

Invasive Plant Species Management, Implementation of Invasive Species Plan Recommendations

Contract #1: Final Report, Field Season 2015 & 2016

Contract #2: Work Plan, Field Season 2017 & 2108

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Introduction

A strategic plan for invasive plant control was completed by Conservation Biology Institute (CBI) in September 2012. This plan created a management structure and outlined priorities for detection, eradication and management of invasive non-native plant species across the conserved lands of western San Diego County. The Invasive Plant Strategic Plan (IPSP) works in conjunction with the region's Management Strategic Plan for Conserved Lands in western San Diego County (MSP; available at www.sdmmp.com). The County of San Diego's Department of Agriculture, Weights and Measures (AWM), under an agreement with the San Diego Association of Governments (SANDAG) is tasked with the initial implementation of the IPSP with a focus on Early Detection Rapid Response (EDRR). This Contract#1 Final Report for the 2015 and 2016 field seasons was prepared to summarize treatment and tracking of regional invasive plant control in support of EDRR. This report also outlines a work plan for 2017 and 2018 field seasons (contract#2).

Background on Early Detection and Rapid Response Management Approach

As outlined in the IPSP, if eradication is the goal, the best time to initiate control of an invasive non-native species, in terms of both cost and effectiveness, is when the species has just been introduced into a system. This management approach is termed 'Early Detection and Rapid Response' (EDRR). Rejmanek and Pitcairn (2002), of the University of California Davis, analyzed weed eradication efforts by the California Department of Food and Agriculture (CDFA) over a 30-year period. They showed that weed eradication success decreased exponentially and the effort (time, money, etc.) increased exponentially as the size of the weed infestation increased.

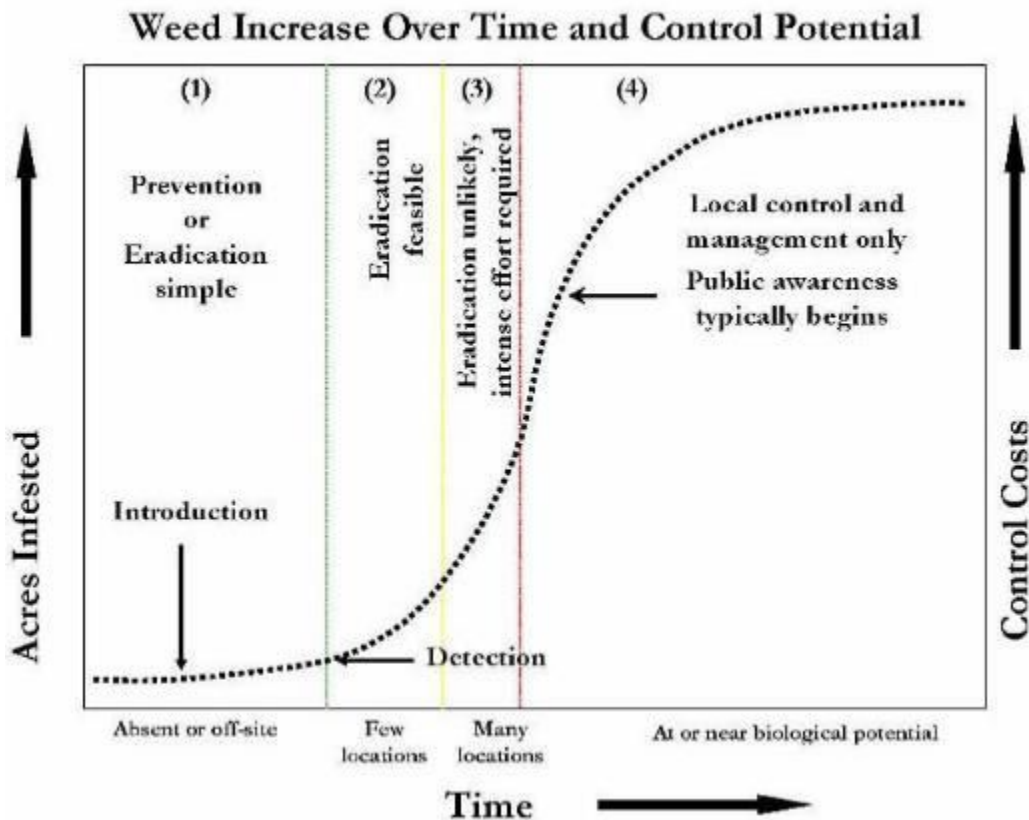
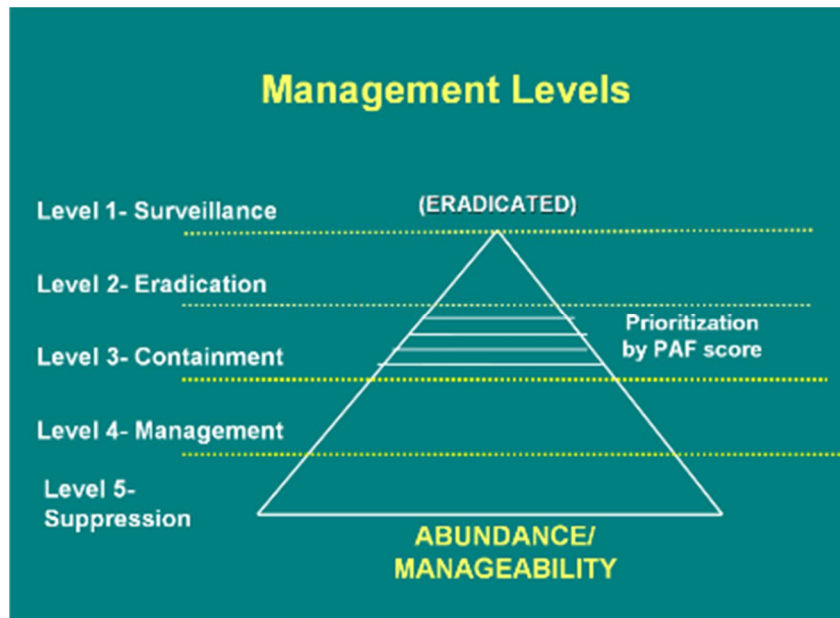


Figure 1. The process of invasion and the optimal time to initiate management. (Siemens and Tu 2007).

For this reason funding provided by SANDAG EMP is being focused on the control of EDRR species, with eradication of the species being the goal. The IPSP outlined a framework of 'management levels' to categorize invasive plant species worked on in the region. There are five management levels in all, with the top two levels falling within the EDRR management approach.



The five management levels in treated invasive non-native plant species.

Table 1. Summary of management levels and goals.

Level	Distribution	Scale of Management	Feasibility	Goal
1- Surveillance	Not present	Region-wide	<u>High</u> : low effort required to achieve goal	Regional surveillance, early detection, rapid response
2- Eradication	Limited; few individuals or populations	Region-wide	<u>High</u> : moderate effort required to achieve goal	Eradication with regionally coordinated control program
3- Containment	Variable	Watershed or management unit	<u>Medium</u> : Funding typically available for re-treatments or control of small populations	Eradication with coordinated programs by management unit or watershed
4- Directed Management	Wide; abundant	Sub-management unit or reserve	<u>Medium</u> : area may be managed effectively, with slow re-invasion	Control within reserve or sub-management unit to benefit NCCP resources
5- Directed Suppression	Wide; abundant	Reserve or site	<u>Low</u> : control is typically of short term benefit (rapid re-invasion) without active restoration	Suppression, typically to allow recovery of disturbed site, improve re-vegetation success, or benefit NCCP resources

In support of the IPSP 55 species were assessed and scored using a regional plant assessment process (SDPAF score) based on the Cal-IPC state wide assessment standard. This process evaluates abiotic and biotic impacts, invasiveness, and distribution. The IPSP made management recommendations for 29 species in the region. Currently as of June 2017, there is one species in Management Level 1 surveillance priority (Scotch broom) and 17 species in Management Level 2 (eradication targets).

Contract #1: Work completed January 2015 through February 2017

This summary report outlines control work (“treatments”) by AWM on thirteen of the seventeen Level 2 species in the IPSP (Table 2). The four species with no AWM work are: 1) barbed goat grass, which has one population being treated by the Department of Defense (DoD), 2) medusahead, which needs further work verifying its distribution, 3) purple loosestrife, where ROE permissions have not been successfully obtained, and 4) purple star thistle, which has a low SDPAF score and was identified as a low priority in the IPSP. There are five Level 2 species that have been added to the IPSP - two *Limonium* species (European and Algerian sea lavenders), *Sesbania punicea* (rattlebox), *Euphorbia virgata* (leafy spurge) and *Volutaria tubiliflora* (volutaria knapweed). As outlined in the 2015-2016 Work Plan and this summary report/work plan, these five species are significant threats to MSP resources (SDPAFs in preparation). There are also seven species of limited distribution being considered for addition to Management Level 2: *Arctotheca calendula* (Cape weed), *Chrysanthemoides monilifera* (bitou bush), *Enchylaena tomentosa* (ruby saltbush), *Heliotropium supinum*, *Pentameris airoides* (annual pentaschistis), *Myoporum acuminatum* (strychnine bush), and *Senecio quadridentatus* (cotton burnweed) (Table 3). Five of the seven species being considered as additions to Management Level 2 are known by single populations, two of which are under active management by DoD (*Senecio quadridentatus* and *Pentameris airoides*). SDPAFs will be prepared for appropriate species and will be further described in the next update of the IPSP.

The second critical activity is tracking, monitoring and assessing work carried out by others on Level 2 management species, as well as monitoring historic sites to ensure that controlled populations are truly eradicated (Table 3).

This report provides detailed summaries for each of the thirteen non-native plant populations worked on in the field during the first contract with the following information included: current condition, rationale for management, management information, work completed, future work recommendations, a table of specific population locations (sites), infestation size, planned work to be implemented, general property ownership, and maps (regional map with all populations and detailed site specific map for sites actively worked on by AWM).

It is important to remember that the main priority, and most efficient approach, in eradicating newly introduced invasive plant species is to treat them **before** they begin to directly impact sensitive resources and **before** they become widely distributed. Therefore, prioritization for treating the non-native species has been based on the overall ecological impacts associated with the invading plant the plant's invasiveness, as well as the size of known populations (see SDPAF scores and documentation). There are a few instances where sensitive plant species are adjacent to or near locations of target plants to be controlled, and at least two examples where they are co-occurring or intermixed (*Limonium duriusculum* and salt marsh bird's beak at San Diego River estuary, and *Volutaria* and Orcutt's bird's beak at Rice Canyon, Chula Vista). These situations create management constraints to implementation and in some situations could make it difficult to eradicate target invasives due to potential negative impacts to sensitive resources. This is why detection and response (EDRR) are the

foundation of this program: detect and respond **before** there are constraints to doing the work or it is simply too late to eradicate the invading species from the region because it is too widely distributed.

A coordinated regional approach is the best long term solution to achieving eradication. County AWM work funded through the Transect EMP program aims to push control/management work toward the goal of eradication. County AWM crews and monitoring aid this effort by assisting in control and monitoring – adding rounds of treatment, assisting in reminders and identification, and treating populations outside local land managers program/work areas. Specific examples of this movement from localized control toward the goal of regional eradication are: bridal broom (DoD was treating on their lands only), Canary Island St. John’s wort (some sites treated by City of San Diego Departments, other sites were not being treated) and French broom (some sites treated other sites not being treated). Now most sites are under treatment for these plants. Examples of ‘rapid response’ to newly identified populations: *Volutaria* and *Euphorbia terracina*, with all known sites are under treatment.

Contract #2: Work plan January 2017 through December 2018

Field work for 2017 and 2018 has already been initiated. This work includes re-treating sites where work occurred in 2015 and 2016, as well as initiating work at new treatment sites to continue progress toward achieving eradication of EDRR species. Table 4 outlines a summary of planned work in 2017 and 2018 by species. Site specific recommendations and planned treatments are presented in the next section of the report. Multiple rounds of re-treatment within a season are frequently required to achieve complete control of all individuals, particularly for species with large seedbanks (e.g. *Euphorbia terracina*, bridal broom, French broom). New treatment sites for 2017 and 2018 are also identified and are being added to the treatment schedule (Canary Island St. John’s wort). One species (Ward’s weed) is being scheduled for less work by treatment crews due to difficulty of control and the discovery of a larger population beyond the scope of this contract. A new pre-emergent (Gallery) may be tried on a portion of the Ward’s weed site to assess if this provides better control.

Reports of new populations for target plants will be confirmed and added to treatment sites and work schedule as appropriate.

Treatment methods, Right of Entry forms (ROE) used for the project, and environmental/regulatory documents are presented in Appendices.

Table 2: Seasonal treatment schedule by AWM crews, Level 2 management species (EDRR targets). Not all populations are being treated, see detailed treatment, tracking, and monitoring breakouts for each species.

Scientific Name	Common Name	Growth form	Known populations (active)	Populations worked on in 2015	Populations worked on in 2015 by AWM	Populations worked on in 2016 ^a	Populations worked on in 2016 ^a by AWM
<i>Ageratina adenophora</i>	Eupatory	Perennial forb	4	2	2	3	3
<i>Carrichtera annua</i>	Ward's weed	Annual forb	3	2	1	2	1
<i>Centaurea solstitialis</i>	Yellow star thistle	Annual forb	7	6	6	6	6
<i>Centaurea stoebe</i>	Spotted knapweed	Annual forb	2	1	1	2	2
<i>Euphorbia terracina</i>	Carnation spurge	Annual forb	6	3	3	5	5
<i>Euphorbia virgata</i>	Leafy spurge	Annual forb	2	0	0	1	1
<i>Genista monspessulana</i>	French broom	Perennial shrub	5	2	1	2	1
<i>Hypericum canariense</i>	Canary Island St. John's wort	Perennial shrub	12	7	2	7	2
<i>Limonium duriusculum</i>	European sea lavender	Perennial forb	8	5	4	5	4
<i>Limonium ramosissimum</i>	Algerian sea lavender	Perennial forb	14	9	5	5	4
<i>Retama monosperma</i>	Bridal broom	Perennial shrub	4(6 ^b)	4	3	4	3
<i>Sesbania punicea</i>	Rattlebox	Perennial shrub	2	2	0	2	1
<i>Volutaria tubiliflora</i>	Volutaria knapweed	Annual forb	2	-	-	2	1

a) Through 2-28-2017 (contract end date) b) There are two production grove sites that appear to be non-invasive

Table 3: Tracking, monitoring and assessing schedule: Level 2 management species (EDRR targets). 'Tracking' is the coordinator contacting non-AWM entity to ensure treatment work is occurring. 'Monitoring' is visiting sites to ensure that either: work is occurring, or that populations considered eradicated (have no new individuals). 'Assessing' is the coordinator or AWM crew surveying to determine if the species is too wide spread to be considered an EDRR target.

Scientific Name	Common Name	Management Level	Growth form	Populations/sites to be monitored, tracked, assessed	Track: confirm other's work is occurring 2015/2016	Assess: map and survey to determine EDRR action	
						2015/16	2017/18
<i>Aegilops triuncialis</i>	Barbed goat grass	Level 2	Annual grass	1	1 (Fallbrook NWS)	-	-
<i>Arctotheca calendula</i>	Capeweed	Assess for Level 2	Annual forb	2	1 (Camp Pendleton)	-	1
<i>Centaurea calcitrapa</i>	Purple star thistle	Level 2	Annual forb	1	-	-	-
<i>Chrysanthemoides monilifera</i>	Bitou bush	Assess for Level 2	Perennial shrub	1	-	-	1
<i>Enchylaena tomentosa</i>	Ruby saltbush	Assess for Level 2	Perennial sub-shrub	2	-	1	1
<i>Elymus caput-medusae</i>	Medusahead	Level 2	Annual grass	3	2	1	2
<i>Heliotropium supinum</i>	Dwarf heliotrope	Assess for Level 2	Annual forb	1	1	-	-
<i>Lythrum salicaria</i>	Purple loosestrife	Level 2	Annual forb	2	1 (SELC)	-	1
<i>Myoporum acuminatum</i>	Strichnine bush	Assess for Level 2	Perennial shrub	1	-	1	-
<i>Pentameris airoides</i>	Annual pentaschistis	Assess for Level 2	Annual grass	1	1 (Camp Pendleton)	-	-
<i>Retama monosperma</i>	Bridal broom	Level 2	Perennial shrub	1	1 (Fallbrook NWS)	-	-
<i>Senecio quadridentatus</i>	Cotton burnweed	Assess for Level 2	Annual forb	1	1 (Camp Pendleton)	-	-
<i>Volutaria tubiliflora</i>	Volutaria knapweed	Level 2	Annual forb	1	1 (DoD, Point Loma)	-	-

Table 4: Treatment schedule by AWM crews of Level 2 Management species (EDRR targets that were known to be in the County at the ISP was written in 2012). Target plant populations may cover multiple properties and contain multiple discrete patches of plants.

