, in areas with few fires (e.g., northwest corner of South Crest) or relatively long intervals between fires and/or the last fire (e.g., Gibson), vegetation is diverse and well-developed and supports few invasive species compared to sites with higher burn frequencies. Conversely, preserves that have burned more frequently (e.g., South Crest, Odom) show evidence of habitat type conversion and a greater concentration of invasive plant species. Disturbance other than fire can contribute to invasive plant establishment; however, fires that remove vegetation provide opportunities for colonization by invasive species.

Fire is an integral part of the ecosystem in this complex, and when it occurs at appropriate frequencies and intensities can have a beneficial effect on vegetation and species. The Gibson preserve, which has 3 recorded burns and last burned in the 1970 Laguna Fire, supports healthy populations of two MSP plants, Lakeside ceanothus and Encinitas baccharis. The South Crest and Odom preserves support MSP plant populations impacted by fire, resulting in loss of individuals and nonnative plant invasion. Both South Crest and Odom burned 14 times between 1940-2013, with one location on Odom burning 7 times between 1956 and 2003.

Cultural Features

Previous Studies

AECOM conducted a records search through the South Coastal Information Center at San Diego State University on May 18, 2016 for the initial five preserves in this R-FMP (CBI and AECOM 2017). Results indicated that from 1948-2015, 40 cultural investigations overlapped with South Crest (28 studies), Michelsen (6), Ulrich (5), Gibson (7), and Kemerko (6) preserves (Table B-5), or an estimated 803 acres within the complex (Figure B-4).

The Odom and Davison preserves were not included in the records search; however, survey overlap areas for South Crest and Michelsen may include portions of the Odom Preserve, while surveys for Gibson may include all or portions of the Davison Preserve.



Eira Data ¹	Eiro Nomo ¹		Sou	th ^{2,3}			East ^{2,3}	
File Date	File Maille	SC	MI	UL	OD	GI	KE	DA
1940	Unnamed					Х	Х	Х
1947	Unnamed						Х	
1950	East Suncrest			Х				
1952	Dehesa	Х			Х			
1953	Dehesa #2	Х	Х		Х			
1956	Singing Hills	Х	Х		Х			
1970	Laguna	Х		Х	Х	Х	Х	Х
1979	Unnamed	Х			Х			
1981	Dehesa	Х			Х			
1982	Dehesa #5	Х			Х			
1982	Dehesa #6				Х			
1983	Dehesa #7	Х			Х			
1983	Euclid	Х			Х			
1983	Harbison					Х		
1984	Dehesa	Х	Х		Х			
1986	Flinn							Х
1987	Dehesa #2	Х						
1999	Sloane	Х			Х			
2003	Cedar	Х	Х	Х	Х		Х	
2003	Dehesa	Х			Х			
No. of Fires		14	4	3	14	3	4	3

Table B-4. Fire History within the Greater Crestridge Ecological Reserve Complex.

¹ Refer to CalFire (2014) for fire data.

² South Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East Preserves: GI = Gibson, KE = Kemerko, DA = Davison.

³ X indicates that fire occurrence on preserve.

Previously Recorded Cultural Resources

Based on the records search, 20 cultural resources are located within the complex: 15 on South Crest, 3 on Gibson, and 2 on Kemerko (Table B-6). These are all sites; no isolates occur. Most sites (14) are prehistoric, with only 3 historic sites and 3 multicomponent sites that contain both prehistoric and historic elements. Prehistoric sites consist primarily of bedrock milling sites (10), although rock shelters (2), lithic scatter (1), and a potdrop (1) also occur. Historic sites include two refuse scatters and an open pit mine. Multicomponent sites include a prehistoric habitation deposit with historic-era wall and fence, a bedrock milling feature surrounded by historic trash, and bedrock milling features with an historic fire ring. Records search result maps contain confidential information and therefore cannot be included as a part of this summary; however, a map of culturally sensitive areas within the complex is included as Figure B-5.



SCIC	Deta	Authors	Bapart Titla		Sout	th ^{2,3}		East ^{2,3}		
Report No. ¹	Date	Authors	Report flue	SC	MI	UL	OD	GI	KE	DA
SD-00184	1979	Berryman, Judy A.	Results of a Phase II Archaeological Study on the B&R Property Crest, California	Х			4			
SD-00544	1975	Cupples, Sue Ann	An Archaeological Survey of a Portion of the Proposed 69 KV Transmission Line Route Between Los Coches Substation and Alpine Substation					х	х	5
SD-00741	1975	Kaldenberg, Russell L. and Charles S. Bull	An Archaeological Resource Impact Report for the Singing Hills Ranch Company	Х			4			
SD-00826	1989	Gallegos, Dennis and Carolyn Kyle	Response to Cultural Resource Conditions for the Singing Hills Specific Plan PRD. Areas Three and Four, County of San Diego	Х			4			
SD-01202	1986	Carrico, Richard	Archaeological Testing and Site Significance Assessment for the Singing Hills Specific Plan PRD, Areas Three and Four (W-929, 930, 931, 932, 933, 936, 938, and 1168).	Х			4			
SD-01626	1978	WESTEC SERVICES INC.	Archaeological and Biological Surveys of the Rancho Montana Project, San Diego County, California	Х			4			
SD-01824	1986	Carrico, Richard and Theodore Cooley	Archaeological Testing and Site Significance Assessment for the Singing Hills Specific Plan PRD, Areas Three and Four	X			4			
SD-02290	1991	Smith, Brian F.	Results of an Archaeological Survey and Evaluation of Cultural Resources at the Memorial Estates Cemetery Project	X			4			

Table B-5. Cultural Resources Investigations within the Greater Crestridge Ecological Reserve Complex.



SCIC	Data	Authors	Boport Title		Sout	th ^{2,3}		East ^{2,3}		
Report No. ¹	Date	Autions	Report The	SC	MI	UL	OD	GI	KE	DA
SD-02437	1990	Cheever, Dayle and Susan Hector	Draft Environmental Impact Report for Rancho Montana	Х			4			
SD-02498	1990	New Horizons Planning Consultants, Inc.	Draft Supplemental Environmental Impact Report for Sloan Canyon Sand Company Sweetwater Specific Plan SP 75-02 Amendment, Major Use Permit P74-68W Modification and Reclamation Plan and Singing Specific Plan	Х			<u> </u>			
SD-02956	1991	Bissell, Ron	No title provided	Х	Х		4			
SD-04303	1986	WESTEC SERVICES INC.	Archaeological Testing & Site Significance Assessment for the Singing Hills Specific Plan PRD, Area Three	Х						
SD-04623	1948	William A. Steen & Associates	Draft Environmental Impact Report David Shuaib, Estates of Florence BYK and Mousa Namvar	Х			4			
SD-04736	1994	Dominica, Debra	Historic Property Survey Report for the Rancho Montana Biological Mitigation Parcel for the State Route 54 and 54/125 Projects, San Diego County, California (11-SD-54 P.M. 1.8-5.4 11208-010130 11-SD-125/11- SD-54 P.M. 11R-R15.6/ 5.3-6.7 1120	х			4			
SD-05817	1977	RECON	Singing Hills Ranch Property Draft General Plan Amendment Report and Draft Environmental Impact Report	Х			4			
SD-06425	1990	Carrico, Richard	Historic Resources Inventory Sweetwater Valley	Х	X	X	4	Х	X	⁵
SD-06719	1977	Bull, Charles	Letter Report: Historic Site SDM-W-	Х			4			

Table B-5. Cultural Resources Investigations within the Greater Crestridge Ecological Reserve Complex.



SCIC	Data	Authons	Depent Title		Sout	$h^{2,3}$		East ^{2,3}		
Report No. ¹	Date	Autions	Report The	SC	MI	UL	OD	GI	KE	DA
			1170							
SD-08001	1987	WESTEC SERVICES INC.	Singing Hills Specific Amendment Draft Supplemental EIR	X			4			
SD-08509	1984	Cook, John	Cultural Resource Survey Report for the Westfield Archaeology Study	X			4			
SD-08571	1979	WESTEC SERVICES INC.	Archaeological Survey of the B&R Development Project, Crest-Dehesa	X	X		4			
SD-08572	1977	Cook, John	Mountain View Villas Crest, CA					Х		5
SD-08847	2003	Miller, Jason	Cultural Resources Reconnaissance for the Overton Trust Parcel, Crest, San Diego County, California			Х	⁴			
SD-09268	2003	Pigniolo, Andrew R.	An Archaeological Survey of the Crest View Properties, San Diego County, California			X	4			
SD-09269	2003	Pigniolo, Andrew R.	Cultural Resource Survey of the Kemerko TPM Project, Harbison Canyon, San Diego County, California						X	
SD-09368	2005	Wright, Gail	Cultural Resources Survey Report for TPM 20875, Log No. 04-14-036 Williams Minor Subdivision APN 513-130-04, 14 Negative Findings	X	X		4			
SD-10375	2005	Wright, Gail	Cultural Resources Survey Report of the TPM 20875, Log No. 04-14-036 Williams Minor Subdivision APN 513-130-04	Х	Х		4			
SD-10387	2004	De Barros, Philip	Cultural Resources Summary and Preliminary Assessment for the 1,166- Acre Singing Hills Estates Project, San Diego County, California	Х	X		4			

Table B-5. Cultural Resources Investigations within the Greater Crestridge Ecological Reserve Complex.



SCIC	Data	Authons	Donort Title		Sout	$h^{2,3}$		East ^{2,3}		
Report No. ¹	Date	Autions	Report flue	SC	MI	UL	OD	GI	KE	DA
SD-10432	2006	Hector, Susan	Cultural Resources Sensitivity Analysis for the Carryover Storage and San Vicente San Raise Project (CSP) Alternative Analysis					X		5
SD-10455	1991	Smith, Brian F.	Results of an Archaeological Survey and the Evaluation of Cultural Resources at the Memorial Estates Cemetery Project, El Cajon, County of San Diego P-90-013, EAD LOG # 90-14-22	X			4			
SD-10488	1978	Eckhardt, William	Archaeological Survey of the Rancho Montana Project, San Diego County, California	X			⁴			
SD-11413	2007	Sholom, Diane	Cultural Resources Survey Report for Ward - TPM 21099, LOG NO. 07- 140-13, APN 509-242-03			Х				
SD-11733	2006	Pigniolo, Andrew R.	Archaeological Records Search for the Worley Biological Mitigation Bank Project in Crest, San Diego County, California					X		5
SD-12570	2009	Analytical Environmental Services	Cultural Resources Study Sycuan Fee- To-Trust	X			4			
SD-12616	2010	Auck, Jessica and Brian F. Smith	A Phase I Cultural Resources Survey of the Greater Alpine Fire Safe Council Edith Fuels Treatment Buffer Project, San Diego County, California						Х	
SD-13399	2011	Whitaker, James	ETS #21946, Cultural Resources Monitoring for the Wood Pole Inspections, 11 Poles, Suncrest Truck	X			4			

Table B-5. Cultural Resources Investigations within the Greater Crestridge Ecological Reserve Complex.



