3.0 Goals and Objectives for Vegetation Management Focus Species

This section provides the goals and objectives for MSP species assigned to the Vegetation Management Focus group. Only VF species are the target of vegetation management actions with VG species benefitting incidentally from vegetation management. Details on the approach to management categorization are presented in Vol. 1, Section 2.0. The criteria and rationale for assigning each species into a management category are provided in Vol. 1, App. 1C. Abbreviated goals and objectives and the prioritization of management objectives for vegetation communities over a 5-year planning horizon are shown in Vol. 2, App. 2A.

Only coastal sage scrub and grassland have detailed vegetation management goals and objectives developed at this time. These two vegetation communities were prioritized for management over the first 5-year planning horizon (2014-2018) since these communities support VF species of high conservation concern, are faced with a high level of threats, require development of BMPs at the landscape-scale, and are not already the focus of extensive management by other entities.

Goals and objectives for vernal pool and alkali playa are deferred until after a workshop is held in 2014 with vernal pool experts, scientists, wildlife agencies, and land owners/managers. The goal of the workshop is to identify best management practices (BMPs) for vernal pools and assess whether additional BMPs need to be developed and tested, to identify information gaps, determine the current condition and management of vernal pools, and ascertain management needs for vernal pool habitat and associated vernal pool and alkali playa species.

Management of Tecate cypress vegetation will focus on restoring a natural fire regime and MSP goals and objectives will be prepared once the FWSP is completed.

Goals and objectives will be prepared for salt marsh and freshwater marsh habitats and incorporated into the MSP in 2014. The remaining vegetation communities (chaparral, riparian forest and scrub, Torrey pine forest, and oak woodland) will be addressed in the next 5-year planning horizon (2019-2023).

3.1. COASTAL SAGE SCRUB VEGETATION COMMUNITY GOALS AND OBJECTIVES

Species Benefitting from Coastal Sage Scrub Vegetation Community Management

Cliff spurge, Blaineville's horned lizard, California gnatcatcher, and San Diego black-tailed jackrabbit are VF species and the focus of coastal sage scrub management (Vol. 2 App. 2A). Other species may benefit if they co-occur in areas where the vegetation is managed for these species and if they share similar habitat requirements. VG species expected to benefit from coastal sage scrub management include California adolphia, snake cholla, Palmer's goldenbush, San Diego barrel cactus, orange-throated whiptail, northern red diamond rattlesnake, southern California rufous-crowned sparrow, Bell's sage sparrow, northwestern San Diego pocket mouse, and southern mule deer.

A model has been developed that characterizes "very high", "high", "moderate" and "low" quality coastal sage scrub in western San Diego County relative to California gnatcatcher use (Winchell et al. 2006). Environmental variables included in the model are slope, patch size, annual precipitation, and average annual temperature. Focused surveys found that California gnatcatchers had the highest probability of occupancy in the very high and high habitat strata. Gnatcatcher occupancy was associated with shallow slopes and warmer and wetter coastal sage scrub. Three years of gnatcatcher survey data (2004, 2007, 2009) were recently reviewed by a scientific panel and recommendations were made to develop models predicting gnatcatcher occupancy based upon measured vegetation and substrate variables. These occupancy models are under development (P. Doherty, pers. comm.). In the interim, preliminary results from simpler models constructed by SDMMP indicate gnatcatchers are associated positively with California sagebrush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), and bare ground. Once the occupancy modeling is completed, the results will be used to develop success that will be used for coastal sages scrub management that targets California gnatcatchers.

As monitoring data become available for other VF species, we will develop specific criteria focused on managing coastal sage scrub for their benefit.

Management Units with Coastal Sage Scrub

Nearly 68,700 acres of coastal sage scrub are on Conserved Lands within the MSPA. All management units within the MSPA have conserved coastal sage scrub, with MU3 having the most (33,000 acres), followed by MU4 (16,650 acres), and MU6 (9,700 acres). Maps showing the distribution of coastal sage scrub and grassland communities within the MSPA and in each MU are in Vol. 1, Section 3.0. Very high and high quality sage scrub associated with gnatcatcher occupancy is most abundant in MU3 (28,550 acres), followed by MU6 (9,050 acres) and MU4 (8,230 acres).