Scientific Name	Common Name	Growth form	Known populations (active*)	Populations worked on in 2015	Populations worked on in 2016	Populations to be worked on in 2017	Populations to be worked on in 2018	2017 & 2018 Amendment #2 Notes
<i>Ageratina adenophora</i>	Eupatory	Perennial forb	4	3: New	2: Re-treatment	3: Re-treatment 1: New treatment	4: Re-treatment	Includes new treatment on portion of San Diego River site and one new site.
<i>Arctotheca calendula</i>	Capeweed	Perennial forb	1	0	0	1: New treatment?	1: Re-treatment?	Confirmed on USMCB Camp Pendleton, source population may be in County.
<i>Carrichtera annua</i>	Ward's weed	Annual forb	1	1: Re-treat	1: Re-treatment	1: Re-treatment (new herbicide trial)	Assess	A large population identified in 2016 is beyond funding limits for this program.
<i>Centaurea solstitialis</i>	Yellow star thistle	Annual forb	7	6: Re-treat	6: Re-treatment	6: Re-treatment 1: New treatment	7: Re-treatment	Confirm and treat any new sites reported.
<i>Centaurea stoebe</i>	Spotted knapweed	Annual forb	2	1: Re-treat	1: Re-treatment 1: New treatment	2: Re-treatment	2: Re-treatment	A large new site was found in 2016. Work partially funded by CDFA.
<i>Elymus caput-medusae</i>	Medusahead	Annual grass	>3	-	-	-	-	Some sites may be treated, assessing if too wide spread.
<i>Euphorbia terracina</i>	Carnation spurge	Annual forb	5	3: New treatment	3: Re-treatment 2: New treatment	5: Re-treatment	5: Re-treatment	Confirm and treat any new sites reported.
<i>Enclylaena tomentosa</i>	Ruby saltbush	Perennial sub-shrub	2	0	0	0	2: New?	Work may be initiated (trial), many ROEs needed if tackled.
<i>Euphorbia virgata</i>	Leafy spurge	Annual forb	2	0	1: Re-treatment	1: Re-treatment 1: New treatment	2: Re-treatment	Two small sites in San Diego, one had been treated by City.
<i>Genista monspessulana</i>	French broom	Perennial shrub	5	1: New	1: Re-treatment	1: Re-treatment 1: New treatment 2: Assist other	2: Re-treatment 1: New treatment 2: Assist other	Expand control on this species. 'Assist other'

Scientific Name	Common Name	Growth form	Known populations (active*)	Populations worked on in 2015	Populations worked on in 2016	Populations to be worked on in 2017	Populations to be worked on in 2018	2017 & 2018 Amendment #2 Notes
								indicates AWM re-treatment assistance.
<i>Hypericum canariense</i>	Canary Island St. John's wort	Perennial shrub	8	1	1: Re-treatment 1: New treatment	2: Re-treatment 1: New treatment 2: Assist other	3: Re-treatment 1: New treatment 2: Assist other	Expand control on this species. Assist other indicates AWM re-treatment assistance.
<i>Limonium duriusculum</i>	European sea lavender	Perennial forb	7	4: New	4: Re-treatment 1: New treatment	3: Re-treatment 1: New treatment	4: Re-treatment 1: New treatment	San Elijo Conservancy is taking over re-treatments on two sites.
<i>Limonium ramosissimum</i>	Algerian sea lavender	Perennial forb	9	5: New	5: Re-treatment	3: Re-treatment 1: New treatment 2: Assist other	3: Re-treatment 1: New treatment 2: Assist other	San Elijo Conservancy is taking over re-treatments on three sites.
<i>Lythrum salicaria</i>	Purple loosestrife	Perennial forb	1	0	0	-	1: Re-treatment	Site in Escondido, difficulty getting ROEs.
<i>Retama monosperma</i>	Bridal broom	Perennial shrub	3	3: New	3: Re-treatment	3: Re-treatment	3: Re-treatment	
<i>Sesbania punicea</i>	rattlebox	Perennial shrub	1	0	0	1: Re-treatment	1: Re-treatment	Survey and re-treat Tecolote canyon.
<i>Volutaria tubiflora</i>	<i>Volutaria</i>	Annual forb	1	0	1: New treatment	1: Re-treatment	1: Re-treatment	

*Active populations that are NOT under treatment by separate program/entity.

Ageratina adenophora (eupatory)

SD PAF score: 5.4

Current condition 2017: There are four known populations of this plant, all of which are under two acres in size (see table and map). Eupatory typically occurs in riparian areas, but can also be found in upland scrub. In San Diego it grows in dense spreading stands, in both open and closed canopy riparian areas (as seen on Sweetwater, Florida Canyon, and San Diego River sites). The species can also occur in drier riparian systems (Otay site). There is limited information on its impacts in our region, but it has severe impacts in other parts of the world where it has invaded and spread aggressively. Eupatory is also well established on Tujunga River in Los Angeles County. This plant may be in a *lag phase* (a lower reproductive period prior to a rapid expansion) in our region. This species is listed as a noxious weed by USDA and is Q rated (Quarantine) by CDFA.

Control of eupatory is progressing well in the region. Two sites are under full treatment (Sites 1 & 2). One site is partially treated (Site 3), with a strategy to treat property where AWM does not have access. A new site discovered in Otay is on rugged BLM lands close to the border with Mexico that drain toward Mexico. This site will be reviewed with EMP staff prior to field control work.

Rationale: Eupatory could severely impact riparian habitat, where dense growth would interfere with riparian succession processes, particularly in wetter systems. Currently invaded sites support least Bell's vireo (LBV), and California gnatcatcher (CAGN) are adjacent. If eupatory were to spread to more riparian systems in the region a wider range of species could be impacted including *Ambrosia pumila* (Amb pum), Southwestern willow flycatcher (SWWFC), and arroyo toad (AT) (see site maps).

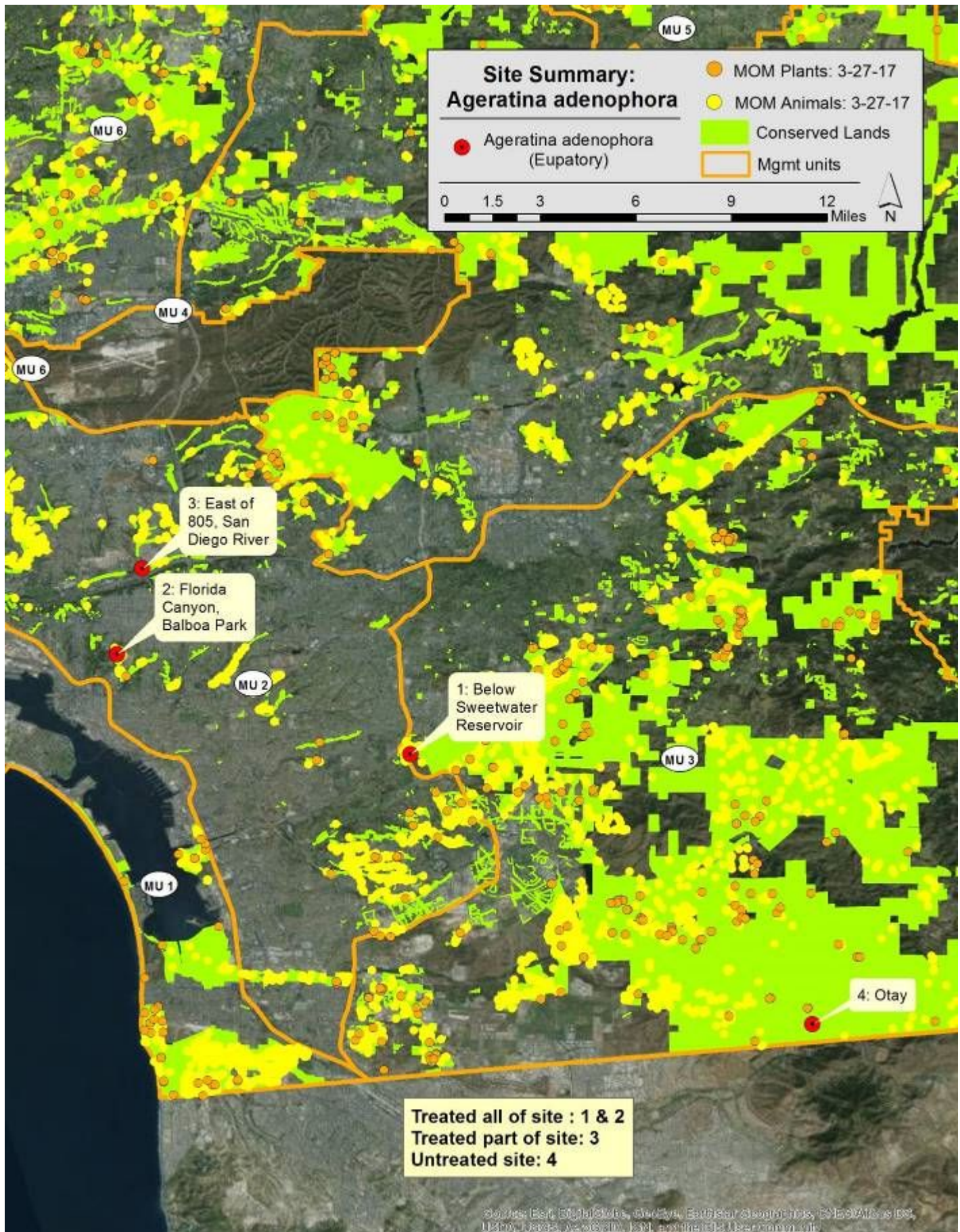
Management information: This perennial subshrub is moderately difficult to control, requiring a multi-year commitment because it produces copious quantities of seed and is rhizomatous. Seed is wind-dispersed and can float on water surfaces. The plant can grow from broken stem and root fragments with the crown attached (this lateral spread and fragmentation may be the main mechanism of spread in the SD region to date), and can re-sprout after fire. Limited information on control is available, but herbicide application (glyphosate) is used in Australia, and has been effective in treatments completed by County AWM crews.

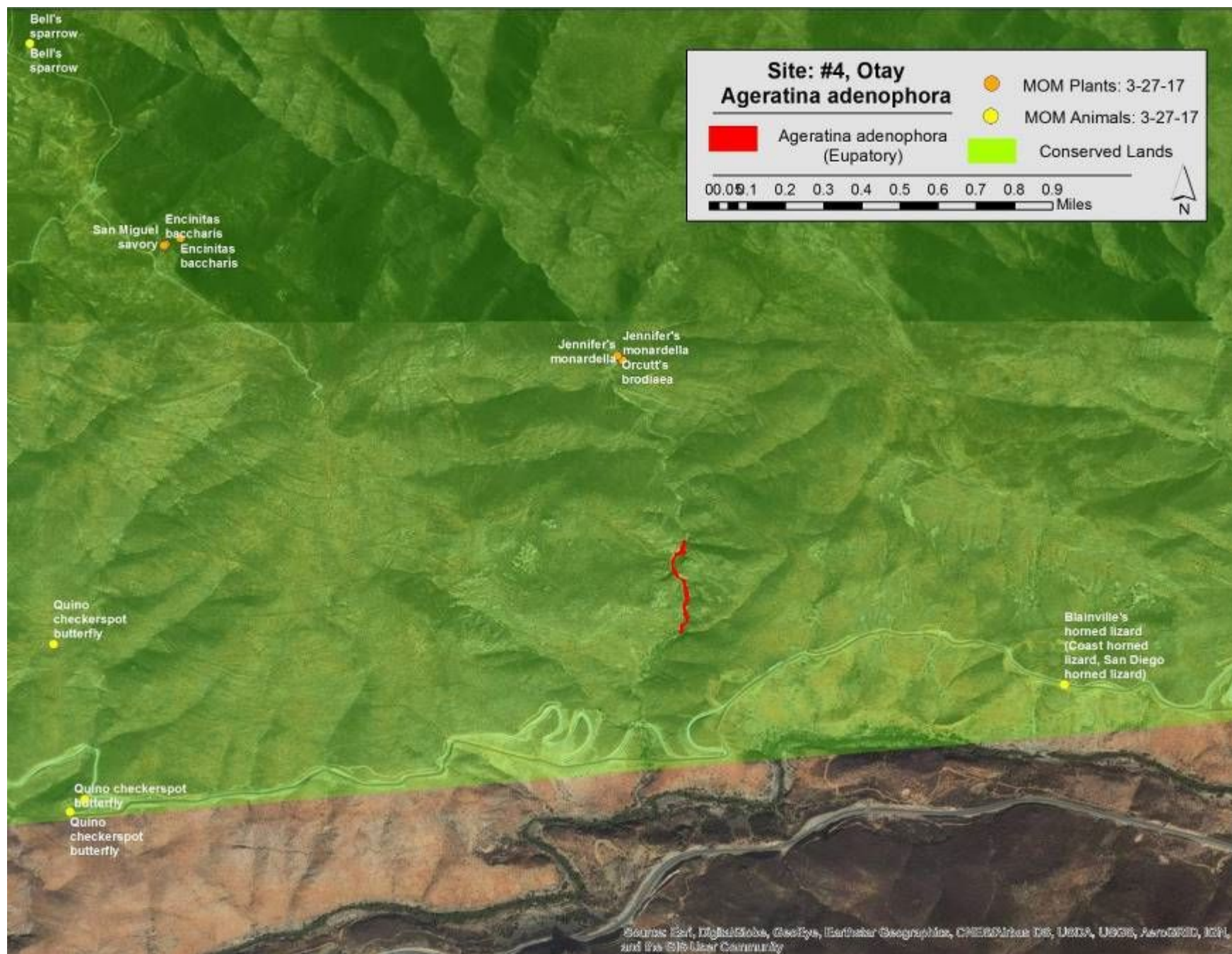
Summary of work 1-2015 to 2-2017:

- Site #1 Sweetwater Authority: Sweetwater Authority has granted access for mapping and control. AWM crews treated the site in 2015 and again in 2016. Control was effective with >90% reduction in cover.
- Site #2 Balboa Park: City of San Diego granted permission for treatments in Florida Canyon, AWM crews treated the site in early 2017. More plants were found in a larger area than were expected.
- Site #3 San Diego River: San Diego River Foundation granted permission for control. AWM crews treated the site in 2015 and 2016. Caltrans and Fenton properties have not granted permission to date. AWM will work with Caltrans and the San Diego River Conservancy to either obtain ROEs or have untreated areas controlled under their invasives program.
- Site #4 Otay. This area was recently discovered by Jessie Vinje (CBI, 2016). The site will be treated in fall 2017 if an ROE can be obtained from BLM and if EMP approves treatments on federal land. Co-ordination with Border Patrol would be required as the site is adjacent to the border fence.