SCIC	Data	Authors	Papart Titla		Sout	$th^{2,3}$		East ^{2,3}		
Report No. ¹	Date	Autions	Report The	SC	MI	UL	OD	GI	KE	DA
			Trail Project, San Diego County, California (HDR #172454)							
SD-13651	2010	Clowery, Sara and Nicole Blotner	ETS #8789; TL 678 Wood to Steel and Reconductor, Los Coches to Alpine Substations, Cultural Resources Inventory Report					Х	Х	5
SD-13952	2003	Robins-Wade, Mary	Archaeological Resources Survey, La Cresta, San Diego County, California	Х			4			
SD-14024	2012	Ni Ghabhlain, Sinead, Shelby Castells, and Sarah Stinger-Bowsher	Archaeological Survey Report for the Stoneridge Preserve, San Diego County, California						X	
SD-15067	2008	Pigniolo, Andrew and Heather Kwiatkowiski	Cultural Resources Survey, Testing, and Evaluation of the Kemerko TPM Project, Harbison Canyon, San Diego County, California							
SD-15536	2015	Prouty, Michael	Cultural Network Analysis of Spanish Colonial Settlement Patterns in San Diego, California	X		X	4	X		5

Table B-5. Cultural Resources Investigations within the Greater Crestridge Ecological Reserve Complex.

¹ SCIC Report No. = South Coastal Information Center.
 ² South preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East preserves: GI = Gibson, KE = Kemerko, DA = Davison.
 ³ X indicates that previous investigations (reports) overlap of with preserve(s).
 ⁴ No records search done for the Odom Preserve; however, surveys on the South Crest or Michelsen preserves may overlap with the Odom Preserve.
 ⁵ No records search done for the Davison Preserve; however, surveys on the Gibson Preserve may overlap with the Davison Preserve.





Path: P: 603460344156 SANDAG RMP9900-CAD-GIS/920 GIS/922 Maps Cultural Records Search 2016/EHCUnsurveyeddrean 2016.mad, 928/2016, wilsons5

Figure B-4. Unsurveyed Areas for Cultural Resources within the Greater Crestridge Ecological Reserve Complex.



Primary No.	Trinomial No.	Resource Type	Age	Site Type	Site Description	Preserve ¹
P-37- 004521	CA-SDI- 004521	Site	Multi- component	Habitation site; ranch	Bedrock milling stations, midden deposits, and artifacts including manos, metates, ceramics, and stone debitage; historic-era stone wall and barbed-wire fence. Not relocated in 1991.	South Crest
P-37- 005708	CA-SDI- 005708	Site	Multi- component	Bedrock milling features; refuse scatter	Bedrock milling on nine outcrops. Refuse scatter of cans, bottles, and glass fragments. A 1994 survey could not relocate all milling surfaces due to dense poison oak, and trash scatter was not relocated.	South Crest
P-37- 006719	CA-SDI- 006719	Site	Multi- component	Bedrock milling features; historic fire ring	Bedrock milling on four outcrops; historic fire ring and bubbler dating to 1952.	South Crest
P-37- 006720	CA-SDI- 006720	Site	Prehistoric	Bedrock milling feature	Bedrock milling on one outcrop. Not relocated in 1991.	South Crest
P-37- 006721	CA-SDI- 006721	Site	Prehistoric	Bedrock milling feature; possible rock shelter	Bedrock milling on one outcrop; possible rock shelter. Not relocated in 1991.	South Crest
P-37- 013139	CA-SDI- 013139	Site	Historic	Refuse scatter	Numerous trash deposits along Sunset Truck Trail. Deposits range from the 1940s to present.	South Crest

Table B-6. Previously Recorded Cultural Resources within the Greater Crestridge Ecological Reserve Complex.



Primary No.	Trinomial No.	Resource Type	Age	Site Type	Site Description	Preserve ¹
P-37- 013140	CA-SDI- 013140	Site	Prehistoric	Bedrock milling features; rock wall	Bedrock milling site with four loci. Locus 1 contains a single milling slick, Locus 2 is the rock wall, Locus 3 consists of three slicks, and Locus 4 contains 21 slicks.	South Crest
P-37- 013141	CA-SDI- 013141	Site	Historic	Open pit mine	Open pit mine with two separate areas; each has been excavated to a depth of 3 meters. Associated artifacts include picks, shovels, and various digging tools.	South Crest
P-37- 013143	CA-SDI- 013143	Site	Prehistoric	Bedrock milling features	Two bedrock milling slicks on two separate outcrops.	South Crest
P-37- 013144	CA-SDI- 013144	Site	Prehistoric	Bedrock milling feature	Single bedrock milling feature.	South Crest
P-37- 013145	CA-SDI- 013145	Site	Prehistoric	Bedrock milling features and possible petroglyph	Two bedrock milling slicks on two separate outcrops and a possible petroglyph on a third outcrop.	South Crest
P-37- 013146	CA-SDI- 013146	Site	Prehistoric	Bedrock milling feature	Single bedrock milling feature.	South Crest
P-37- 013152	CA-SDI- 013152	Site	Prehistoric	Potdrop	Seven Tizon brownware pottery sherds from a single vessel.	South Crest

Table B-6. Previously Recorded Cultural Resources within the Greater Crestridge Ecological Reserve Complex.



Primary No.	Trinomial No.	Resource Type	Age	Site Type	Site Description	Preserve ¹
P-37- 013154	CA-SDI- 013154	Site	Prehistoric	Bedrock milling feature and rock pile	Single bedrock milling feature and a 1.4- by-1.3-meter rock pile.	South Crest
P-37- 013158	CA-SDI- 013158	Site	Prehistoric	Bedrock milling feature	Groove with a bedrock mortar at either end and a rectangular cutout in the center.	South Crest
P-37- 000296	CA-SDI- 000296	Site	Prehistoric	Rock shelter with petroglyphs	Rock shelter with petroglyphs and midden.	Gibson
P-37- 000297	CA-SDI- 000297	Site	Prehistoric	Rock shelter with petroglyphs	Rock shelter with petroglyphs.	Gibson
P-37- 010479	CA-SDI- 010479	Site	Prehistoric	Lithic scatter	Low-density lithic scatter of debitage measuring 15 by 10 meters.	Gibson
P-37- 025164	CA-SDI- 016664	Site	Prehistoric	Bedrock milling features	Two bedrock milling features on two outcrops. Tested in 2003 with negative results.	Kemerko
P-37- 031132	CA-SDI- 019726	Site	Historic	Refuse scatter	Trash scatter measuring 37 by 19 meters of large household appliance material and automotive body and engine parts dating to circa post-1945.	Kemerko

Table B-6. Previously Recorded Cultural Resources within the Greater Crestridge Ecological Reserve Complex.

¹ Note that survey results for South Crest may overlap with Odom, while survey results for Gibson may overlap with Davison.





SANDAG EHC and Otay Mesa Records Search Park: P. 603460341156 SANDAG RMPs/000-CAD-GIS/920 GIS/922 Maps Cultural Records Search 2016/EHC ESA Map. 2016.real, 9/28/2016, withouts



Native American Contact Program

AECOM contacted the Native American Heritage Commission (NAHC) and local Native American individuals and tribes for information on cultural resources. They sent a letter to the NAHC on May 1, 2016, requesting a search of its Sacred Lands File and a list of Native American individuals and organizations knowledge about cultural resources within the complex. The NAHC response (May 2, 2016) stated that sacred sites are on file within or near the complex and the area is known to be culturally sensitive. Further, the NAHC identified 22 Native American representatives (Table B-7). AECOM sent letters to these representatives on May 3, 2016, and received two responses.

Lisa Haws, Cultural Resources Manager for the Sycuan Band of the Kumeyaay Nation, responded via email on May 10, 2016 that the Sycuan Natural and Cultural Resource Committee will likely have comments at a later date. She also requested additional information and a link to the project on the SANDAG website. We informed Ms. Haws that the F-RMP is not a required project, but an internal planning tool for MSP implementation, and provided a link to the MSP on the SDMMP website. Carmen Lucas of the Kwaaymii Laguna Band of Mission Indians replied on May 10, 2016, and requested that Jamul, Viejas, and Sycuan be involved in all projects related to the complex, if they so choose.

Summary

Based on the records search and Native American Contact Program, both historic and prehistoric resources occur in 20 cultural sites within the complex. We determined that cultural surveys cover 70% of the preserves, excluding Odom and Davison. The NAHC file check identified sites within or near the complex, and local Native American individuals or tribes expressed an interest in the properties and indicated they are culturally sensitive to the Native American community.

Geology and Soils

The complex is topographically diverse, supporting mountains and steep slopes, rocky ridges and peaks, flat to gently sloping areas, and several ephemeral drainages. Dehesa Peak on the Odom Preserve reaches 1,896 feet elevation, and the Dehesa Mountain ridgeline extends to the south and east of the peak, through Odom and South Crest. More than half of the complex consists of slopes greater than 30%. Much of the complex is comprised of granitic soils, with additional derived from gabbroic igneous rock, metavolcanic rock, and metasedimentary rock. Gabbroic soils are high in iron and magnesium and support edaphic endemic plants.