Threats to Coastal Sage Scrub

The greatest threat to coastal sage scrub is the invasion of non-native plant species, particularly annual grasses, that has led to large-scale type conversion of coastal sage scrub to non-native grassland (Freudenberger et al. 1987, Minnich and Dezzani 1998, Allen et al. 2000, Talluto and Suding 2008). An altered fire regime with too frequent fire, nitrogen deposition, disturbance such as clearing, and over-grazing are all factors in the conversion of coastal sage scrub to non-native grassland (Westman and O'Leary 1986, Stylinski and Allen et al. 1999, Keeley et al. 2005, Talluto and Suding 2008, Ochoa-Hueso

et al. 2011). Climate change models predict a warmer climate with more intense and longer duration heat waves in the future in southern California (Hayhoe et al. 2004, Cayan et al. 2008). There is also growing concern that this region could have longer and more intense droughts (Seager et al. 2007). These changes in climate could affect coastal sage scrub community composition and structure.

Within the MSPA, extremely large wildfires in 2003 and 2007 burned large expanses of the MSPA. In 2003, approximately 378,800 acres burned in San Diego County, 103,219 of which were on Conserved Lands in the MSPA (FRAP 2012). A total of 17,634 acres of very high and high quality coastal sage scrub burned, primarily in MUs 3 and 4. In 2007, wildfires consumed 334,000 acres in San Diego County, including 101,272 acres of Conserved Lands and 21,673 acres of very high and high quality coastal sage scrub. Based on the 2004 and 2007 surveys, California gnatcatchers did not occupy coastal sage scrub immediately following the 2003 fire and were slow to colonize recovering coastal sage scrub (USFWS 2009). The current status of burned coastal sage scrub across the MSPA is not well documented, but initial analysis of data from post-fire vegetation monitoring at several sites indicate recovery is poor in some areas and that invasive, non-native annual grasses are a threat (USGS FWSP Workshop).

Management Approach

Type conversion of coastal sage scrub to non-native grassland is the largest threat that needs to be managed in coastal sage scrub. For the first 5-year planning horizon, the focus will be on assessing the condition of burned and unburned coastal sage scrub across the MSPA to determine whether management is needed to restore or enhance some areas to high or very high quality for California gnatcatchers. In future planning cycles, the focus may broaden to include management for other three coastal sage scrub VF species (cliff spurge, Blaineville's horned lizard, black-tailed jackrabbit) if monitoring data suggest there is the need to do so. Currently, there are no BMPs for landscape scale management of invasive annual grasses in coastal sage scrub. A study needs to be conducted to test management options and develop BMPs that can be used at a scale of thousands of acres to enhance coastal sage scrub by controlling invasive annual grasses. This study would evaluate whether grazing that is focused on habitat enhancement (and not livestock production) effectively reduces annual grasses without further impacting coastal sage scrub. Grazing as a method to enhance coastal sage scrub should be conducted at several sites over multiple years with annual variation in the timing and amount of precipitation. Other variables to consider in assessing the effectiveness of grazing include the type of livestock, the timing of grazing, the stocking rate, the duration, the frequency, the feasibility, and the cost. After the AECOM (2012) vegetation map is finalized, it will be used in prioritizing areas to survey coastal sage scrub and to assess threats and collect other covariate data. Near the end of the first 5-year planning horizon (2017) an implementation plan will be prepared that identifies high priority management actions to begin in 2018. Table 3-1 provides coastal sage scrub management goals and objectives.

Table 3-1. Vegetation management goals for coastal sage scrub VF species.