Populations of *Ageratina adenophora* (croftonweed, eupatory)

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 and early 2017	Future action
1	Below Sweetwater Reservoir	0.75 ac, 4,000 plants	Sweetwater Authority	ROE Agreement obtained, surveyed, first treatment	Re-treated	Re-treat
2	Florida Canyon, Balboa Park	0.5 acre, 2,000 plants	City of San Diego	ROE Agreement obtained	First treatment	Re-treat
3	San Diego River, East of 805	0.6 ac, >5,000 plants	Multiple	ROE Agreement, first treatment (partial)	Re-treated (partial)	Re-treat and expand treatment area
4	Otay	1.0?	BLM	-	Discovered in 2016	Treat





Carrichtera annua* (Ward's weed)*SD PAF score: 4.2**

Current condition 2017: There are three occurrences of this plant in CA (and the entire US), Carlsbad (Sites 1 & 2) and Camp Pendleton (Site 3, see summary map). This species has few documented impacts, in part due to its very limited distribution, but it is a problematic weed in Australia. It occurs in coastal sage scrub and grasslands. Two populations have been under treatment for multiple years. Although significant effort by AWM and CNLM has occurred (with EMP and land management endowment), the plant has not been eradicated at Site #1 La Costa. The site has a large persistent seedbank, combined with rapid plant growth and seed set, crews have not been able to suppress all plant growth. The discovery of an even larger population east of Site #1 La Costa Site, the Site #2 Bressi Ranch which has over 100 acres of invaded habitat, make control of this species unrealistic given current funding resources.

Rationale: The Carlsbad sites have multiple priority listed plants nearby: Del Mar manzanita, San Diego thornmint (AIL), thread-leaved brodiaea (BRFI), Orcutt's hazardia (HOR) as well as nearby CAGN and LBV (see site map).

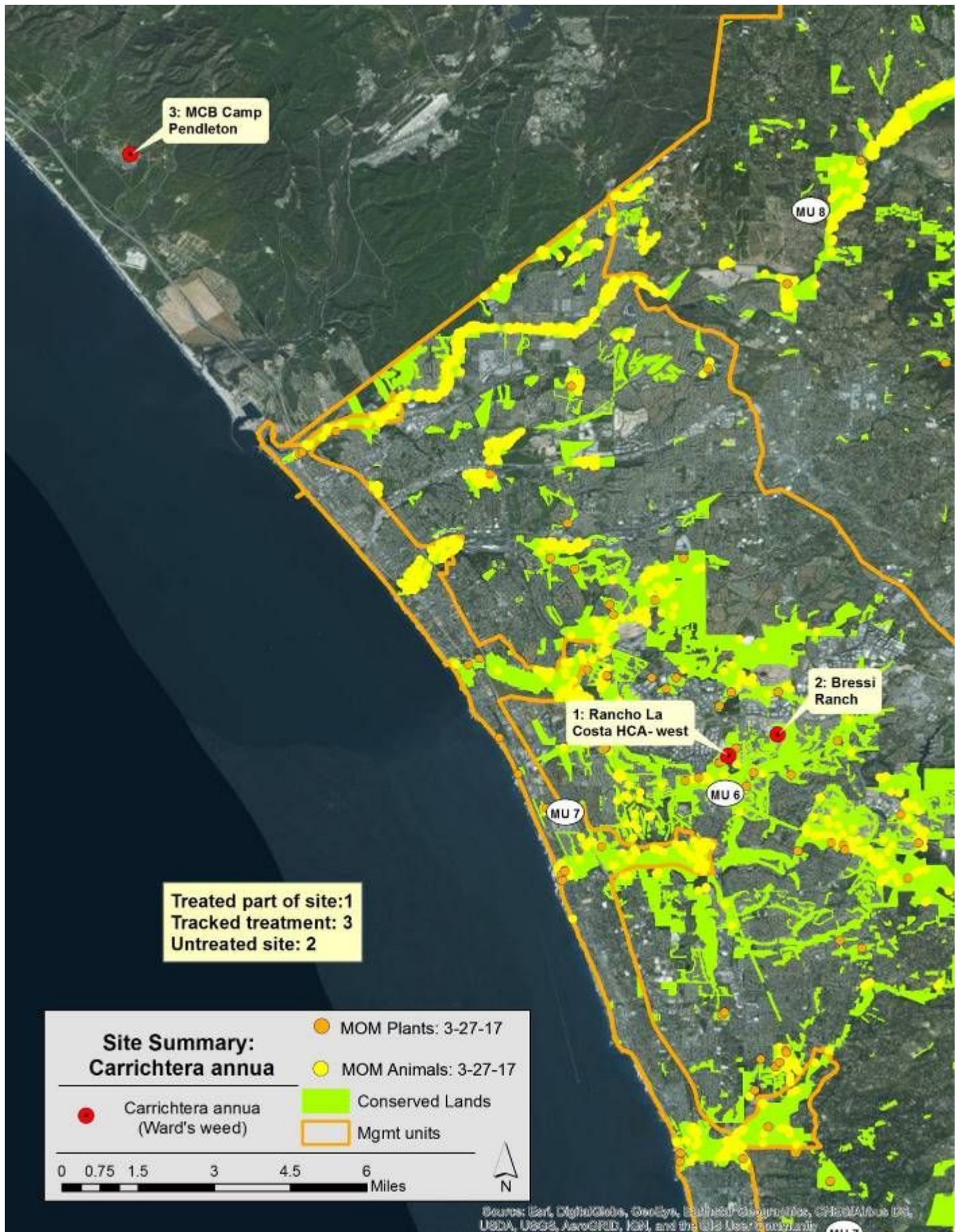
Management information: This annual herb is a prolific seed producer, with seed viability lasting quite some time (at least 3-5 years). Seeds are primarily gravity- or rain-dispersed, with most seeds falling close to the parent plant. Seeds can be spread further distances by animals, runoff, or human-related activities. Although pre-emergent chemical application reduces seedbank expression, seedlings are not fully suppressed. Mature plants are fairly easy to control with proper timing of application; however, seedlings are difficult to detect in dense coastal sage scrub and grasslands. Additionally plants mature very rapidly and appear to respond to rainfall cycles. The length of required control effort is a minimum of 5 years, but no site has achieved full control to date. Sites must be treated multiple times during the winter and spring (as well as summer if artificial watering occurs as in portions of La Costa Greens site) to ensure treatment of all individuals. A new pre-emergent herbicide may be tried to see if better seedling suppression is possible.

Summary of work 1-2015 to 2-2017 and recommendations:

- **Site #1 La Costa Greens:** AWM and CNLM treated multiple times in 2015, 2016 and 2017. Pre and post emergent herbicides were used. Hand pulling also occurred. Although portions of the site have reduced cover, significant numbers of plants are still germinating each year, particularly on the eastern portion of the site. Ward's weed is proving to be too difficult to control for the program to reasonably expect eradication as an achievable goal, especially with the discovery of the larger Bressi Ranch population (Site #2).
- **Site #2 Bressi Ranch:** No work has occurred at this site which was discovered in 2016. Treatment of the 100 acres is far beyond the scope of current funding, and may not be realistic given the difficulty that control crews have had controlling the species.

Populations of *Carrichtera annua* (Ward's weed)

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 and early 2017	Future action
1	La Costa Greens Ecological Reserve, East and West, Carlsbad	3.0 ac	City of Carlsbad, CNLM	ROE Agreement obtained, surveyed, first treatment	Re-treated	Trial of new pre-emergent
2	Bressi Ranch, Carlsbad	110 ac	Multiple	-	Multiple	Seek outside funding?
3	Las Flores Rd., Camp Pendleton	10 ac	Camp Pendleton	Treated	Re-treated	Track





Current condition 2017: There are twenty-one sites where yellow star thistle has been found in San Diego. Five of the sites have active treatment (4, 8-9, & 16-17), eight are being monitored as recent control sites with no plants found recently (5-6, 11-15, & 18) and seven sites are believed to be eradicated (1-3, 7, 10, 20-21) (see site summary map). AWM, as well as other land managers, have been working actively on this plant since at least 2000. It is very widely distributed in much of California (millions of acres invaded), occurring in a wide range of ecotypes including woodlands, scrub, grasslands, and riparian areas. Our region is at the edge of its distribution, so it is possible to keep the plant suppressed, if not eliminated, from the region. A coordinated treatment effort has made significant gains in controlling this species in the region. Yellow star thistle is a C-rated CDFA noxious weed, with significant ecological impacts to flora and, to a lesser extent, fauna.

Rationale: There are few current direct impacts associated with the plant in our region, but there are many invaded sites on conserved lands and within the MSP area (see site maps). AWM has secured CDFA funding that will allow treatment of about half the sites. It is proposed that this be directed at areas outside the MSP, with SANDAG EMP contract funds directed at the sites within the MSP.

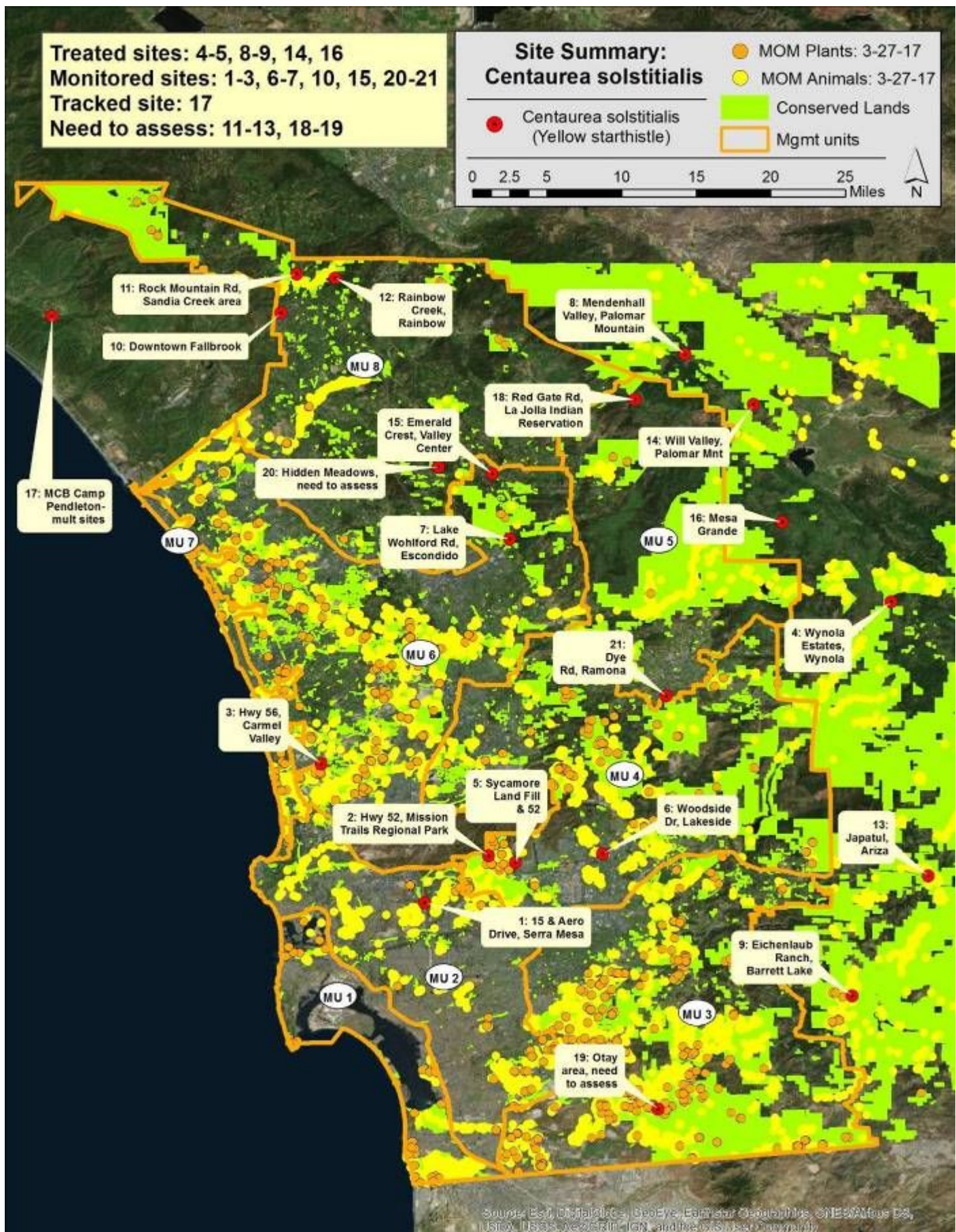
Management information: This annual herb has seeds that survive in soil 3 years or more. Seeds are primarily gravity-dispersed, although wind, animals, and humans may also be effective dispersal agents. Control is generally reasonable and can be of short duration (~3 years), if all individuals are treated. Initial seasonal treatments are typically carried out, with follow-up rounds of hand pulling and spot treatment.

Summary of work 1-2015 to 2-2017 and recommendations:

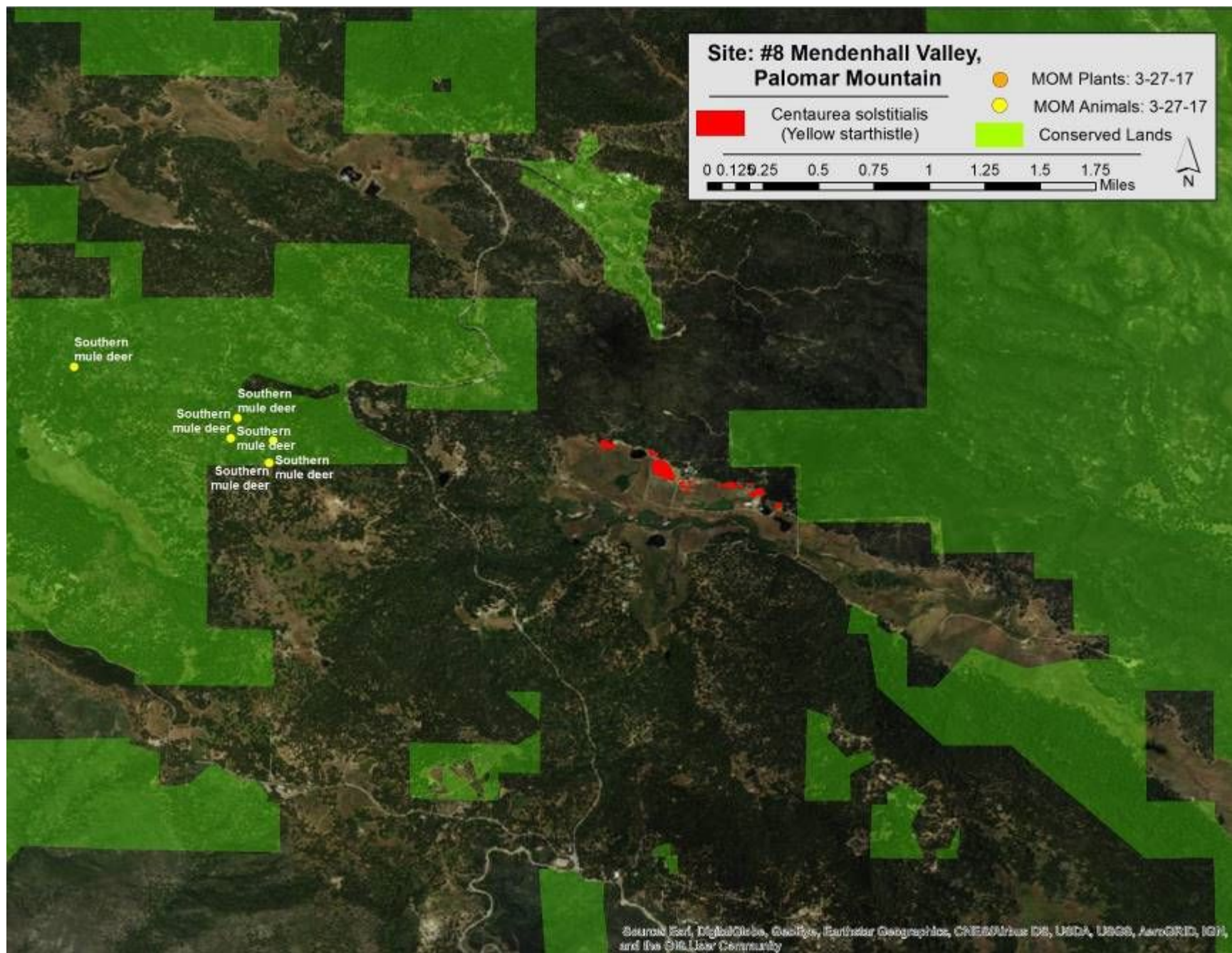
- **Site #4 Wynola Estates:** Crews have treated the site each year. 28 plants were found in 2015 and 81 in 2016.
- **Site #5 Sycamore Landfill:** 5 plants found in 2015 and one plant in 2016 and none in 2017.
- **Site #8 Mendenhall Valley:** Crews have treated the site each year. 436 plants were found in 2015, and 1,664 in 2016.
- **Site #16 Mesa Grande:** 2 plants found in 2015, and 1,505 in 2016.