Affiliation	Name/Title	Date of Contact	Discussion
Native American		5/1/2016	Request letter sent via email.
Heritage Commission		5/2/2016	Received results of Sacred Lands File search and Native
(NAHC)			American contact list via fax.
Barona Group of the	Clifford LaChappa,	5/3/2016	Letter sent via USP Service (USPS).
Capitan Grande	Chairperson		
	Sheila Alvarez	5/3/2016	Letter sent via USPS.
Ewiiaapaayp Tribal	Rolbert Pinto Sr.,	5/3/2016	Letter sent via USPS.
Office	Chairperson		
	Michael Garcia, Vice	5/3/2016	Letter sent via USPS.
	Chairperson		
	Will Micklin, Executive	5/3/2016	Letter sent via USPS.
	Director		
San Pasqual Band of	Allen Lawson	5/3/2016	Letter sent via USPS.
Mission Indians	Chairperson		
	John Flores,	5/3/2016	Letter sent via USPS.
	Environmental		
	Coordinator		
Sycuan Band of the	Cody Martinez,	5/3/2016	Letter sent via USPS.
Kumeyaay Nation	Chairperson		
	Lisa Haws, Cultural	5/3/2016	Letter sent via USPS.
	Resources Manager	5/10/2016	Response received via email requesting additional
			information about the project and a link to the project on the
			San Diego Association of Government (SANDAG) website.
			Ms. Haws also indicated that Sycuan Natural and Cultural
			Resource Committee will likely have additional comments at

 Table B-7.
 Native American Contact Program.



Table B-7.	Native American	Contact Program.
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Affiliation	Name/Title	Date of Contact	Discussion
		5/11/2016	a later date. Reply sent via email explaining that the Resource Management Plan (RMP) is not a required project but rather an internal planning tool and it will not be on the SANDAG website. Provided a link to the Management Strategic Plan (MSP).
Viejas Band of the Kumeyaay Nation	Robert Welch. Sr., Chairperson	5/3/2016	Letter sent via USPS.
	Julie Hagen, Cultural Resources	5/3/2016	Letter sent via USPS.
Kumeyaay Cultural Historic Committee	Ron Christman	5/3/2016	Letter sent via USPS.
Jamul Indian Village	Erica Pinto, Chairperson	5/3/2016	Letter sent via USPS.
Mesa Grande Band of Mission Indians	Virgil Oyos, Chairperson	5/3/2016	Letter sent via USPS.
Kwaaymii Laguna	Carmen Lucas	3/14/2016	Letter sent via USPS.
Band of Mission Indians		5/10/2016	Received response letter requesting that Jamul, Viejas, and Sycuan be involved in all projects if they prefer.
Iipay Nation of Santa	Virgil Perez, Chairperson	5/3/2016	Letter sent via USPS.
Ysabel	Clinton Linton, Director of Cultural Resources	5/3/2016	Letter sent via USPS.
Inaja Band of Mission Indians	Rebecca Osuna, Chairperson	5/3/2016	Letter sent via USPS.
Kumeyaay Cultural Repatriation Committee	Steve Benegas, Spokesperson	5/3/2016	Letter sent via USPS.



Table B-7.	Native	American	Contact	Program.
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Affiliation	Name/Title	Date of Contact	Discussion
	Bernice Paipa, Secretary	5/3/2016	Letter sent via USPS.
Kumeyaay Diegueno	Kim Bactad, Executive	5/3/2016	Letter sent via USPS.
Land Conservancy	Director		
Inter-Tribal Cultural	Frank Brown,	5/3/2016	Letter sent via USPS.
Resource Protection	Coordinator		
Council			

Soils have an influence on vegetation and plant species composition. Clay and gabbro-derived soils within the complex support San Diego thornmint, Dehesa nolina, variegated dudleya, and Parry's tetracoccus (*Tetracoccus parryi*); clay soils support native grassland; and acid igneous rock land (Figure B-6) supports Lakeside ceanothus and Encinitas baccharis.



Figure B-6. Acid Igneous Rock Land on the Gibson Preserve.

We describe soil series below with respect to general structure and qualities, parental material, uses, location within the complex, and presence of MSP plant species. Refer to Table B-8 and Figures B-7a.b for the distribution of soils on individual preserves.

Acid Igneous Rock (AcG)

Acid Igneous rock land includes low hills and steep mountains that support large boulders and rock outcrops. The shallow soils are loam to loamy coarse sand over decomposed granite or basic igneous rock (USDA 1973). In some places, between boulders, deep soil pockets occur. Water runoff is very high and erosion potential is moderate to very high.



Soil Series ¹	South ^{2,3}				East ^{2,3}		
	SC	MI	UL	OD	GI	KE	DA
Acid Igneous Rock Land ⁴	Х			Х	Х	Х	Х
Auld ⁴	Х			Х			
Cieneba	Х	Х	Х	Х	Х		
Cieneba-Fallbrook	Х			Х			
Fallbrook	Х		Х			Х	
Fallbrook-Vista				Х			
Friant		Х					
Las Posas ⁴	Х	Х		Х	Х	Х	Х
Ramona				Х			
Stony Land	Х						
Visalia	Х						
Vista	Х	Х	Х	Х			

Table B-8. Distribution of Soils within the Greater Crestridge Ecological Reserve Complex.

¹ Soil series identified per USDA 1973; soils maps derived from the SSURGO database for San Diego County (USDA-NRCS 2011).

² South Preserves: SC = South Crest, MI = Michelsen, UL = Ulrich, OD = Odom; East Preserves: GI = Gibson, KE = Kemerko, DA = Davison.

³ X =occurrence of soil series on the preserve.

⁴ Soil type supports MSP plants within the complex.

Approximately 433 acres of Acid Igneous Rock land occur on 15-75% slopes on South Crest, Odom, Gibson, Kemerko, and Davison (Figure B-6). Acid Igneous rock land supports nearly all of the Lakeside ceanothus on Gibson and Kemerko and all of the Encinitas baccharis on Gibson.

Auld (AyE)

Auld soils occur on uplands and consist of well-drained clays that are underlain by metavolcanic rock (USDA 1973). Runoff is medium to rapid, erosion is moderate to high and these soils can be stony. Uncultivated areas consist of nonnative grassland, forbland, and scrub oak (USDA 1973).

Approximately 27 acres of Auld soils occur on 9-30% slopes in the vicinity of Skeleton Flats on South Crest and Odom (Figure B-8). Auld soils support Dehesa nolina, variegated dudleya, and native grasslands on South Crest and Odom.





Figure B-7a. Soils on the South Preserves (South Crest, Michelsen, Ulrich, and Odom).



Greater Crestridge Ecological Reserve Complex Framework Management Plan



Figure B-7b. Soils on the East Preserves (Gibson, Kemerko, and Davison).





Figure B-8. Relatively flat area in center of photo is Skeleton Flats, which supports Auld soils.

Cieneba (CmE2, CmrG)

The Cieneba series consists of very shallow to shallow, loamy, well-drained soils derived from weathered granite and granodiorite with slopes that range between 9 and 85% (USDA 2013). Runoff is low to high, permeability is moderately rapid in soil and slower in bedrock, and erosion potential is high to very high.

Approximately 236 acres of Cieneba soils occur on 9-75% slopes on South Crest, Michelsen, Gibson, and Ulrich. Several scattered stands of Lakeside ceanothus occur on Cieneba soils in the northeastern portion of Gibson.

Cieneba-Fallbrook (CnG2)

The Cieneba-Fallbrook series is approximately 55% Cieneba coarse sandy loam and 40% Fallbrook sandy loam with approximately 20% of the surface covered in rock outcrops and large boulders (USDA 1973). These highly erosive soils are excessively drained to well-drained with slow to rapid permeability and rapid runoff (USDA 1973).

Approximately 91 acres of the Cieneba-Fallbrook series occur on 30-65% slopes on South Crest and Odom. No MSP plants occur on Cieneba-Fallbrook soils within the complex.

Fallbrook (FaE2, FeE2, FvD)

The Fallbrook series occurs on hills and consists of well-drained, deep soils that formed from material weathered from granodiorite (USDA 1973). Runoff is high and the erosion hazard is moderate to high. Slopes range from 2 to 30%. These soils can support nonnative grasslands, chaparral and oak woodland habitats (USDA 1973).

Approximately 130 acres of Fallbrook soils (FaE2, FeE2) occur on 9-30% slopes on South Crest, Kemerko, and Ulrich. No MSP plants occur on Fallbrook soils within the complex.

An additional 12 acres of Fallbrook-Vista soils (FvD) occur on 9-15% slopes in the northeast corner of the Odom Preserve. These soils support oak woodlands.

Friant (FxG)

The Friant soil series occurs on mountainous uplands and formed in material weathered from fine-grained metasedimentary rock. Rock outcrops occur on approximately 2 to 10% of the surface in some areas (USDA 1973). Runoff is very rapid and erosion potential is high. Areas covered in this soil type support native and nonnative habitat types.

Approximately 23 acres of Friant soils occur on very steep slopes in the northern portion of South Crest. No MSP plants occur on Friant soils within the complex.

Las Posas (LrE, LrE2, LrG)

The Las Posas series occurs on hills and gently sloping mesas and consists of well-drained stony fine sandy loams weathered from sandstone and shale (USDA 2013). Slopes range from 5 to 50%, runoff is medium to rapid, permeability is slow, and erosion potential is high to very high. Las Posas soils have a clay subsoil and support chaparral and nonnative grasslands and forblands.

Approximately 558 acres of Las Posas soils occur on 9-65% slopes on South Crest, Michelsen, Odom, Gibson, Kemerko, and Davison. Within the complex, Las Posas soils support San Diego thornmint, Dehesa nolina, variegated dudleya, and several isolated stands of Lakeside ceanothus.

Ramona (RaD2)

The Ramona series occurs on terraces and alluvial fans and formed in granitic alluvium (USDA 1973). Runoff is medium and erosion potential (including sheet and rill erosion) is moderate. Ramona soils are well-drained, deep sandy loams with sandy clay loam subsoils.

Less than 3 acres of Ramona sandy loams occur on 9-15% slopes along the northern boundary of the Odom Preserve, just south of Suncrest Boulevard. No sensitive resources are associated with this soil series within the complex.

Stony Land

Stony land is very steep or strongly sloping and occurs at the base of cliffs or below steep, rocky slopes (USDA 1973). Stony land is comprised of stones, rocks, large boulders, cobblestones, and some fine material, and generally supports brush and scattered oak trees.

Approximately 1 acre of stony land occurs on South Crest, but supports no MSP plants.

<u>Visalia (VaB)</u>

Visalia soils are found on gently sloping flood plains and alluvial fans (USDA 1973). These very deep, sandy loams are moderately well-drained and derived from granitic alluvium. Runoff is slow and erosion is slight.