Regional Management Goal: Enhance and restore coastal sage scrub on Conserved Lands in the MSPA that supports or has the potential to support VF species (cliff spurge, Blaineville's horned lizard, California gnatcatcher, black-tailed jackrabbit) so that these species are resilient to environmental stochasticity and catastrophic disturbances such as fire and will be likely to persist over the long term (>100 years).			
Type	**Objectives**	**MUs**	**Actions**
BMP; Regional	Beginning in 2014, conduct at least a three year experimental study to develop and test grazing as a BMP for controlling invasive non-native annual grasses at a landscape scale in coastal sage scrub at multiple sites on Conserved Lands, monitor annually to determine effectiveness and any impacts to plant and animal species, develop management recommendations, and submit monitoring and management data to SC-MTX.	3,4,5,6	• Initiate adaptive management at three or more selected sites with extensive areas of coastal sage scrub with a large annual grass component in one of the following MUs: 3, 4, 5, 6 • Select livestock species to use in the grazing study that are most feasible to manage, be effective at controlling invasive non-native annual grasses, and that are least likely to impact native plant and animal species. • Conduct experimental trials at multiple sites with sufficient replicates to evaluate the timing and duration of grazing, stocking rates, and frequency of grazing over at least three years with varying amounts and timing of precipitation. • Monitor plant community composition and cover to determine if grazing effectively controls non-native annual grasses, forbs and alters native plant community composition, structure, and cover. • Collect covariates to evaluate impacts of grazing to native plant and animal species. • If utilizing grazing to manage annual grass in coastal sage scrub achieves the desired outcomes and does not have unintended consequences (introduction and or expansion of invasive species, change in shrub structure, etc.) on the coastal sage scrub vegetation community and it is cost effective, develop a BMP for utilizing grazing as a management tool. If a BMP is developed it should include specific guidelines on how to use grazing as a management tool and the costs to utilize it. • Submit monitoring and management data to the SC-MTX website portal.
FWP; Local	Beginning in 2015, implement pre-fire management actions identified in the Strategic Fire Plan in order to reduce the effects of an altered fire regime on coastal sage scrub on Conserved Lands in the MSPA.	1,2,3,4,5,6,7,8	• Perform pre-fire actions identified in the Strategic Fire Plan that would benefit coastal sage scrub, including actions to promote a natural fire return interval. • Submit management data to the SC-MTX website portal.
ISV; Regional	In 2015, survey burned and unburned coastal sage scrub across the MSPA in conjunction with the California gnatcatcher monitoring, measure vegetation and collect covariate data on threats, combine with previously collected	1,2,3,4,5,6,7,8	• Use previously collected data coastal sage scrub vegetation data (e.g., USGS, USFWS, SDSU vegetation transects) and landscape-scale tools (e.g., AECOM 2012 vegetation map, imagery analysis) to identify points to survey

	coastal sage scrub vegetation datasets, and use these data to evaluate the condition of coastal sage scrub across the MSPA, and submit survey data and analysis to the regional SC-MTX website portal.		and measure coastal sage scrub vegetation. • Survey burned and unburned coastal sage scrub in conjunction with the California gnatcatcher surveys and collect vegetation measurements using methods comparable to previous studies (e.g., 50-m transects) and collect covariate data on threats. • Use the 2015 survey data as well as previous vegetation sampling datasets to evaluate the condition of coastal sage scrub across the MSPA, including a focus on recovery from the 2003 and 2007 wildfires. • Submit survey data and management recommendations to the SC-MTX website portal.
PIP; Regional	In 2017 prepare a comprehensive report on the status and trends of coastal sage scrub in all management units and determine if there is a need to prepare and implement a five year plan to enhance and/or restore coastal sage scrub for California gnatcatchers, if there is such a need prepare a restoration/ enhancement plan, and identify the high priority areas for its implementation.	3,4,5,6	• Specify BMPs for landscape-scale restoration of coastal sage scrub based upon the grazing study and any other latest research on coastal sage scrub management. • Use the California gnatcatcher occupancy model results based upon 2004, 2007, 2009 and 2015 gnatcatcher surveys and vegetation measurements to develop vegetation objectives for coastal sage scrub. • Develop models to identify restoration sites that take into account fire history, fire risk, gnatcatcher populations, demography and dispersal capabilities, surrounding landscape matrix, habitat suitability and threats to coastal sage scrub, and evaluate alternative restoration strategies to identify enhancement and/or restoration sites. • In collaboration with land owners/managers select three or more sites in two or more MUs for landscape-scale restoration/enhancement to benefit California gnatcatcher populations taking into account the coastal sage scrub condition assessment and restoration site selection models. • Prepare high priority management actions for landscape-scale coastal sage scrub restoration/enhancement over a five year period.
IIP; Regional	Beginning in 2018, implement high priority management actions identified in the coastal sage scrub implementation plan.	3,4,5,6	• Management actions to be determined by the implementation plan.

3.2. GRASSLAND VEGETATION COMMUNITY GOALS AND OBJECTIVES

Species Benefitting from Grassland Vegetation Community Management

Grassland management would involve restoring native grassland and forbland plant communities in areas that are now dominated by invasive non-native annual grasses. Grasshopper sparrow and Stephen's kangaroo rat are VF species that are the focus of grassland management (Vol. 2 App. 2A). Other species may benefit if they co-occur in areas where the vegetation is managed for these species and if they share similar habitat requirements. VG species expected to benefit from grassland management include ferruginous hawk and Swainson's hawk. Some other species falling into the species-specific management categories that would also benefit include Orcutt's brodiaea, thread-leaved brodiaea, Quino checkerspot, northern harrier, golden eagle, burrowing owl, pallid bat, San Diego black-tailed jackrabbit, and American badger. There are goals and objectives for these species that also address management of grasslands to create specific vegetation structure. In many instances implementing the goals and objectives for these species will accomplish grassland goals and objectives.