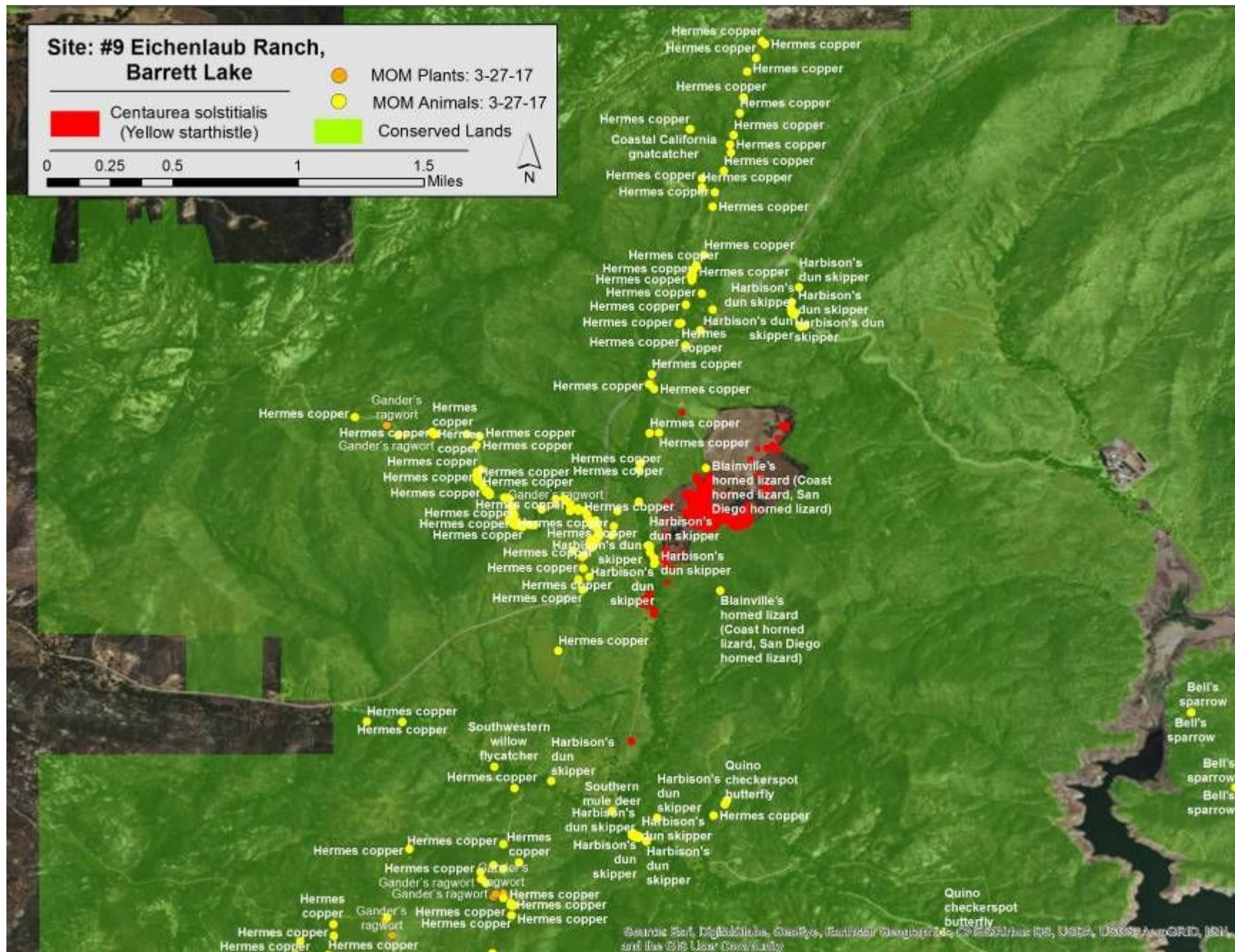
Populations of *Centaurea solstitialis* (yellow star thistle)

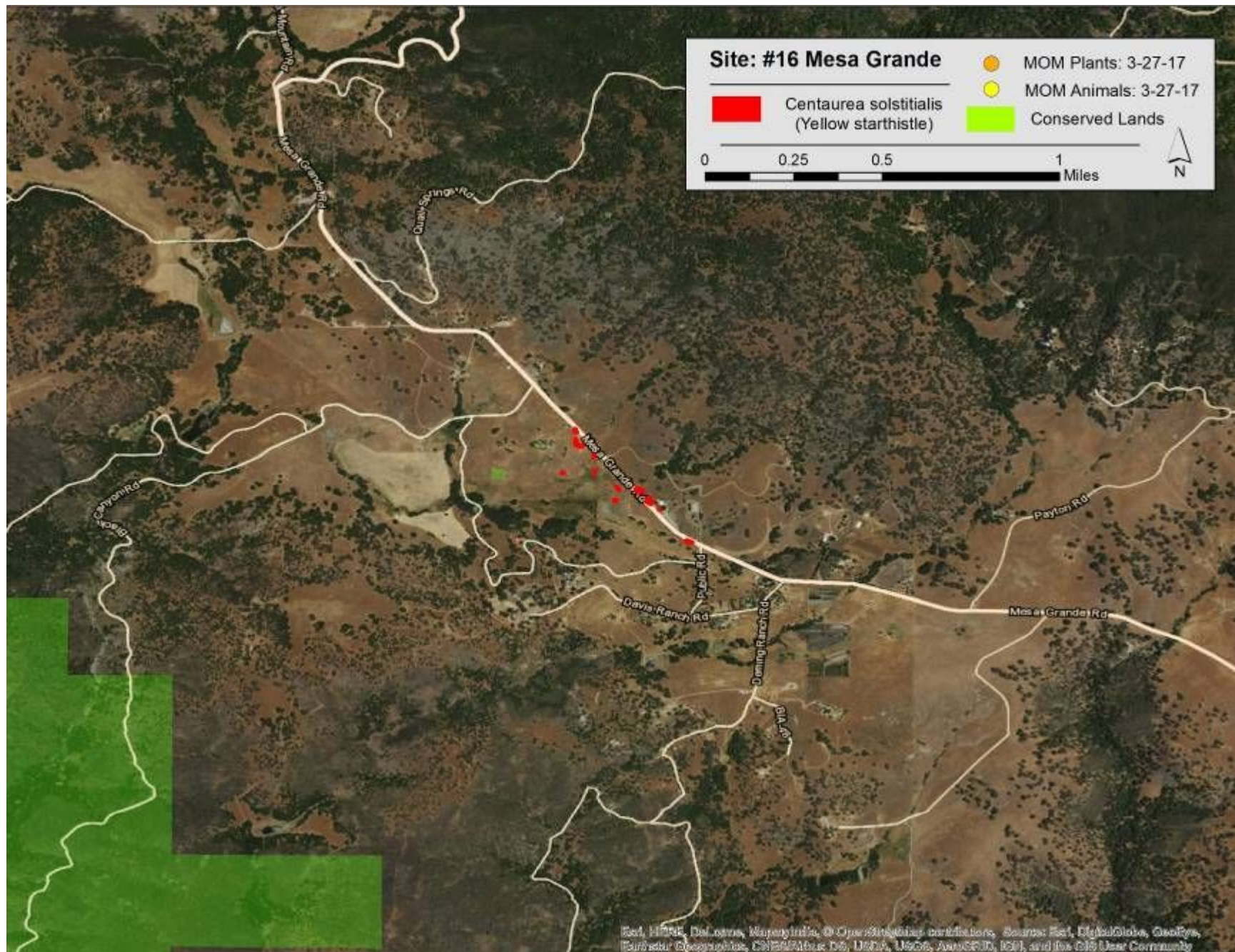
#	Location	Size	Action	Property ownership	Work in 2015	Work in 2016 and early 2017	Future Action
1	I-15 and Aero Dr., Serra Mesa	Eradicated	Monitor	-	Site checked	Site checked	Check site
2	Mission Trails Park	Eradicated	Monitor	-	-	-	Check site
3	SR-56, Carmel Valley	Eradicated	Monitor	-	-	-	Check site
4	Wynola Estates, Wynola	2 acres	Treat	10 Private	Re-treated	Re-treated	Re-treat
5	SR-52 and Sycamore Landfill	5 acres	Treat	City SD, 5 private	Re-treated	Re-treated	Check site
6	Woodside Dr., Lakeside	1 acre	Monitor	City SD	-	-	Check site
7	Lake Wolford Rd., Escondido	Eradicated	Monitor	-	-	-	Check site
8	Mendenhall Valley, Palomar Mtn	25 acres	Treat	2 Private	Re-treated	Re-treated	Re-treat
9	Eichenlaub Ranch, Barrett Lake	10 acres	Treat	City SD	-	-	Check site
10	Downtown Fallbrook	Eradicated	Monitor	-	-	-	Check site
11	Rock Mtn. Rd., Sandia Creek area, Fallbrook	1 acre	Treat	Fallbrook Public Utility District, 1 private	-	-	Check site
12	Rainbow Creek, Rainbow	1 acre	Treat	4 Private	-	-	Check site
13	Japatul, Ariza	2 acres	Treat	2 Private	-	-	Check site
14	Will Valley, Palomar Valley	2 acres	Treat	1 Private	-	-	Check site
15	Emerald Crest, Valley Center	50 acres	Treat	3 Private	Site checked	Site checked	Check site
16	Mesa Grande	5 acres	Treat	3 Private	Re-treated	Re-treated	Re-treat
17	Camp Pendleton, multiple sites	5 acres	Track	-	-	-	-
18	Red Gate Rd., La Jolla Indian Reservation	1 acre, <100 plants	Treat	La Jolla Indian Reservation	-	-	Check site
19	Otay	Assess	Assess	-	-	-	Check site
20	Hidden Meadows	Eradicated	Monitor	-	Developed	Developed	Developed
21	Dye Rd, Ramona	Eradicated	Monitor	-	-	-	Check site
(22)	Mt Olympus preserve	Reported	Confirm	County			Confirm











Centaurea stoebe ssp. micranthus (spotted knapweed) SD PAF score: 6.0

Current condition 2017: Two known populations remain in the County, Bergman Ranch in Palomar Mountain (which has been treated for the past 6 years) and a newly discovered site Calico Ranch in Julian. Multiple additional populations were historically found in the mountain areas of Cuyamaca and Julian/Wynola, but have been controlled and are believed eradicated. Spotted knapweed is a CDFA A-rated noxious weed that can impact flora and, to a lesser extent, fauna. The older treatment site at Bergman Ranch in Palomar Mountain continues to have low numbers of plants sprouting from the seedbank. The site will remain under treatment. The new site at Calico Ranch in Julian had large numbers of plants and the full distribution of the plant is still being determined as the plant was discovered late in 2016. This population will remain under treatment several years and additional properties will be contacted as needed to allow control to occur.

Rationale: Could compete with Cleveland's horkelia, the host plant for Laguna Mountain skipper, which occurs west and north of the Bergman Ranch. Area is one mile from boundary of MU 5.

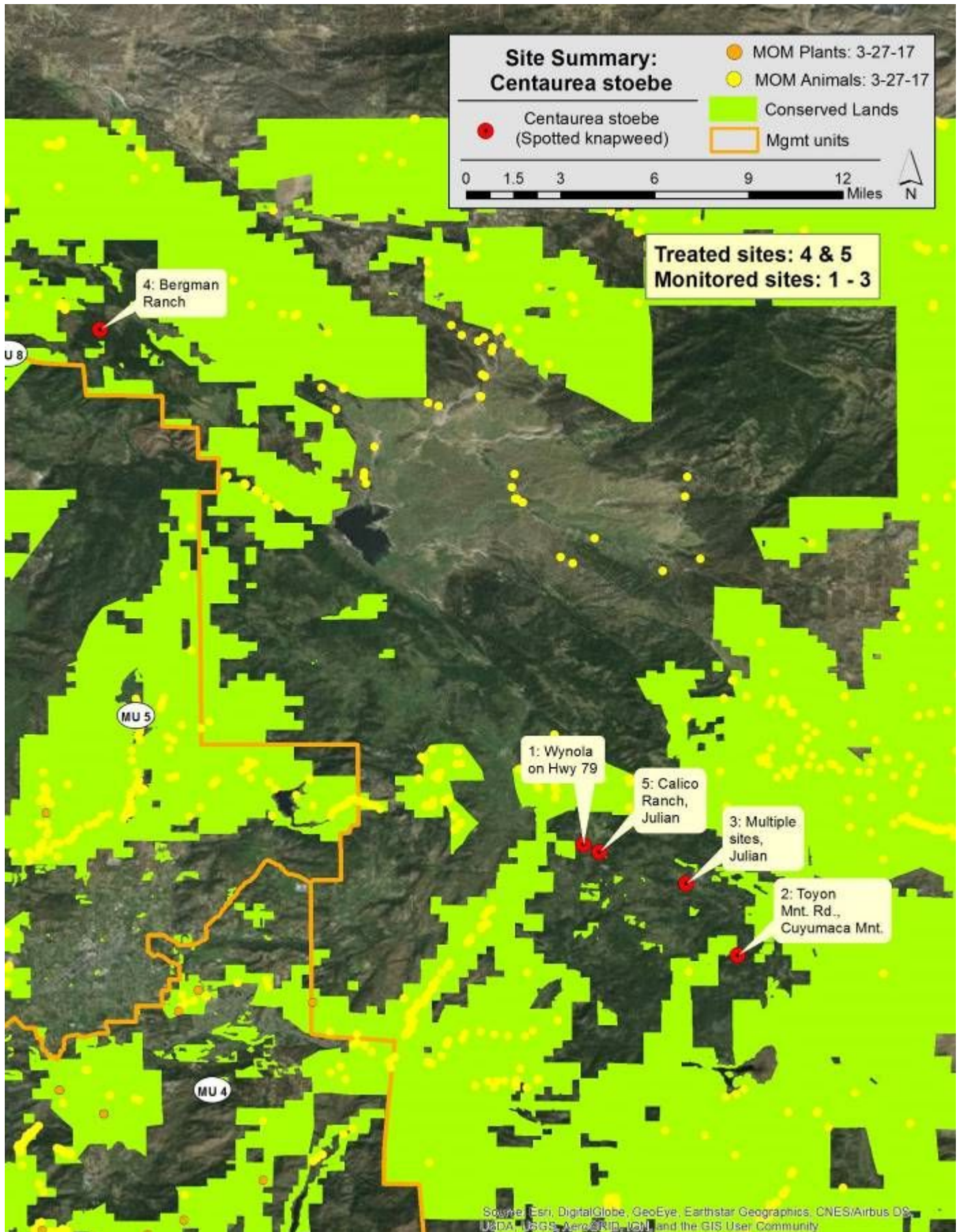
Management information: This annual herb is reasonable to control with proper timing of treatment, and the length of the control effort is 3-5 years. Multiple treatments (two to three) each year are best to ensure that all germinating plants are controlled before they set seed. Most seeds and seed heads are gravity-dispersed, falling near the parent plant, however, longer-distance dispersal may be carried out by wind, water, and animals.

Summary of work 1-2015 to 2-2017 and recommendations:

- **Site #4 Bergman Ranch, Palomar Mountain:** Crews treated the site each year in 2015 and 2016. Crews will retreat the site in 2017 and 2018.
- **Site #5 Calico Ranch, Julian:** Crews assessed the newly discovered site and began control work, but it was late in the season. Crews will complete the initial treatment in 2017 and continue control in 2018.