Approximately 3 acres of Visalia soils occur on 2-5% slopes on South Crest, but support no MSP plants.

Vista (VsD, VsE2, VvD, VvE, VvG)

The Vista series occurs on mountainous uplands and hills and consists of well-drained, moderately deep soils derived from granodiorite or quartz diorite (USDA 1973). Runoff is high, permeability is moderately rapid, and erosion potential is moderate to high. This series supports nonnative grassland, sage scrub, and chaparral.

Approximately 182 acres of Vista soils occur on 9-65% slopes on South Crest, Michelsen, Odom, and Ulrich (USDA 2013). No MSP plants occur on Vista soils in the complex.

Hydrology

Most of the complex falls within the Sweetwater River watershed (Sweetwater Hydrologic Unit; Jamacha, Dehesa, and Alpine Heights subunits), with only the northwest corner of South Crest in the San Diego River watershed (San Diego Hydrologic Unit; El Cajon subunit) (Figure B-9). The Sweetwater Watershed includes approximately 230 square miles of mostly undeveloped land, open space, and agricultural areas, while the San Diego Watershed includes approximately 440 square miles of mostly undeveloped land (CRWQCB 1994).

Hydrologic features within the South preserves include an unnamed, north-south blueline stream on Ulrich that flows southward to Dehesa Creek, an unnamed, east-west oriented blueline stream on Michelsen that also flows into Dehesa Creek, and an unnamed north-south oriented blueline stream that flows through South Crest and Odom but terminates before it reaches the Sweetwater River. Intermittent drainages on South Crest, Ulrich, and Odom receive some urban runoff from the community of Crest to the north. The East preserves drain to Harbison Canyon. Rugged topography covers much of the complex, and there is significant erosion in some areas.



Figure B-9. Hydrology within the Greater Crestridge Ecological Reserve Complex.



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Appendix C Technical Resource Documents and Data Sources

Appendix C

Technical Resource Documents and Data Sources

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Appendix D Budget (2017-2021)

					#		2017			2018			2019			2020			2021		Tatal Cast	
Task	Task Description	Preserve ¹	Personnel	Specification	Unit	# Years	# Units	Cost/Unit	Annual Cost	(5 Years)												
Vegetation 0	communities (VEG)																					
VEG-1.1	Refine Baseline Vegetation Map	All	Contractor	CBI	Cost	1							1	\$21,951.75	\$21,951.75							\$21,951.75
VEG-1.2	Update Vegetation Map																					\$0.00
VEG-1.3	Identify/Prioritize Vegetation Management	All	Contractor	CBI	Cost	1							1	\$9,036.55	\$9,036.55							\$9,036.55
VEG-2.1	Coordinate with Regional Vegetation Monitoring	All	Preserve Manager		L. Hours	1							6	\$130.00	\$780.00							\$780.00
VEG-2.2	Conduct Preserve-level Vegetation Monitoring	All	Contractor	CBI	Cost	1																\$0.00
INV-1.1	Conduct Invasive Plant Surveys	All	Contractor	CBI	Cost	1													1	\$18,200.20	\$18,200.20	\$18,200.20
INV-1.2	Update Invasive Plant Lists	All	Contractor	CBI	Cost	5	1	\$1,340.00	\$1,340.00	1	\$1,384.00	\$1,384.00	1	\$1,424.00	\$1,424.00	1	\$1,468.00	\$1,468.00	1	\$1,508.00	\$1,508.00	\$7,124.00
INV-1.3	Update Invasive Plant Map	All	Contractor	CBI	Cost	1													1	\$3,212.00	\$3,212.00	\$3,212.00
INV-2.1	Update Invasive Plant Management Priorities	All	Contractor	СВІ	Cost	1													1	\$2,480.00	\$2,480.00	\$2,480.00
INV-2.2	Identify Invasive Plant Priority Treatment/Maintenance Areas	All	Preserve Manager		L. Hours	1													16	\$135.00	\$2,160.00	\$2,160.00
			Contractor	CBI	Cost	1													1	\$2,996.00	\$2,996.00	\$2,996.00
INV-3.1	Manage Brachypodium	SC, MI	Contractor	Recon	Cost	5	1	\$5,200.00	\$5,200.00	1	\$5,356.00	\$5,356.00	1	\$5,463.12	\$5,463.12	1	\$5,572.38	\$5,572.38	1	\$5,683.83	\$5,683.83	\$27,275.33
INV-3.2	Contain Saharan Mustard	SC	Preserve Manager		L. Hours	5	16	\$125.00	\$2,000.00	16	\$128.00	\$2,048.00	16	\$130.00	\$2,080.00	16	\$133.00	\$2,128.00	16	\$135.00	\$2,160.00	\$10,416.00
	i	SC	Preserve Manager		L. Hours	5	1	\$125.00	\$125.00	4	\$128.00	\$512.00	2	\$130.00	\$260.00	1	\$133.00	\$133.00	1	\$135.00	\$135.00	\$1,165.00
INV-3.3	Eradicate Stinkwort	GI	Preserve Manager		L. Hours	5	1	\$125.00	\$125.00	4	\$128.00	\$512.00	2	\$130.00	\$260.00	1	\$133.00	\$133.00	1	\$135.00	\$135.00	\$1,165.00
		KE	Preserve Manager		L. Hours	5	1	\$125.00	\$125.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	1	\$133.00	\$133.00	1	\$135.00	\$135.00	\$909.00
INV-3.4	Eradicate Fennel	SC	Preserve Manager		L. Hours	3	1	\$125.00	\$125.00	•	\$128.00	\$0.00	1	\$130.00	\$130.00	0	\$133.00	\$0.00	1	\$135.00	\$135.00	\$390.00
INV-3.5	Suppress Garland Chrysanthemum	SC UI	Preserve Manager		L. Hours	5	0 4	\$125.00	\$1,000.00	0 4	\$128.00	\$1,024.00	0 4	\$130.00	\$1,040.00	0 4	\$133.00	\$1,064.00	0 4	\$135.00	\$1,080.00	\$5,208.00
	· · · · · · · · · · · · · · · · · · ·	GI	Preserve Manager		L. Hours	5	4	\$125.00	\$500.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2,604.00
INV-3.6	Contain/Suppress Bermuda Buttercup	SC	Preserve Manager		L. Hours	5	3	\$125.00	\$375.00	3	\$128.00	\$384.00	3	\$130.00	\$390.00	3	\$133.00	\$399.00	3	\$135.00	\$405.00	\$1,953.00
INV-3.7	Eradicate Giant Reed	UL	Preserve Manager		L. Hours	4	16	\$125.00	\$2,000.00	16	\$128.00	\$2,048.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00		\$135.00	\$0.00	\$6,152.00
INV-3.8	Eradicate Pampas Grass	GI	Preserve Manager		L. Hours	2	1	\$125.00	\$125.00		\$128.00	\$0.00	1	\$130.00	\$130.00		\$133.00	\$0.00		\$135.00	\$0.00	\$255.00
INV-3.9	Contain Long-flowered Veldt Grass	GI	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
		All	Preserve Manager		L. Hours	5	16	\$125.00	\$2,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$6,208.00
INV-3.10	Respond Rapidly to New or Expanding Invasions	All		Pesticides, Surfactants	ltem	5	1	\$350.00	\$350.00	1	\$175.00	\$175.00	1	\$350.00	\$350.00	1	\$175.00	\$175.00	1	\$350.00	\$350.00	\$1,400.00
		All		Pesticide Equipment	ltem	5	1	\$400.00	\$400.00	1	\$50.00	\$50.00	1	\$50.00	\$50.00	1	\$50.00	\$50.00	1	\$50.00	\$50.00	\$600.00
INV-3.11	Reduce Fire Risk from Invasive Plants	All	Preserve Manager		L. Hours	5		\$125.00	\$0.00		\$128.00	\$0.00		\$130.00	\$0.00		\$133.00	\$0.00		\$135.00	\$0.00	\$0.00
INV-3.12	Monitor Invasive Plant Treatment Effectiveness	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
RS-1.1	Treat Invasive Plants in Restoration Sites	SC	Contractor	Recon	Cost	5	1	\$13,140.00	\$13,140.00	1	\$13,534.20	\$13,534.20	1	\$13,940.23	\$13,940.23	1	\$14,358.43	\$14,358.43	1	\$14,789.19	\$14,789.19	\$69,762.04
RS-1.2	Monitor Restoration Effectiveness	SC	Preserve Manager		L. Hours	5	6	\$125.00	\$750.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2,854.00
RS-1.3	Adjust Restoration Management/Monitoring Regime	sc	Preserve Manager		L. Hours	1										4	\$133.00	\$532.00			\$0.00	\$532.00
		SC	Contractor	CBI	Cost	1										1	\$2,343.80	\$2,343.80			\$0.00	\$2,343.80
RS-2.1	Identify/Prioritize Restoration Sites	All	Preserve Manager	001	L. Hours	1										24	\$137.00	\$3,288.00				\$3,288.00
	<u> </u>	All	Contractor Preserve Manager	CBI	L Hours	1										1	\$5,481.60	\$5,481.60	60	\$135.00	\$8 100 00	\$5,481.60
RS-2.2	Pursue Funding for Restoration	All	Contractor	CBI	Cost	1													3	\$11,934.00	\$35,802.00	\$35,802.00
RS-2.3	Develop/Implement Restoration Plan(s)																					\$0.00
RS-2.4	Procure Native Plant Propagules																					\$0.00
RS-2.5	Monitor Restoration Effectiveness																					\$0.00
RS-2.6	Adjust Restoration Monitoring/Management Regime																					\$0.00
MSP Animal	Species (AN)																					
AN-1.1	Conduct Quino Checkerspot Butterfly Surveys	SC. MI	Preserve Manager		L. Hours	1							2	\$130.00	\$260.00							\$260.00
		SC, MI	Contractor	TBD	Cost	1							1	\$64,000.00	\$64,000.00							\$64,000.00
AN-1.2	Facilitate Hermes Copper Butterfly Surveys																					\$0.00
AN-1.3	Conduct Western Spadefoot Toad Surveys	All	Preserve Manager		L. Hours	1							24	\$130.00	\$3,120.00							\$3,120.00
AN-1.4	Facilitate Golden Eagle Surveys	All	Preserve Manager		L. Hours	5	2	\$125.00	\$250.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,302.00
AN-1.5	Conduct Burrowing Owl Surveys	SC	Preserve Manager		L. Hours	1							2	\$130.00	\$260.00							\$260.00
<u> </u>		SC	Contractor		Cost	1							1	\$5,500.00	\$5,500.00							\$5,500.00
AN-1.5	Facilitate/Conduct Coastal California Gnatcatcher Surveys	All	Preserve Manager		L. Hours	1										8	\$133.00	\$1,064.00				\$1,064.00