Management Units with Grassland

Native grasslands in southern California are comprised of perennial bunch grasses and can support an array of perennial and annual herbs. Native grasslands can occur in a savannah setting with oaks or as open grassland. Non-native grasslands are dominated by European annual grasses and often have an exotic forb component as well. Beginning in the 1700s with European settlement and the introduction of livestock, non-native grasses and forbs began invading native grasslands, forblands, and coastal sage scrub often leading to type conversion to non-native grassland (D'Antonio et al. 2000, Barry et al. 2006, Minnich 2008). Native grassland and forbland often occur together with other vegetation communities (e.g., coastal sage scrub, oak woodland) in a landscape mosaic. At a finer-scale the configuration of native forbland and grassland is influenced by soils, with native grassland grasses and perennial herbs often associated with heavier, clay soils.

Approximately 6,150 acres was mapped in 1995 as native grassland on Conserved Lands in the MSPA and 11,400 acres as non-native grassland. All management units within the MSPA have conserved native and non-native grasslands. MU3 has the most grassland (2,370 acres native, 2,970 acres non-native), followed by MU6 (1,470 acres native, 2,700 acres non-native), and MU5 (180 acres native, 2,280 acres non-native). MU4 has1,260 acres native and 753 acres of non-native grassland. The actual number of acres of extant grasslands may be significantly different due reversion of dry-land farmed areas to non-native grassland, changes in vegetation communities since the 2003-2007 wild fires, and mapping errors in the 1995 vegetation map dataset. The distribution of grassland communities (based on the 1995 vegetation map) within the MSPA and in each MU is shown in Vol. 1, Section 3.0.

Threats to Native Grassland and Forblands

The loss of millions of hectares of native grasslands and forblands in California over the last 150 years is attributed to the expansion and intensification of agriculture, urbanization, livestock overgrazing, and invasion of non-native plants (D'Antonio et al. 2000, Seabloom et al. 2003, Barry et al. 2006, Minnich 2008). A prolonged and intensive drought in the mid-1800s combined with overgrazing may have helped exotic annual grasses to become dominant (Burcham 1956, D;Antonio et al. 2000). Native forblands in particular have declined in southern California as a result of invasive annual grasses (Minnich 2008) which has led to declines in MSP species dependent on flowers such as the Quino checkerspot (Preston et al. 2012).

Management Approach

Restoration of native forbland and grassland would enhance and expand habitat for a number of plant and animal species. The focus of restoration would be in areas that would benefit SL, SO and SS species (e.g., Orcutt's brodiaea, thread-leaved brodiaea, Quino checkerspot, northern harrier, golden eagle, burrowing owl, pallid bat, San Diego black-tailed jackrabbit, and American badger) and in areas where the two VF species (grasshopper sparrow, Stephen's kangaroo rat) would also benefit. Currently, BMPs are needed for landscape-scale restoration of non-native grasslands to native forblands and grasslands in southern California. Most research involving landscape-scale management of grasslands using fire and livestock grazing has been conducted in the northern and central portions of the state (D'Antonio et al. 2000, Stahlheber and D'Antonio 2013). A study needs to be conducted to test management options and develop BMPs that could be used at a scale of hundreds to thousands of acres to restore a mosaic of native forbland and grassland. This study would evaluate whether how to use grazing as a management tool (and not livestock production) to modify vegetation communities thereby creating and or enhancing habitat for target species. The tool needs to effectively reduce annual grasses and in combination with an existing native forb and grass seed bank (or when combined with re-seeding of native species) recovers non-native grassland to native forbland and grassland that benefits the target species. Fire may also be utilized as layered treatment in some situations. Metrics to measure would include species richness, vegetation structure, cover of native versus non-native grasses, forbs, and shrubs and potential impacts to MSP plant and animal species. Adaptive grazing management should be conducted at several sites over multiple years with annual variation in the timing and amount of precipitation. Other variables to consider assessing include the type of livestock, the timing of grazing, the stocking rate, the duration, the frequency, the feasibility, and the cost. The willingness of preserve managers to participate in the adaptive management program and the finalized 2012 AECOM vegetation map will be used to prioritize management areas. The project will be initiated in 2014 and the implementation plan developed in late 2014 or early 2015. The project will include surveys of native and non-native grassland and to assess threats and collect other covariate data at potential management sites. It is anticipated that the first year of project

implementation will be 2015 or 2016. Table 3-2 describes grassland management goals and objectives.

Table 3-2. Vegetation management goals for grassland VF species.