Populations of *Centaurea stoebe ssp. micranthus* (spotted knapweed)

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 Early 2017	Future Action
1	Wynola on Hwy. 79.	Eradicated	-	-	-	Monitor
2	Multiple sites in Julian: post office, Porter Lane	Eradicated	-	-	-	Monitor
3	Toyon Mtn Rd., near Harrison Park	Eradicated	-	-	-	Monitor
4	Bergman Ranch, Palomar Mountain	4.2 acres	1 Private	Re-treated	Re-treated	Re-treat
5	Calico Ranch, Julian	0.7 acres	3 Private	-	Discovered in 2016, treated	Re-treat
6	California Wolf Center, Julian	Unknown		-	-	Survey and treat



Euphorbia terracina (carnation spurge)**SD PAF score: 5.1**

Current condition: Active populations of *Euphorbia terracina* were not known to occur in the County when the Invasives Plan was written. There was one known site in Otay Mesa where the plant was controlled. Multiple populations have now been identified distributed from Black Mountain to Del Dios. All of these populations are under treatment. Treatments appear to be working with decreasing number of plants each year. However a large seedbank is likely present at the sites. Additional sites may be discovered as there have been one or two new sites found each year in the Black Mountain area. This species is Q-rated (Quarantine) by CDFA.

Rationale: *Euphorbia terracina* occurs in a wide variety of ecotypes and communities including riparian, upland, and adjacent to vernal pools. The species would likely have moderate impacts to sensitive flora and fauna, but few impacts to abiotic ecosystem processes. In Santa Monica Mountains the plant has invaded a number of areas in a range of habitats including woodlands. It has formed very dense stands excluding nearly all vegetation.

Management information: This species is moderately difficult to control due to a persistent seed bank. Seed is primarily gravity-dispersed, falling to the ground below/near the parental plant. Some populations are also in riparian areas (sites 2-3, 5) where seeds could be dispersed downstream by flowing water. Animals may also function as occasional dispersal agents.

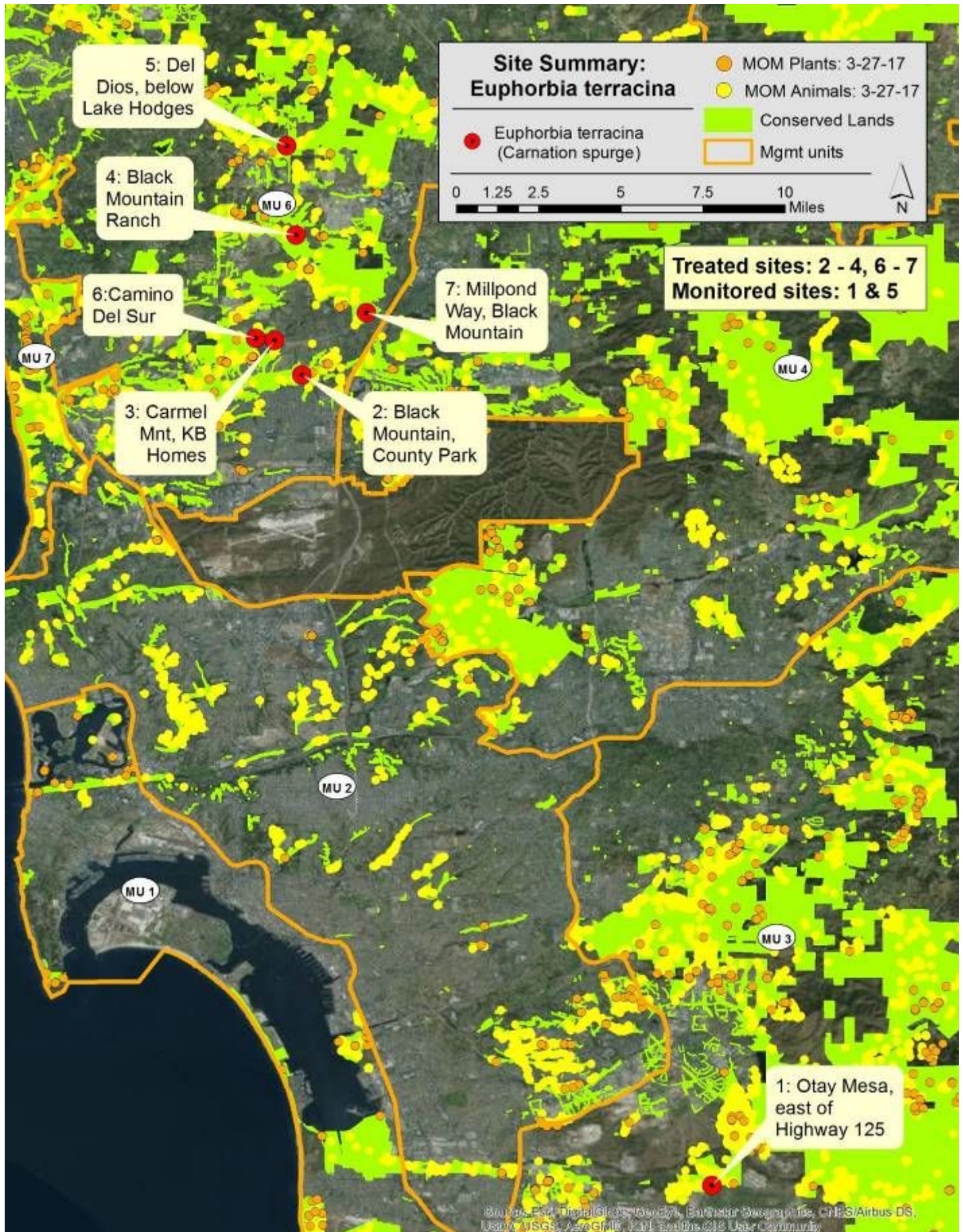
Summary of work 1-2015 to 2-2017 and recommendations:

- **Site #2 Black Mountain Park:** This site has scattered small patches of plants in a riparian area. Crews have treated the site at least twice each year. The number of plants is decreasing. Crews will retreat the site in 2017 and 2018.
- **Site #3 Carmel Mountain, KB Homes and adjacent areas:** This site has a dense stand of plants in a riparian area (KB Homes) and scattered patches of plants in nearby upland areas. Crews have treated the site at least twice each year. The number of plants is decreasing. Crews will retreat the site in 2017 and 2018.
- **Site #4 Black Mountain Ranch:** This site was discovered in late 2016. It is the largest (1 acre) and densest population found to date. Crews treated the site in spring 2017. Crews will retreat the site in 2017 and 2018.
- **Site #6 Camino Del Sur:** Plants are scattered along road edges. Volunteers are pulling plants and monitor/coordinator is pulling any that are missed.
- **Site #7 Millpond Way, Black Mountain:** This small site was discovered in 2016. Crews treated the site in spring 2017. Crews will retreat the site in 2017 and 2018.

Populations of Euphorbia terracina (carnation spurge)

#	Location	Size	Property Owner	Work in 2015	Work in 2016 Early 2017	Future Action
1	Otay Mesa			Track	Track	Track
2	Black Mountain, County Park		County San Diego	Discovered, Treated	Re-treat	Re-treat
3	Carmel Mountain, KB Homes		KB Homes	Discovered, Treated	Re-treat	Re-treat
4	Black Mountain Ranch		City of San Diego	-	Discovered, Treated	Re-treat

#	Location	Size	Property Owner	Work in 2015	Work in 2016 Early 2017	Future Action
5	Del Dios, San Dieguito		City of San Diego	Tracked	Tracked	Tracked, possibly assist it control
6	Camino Del Sur		City San Diego	Tracked and hand pulling	Tracked and hand pulling	Track and hand pull
7	Millpond Way, Black Mountain		City of San Diego	-	Discovered, Treated	Re-treat





Genista monspessulana (French broom)**SD PAF score: 6.9**

Current condition 2017: Five populations (sites) in three areas are known in the County (see site summary map). One site in Julian is under treatment by the County crew (Site #5 Heise Park). A second site on San Dieguito is being treated by a different contractor. Remaining sites will be started in 2017 and re-treated in 2018. This species has the ability to impact abiotic ecosystem processes (fire), as well as flora and fauna. It invades a broad range of vegetation types in both upland and riparian habitats. In our region it appears to be invading riparian areas as well as adjacent uplands (grassland/scrub). There are multiple points of introduction in California (horticultural) with genetic types from different source regions in the Mediterranean. These types cross with each other, and may outcross with other hybrid species. This creates the potential for a wide range of plant characteristics that may increase wild population invasiveness and impacts. French broom is listed as a C-rated noxious weed by CDFA.

Rationale: This species is an aggressive invader in other parts of California. It should be eradicated before it becomes established, particularly in riparian areas where it would disperse downstream making eradication unrealistic.

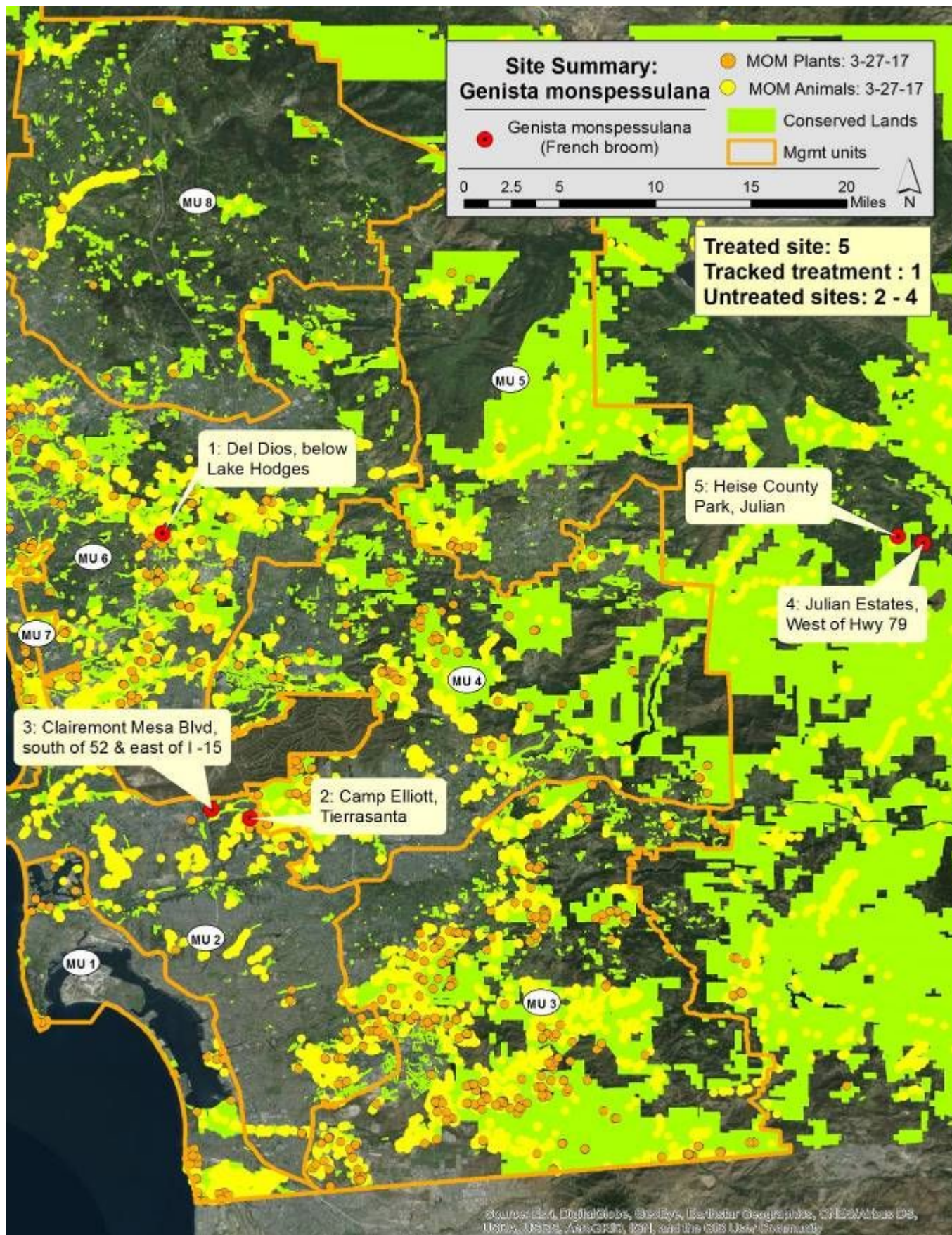
Management information: This perennial shrub requires a multi-year commitment to ensure eradication. Monitoring and re-treatments may be required for 10-15 years due to long seed viability. Seed pods burst to eject seed up to 4 meters from the parent plant and longer-distance dispersal may occur via water, soil movement, and animals. Individual plants are moderately difficult to control with herbicide, and re-sprouting may occur. Plants have low leaf area for translocation of herbicide, and young plants have thin stems, making cutting stem and basal bark applications of herbicide challenging. Small plants may be pulled depending on soil conditions.

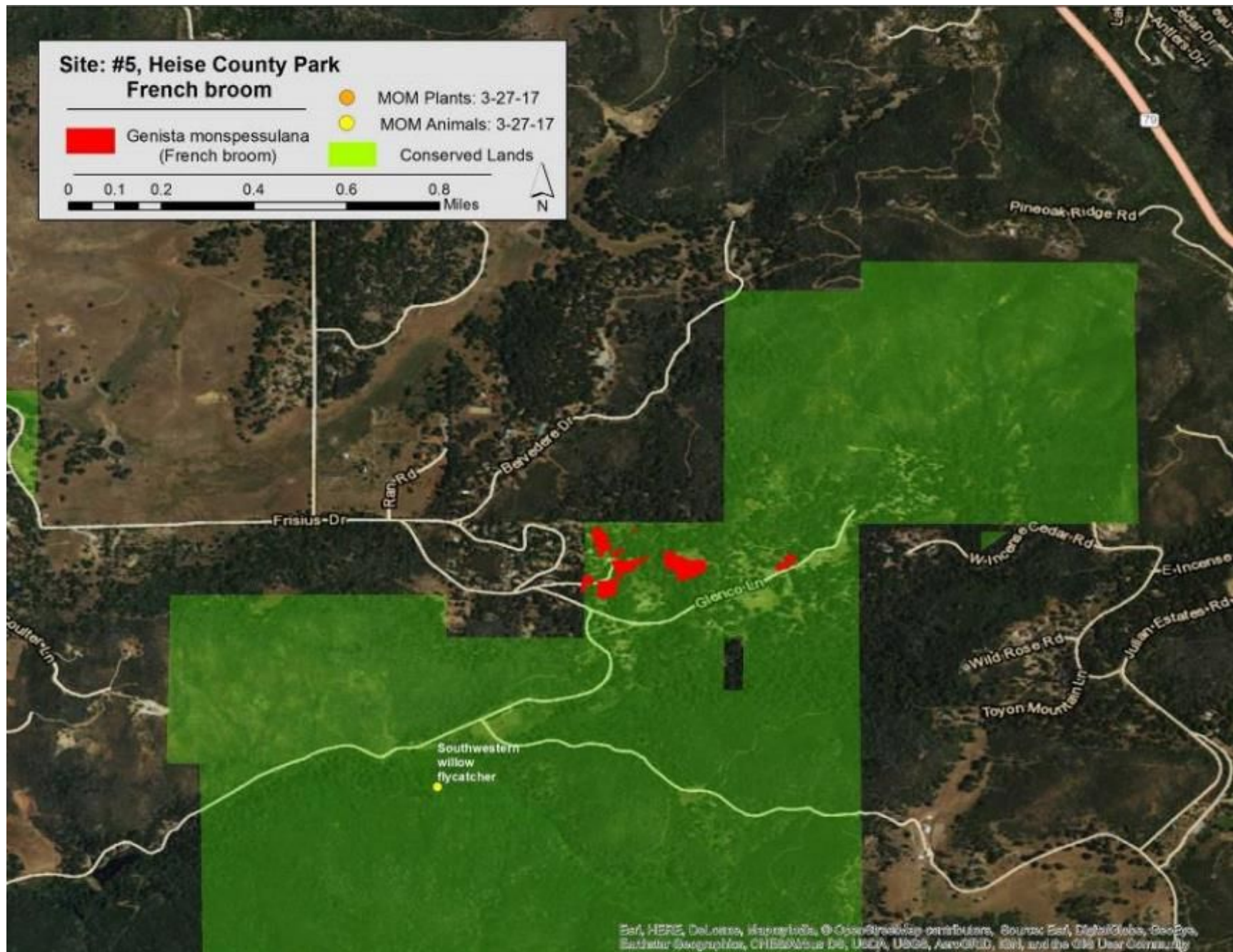
Summary of work 1-2015 to 2-2017 and recommendations:

- **Site #5 Heise County Park:** Site was treated in 2015 and re-treated in 2016. Site will be re-treated in 2017 and 2018. There are a few plants on private property that will require ROEs to be obtained.