								2017			2018			2019			2020			2021		
Task	Task Description	Preserve ¹	Personnel	Specification	Unit	# Years	# Units	Cost/Unit	Annual Cost	# Units	Cost/Unit	Annual Cost	# Units	Cost/Unit	Annual Cost	# Units	Cost/Unit	Annual Cost	# Units	Cost/Unit	Annual Cost	Total Cost (5 Years)
AN-1.7	Facilitate Pallid and Townsend Bat Surveys																					\$0.00
AN-2.1	Develop Animal Inventory System	All	Contractor	CBI	Cost	1				1	\$1,888.00	\$1,888.00										\$1,888.00
AN-2.2	Develop/Maintain Animal Species List	All	Contractor	CBI	Cost	4				1	\$1,888.00	\$1,888.00	1	\$610.00	\$610.00	1	\$625.00	\$625.00	1	\$645.00	\$645.00	\$3,768.00
AN-3.1	Conduct Argentine Ant Surveys																					\$0.00
AN-3.2	Conduct Oak Borer Surveys	SC. UL, KE	Contractor	Green Tree	Cost	1										1	\$3,140.00	\$3,140.00				\$3,140.00
AN-4.1	Monitor MSP Priority Animals			Forest Service																		\$0.00
AN-4.2	Monitor MSP Animal Management Effectiveness																					\$0.00
AN-4.3	Monitor/Facilitate Monitoring of Wildlife Connectivity	SC, GI, KE	Preserve Manager		L. Hours	3							2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$796.00
AN-5.1	Prioritize MSP Animal Management Actions																					\$0.00
AN-6.1	Treat Invasive Animals																					\$0.00
AN-6.2	Augment MSP Animal Populations																					\$0.00
AN-6.3	Restore Wildlife Habitat																					\$0.00
AN-6.4	Improve Connectivity																					\$0.00
AN-7.1	Facilitate Animal Research Studies	All	Preserve Manager		L. Hours	4				2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,052.00
MSP Plant S	pecies (PL)																					
PL-1.1	Conduct San Miquel Savory Surveys	SC. MI	Contractor	CBI	Cost	1				1	\$5.028.40	\$5.028.40										\$5.028.40
PI -1.2	Conduct Gander's Ragwort Surveys	SC MI	Contractor	CBI	Cost	1				1	\$4,533,40	\$4,533,40										\$4,533,40
PL-1.3	Conduct Parry's Tetracoccus Surveys	GI. KE	Contractor	CBI	Cost	1							1	\$5.524.10	\$5.524.10							\$5.524.10
PI -1.4	Conduct Lakeside Ceanothus Surveys	ui	Contractor	CBI	Cost	1							1	\$4.676.00	\$4.676.00							\$4.676.00
PL-15	Conduct Felt-leaved Monardella Surveys	SC MLGLKE	Contractor	CBI	Cost	1							1	\$5 154 00	\$5,154,00							\$5 154 00
PL-1.6	Conduct Encelmann Oak Surveys	MLUI	Contractor	CBI	Cost	1													1	\$4 920 20	\$4,920,20	\$4,920,20
PL-2.1	Develop Plant Inventory System	All	Contractor	CBI	Cost	1				1	\$1,534,00	\$1,534,00									+ .,======	\$1,534.00
PL-2.2	Develop/Maintain Plant Species List	All	Contractor	CBI	Cost	1				1	\$2,006,00	\$2,006,00	1	\$610.00	\$610.00	1	\$625.00	\$625.00	1	\$645.00	\$645.00	\$3,886,00
PL-3.1	Monitor MSP Priority Plant Species	SC MI	Contractor	CBI	Cost	4				1	\$6,154.00	\$6,154.00	1	\$8,940.00	\$8,940,00	1	\$7,258,60	\$7,258.60	1	\$15,692,20	\$15,692,20	\$38,044,80
PL-3.2	Monitor MSP Plant Management Effectiveness	00, mi	Contractor	0Di	0001						\$6,101.00	\$0,101.00		\$0,010.00	\$0,010.00		\$1,200.00	\$1,200.00		010,002.20	\$10,00E.E0	\$0.00
PL-4.1	Prioritize MSP Plant Management Actions	SC, MI, GI, KE	Contractor	CBI	Cost	1				1	\$2,504.00	\$2,504.00										\$2,504.00
PL-5.1	Treat Invasive Plants	SC	Preserve Manager		L. Hours	5	12	\$125.00	\$1,500.00	12	\$128.00	\$1,536.00	12	\$130.00	\$1,560.00	12	\$133.00	\$1,596.00	12	\$135.00	\$1,620.00	\$7,812.00
		SC, MI, GI, KE	Preserve Manager		L. Hours	1							8	\$130.00	\$1,040.00							\$1,040.00
PL-5.2	Establish Seed Bank	SC, MI, GI, KE	Preserve Manager	CBI	Cost	1							1	\$5,561.10	\$5,561.10							\$5,561.10
PL-5.3	Establish Ex Situ Nursery Stands	KE III	Preserve Manager		L Hours	1							4	\$130.00	\$520.00							\$520.00
PL-5.4	Augment MSP Plant Populations	9C	Preserve Manager		L Hours	5	8	\$125.00	\$1,000,00	8	\$128.00	\$1 024 00		\$130.00	\$1.040.00	8	\$133.00	\$1,064,00	8	\$135.00	\$1,080,00	\$5,208,00
120.1	agnore nor ran ropalatorio	80	Contractor	CBI	Cost	1	-		.,	-		.,	1	\$2,800.55	\$2,800.55	-		*	-			\$2,800,55
PL-5.4	Augment MSP Plant Populations	sc	Contractor	Recon	Cost	1								\$2,000.00	\$2,000.00	1	\$6,900,00					\$0.00
PL-6.1	Facilitate Pollinator Studies	00	Contractor	Recon	0031												\$0,000.00					\$0.00
PL-6.2	Facilitate Regional Soils Studies	SC, MI	Preserve Manager		L. Hours																	\$0.00
Coordinatio	n (CO)																					
CO-1.1	Contact Landowners	All	Preserve Manager		L. Hours	5	16	\$125.00	\$2,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$6,208.00
CO-1.2	Develop/Maintain Landowner Contact List	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$3,104.00
CO-1.3	Develop/Maintain Landowner Reporting System	All	Preserve Manager		L. Hours	5	2	\$125.00	\$250.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,302.00
CO-2.1	Resolve Encroachment Issues	UL, KE	Preserve Manager	1	L. Hours	5	16	\$125.00	\$2,000.00	16	\$128.00	\$2,048.00	16	\$130.00	\$2,080.00	12	\$133.00	\$1,596.00	12	\$135.00	\$1,620.00	\$9,344.00
CO-2.2	Coordinate Fuel Modification	All	Preserve Manager	l	L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
CO-3.1	Contact Fire Agencies	All	Preserve Manager		L. Hours	4			\$0.00	4	\$128.00	\$512.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,308.00
CO-3.2	Identify Fuel Modification Needs	All	Preserve Manager	l	L. Hours	1	4	\$125.00	\$500.00													\$500.00
CO-3.3	Maintain Roads	All	Preserve Manager		L. Hours	3	2	\$125.00	\$250.00				2	\$130.00	\$260.00				2	\$135.00	\$270.00	\$780.00
CO-4.1	Contact Utilities	All	Preserve Manager		L. Hours	5	2	\$125.00	\$250.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,302.00
CO-4.2	Provide Biosecurity Measures	All	Preserve Manager		L. Hours	5	4	\$125.00	\$500.00	1	\$128.00	\$128.00	1	\$130.00	\$130.00	1	\$133.00	\$133.00	1	\$135.00	\$135.00	\$1,026.00