Regional Management Goal: Enhance and restore native grasslands and forblands on Conserved Lands in the MSPA that support or has the potential to support VF species (grasshopper sparrow, Steven's kangaroo rat) and to incidentally benefit a diverse array of other species (e.g., Quino checkerspot, burrowing owl, golden eagle) so that they are resilient to environmental stochasticity and will be likely to persist over the long term (>100 years).			
Type	**Objectives**	**MUs**	**Actions**
BMP; Regional	Beginning in 2014, conduct at least a four year adaptive management study to develop and test grazing and other techniques as a BMP for controlling annual grasses in non-native grasslands and restoring mosaics of native grasslands and forblands at a landscape scale at multiple sites on Conserved Lands, monitor annually to determine effectiveness and any impacts to plant and animal species, develop management recommendations, and submit monitoring and management data to SC-MTX.	3,4,5,6	• Develop a conceptual model of the grassland system to help identify key relationships and threats/stressors and how proposed management techniques might affect the system. • Initiate adaptive management at three or more selected sites with extensive areas of native and non-native grassland in one of the following MUs: 3, 4, 5, 6. • Select livestock species to use in the grazing study that are most feasible to manage, effective at controlling invasive non-native annual grasses, and that are least likely to impact native plant and animal species. • Conduct experimental trials at multiple sites with sufficient replicates to evaluate the timing and duration of grazing, stocking rates, and frequency of grazing over at least three years with varying amounts and timing of precipitation. • Include in the experimental design different seeding trials to determine the combination of invasive plant control and re-seeding techniques that results in the most effective restoration outcomes. • Include in the design layered management techniques such as prescribed fire. • Monitor plant community composition and cover to determine if grazing and other treatments effectively control non-native annual grasses, forbs, and alter native plant community composition, structure, and cover. • Collect covariates to evaluate impacts of grazing and other treatments to native plant and animal species. • If utilizing grazing (by itself or a part of a layered treatment regime) controls non-native annual grasses and helps achieves the desired outcomes (with no unintended consequences, such as the introduction and or expansion of invasive species, change in shrub structure) in regards to native forbland and grassland communities and it is cost effective, develop a BMP for utilizing grazing as a management tool.

			The BMP it should include specific guidelines on how to use grazing as a management tool and the costs to utilize it. • Submit monitoring and management data to the SC-MTX website portal.
ISV; Regional	In 2016 and 2017, survey native and non-native grasslands across the MSPA, measure vegetation and collect covariate data on threats and other environmental attributes, combine with previously collected grassland vegetation datasets, and use these data to evaluate the condition of grasslands and potential areas for restoration of native grassland and/or forbland, and submit survey data and analysis to the regional SC-MTX website portal.	1,2,3,4,5,6,7,8	• Use previously collected data grassland data (e.g., USGS, SDSU vegetation transects) and landscape-scale tools (e.g., AECOM 2012 vegetation map, imagery analysis), and habitat suitability models to identify points to survey. Assess occupancy or potential for occupancy of grassland SL, SO, SS and VF species that would benefit from restoration of native forbland and grassland. • Measure vegetation at survey points using methods consistent to previous studies (e.g., 50-m transects and quadrats) and collect covariate data including data on threats. • Conduct site assessments, including evaluating soils and the composition of native forb and grass species to identify suitable habitat for grassland and forbland restoration. • Use the 2016/2017 grassland survey data as well as previous vegetation sampling datasets to evaluate the condition of grasslands across the MSPA and to identify suitable areas to restore native forblands and grasslands using the grassland management BMP. • Submit survey data and management recommendations to the SC-MTX website portal.
PIP; Regional	In 2018 prepare a comprehensive report on the status and trends of grassland in all management units, identify areas for restoration based upon occupancy or potentially suitable habitat for grassland SL, SO, SS and VF species (grasshopper sparrow, Stephen's kangaroo rat) and prepare a five year plan to restore native grassland and forbland, and identify the high priority areas for its implementation.	3,4,5,6	• Specify BMPs for landscape-scale restoration of grassland and forbland based upon the grazing and seeding/planting study and other research on grassland and forbland management. • Use existing information on habitat preferences for SL, SO, SS grassland species, Stephen's kangaroo rat, and grasshopper sparrow to develop restoration site selection models and specify restoration objectives. • In collaboration with land owners/managers select three or more sites in two or more MUs for landscape-scale (>500s acres) restoration of native grassland and forbland using the restoration site selection models. • Prepare high priority management actions for landscape-scale grassland and forbland restoration/enhancement over a five year period.
IIP; Regional	Beginning in 2019, implement high priority management actions identified in the grassland and forbland restoration implementation plan.	3,4,5,6	• Management actions to be determined by the implementation plan.