Populations of *Genista monspessulana* (French broom)

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 and early 2017	Future action
1	Del Dios, Crosby Estates, San Dieguito River	~ 1 mile, scattered	City of San Diego	Tracked (treatment did occur)	Tracked (treatment did occur)	Track work, possibly assist in treatment.
2	Tierrasanta	Scattered, >1,000?	City of San Diego	-	-	Treat 2017, re-treat 2018
3	Clairemont Mesa Blvd, Tierrasanta	< 0.5 acre, 25 plants along road	City of San Diego, Private	-	-	Treat 2017, re-treat 2018
4	Julian Estates, west of Hwy 79, Julian	~10 acres	Private	-	-	Treat 2017, re-treat 2018
5	Heise County Park, Julian	<10 acres, 3,000-5,000 plants	County of San Diego. Private	Treated	Re-treated	Retreat in 2017 and 2018





Current condition 2017: This large shrub has invaded twelve sites within the County, but is primarily distributed in the southern half of the County to date (see site summary map). Three new populations were discovered last year: a new site at Miramar (they will treat it in 2017/18), a site along Keany Villa Rd. and a site in La Jolla. Significant work has occurred on two of the larger sites (#2 Lake Murray and #4 Balboa Park). These sites will be re-treated in 2018. A minimum of two and up to four new sites will be started in 2017 and re-treated in 2018. CISJW typically invades coastal scrub, maritime chaparral and grassland habitats, forming dense stands over time. Although abiotic impacts have not yet been documented (fire), this species alters vegetation structure and displaces native species. The species is a growing problem in many coastal portions of the State, and is considered highly invasive. There has been a concerted effort by the DoD and some regional land managers to control this species.

Rationale: This species has had limited impacts to date on MSP areas, but it has the potential to spread and become a serious invader. Impacts to resources may have been occurring on DoD lands, but they have nearly eliminated the species (Miramar and Point Loma). EMP funding support should allow eradication of the species, which will compliment work by the City of San Diego and the DoD. Many of the sites are on or adjacent to conserved lands (see site maps).

Management information: This perennial woody shrub produces a large quantity of seed that could be viable up to 5 years. It is primarily gravity-dispersed, but long distance dispersal occurs via vehicles and human activities, and along drainages. Plants are moderately difficult to control, with re-sprouting observed. Control of the seed bank and re-sprouting adults will require an effort >5 years in duration.

Summary of work 1-2015 to 2-2017:

- **Site#2 Lake Murray:** This is a very large site on a hill side with large mature plants. Crews cut, removed and treated all plants. Initial work occurred in 2016 and re-treatment occurred in 2017. The site will be re-treated in 2018.
- **Site#4 Balboa Park, Florida Canyon:** This is a very large site on both sides of Florida Canyon in addition to a separate population along Highway 163, all with large mature plants. Crews cut and treated plants, and foliar treated some stands of smaller plants. Initial work occurred in 2015 and 2016 with re-treatments in 2016 and 2018. The site will be re-treated in 2018.
- **Site #8 Tecolote Canyon:** Initial work occurred under CCC and City contractor. Crews will re-treat this site in 2017 and 2018.
- **Planned new treatment sites:** #7 Mission Center (need ROEs) and #12 Kearny Villa Rd.
- **Possible new treatment sites:** #9 Mission Valley East (very steep site, need ROEs), #10 Mission Valley West (very steep site, need ROEs) and # 11 Starlight Dr. La Jolla (need ROEs).

Populations of *Hypericum canariense* (Canary Island St. John's wort)

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 Early 2017	Future Action
1	Lusardi Creek, Fairbanks Ranch	200 acre area, mostly seedlings	City of San Diego	Tracked (work did occur)	Tracked (work did occur)	Track, assist if needed
2	Lake Murray, La Mesa:	1.8 acres, 3,000-5,000 plants	City of San Diego, 2 Private	-	Treated 2016, Re-treated 2017	Re-treat in 2018
3	MCAS Miramar: 2 sites	1- Eradicated 2- Untreated	DoD	1- Tracked (treated)	1- Track (treated) 2- Discovered	1- Track (treat) 2- Track (treat)
4	Florida Canyon, Balboa Park	3.8 acres, 3,000-5,000 plants	City of San Diego	Treated	Re-treated	Re-treat in 2018
5	Naval Base Point Loma	1 acre	DoD	Tracked (work did occur on some of sites)	Tracked (work did occur on some of sites)	Track- encourage all sites re-treated
6	Borderfield State Parks	<1 acre, 50 plants	State Parks	Tracked (work did occur)	Tracked (work did occur)	Track
7	Mission Center Rd. above Friars Rd.	0.6 acres, 1,000-3,000 plants	1 Private	-	-	Obtain ROE, Treat in 2017, re-treat in 2018
8	Manning St, Tecolote Canyon	2.0 acres, 5,000-10,000 plants	City of SD	Tracked (initial treatment occurred)	Tracked (re-treatment occurred)	Re-treat in 2017 and 2018
9	South Mission Valley, East of 805	0.6 acres, 1,000-3,000 plants	4 Private	-	-	Possibly treat in 2017, re-treat in 2018
10	South Mission Valley, West of 805	0.1 acres, 500 plants	1 Private	-	-	Possibly treat in 2017, re-treat in 2018
11	Starlight Dr, La Jolla	0.6 acres, 1,000-3,000 plants	4 Private	-	Discovered	Possibly treat in 2017, re-treat in 2018
12	Kearny Villa Rd.	0.1 acres, 50 plants	City of San Diego	-	Discovered	Treat in 2017, re-treat in 2018



Current condition 2017: European sea lavender occurs at 8 known locations and is highly invasive. This species is invading estuary habitat all the way down to low marsh areas, in the tidal zone, where cordgrass grows. Salt marshes are typically considered 'resistant' to invasion, but this species grows with pickleweed, *Frankenia salina*, *Batis maritima*, *Distichlis spicata* and *Monanthochloe littoralis*. European sea lavender forms a dense carpet with plants growing edge to edge excluding all other vegetation at older sites. Control of this species has been a program priority. Five of the eight sites are being treated. Three sites have not been treated yet. The San Diego River (site #1) is the oldest, most invaded site encountered to date, it is expected to be treated and restored as part of a mitigation project. The other two untreated sites (#5 Sweetwater and #8 Bressi Ranch) should have work initiated in 2017 if access can be secured. The source of estuary populations appears to be seed dispersal from landscaping in upland areas. These sources are being treated when they can be located (sites #2, #7 and #8).

Rationale: The San Diego River infestation (site #1) is extensive and is directly impacting salt marsh birds beak (*Chloropyron maritimum*), and is adjacent to populations of Nuttall's lotus (*Acmispon prostrate*; NULO), and coast cotton-heads (*Nemacaulus denudata*; COCH). Several listed birds are estuary obligates including: light footed clapper rail, Belding's savannah sparrow, snowy plover, and California least tern. These avian species are less common at San Diego River, but core populations are found at the other three sites: San Elijo, San Dieguito, and Chula Vista.

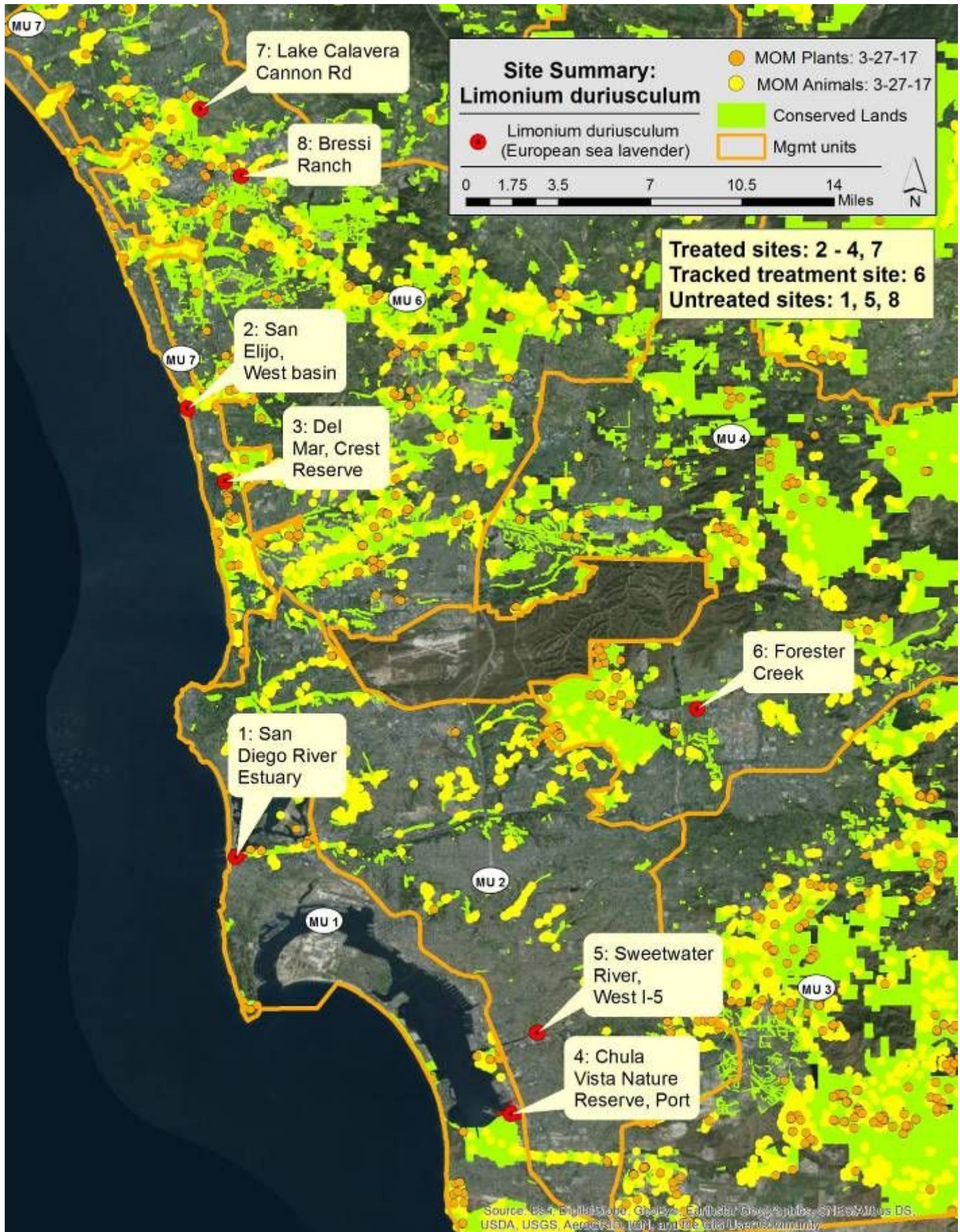
Management information: European sea lavender is being controlled using glyphosate (post emergent) and in selected areas Imazapyr is being added for seedling suppression (pre and post emergent). This treatment approach is also being used by the San Francisco 'Spartina Project' which is also controlling *Limonium* species in the Bay area. Limdur is difficult to treat as the plants are small and often intermixed with and under native marsh plants.

Summary of work 1-2015 to 2-2017:

- **Site #2 San Elijo Lagoon:** This site includes estuary habitat in the lagoon as well as two sites in landscaping that are the propagule source for the estuary population. Crews treated the sites in 2015 with re-treatments in 2016 and 2017. Re-treatments will continue in 2017 and 2018.
- **Site #3 Crest Reserve Del Mar:** This site was hand pulled in 2015, and re-visited and pulled by the coordinator in 2016 and 2017. The site will be re-visited in 2018.
- **Site #4 Chula Vista Nature Reserve:** This site is very large with extensive estuary shoreline, a created estuary complex, as well as large degraded upland areas where a power plant was decommissioned. This site has extensive acreage of both European and Algerian sea lavender, and is important as it is part of the San Diego Bay estuary system. Treatments were initiated in 2015 over most of the site, re-treated in 2016, and expanded and re-treated in 2017. Limdur is more common in the high marsh and degraded portions of the site where facilities were removed. But there are low and mid marsh areas that are being invaded as well. These areas are more difficult to treat as they are more intermixed with natives.
- **Site #7 Lake Calavera Cannon Rd:** This is a large site high on the Agua Hedionda Watershed. Both Limram and Limdur co-occur at the site, which is modified drainage with cut slopes, brow ditches, paved access roads, and non-native landscaping. The site is directly adjacent to Lake Calaveras open space. Crews treated flat portions of the site in 2015, re-treated these areas in 2016, and we are working with SELC to hand the site over to them for the next few years.

Site #	Location	Size	Property ownership	Work in 2015	Work in 2016 and early 2017	Future action
1	San Diego River	5.6 ac	USFWS	-	-	Mitigation site
2	San Elijo Lagoon, West Basin	0.1 acres	CDFW	Treated	Re-treated	SELC taking over work
3	Crest Reserve, Del Mar	<50 plants	City SD	Treated	Re-treated	Re-treat
4	Chula Vista Nature Reserve	11.1 ac	Port San Diego	Treated	Re-treated	Re-treat
5	Sweetwater River, CA-54	0.25 ac	Caltrans	-	-	Obtain ROE and treat
6	Forester Creek (see Limram)	1.5 ac	Caltrans	Treated by SDRPF	Re-treated by SDRPF	Re-treat by SDRPF
7	Lake Calavera Cannon Rd	1.6 ac	HOA	Treated	Re-treated	SELC possibly taking over work
8	Bressi Ranch	0.6 ac	Private	-	Discovered	Obtain ROE and treat

SRRPF: San Diego River Park Foundation







Current condition in 2017: Algerian sea lavender occurs at 15 known locations and is highly invasive. This species is invading estuary habitat all the way into low marsh areas, right up to and occasionally within the low tidal zone, where cordgrass grows. Salt marshes are typically considered 'resistant' to invasion, but this species grows with pickleweed, *Frankenia salina*, *Batis maritima*, *Distichlis spicata* and *Monanthochloe littoralis*. Algerian and European sea lavenders form a dense carpet with plants growing edge to edge excluding all other vegetation at older sites. Control of this species has been a program priority. Ten of the fifteen sites are being treated. The five untreated sites will be added to active work areas in 2017 and 2018. The source of estuary populations frequently appears to be seed dispersal from landscaping in upland areas. These sources are being treated when they can be located (sites #1 and #5).

Rationale: The Agua Hedionda site (site #1, 15 acres) is extensive and quite old. Several listed birds are estuary obligates including: light footed clapper rail, Belding's savannah sparrow, snowy plover, and California least tern. These avian species are less common at San Diego River, but core populations are found at the other three sites: San Elijo, San Dieguito, and Tijuana Estuary (upon completion of *Limonium* surveying detailed maps will be provided). Sites #2-4 should be treated and site #1 should be worked on in partnership with SDRF and FWS. Batiquitos Lagoon (site #2) has infestations on artificial tern breeding areas on the northeast shore. Plants could have invaded these areas naturally, been introduced from Agua Hedionda, or been brought with contaminated sandy substrate.

Management information: European sea lavender is being controlled using glyphosate (post emergent) and in selected areas Imazapyr is being added for seedling suppression (pre and post emergent). This treatment approach is also being used by the San Francisco 'Spartina Project' which is controlling *Limonium* species in the Bay area. Limram is easier to treat than Limdur, as the plants tend to be larger and mounded.