Task Description Preserv ¹ Personel Specification Unit Personel Function CostUnit Annual Cost Funit Funit CostUnit Funit	
Property Stewardship (PS) Install Maintain Fencing SC Preserve Manager L. Hours 5 16 \$125.00 \$22.000.00 16 \$130.00 \$22.040.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 16 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 4 \$133.00 \$22.128.00 \$22.00 2 \$12.00 \$1 \$330.00 \$22.128.00 \$22.00 2 \$12.00 \$22.00 2 \$138.00 \$22.00 2 \$12.00 \$22.00 \$22.00 <t< th=""><th>Total Cost (5 Years)</th></t<>	Total Cost (5 Years)
SC Preserve Manager L. Hours 5 16 \$1250 \$2,000.0 16 \$130.0 \$2,000.0 16 \$130.0 \$2,128.0 16 \$133.00 \$2,128.0 16 \$133.00 \$2,128.00 16 \$133.00 \$2,128.00 16 \$133.00 \$2,128.00 16 \$133.00 \$5,22.00 4 \$135.00 \$5,240.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$133.00 \$5,22.00 4 \$135.00 \$5,40.00 \$1 \$330.00 \$1,000.00 \$1 \$330.00 \$1,000.00 \$1,000.00 \$1,000.00 \$1 \$330.00 \$5,22.00 \$4 \$1,55.00 \$4,000.00 \$1 \$330.00 \$2,000.00 \$4 \$1,330.00 \$5,22.00 \$4 \$1,35.00 \$5,20.00 \$2 \$1,200.00 \$2,200.00 \$2 \$1,200.00 \$2,200.00 \$2 <th< th=""><th></th></th<>	
PS-1.1 Install/Maintain Fending Gil Preserve Manager L. Hours 5 4 \$125.00 \$512.00 4 \$130.00 \$552.00 4 \$133.00 \$552.00 4 \$133.00 \$512.00 \$512.00 4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$128.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 \$133.00 \$512.00 \$4 <	\$10,416.0
Notationalinate Prescry KE Preserve Manager L. Hours 5 8 \$125.00 \$1,000.00 8 \$1,024.00 8 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1 \$1,000.00 \$1	\$2,604.0
Image: Note of the serve Manager L Hours 5 2 1 \$330.00 4 \$1 \$330.00 \$3	\$5,208.0
SC Preserve Manager L Hours 5 2 \$125.00 \$4,000.00 4 \$128.00 \$220.00 4 \$130.00 \$522.00 4 \$131.00 \$522.00 4 \$131.00 \$522.00 4 \$131.00 \$522.00 2 \$131.00 \$522.00 2 \$128.00 \$220.00 2 \$131.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$522.00 2 \$128.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$522.00 2 \$132.00 \$280.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$526.00 2 \$133.00 \$120.00	\$660.0
PS-12 Install/Maintain Gates Origin Preserve Manager Lindux 5 2 312000 2 312000 2 313000 3220000 1 313000 3220000 1 313000 32200000 1 313000 32200000 1 313000 32200000 1 313000 32200000 1 <th< td=""><td>\$6,104.0</td></th<>	\$6,104.0
PS-1.2 Install/Maintain Gates Cash of and arg Cost 1 1 S230.00 S230.00 1 S1,200.00 S1,200.00 1 S1,200.00 S1,200.00<	\$1,302.0
Sc Electronic Gate Maintenance Cost 5 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 1 \$1,200.00 \$1,200.00 1 \$1,200.00 <t< td=""><td>\$230.0</td></t<>	\$230.0
GL,KE Locks Cost 2 1 \$18.25 \$18.25 1 \$18.25 \$1	\$6,000.0
SC Preserve Manager L. Hours 5 16 \$125.00 \$22,000.00 4 \$128.00 \$512.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 4 \$130.00 \$532.00.00 <td>\$36.5</td>	\$36.5
MI Preserve Manager L Hours 5 4 \$125.00 \$4 \$128.00 \$512.00 4 \$130.00 \$520.00 4 \$133.00 \$532.00 4 <t< td=""><td>\$4,104.0</td></t<>	\$4,104.0
UL Preserve Manager L. Hours 5 4 \$125.00 \$500.00 4 \$128.00 \$512.00 4 \$130.00 \$520.00 4 \$133.00 \$532.00 4 \$135.00 \$540.00	\$2,604.0
	\$2,604.0
PS-13 InstallMantan Sgnage GI Preserve Manager L Hours 5 2 \$125.00 \$250.00 2 \$126.00 2 \$130.00 2 \$130.00 2 \$133.00 \$250.00 2 \$135.00 \$270.00 \$	\$1,302.0
NE Preserve manageri E rindui 3 4 arc200 add00.00 4 arc200 add20.00 4 arc200 4 arc200 4 arc200 4 arc200 4 arc200 add20.00 4 arc200 add20.00 4 arc200 add20.00 add20	\$910.0
All Significant Cost 5 1 \$144.00 1 \$140.00 1\$14.00 1\$14.00 1\$140.00 1\$14.00	\$720.0
SC Preserve Manager L Hours 5 8 \$125.00 \$1,000.00 4 \$128.00 \$512.00 4 \$130.00 \$520.00 4 \$133.00 \$532.00 4 \$133.00 \$532.00 4 \$135.00 \$540.00	\$3,104.0
UL Preserve Manager L Hours 5 16 \$125.00 \$2,000.00 16 \$128.00 \$2,048.00 8 \$130.00 \$1,040.00 8 \$1,040.0	\$7,232.0
PS-2.1 Remove Trash KE Preserve Manager L. Hours 5 32 \$125.00 \$4,000.00 24 \$128.00 \$3,072.00 16 \$130.00 \$2,080.00 8 \$133.00 \$1,064.00 8 \$135.00 \$1,080.00	\$11,296.0
KE Contractor Large Debris Removal/HRS Cost 1 1 \$5,000.00	\$5,000.0
PS 3.1 Conduct Rende (Trails Insurance) All Preserve Manager L. Hours 1 24 \$130.00 \$3,120.00 Image: Conduct Rende (Trails Insurance)	\$3,120.0
PS.1 Onload Wadds (raise invention) All Contractor CBI Cost 1 1 \$10,291.60 \$10,291.60 -	\$10,291.6
PS-3.2 Develop Roads/Trails Plan All Contractor CBI Cost 1 1 \$6,396.00 \$6,396.00	\$6,396.0
PS-3.3 Implement Roads/Trails Plan	\$0.0
PS-4.1 Prioritize Erosion Control All Preserve Manager L. Hours 5 4 \$125.00 \$500.00 4 \$128.00 \$512.00 4 \$130.00 \$520.00 4 \$133.00 \$532.00 4 \$133.00 \$532.00 4 \$135.00 \$540.00	\$2,604.0
SC Preserve Manager L. Hours 2 2 24 \$130.00 \$3,120.00 6 \$135.00 \$810.00	\$3,930.0
SC Erosion Control Devices Cost 1 1 \$110.00 \$110.00 \$110.00 1	\$110.0
SC Long-term 1 Page 1 Constant	\$0.0
111 Preserve Manager 1 1 16 \$130.00 \$2.080.00	\$2 080 0
PS-4.2 Install/Maintain Erosion Control UL Erosion Control Cost 1 1 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	\$56.0
GI Preserve Manager L. Hours 1 8 \$130.00 \$1,040.00	\$1,040.0
GI Erosion Control Devices Cost 1 1 1 1 \$28.00 \$28.00	\$28.0
KE Preserve Manager L. Hours 1 8 \$130.00 \$1,040.00 1	\$1,040.0
KE Erosion Control Devices Cost 1 1 \$28.00 \$28.00	\$28.0
PS-5.1 Conduct Routine Patrols All Preserve Manager L. Hours 5 192 \$125.00 \$24,000.00 192 \$128.00 \$24,576.00 192 \$130.00 \$24,960.00 192 \$133.00 \$25,556.00 192 \$133.00 \$25,556.00 192 \$133.00 \$25,556.00 192 \$135.00 \$25,920.00 \$192 \$135.00 \$25,920.00 \$192 \$135.00 \$25,920.00 \$192 \$135.00 \$25,920.00 \$192 \$135.00 \$192 \$112 \$112 \$112 \$112 \$112 \$112 \$112	\$124,992.0
PS-52 Enforce Rules and Regulations All Preserve Manager L. Hours 5 2 \$125.00 \$250.00 2 \$128.00 \$256.00 2 \$130.00 \$260.00 2 \$133.00 \$266.00 2 \$135.00 \$270.00	\$1,302.0
Fire Management (FM)	
FM-1.1 Coordinate with Wildlife Fire Resource Advisor Program (WFRAP) All Preserve Manager L Hours 5 4 \$125.00 \$500.00 2 \$128.00 \$256.00 2 \$130.00 \$260.00 2 \$133.00 \$266.00 2 \$133.00 \$266.00 2 \$133.00 \$260.00 \$2 \$130.00 \$260.00 \$2 \$130.00 \$200.00 \$2 \$130.00 \$200.00	\$1,552.0
FM-12 Participate in Fire Safety Organizations All Preserve Manager Hugs 5 4 \$125.00 \$500.00 2 \$128.00 \$266.00 2 \$130.00 \$260.00 2 \$133.00 \$266.00 2 \$133.00 \$266.00 2 \$133.00 \$266.00 2 \$133.00 \$266.00 2 \$135.00 \$270.00 \$	\$1.552.0
FM-1.3 Participate in a Modified Burn Area Emergency Response (BAER) Program All Preserve Manager L. Hours 1 <th1< th=""> 1 <th1< th=""> <th1< th=""></th1<></th1<></th1<>	¢1.560.0
FM-1.4 Coordinate with Fire Agencies All Preserve Manager L. Hours 3 6 \$125.00 \$750.00 6 \$128.00 \$768.00 4 \$133.00 \$552.00	91,000.L
FM-2.1 Coordinate with Local Resource Advisor	\$2,050.0
Ell'11 Coordinata with Modified BAED Browsm	\$2,050.0
	\$2,050.0
FM4.1 Prepare Resource Avoidance Area Map All Preserve Manager L. Hours 1 8 \$125.00 \$1,000.00 Image: Contractor Contractor Cost 1 1 \$5,842.00 Image: Contractor Image: Contractor Contractor Cost 1 1 \$5,842.00 Image: Contractor Image: Contractor Image: Contractor Contractor Cost 1 1 \$5,842.00 Image: Contractor Image: Contrector Image: Contractor	\$1,000.0

								2017			2018			2019			2020			2021		
Task	Task Description	Preserve ¹	Personnel	Specification	Unit	# Years	# Units	Cost/Unit	Annual Cost	(5 Years)												
		SC	Preserve Manager		L. Hours	5	73	\$125.00	\$9,125.00	73	\$128.00	\$9,344.00	73	\$130.00	\$9,490.00	73	\$133.00	\$9,709.00	73	\$135.00	\$9,855.00	\$47,523.00
		MI	Preserve Manager		L. Hours	5	18	\$125.00	\$2,250.00	18	\$128.00	\$2,304.00	18	\$130.00	\$2,340.00	18	\$133.00	\$2,394.00	18	\$135.00	\$2,430.00	\$11,718.00
FM-5.1	Reduce Fire Ignition Probability	GL	Preserve Manager Preserve Manager		L. Hours	5	6 16	\$125.00	\$750.00	ь 16	\$128.00	\$768.00	ь 16	\$130.00	\$780.00	b 16	\$133.00	\$798.00	5 16	\$135.00	\$810.00	\$3,906.00
1 11 0.1	reddoor no gridor roodollwy	KE	Preserve Manager		L. Hours	5	42	\$125.00	\$5,250.00	42	\$128.00	\$5,376.00	42	\$130.00	\$5,460.00	42	\$133.00	\$5,586.00	42	\$135.00	\$5,670.00	\$27,342.00
		All		Reduction Equipment	Cost	5	1	\$3,700.00	\$3,700.00	1	\$3,700.00	\$3,700.00	1	\$4,238.00	\$4,238.00	1	\$3,700.00	\$3,700.00	1	\$3,700.00	\$3,700.00	\$19,038.00
FM-5.2	Reduce Fire Intensity	All	Preserve Manager		L. Hours																	\$0.00
514.5.0		All	Preserve Manager		L. Hours	1													6	\$135.00	\$2,048.00	\$2,048.00
PM-0.3	Finalize Fire Management Plan	All	Contractor	CBI	Cost	1													1	\$4,752.00	\$4,753.00	\$4,753.00
FM-6.1	Implement Post-fire Modified BAER Program																					\$0.00
FM-6.2	Identify/Prioritize Invasive Plants																					\$0.00
FM-6.3	Treat Invasive Plants																					\$0.00
FM-7.1	Identify/Treat Invasive Species and Thatch	All	Preserve Manager		L. Hours																	\$0.00
FM-7.2	Establish Seed Bank	All	Preserve Manager		L Hours	1							8	\$130.00	\$1,040,00							\$1,040,00
FM-7.3	Establish Fx Situ Nursery Stands	All	Preserve Manager		L. Hours	1							8	\$130.00	\$1,040,00							\$1,040,00
FM-7.4	Facilitate Pollinator Studies	All	Preserve Manager		L Hours	5	2	\$125.00	\$250.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,302.00
EM-7.5	Assess/Map MSP Animals	All	Preserve Manager		L Houre	5	4	\$125.00	\$500.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2.604.00
FM-8.1	Assess/Map Fire Suppression Impacts		, in the second		2.110010																	\$0.00
EM 9.2	Identify/Prioritize Investive Plants																					\$0.00
EM 9.2	Troot Investive Plants																					\$0.00
FW-0.3																						30.00
FM-0.4	Conduct Post-line Surveys		1																			\$0.00
FM-8.5	Monitor Population Recovery																					\$0.00
FM-8.6																						\$0.00
FM-8.7	Establish Seed Bank																					\$0.00
FM-8.8	Augment MSP Plant Populations					<u> </u>																\$0.00
FM-8.9	Augment MSP Animal Populations																					\$0.00
FM-8.10	Restore Wildlife Habitat																					\$0.00
FM-8.11	Conduct Hydrology Studies																					\$0.00
FM-8.12	Install Erosion Control																					\$0.00
FM-8.13	Provide Temporary Habitat																					\$0.00
FM-8.14	Manage Vegetation to Promote Foraging Habitat																					\$0.00
Cultural Res	ources (CUL)																					1
CUL-1.1	Conduct Archaeological Surveys																					\$0.00
CUL-1.2	Stabilize/Recover Archaeological Resources																					\$0.00
CUL-2.1	Conduct Architectural Surveys																					\$0.00
CUL-2.2	Develop Historic Structure Management Plan																					\$0.00
CUL-3.1	Identify Tribal Cultural Resources																					\$0.00
CUL-3.2	Evaluate Tribal Cultural Resources																					\$0.00
Public Outre	ach, Education, and Research (OER)																					
0ER-1.1	Promote Public Stewardship	All	Preserve Manager		L. Hours																	\$0.00
OEP 1 2	Provide Information Materials	All	Preserve Manager		L. Hours	5	4	\$125.00	\$500.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2,604.00
UEN-1.2	riovide information materials	All	Preserve Manager	Copy Center	Cost	5	1	\$100.00	\$100.00	1	\$125.00	\$125.00	1	\$150.00	\$150.00	1	\$175.00	\$175.00	1	\$200.00	\$200.00	\$750.00
0ER-1.3	Attend Community Meetings	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
0ER-1.4	Coordinate/Lead Site Tours/Visits	All	Preserve Manager		L. Hours	3	8	\$125.00	\$1,000.00		\$128.00	\$0.00	8	\$130.00	\$1,040.00		\$133.00	\$0.00	8	\$135.00	\$1,080.00	\$3,120.00
0ER-1.5	Coordinate/Lead Volunteer Projects	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
0ER-2.1	Review/Prioritize Research Requests	All	Preserve Manager		L. Hours	5	4	\$125.00	\$500.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2,604.00
0ER-2.2	Provide Researcher Access	All	Preserve Manager		L. Hours	5	4	\$125.00	\$500.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$2,604.00
0ER-2.3	Maintain Research Log	All	Preserve Manager		L. Hours	5	2	\$125.00	\$250.00	2	\$128.00	\$256.00	2	\$130.00	\$260.00	2	\$133.00	\$266.00	2	\$135.00	\$270.00	\$1,302.00
Program Ad	ministration and Reporting (AR)																					
AR-1.1	Create/Maintain Website	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$3,104.00
	Create/Maintain Website	All	Contractor	CBI	Cost	5	1	\$2,392.00	\$2,392.00	1	\$1,186.00	\$1,186.00	1	\$1,224.00	\$1,224.00	1	\$1,260.00	\$1,260.00	1	\$1,298.00	\$1,298.00	\$7,360.00
AR-1.2	Create/Maintain Data Management System	All	Preserve Manager		L. Hours	5	8	\$125.00	\$1,000.00	4	\$128.00	\$512.00	4	\$130.00	\$520.00	4	\$133.00	\$532.00	4	\$135.00	\$540.00	\$3,104.00
AR-1.3	Manage Data	All	Preserve Manager	1	L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00

								2017			2018			2019			2020			2021		
Task	Task Description	Preserve ¹	Personnel	Specification	Unit	# Years	# Units	Cost/Unit	Annual Cost	fotal Cost (5 Years)												
PRV-1.0	manayo bata	All	Contractor		Cost	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	8	\$130.00	\$1,040.00	8	\$133.00	\$1,064.00	8	\$135.00	\$1,080.00	\$5,208.00
AR-2.1	Prepare Annual Work Plan	All	Preserve Manager		L. Hours	3							24	\$130.00	\$3,120.00	24	\$133.00	\$3,192.00	24	\$135.00	\$3,240.00	\$9,552.00
		All	Contractor	CBI	Cost	1				1	\$2,402.00	\$2,402.00										\$2,402.00
AR-2.2	Prepare Annual Report	All	L. Hours	CPI	L. Hours	5	8	\$125.00	\$1,000.00	8	\$128.00	\$1,024.00	40	\$130.00	\$5,200.00	40	\$133.00	\$5,320.00	40	\$135.00	\$5,400.00	\$17,944.00
AR-2.3	Share Data	All	Contractor Preserve Manager	СЫ	L Hours	5	1	\$3,358.00	\$3,358.00	1	\$3,448.00	\$3,448.00	8	\$130.00	\$1 040 00	8	\$133.00	\$1,064,00	8	\$135.00	\$1 080 00	\$5,806.00
AD 2.1	Povinte (Parine Existing ASMDe/Taska		· · · · · · · · · · · · · · · · · · ·			-	-		1.1	-		+	-		1.,	-		1.,00	-		* .,	\$0.00
AR-3.1	Develop New ASMDs/Tasks					-																\$0.00
AR-4.1	Identify/Implement Contingency Measures	All	Preserve Manager		L. Hours	5	6	\$125.00	\$750.00	6	\$128.00	\$768.00	6	\$130.00	\$780.00	6	\$133.00	\$798.00	6	\$135.00	\$810.00	\$3,906.00
Operations																						
	Vehicle	All			Cost	5	1	\$5,427.00	\$5,427.00	1	\$5,427.00	\$5,427.00	1	\$5,427.00	\$5,427.00	1	\$5,427.00	\$5,427.00	1	\$5,427.00	\$5,427.00	\$27,135.00
	Employee Training & Professional Development		Preserve Manager		L. Hours	5	80	\$125.00	\$10,000.00	80	\$128.00	\$10,240.00	80	\$130.00	\$10,400.00	80	\$133.00	\$10,640.00	80	\$135.00	\$10,800.00	\$52,080.00
	Uniforms		Preserve Manager		Cost	3	1	\$100.00	\$100.00				1	\$100.00	\$100.00				1	\$100.00	\$100.00	\$300.00
		SC			Cost	5	1	\$3,403.72	\$3,403.72	1	\$3,403.72	\$3,403.72	1	\$3,403.72	\$3,403.72	1	\$3,403.72	\$3,403.72	1	\$3,403.72	\$3,403.72	\$17,018.60
		MI			Cost	5	1	\$637.88	\$637.88	1	\$637.88	\$637.88	1	\$637.88	\$637.88	1	\$637.88	\$637.88	1	\$637.88	\$637.88	\$3,189.40
	Fixed Fees	UL			Cost	5	1	\$1,274.80	\$1,274.80	1	\$1,274.80	\$1,274.80	1	\$1,274.80	\$1,274.80	1	\$1,274.80	\$1,274.80	1	\$1,274.80	\$1,274.80	\$6,374.00
		GI			Cost	5	1	\$4.94	\$4.94	1	\$4.94	\$4.94	1	\$4.94	\$4.94	1	\$4.94	\$4.94	1	\$4.94	\$4.94	\$24.70
		KE			Cost	5	1	\$24.04	\$24.04	1	\$24.04	\$24.04	1	\$24.04	\$24.04	1	\$24.04	\$24.04	1	\$24.04	\$24.04	\$120.20
		SC																				\$0.00
		MI																				\$0.00
	Water Fees ²	UL																				\$0.00
		GI																				\$0.00
		RE CO	-																			\$0.00
		SC MI	-																			\$0.00
	Property Taxes ²																					\$0.00
		GL																				\$0.00
		KE																				\$0.00
SUBTOTAL	All COSTS)								\$160,575.38			\$171,558.63			\$323,561.38			\$171,227.45			\$251,386.00	\$1,078,308.83
Adminstrati	ve and Office Maintenance																					
	Administrative, office supplies, computer-related, telephone, office maintenance (15%)				Cost	5	1	\$24,086.31	\$24,086.31	1	\$25,733.79	\$25,733.79	1	\$48,534.21	\$48,534.21	1	\$25,684.12	\$25,684.12	1	\$37,707.90	\$37,707.90	\$161,746.32
Contingenc	/																					
	Contingency (15%)				Cost	5	1	\$24,086.31	\$24,086.31	1	\$25,733.79	\$25,733.79	1	\$48,534.21	\$48,534.21	1	\$25,684.12	\$25,684.12	1	\$37,707.90	\$37,707.90	\$161,746.32
TOTAL (All (COSTS)								\$208,747.99			\$223,026.22			\$420,629.79			\$222,595.68			\$326,801.79	\$1,401,801.48

¹Preserves: SC = South Crest, MI = Michelson, UL = Ulrich, GI = Gibson, KE = Kemerko.

²We were not able to calculate water fees and property taxes for the 5-year budget, but include them as line items so EHC can input the information as it becomes available.