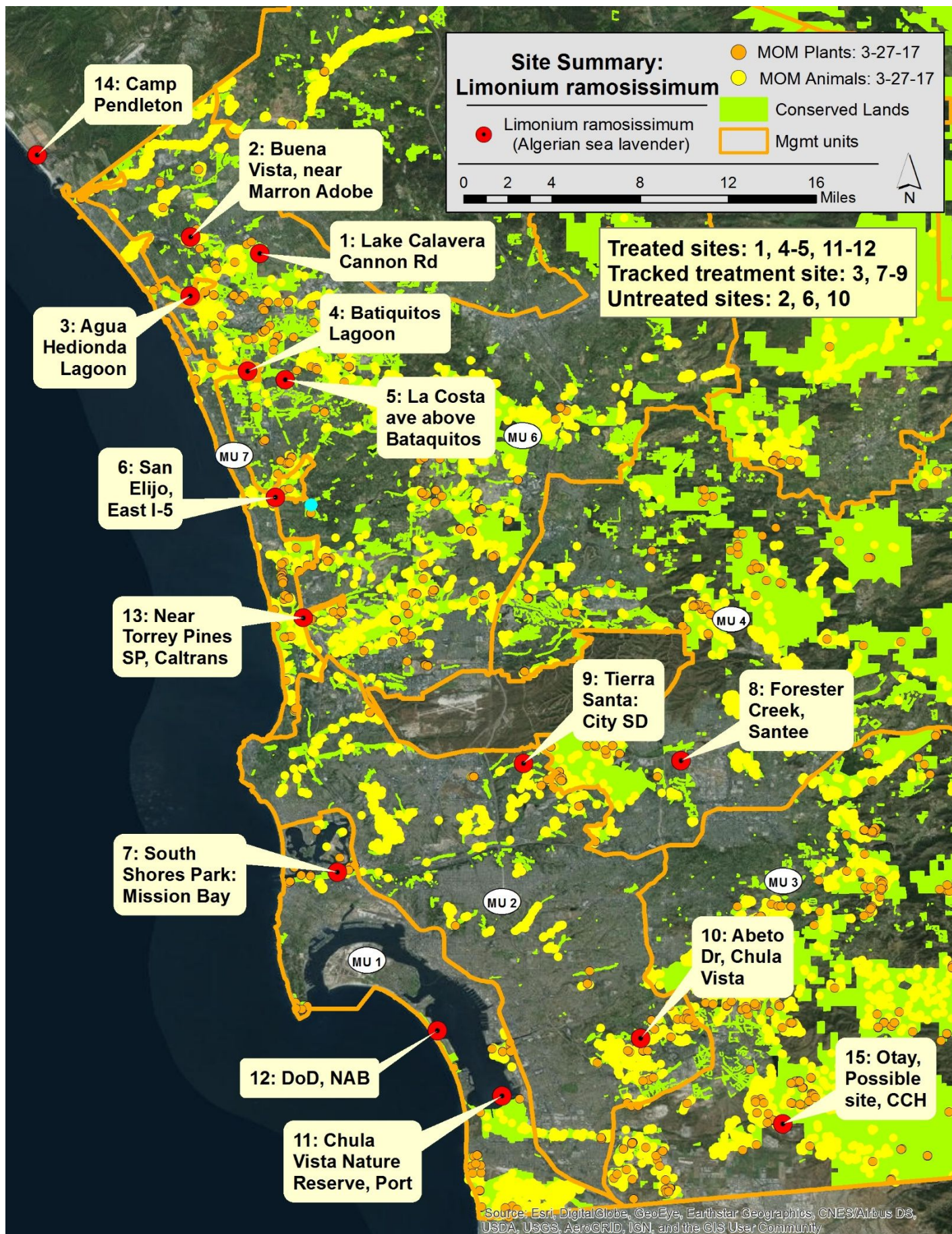
Summary of work 1-2015 to 2-2017 and recommendations:

- **Site #1 Lake Calavera Cannon Rd:** This is a large site high on the Agua Hedionda Watershed. Both Limram and Limdur co-occur at the site, which is modified drainage with cut slopes, brow ditches, paved access roads, and non-native landscaping. The site is directly adjacent to Lake Calaveras open space. Crews treated flat portions of the site in 2015, re-treated these areas in 2016, and we are working with SELC to hand the site over to them for the next few years. Treatments greatly reduced cover of *Limonium*, but there are still scattered live plants, seedlings sprouting after rains, and portions of the site that have not been treated on higher slopes.
- **Site #4 Batiquitos Lagoon:** This site is composed of four areas all in the eastern portion of the estuary. Two of the areas are least tern breeding areas (north shore and island). The area east of the island is where San Marcos Creek enters the estuary. There is also an area south of the island (this area was only partially treated). The north and east shore areas have been treated three times, the island once, and the south shore partially once. Treatments and hand pulling plants has reduced cover and number of plants significantly (>20,000 plants to fewer than 1,500, most of which are now on the south shore). SELC is treating this site for the next 3 to 5 years.
- **Site #5 La Costa Ave above Batiquitos:** This site is most likely the source population for the Lagoon population. It is a narrow strip along La Costa Ave. Plants were treated multiple times in 2015 and 2016. >95% of plants have been controlled. The site will be retreated in 2017 and 2018.

- **Site #11 Chula Vista Nature Reserve, Port:** This large site is important for restoring the high value habitat at CVNR as well as it being a seed source for the entire San Diego Bay. Plants are intermixed in high quality native habitat in low, mid and high marsh. Plants were treated in 2015 and re-treated in 2016. Re-treatments will be carried out in 2017 and 2018.

Limonium ramosissimum (Algerian sea lavender)

#	Location	Size	Property ownership	Work in 2015	Work in 2016 Early 2017	Future Action
1	Lake Calavera Cannon Rd (Limdur too)	3 ac	HOA	Treated	Re-treated	Re-treat
2	Buena Vista, near Marron Adobe	0.01 ac	Private	-	-	Survey, treat if needed
3	Agua Hedionda Lagoon	15 ac	CDFW	-	-	SELC work
4	Batiquitos Lagoon	0.2 ac	CDFW	Treated	Re-treated	SELC work
5	La Costa ave above Batiquitos	0.2 ac	City of Carlsbad	Treated	Re-treated	SELC work
6	San Elijo, East I-15	Eradicated	CDFW	Surveyed	-	-
7	Mission Bay, South Shores Park	1.3 ac	City of San Diego	Treated	-	Survey, treat if needed
8	Forester Creek, Santee (Limdur too)	1.0 ac	Caltrans	Treated by SDRPF	Re-treated by SDRPF	Re-treat by SDRPF
9	Tierra Santa: City SD	1.4 ac	City of San Diego	Treated by Canyonlands	Re-treated by Canyonlands	Re-treat by Canyonlands
10	Abeto Dr, Chula Vista	0.1 ac	HOA	-	-	Survey, treat if needed
11	Chula Vista Nature Reserve, Port	2.8 ac	Port District	Treated	Re-treated	Re-treat
12	DoD NAB, Delta Beach South	0.1 ac	DoD	Treated by DoD	Treated by DoD	Re-treat by DoD
13	Near Torrey Pines SP, Caltrans I-5	0.1 ac	Caltrans	-	-	Survey, treat if needed
14	Camp Pendleton	-	DoD	Treated by DoD	Treated by DoD	Re-treat by DoD
15	Otay, Possible site, CCH	0.1 ac	-	-	-	Survey, treat if needed







Current condition 2017: This species occurs in North County at several locations (see site summary map). Three of the populations are established invasive wildland populations (#2, 3, and 5). Two of the populations (sites #2 and #3) were completely treated in 2015 and re-treated in 2016. Re-treatments will be carried out in summer 2017 and 2018. These wildland sites have treated all adult plants with >95% control. Seedlings are sprouting from the seedbank, these will be treated until the seedbank is depleted. Three additional sites were old production groves (cut flower industry) two of which should be monitored for signs of invasiveness (#1 and #4), the third small site was treated in 2015 and re-treated in 2016 (site #6). This species can be aggressively invasive, as seen on the Fallbrook Naval Weapons Station where a large 1,000 acre invasion occurred that was impacting federally endangered Stephen's kangaroo rat (SKR) and federally threatened California gnatcatcher (Jacobsen 2000). This population, site #5, has been drastically reduced in size (now seedlings each year). Bridal broom impacts flora and fauna in grassland and scrub habitats. Bridal broom is listed as a B-rated noxious weed by CDFA.

Rationale: The species directly impacts a number of listed species in coastal sage scrub (SKR and CAGN), and would likely impact *Ambrosia pumila*, as noted above. Sites #2 and 3 are in close proximity to the Weapons Station and are actively reproducing - these should be controlled to assist the Weapons Station in eliminating this plant. Sites #1 and site #4 do not currently seem to be spreading but they should be monitored to ensure they do not become invasive (this may be occurring when plants become self-compatible, according to Dean Keltch, CDFA).

Management information: This large perennial shrub requires a multi-year commitment to ensure eradication. Monitoring and re-treatments may require up to 15 years due to long seed viability. Individual plants are moderately difficult to control with herbicide, and re-sprouting may occur. Seeds are gravity-dispersed, but long-distance dispersal occurs via animals, which can carry seed a significant distance from the parent plant.

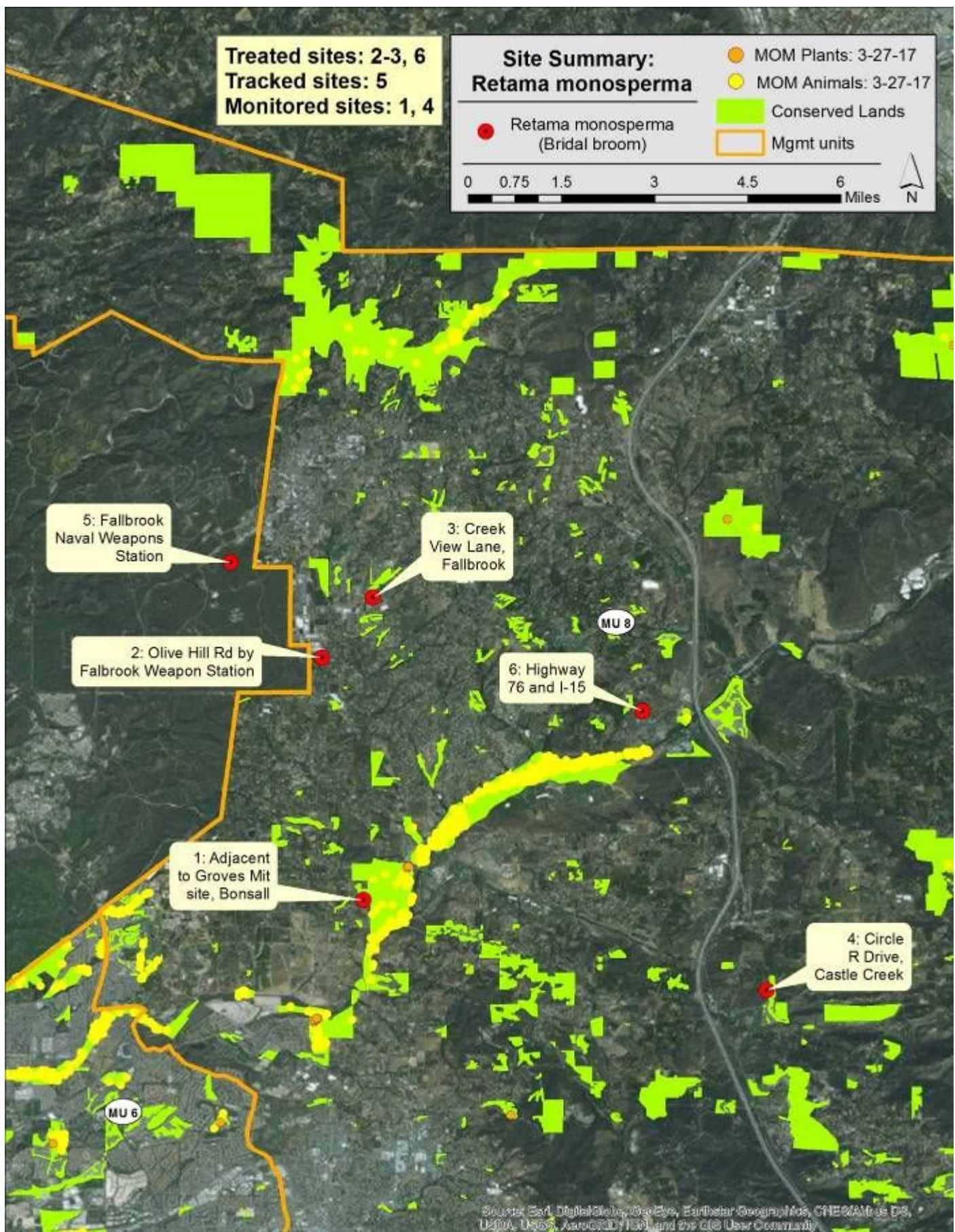
Summary of work 1-2015 to 2-2017:

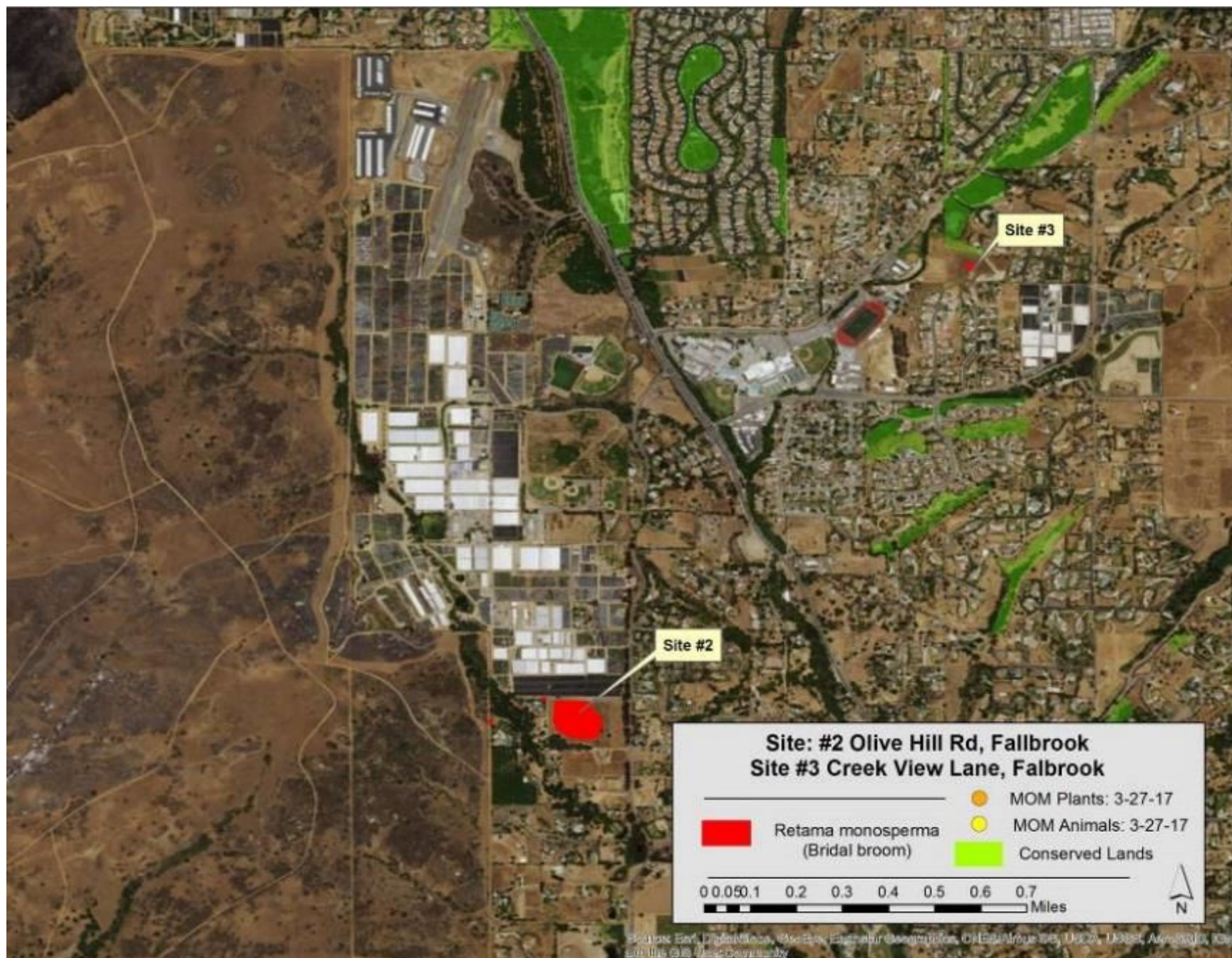
- **Site#2 Olive Hill Rd, Fallbrook:** This was a large site with many mature adult shrubs > 3 m in height. All plants were cut and removed in 2015, and cut stumps were treated. The site was re-treated in 2015 and seedlings were foliar sprayed. In 2016 the site was re-treated (re-sprouts and seedlings). The site will be re-treated in 2017 and 2018.
- **Site#3 Creekview Lane, Fallbrook:** This site had a few mature plants and seedlings. All plants were cut and removed in 2015, and cut stumps were treated. The site was re-treated in 2015 and seedlings were foliar sprayed. In 2016 the site was re-treated (re-sprouts and seedlings). The site will be re-treated in 2017 and 2018.
- **Site#6 Highway 76 and I-15:** This site was a small production grove that was fallow. All plants were cut and removed in 2015, and cut stumps were treated. The site was re-treated in 2015 and seedlings were foliar sprayed. In 2016 the site was re-treated (re-sprouts and seedlings). The site will be re-treated in 2017 and 2018.

Populations of *Retama monosperma* (bridal broom)

#	Location	Size	Property ownership	Work in 2015	Work in 2016 Early 2017	Future Action
1	Adjacent to the Groves mitigation site, Bonsall.	~4 acres	1 Private	Monitored	-	Monitor
2	Olive Hill Rd., east of Fallbrook NWS	1.0 acre	3 Private	Treated	Re-treated	Re-treat
3	Creek View, Fallbrook.	1 plant	1 Private	Treated	Re-treated	Re-treat
4	Circle R Drive, Castle Creek	1 acre	1 Private	Monitored	-	Monitor
5	Fallbrook NWS	500 acres, scattered	DoD	Treated by DoD	Treated by DoD	Re-treat by DoD
6	Highway 76 and I-15	0.1 ac	1 Private	Treated	Re-treated	Re-treat

DOD = Department of Defense





Volutaria tubiliflora (Volutaria knapweed)**SD PAF score: NA**

Current condition 2017: This species is only known to occur at four locations in North America. The largest infestation, distributed over a 1,000 acres of desert habitat, is being treated in Borrego Springs in eastern San Diego County. Three additional sites have been discovered in the past two years, two in San Diego (Site #1 and #2) and a third in Orange County. These three populations are in uplands (grassland and scrub habitat), all are being treated.

Rationale: The species is invading a wide range of habitats ranging from deserts to coastal uplands. The species prefers disturbed habitat where it forms dense stands of plants, but it is able to spread into native habitat. Two sensitive plants occur near or in patches of *Volutaria* in Rice Canyon (site #1), Orcutt's Bird beak (Jessie Vinje discovered *Volutaria* during her 2016 survey work), and Sand Diego thorn-mint. Two avian species also occur in close proximity, cactus wren and gnatcatcher. *Volutaria*'s ability to persist at dryer sites may allow it to invade and persist in cactus patches in rice canyon, potentially increasing the fuel load within cactus patches (cactus patches typically have low cover of fine fuels).

Management information: This large perennial shrub requires a multi-year commitment to ensure eradication. Monitoring and re-treatments may require up to 15 years due to long seed viability. Individual plants are moderately difficult to control with herbicide, and re-sprouting may occur. Seeds are gravity-dispersed, but long-distance dispersal occurs via animals, which can carry seed a significant distance from the parent plant.

Summary of work 1-2015 to 2-2017:

Site#1 Rice Canyon, Chula Vista: This site was the largest coastal infestation known at 1.4 acres and > 50,000 plants. Most plants were along brow ditches in coastal sage habitat, but plants had spread down slope to intermingle with Orcutt's bird's beak at the bottom of the canyon. On the main site a pre and post-emergent was used in winter 2017 that selectively controls for broadleaf plants, particularly plants in the composite family. Control was quite good (>99%), but several hundred scattered plants were controlled during re-treatments with glyphosate and selected hand pulling (such as near the Orcutt's bird's beak population).

Populations of Volutaria tubiliflora (Volutaria knapweed)

#	Location	Size	Property ownership	Work in 2015	Work in 2016 Early 2017	Future Action
1	Rice Canyon, Chula Vista	1.4 acres	City of Chula Vista	-	Discovered, treated	Re-treat
2	Point Loma, DoD	0.1 acre	DoD	-	Discovered, treated by DoD	Re-treat by DoD

- DOD = Department of Defense





Appendix 1: Treatment information

All work occurring under this program is 'passive'. No mechanized equipment will be used (mowers, tractors, graders, or other soil disturbing or vegetation reducing equipment). All work is carried out by hand crews on foot.

Treatment of target non-native plants may be by: chemical (herbicide) or physical control (hand pulling or hand cutting) or by a combination of both methods (cut and treat).

Chemical control using herbicides:

All treatments are targeted applications by hand (spot treatments). All treatments will utilize making dye to assure appropriate coverage as well as to detect any drift or non-target application which will be avoided.

The chemicals listed below are all California registered herbicides and are those that can currently be legally used in California. The California Department of Pesticide Regulation (DPR) is responsible for regulating pesticide registrations and use.

- California regulations governing pesticides are frequently stricter than federal regulations
 - None of the herbicides listed can be found on the state of California groundwater contaminants list maintained by DPR
 - All herbicides used are in the lowest toxicity category with the signal word “CAUTION”.
1. Glyphosate Herbicides
Aquatic formulation for use near water
 2. Imazapyr Herbicides
Aquatic formulation for use near water
 3. Triclopyr Herbicide
 4. Aminopyralid Herbicide
 5. Alkyl phenol ethoxylate, Isopropanol, and Fatty acids - Surfactant for Terrestrial / Aquatic Sites
 6. Methylated canola oil, Polyalkyleneoxide heptamethyltrisiloxane, Alkylphenol ethoxylate - Surfactant

Physical control:

Target plants may be cut using hand tools. Any woody non-native plant cutting/removal is restricted to upland habitat types (no woody vegetation removal in riparian areas).

Target plants may be hand pulled (particularly herbaceous annuals and perennials and seedlings of woody perennials). No soil disturbance by extraction (digging out) will occur.

Biomass will be disposed as appropriate, with particular attention to avoiding any distribution of propagules or seed to other sites.

Appendix 2: San Diego County AWM ROE form



County of San Diego

HA DANG
AGRICULTURAL COMMISSIONER/
SEALER OF WEIGHTS & MEASURES

DEPARTMENT OF AGRICULTURE WEIGHTS AND MEASURES
9325 HAZARD WAY, STE. 100, SAN DIEGO, CA 92123-1217
(858) 694-2739
FAX (858) 467-9897
<http://www.sdcawm.org>

MEGAN MOORE
ASSISTANT DIRECTOR

RIGHT OF ENTRY AUTHORIZATION

Property Owner/ Agent: _____ Contact Telephone: _____
APN: _____ Email: _____
Property Address: _____ City: _____ Zip Code: _____
Mailing Address: _____ City: _____ Zip Code: _____

The above-listed Property Owner, Authorized Representative Agent or Operator of Property ("Owner") hereby permits the County of San Diego Department of Agriculture, Weights and Measures, its officers, employees, and agents ("COUNTY"), to enter upon Owner's property ("Premises") located as listed above, subject to all licenses, easements, encumbrances, and claims of title affecting the Premises and upon the following terms and conditions:

- 1. Grant of Right-of-Entry.** Owner hereby grants COUNTY a right-of-entry ("Permit") over the Premises to ingress to and egress from the area to survey for, map locations of, chemically treat, monitor, and remove non-native invasive plants known to be growing on the Premises, subject to the terms and conditions set forth in this Permit. Entry to the Permit Area will be by means of existing roads and driveways, where available, and by other means mutually agreed to by both parties when roads and driveways are not available.
- 2. No Implied Easement.** Nothing in this Permit shall be construed to grant County an easement by implication, prescription, or any other operation of law.
- 3. Term.** This Permit shall become effective upon execution hereof by the Director of COUNTY's Department of Agriculture, Weights and Measures and shall terminate only upon written agreement of the parties.
- 4. Herbicides.** As one means of removing targeted non-native invasive plants from the Premises, COUNTY may apply herbicides to them. Although County will use and apply the herbicides in accordance with the instructions on the herbicide label and in accordance with all applicable state and County laws and regulations, COUNTY makes no guarantees of the efficacy of applied herbicides and makes no guarantee it will be able to permanently eliminate the targeted plants from the Premises and/or not inadvertently damage non-target plants in the attempt to remove targeted plants.
- 5. Compliance with Laws.** In conducting its operations on the Premises, COUNTY shall comply, at COUNTY's expense, with all applicable laws, regulations, rules, and orders, regardless of when they become or became effective, including, without limitation, those relating to health, safety, noise, environmental protection, waste disposal, and water and air quality, and shall furnish satisfactory evidence of such compliance upon request of Owner.

6. **Waiver of Liability.** In consideration of the COUNTY's removal of the non-native invasive plants from the Premises at no cost to Owner, Owner hereby waives, releases and forever discharges any and all rights and claims for damages, injuries, expenses or costs of any kind which Owner has now or may acquire in the future that are directly or indirectly related to the work described above, against the COUNTY and its agents, officials, employees, volunteers and contractors.
7. **Costs.** The work described above shall be done at the COUNTY's sole expense.
8. **Authority.** Owner represents and warrants that it has full power and authority to execute and fully perform its obligations under this Permit pursuant to its governing instruments, without the need for any further action, and that the person(s) executing this Permit on behalf of Owner are the duly designated agents of Owner and are authorized to do so, and that fee title to the Premises vests solely in Owner.
9. **Entire Agreement.** This Permit, together with any addenda, exhibits and riders attached hereto, constitutes the entire agreement between the parties with respect to the subject matter hereof, and all prior or contemporaneous agreements, understandings and representations, oral or written, are superseded.
10. **Modification.** The provisions of this Permit may not be modified, except by a written instrument signed by both parties.
11. **Partial Invalidity.** If any provision of this Permit is determined by a court of competent jurisdiction to be invalid or unenforceable, the remainder of this Permit shall not be affected thereby. Each provision shall be valid and enforceable to the fullest extent permitted by law.

IN WITNESS WHEREOF, both parties have executed this Permit effective as of _____.

COUNTY:

OWNER/AGENT(S):

COUNTY OF SAN DIEGO, a political
Subdivision of the State of California

By: _____

Owner/agent signature

HA DANG
Agricultural Commissioner/
Sealer of Weights and Measures

Owner/agent printed name

Public Disclosure

We strive to protect personally identifiable information by collecting only information necessary to deliver our services. All information that may be collected at this site becomes public record that may be subject to inspection and copying by the public, unless an exemption in law exists. In the event of a conflict between this Privacy Notice and any County ordinance or other law governing the County's disclosure of records, the County ordinance or other applicable law will control.

Access and Correction of Personal Information

You can review any personal information we collect about you. You may recommend changes to your personal information you believe is in error by submitting a written request that credibly shows the error. If you believe that your personal information is being used for a purpose other than what was intended when submitted, you may contact us. In all cases, we will take reasonable steps to verify your identity before granting access or making corrections. See Contact Information section.

Project contact: Mark Martinez, County of San Diego AWM, Integrated Pest Control: Phone: 858-614-7751

Appendix 3: Notice of Exemption

NOTICE OF EXEMPTION

TO: ☒ Recorder/County Clerk
Attn: James Scott
1600 Pacific Highway (M.S. A33)
San Diego, CA 92101

FROM: County of San Diego, Department of Agriculture, Weights
and Measures
Attn: Mark Martinez
9325 Hazard Way
San Diego CA 92123-1217

F I L E D
Renee J. Dunning Jr. Recorder/County Clerk

☐ State Clearinghouse
P.O. Box 3044
Sacramento, CA 95812-3044

FEB 17 2015
G. Meza
DEPUTY

SUBJECT: FILING OF NOTICE OF EXEMPTION IN COMPLIANCE WITH PUBLIC RESOURCES CODE SECTION 21108 OR 21152

Project Name: Implementation of the Management Priorities for Invasive Non-native Plants, A Strategy for Regional Implementation, San Diego County, California Document

Project Location: Conserved lands in San Diego County and surrounding private properties.

Project Applicant: County of San Diego, Department of Agriculture, Weights and Measures, 9325 Hazard Way, San Diego CA 92123

Project Description: Treatment of invasive plants identified as Management Level 2 – Eradication in the Management Priorities for Invasive Non-native Plants, A Strategy for Regional Implementation, San Diego County, California document prepared by Conservation Biology Institute. Invasive plant growth forms to be treated include perennial and annual forbs, annual grass, perennial shrubs, and perennial monocot. Locations of invasive non-native plants to be treated are listed in the Invasive Plant Species Annual Work Plan, prepared by County of San Diego Department of Agriculture, Weights and Measures. Treatment of target non-native invasive plants will include: chemical (herbicide) or physical control (hand pulling or hand cutting) or a combination of both methods (cut and treat). All work will be carried out by hand crews on foot and no mechanized equipment will be used. The following herbicides will be used: Glyphosate and Imazapyr (aquatic formulations); Triclopyr; and Aminopyralid.

Agency Approving Project: County of San Diego

County Contact Person: Mark Martinez **Telephone:** (858) 614-7751

Date Form Completed: January 27, 2015

This is to advise that the County of San Diego Agricultural Commissioner/Sealer of Weights and Measures has approved the above described project on January 27, 2015, and found the project to be exempt from the CEQA under the following criteria:

Exempt status and applicable section of the CEQA ("C") and/or State CEQA Guidelines ("G"): (check only one)

- ☐ Declared Emergency [C 21080(c)(3); G 15269(a)]
☐ Emergency Project [C 21080(b)(4); G 15269(b)(c)]
☐ Statutory Exemption, C Section:
☒ Categories: Exemption, G Section: Section 15304, Minor Alterations to Land
☐ G 15162 – Residential Projects Pursuant to a Specific Plan
☐ Activity is exempt from the CEQA because it is not a project as defined in Section 15378.
☐ G 15081(b)(3) – It can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment and the activity is not subject to the CEQA.

Statement of reasons why project is exempt: The project qualifies for a CEQA Categorical Exemption under Section 15304: Minor Alterations to Land because it consists of minor public alterations in the condition of land and/or vegetation, which does not involve removal of healthy, mature, scenic trees, resulting in improvement of habitat for wildlife resources. Additionally, the project will not impact environmental resources of hazardous or critical concern that are designated, precisely mapped and officially adopted by government agencies; does not contribute to cumulative environmental impact; will not have a significant impact on the environment due to unusual circumstances; does not damage scenic resources within a designated state scenic highway; is not on the list of Hazardous Waste and Substance Sites pursuant to Section 85962.5 of the Government Code; and does not cause adverse change in the significance of a historical resource.

The following is to be filed in only upon formal project approval by the appropriate County of San Diego decision-making body.

Signature: [Signature] **Telephone:** 858-614-7703

Name (Print): HA DAVIS **Title:** DIRECTOR

This Notice of Exemption has been signed and filed by the County of San Diego.

This notice must be filed with the Recorder/County Clerk as soon as possible after project approval by the decision-making body. The Recorder/County Clerk must post this notice within 24 hours of receipt and for a period of not less than 30 days. At the termination of the posting period, the Recorder/County Clerk must return this notice to the Department address listed above along with evidence of the posting period. The originating Department must then retain the returned notice for a period of not less than twelve months. Reference: CEQA Guidelines Section 15062.