Area-specific Management Directive (ASMD) Goal; note that Operations and Administrative and Office Maintenance Costs are not included in the ASMDs but are included in the budget because they are necessary for preserve management.

Task costs are not included in this budget because they will be implemented after 2021.

Task will be costed out only if triggered by monitoring or management actions.

Management action completed or determined not necessary at this time, or included in another task (see Assumptions and Notes).

Subtotal Costs

Total Costs

Conservation Biology Institute

Task	Task Description	Notes and Assumptions							
Vegetation Communit	ies (VEG)	•							
INV-2.2	Identify Invasive Plant Priority Treatment/Maintenance Areas	Includes hours to pursue funding for weed treatments.							
INV-3.1	Manage Brachypodium	\$2,600.00/day for a crew of 5.							
INV-3.10	Respond Rapidly to New or Expanding Invasions	First year purchase two 25-gallon jugs of Round Up Pro Max (or equivalent), one 25-ounce bottle of Fusilade II, surfactant and blue marking dye. First year costs include two battery-powered back pack sprayers, Tyvec suits, gloves and goggles. Costs in subsequent years include back pack parts, cloves or other particide application equipment							
INV-3.11	Reduce Fire Risk from Invasive	Hours included in FM-5.1.							
INV-3.12	Monitor Invasive Plant Treatment Effectiveness	Qualitative monitoring, photographs.							
RS-1.1	Treat Invasive Plants in Restoration Sites	\$2,600.00/day for a crew of 5.							
RS-1.2	Monitor Restoration Effectiveness	Qualitative monitoring, photographs (only EHC).							
RS-1.3	Adjust Restoration Management/Monitoring Regime	EHC and CBI to meet and assess South Crest in 2020 and make recommendations for future monitoring and management. EHC and CBI to meet and assess South Crest in 2020 and make recommendations for future monitoring and management							
RS-2.1	Identify/Prioritize Restoration Sites	EHC and CBI to conduct field mapping and prioritization in 2020. EHC and CBI to conduct field mapping and prioritization in 2020.							
RS-2.2	Pursue Funding for Restoration	EHC to pursue funding in 2021.							
MSP Animal Species	(AN)	•							
AN-1.1	Conduct Quino Checkerspot Butterfly Surveys	Estimated bid based on discussions with two independent consultants.							
AN-1.2	Facilitate Hermes Copper Butterfly Surveys	Based on discussion with Dan Marschalek, surveys are not planned for South Crest/Michelson at this time.							
AN-1.5	Facilitate/Conduct Coastal California Gnatcatcher Surveys	Regional CAGN monitoring; costs include access coordination time for EHC.							
AN-1.7	Facilitate Pallid and Townsend Bat Surveys	Bat surveys are finished. Do not budget for surveys at this time (per Yvonne Moore)							
AN-3.1	Conduct Argentine Ant Surveys	Already completed by USGS.							
AN-3.2	Conduct Oak Borer Surveys	Cost estimate based on 2017 rate provided by Green Tree Forest Service to EHC. Left message to determine if cost is appropriate.							
AN-4.1	Monitor MSP Priority Animals	Monitoring implemented only if surveys detect MSP animals.							
AN-4.2	Monitor MSP Animal Management Effectiveness	Monitors effectiveness of management for MSP animals (no management currently planned).							

	Table D-2.	Budget Notes	and Assum	ptions.
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Task	Task Description	Notes and Assumptions						
AN-4.3	Monitor/Facilitate Monitoring of Wildlife Connectivity	Placeholder of 2 hours/year for coordination.						
AN-7.1	Facilitate Animal Research Studies	Placeholder of 2 hours/year for coordination.						
MSP Plant Species (Pl	L)							
PL-3.1	Monitor MSP Priority Plant Species	No hours included in 2017, when costs covered by SANDAG contract.						
PL-5.2	Establish Seed Bank	Costs include Dehesa nolina seed collection/coordination time (EHC).						
		Costs include Dehesa nolina seed collection/coordination time (CBI).						
PL-5.3	Establish Ex Situ Nursery Stands	<i>Ex situ</i> nursery stand coordination time (EHC)						
PL-5.4	Augment MSP Plant Populations	Maintenance hours (EHC).						
		Collect and submit variegated dudleya seed to Recon.						
PL-5.4	Augment MSP Plant Populations	Recon to outplant propagated variegated dudleya. Cost based on 2015 estimate provided by Recon plus 3% annual increase.						
PL-6.2	Facilitate Regional Soils Studies	Field portion of project complete, so no EHC facilitation hours included.						
Coordination (CO)								
CO-1.1	Contact Landowners	EHC to prepare and disseminate literature during year 1. Make primary contact during year 1 if possible and then continue to make contact in subsequent years.						
CO-1.2	Develop/Maintain Landowner Contact List	Develop list during year 1, then maintain in subsequent years.						
CO-2.1	Resolve Encroachment Issues	Hours are to work with land encroachment issues and conduct limited boundary surveys.						
Property Stewardship	(PS)							
PS-1.1	Install/Maintain Fencing	All Preserves: 1 roll of barbless barbed wire (\$82.80), 1 wire grip (\$8.98), 120 fence clips (\$2.98/bag of 25), 1 pole pounder (\$29.98), and 40 t-posts (6' at \$4.28/t-post). Calculate cost plus 7.25% sales tax. Purchase this equipment twice during the five year period.						

Table D-2.	Budget Notes and	Assumptions.

Task	Task Description	Notes and Assumptions								
PS-1.2	Install/Maintain Gates	 1 roll of barbless barbed wire (\$82.80), 50 fence clips (\$2.98/bag of 25), 20 t-posts (6' at \$4.28/t- post), 2, 6 foot 16-gauge galvanized steel terminal fence posts (\$13.48/post) plus fence post caps (\$1.47/cap), and 2, 50-pound bags of quickset Quickcrete (\$3.85/bag). Calculate cost plus 7.25% sales tax. Purchase this equipment once during the five year period. Maintenance of electronic gate. Scott Grimes 12/1/17. 2 combination locks (Magnum Master lock 								
		\$17.00/lock, plus tax). Purchase 2 during the 5- year period.								
DS 1 3	Install/Maintain Signage	25 custom-made preserve signs plus rules (\$376.25), 25 custom made 'No Trespassing' signs (\$376.25), and 25 'Trail Closed' signs (\$143.75). \$10.00 shipping. Cost is to pay for signs and shipping and install/replace signs for a five year period. Voss Signs.								
13-1.3	install Walitali Signage	Hardware (U channel galvanized steel posts\$15.68/each, hex bolts \$5.22/box, hex nuts \$2.70/box, washers \$3.14/box, 1-pound box of drywall screws \$5.97/box, and plywood for sign backing \$18.63 each) to install/replace signs. Cost is to install/replace approximately 13 signs a year.								
PS-2.1	Remove Trash	One-time pick up fee to remove as much large debris from Kemerko as possible. One day's worth of work (bid based on phone discussion with Habitat Restoration Services).								
PS-3.3	Implement Roads/Trails Plan	Do not include any hours here until the plan is complete. EHC may decide to hire a contractor to maintain roads or decide not to maintain currently accessible roads.								
PS-4.1	Prioritize Erosion Control	Four hours a year to survey erosion areas. Patrol hours can accommodate extra time spent on erosion prioritization.								
PS-4.2	Install/Maintain Erosion Control	Labor to install burlap gravel bags and minor road maintenance along road to Skeleton Flats. Cost for 1 yard of 3/4 inch gravel and 70 burlap flood control bags from RCP Rock. Not included in this budget. EHC to determine when to obtain funding for this plan. Labor to install burlap gravel bags and water bars. 1/2 yard of 3/4 inch gravel and 35 burlap flood control bags. Labor to install burlap gravel bags. 1/4 yard of 3/4 inch gravel and 18 burlap flood control bags. Labor to install burlap gravel bags and discuss erosion with SDGE. 1/4 yard of 3/4 inch gravel and 18 burlap flood								

Table D-2. Budget Notes and Assumptions.

Task	Task Description	Notes and Assumptions						
		control bags.						
PS-5.1	Conduct Routine Patrols	Two full patrol days per month (at eight hours per day).						
PS-5.2	Enforce Rules and Regulations	Most hours to implement this task are included in Task PS-5.1. A few hours included here to maintain patrol log.						
Fire Management (FM	I)							
FM-1.4	Coordinate with Fire Agencies	Conduct work in 2017 and 2018; re-assess maps in 2020.						
FM-5.1	Reduce Fire Ignition Probability	Purchase 1 weed whacker and 1 chainsaw once every 10 years (2019 in this budget). Costs also include equipment rental, maintenance, fuel and herbicide, as provided by Chris Manzuk. His annual estimate for these items is \$3,700.00.						
FM-5.2	Reduce Fire Intensity	Managing <i>Brachypodium</i> thatch in restoration area will help; however, those hours are not included here, but in the invasive plant section.						
FM-7.1	Identify/Treat Invasive Species and Thatch	Occurring in other sections.						
FM-7.2	Establish Seed Bank	Preserve manager coordination time. Assumes that project will be regional.						
FM-7.3	Establish Ex Situ Nursery Stands	Preserve manager coordination time. Assumes that project will be regional.						
FM-7.4	Facilitate Pollinator Studies	Preserve manager coordination time. Assumes that project will be regional.						
Public Outreach, Educ	cation, and Research (OER)							
OER-1.1	Promote Public Stewardship	This task accomplished using hours in Tasks PS- 5.1 and PS-5.2.						
OER-1.2	Provide Information Materials	Copy and print public outreach materials.						
Program Administration	on and Reporting (AR)							
AD 1.1	Create/Maintain Website	EHC to upload data that is not GIS-related to Data Basin.						
AK-1.1	Create/Maintain Website	Upload EHC data (including GIS data) to Data Basin.						
AR-2.1	Prepare Annual Work Plan	CBI prepares first work plan in 2018 and then EHC prepares all subsequent plans.						
AR-2.2	Prepare Annual Report	CBI prepares first and second annual reports and then EHC prepares all subsequent reports.						

Table D-2. Budget Notes and Assumptions.

Area-specific Management Directive (ASMD) Goal; note that Operations and Administrative and Office Maintenance Costs are not included in the ASMDs but are included in the budget because they are necessary for preserve management.

Cost task if triggered by monitoring or management actions.