San Diego Association of Governments (SANDAG)
Memorandum of Understanding (MOU) #5004552

Strategic Removal of Invasive Weed Species
2nd Quarter Report - FY 2015-16: Report #5 for Project

October 1, 2015 – December 31, 2015

Project: County of San Diego, Department of Agriculture, Weights & Measures – Strategic Removal of Invasive Weed Species

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Project:

Invasive plants are considered one of the biggest threats to endangered species and their habitats. A strategic plan for managing non-native invasive plant species in San Diego County was completed in 2012 through a SANDAG contract to the Conservation Biology Institute (CBI) (http://sdmmp.com). The Invasive Plant Strategic Plan (IPSP) is designed to develop a strategic approach towards the eradication and management of invasive plants in the San Diego region. The IPSP is meant to work in conjunction with the Management Strategic Plan for Conserved Lands in Western San Diego County (MSP) (Management Strategic Plan).

This Scope of Work will require the contractor to focus on the management of invasive plants identified in Levels 1, 2, and 3 of the IPSP. The following tasks have been identified as necessary to implement this effort:

TASK 1 – Invasive Plant Species Coordinator:

Level of Effort: (25%) of overall contract

1) Right of Entry (ROE) Work:

   A small amount of work was expended on obtaining ROEs this quarter. One new private property ROE was obtained to cover project work at Lake Murray. Over the next two quarters the program will work with California Department of Parks and Recreation, and Caltrans to obtain legal access to their properties.

Table 1. Summary of ROEs by entity (public agencies or large landholders/programs)

Entity	Type of agreement	Length of agreement	Status	Breadth of agreement
County of San Diego*	Implicit (AWM is County of SD)	Continuous	Complete	All lands
City of San Diego: Parks and Open Space	City ROE	3 Years	Complete	All open space and park lands
City of San Diego: Public Utilities Division	City ROE	3 Year	Complete	Public Utilities Division Lands
Unified Port of San Diego	Unified Port of San Diego ROE	2 Years	Complete	Chula Vista Nature Reserve
California Department of Fish and Wildlife (CDFW)	CDFW ROE	Continuous	Complete	North County estuaries
Sweetwater Authority	Sweetwater Authority ROE	2 years	Complete	Sweetwater Eupatory site
City of Carlsbad: Parks Department	AWM ROE	Continuous	Complete	Ward's weed site
City of Carlsbad: Roads Department	AWM ROE	Continuous	Complete	Sea lavender site
City of Solana Beach	AWM ROE	Continuous	Complete	Sea lavender site
Various private properties: many (1 new)	AWM ROE	Continuous	Complete	
Caltrans	Making determination	Pending determination	In process	Three sites
California Department of Parks & Recreation	Making determination	Pending determination	In process	Unknown

*Includes parks, open space, and roads.

2) The coordinator worked at the following field sites.

    1) Carnation spurge *(Euphorbia terracina)*:
    This Management Level 1 species was identified at two sites, located at Penasquitos Canyon and near Highway 56 (Figure 1). Population #3 at Penasquitos County Park was visited. A few seedlings were observed, most likely responding to summer rains.

    Site #2, Carmel Mtn, KB Homes, was treated once this quarter.

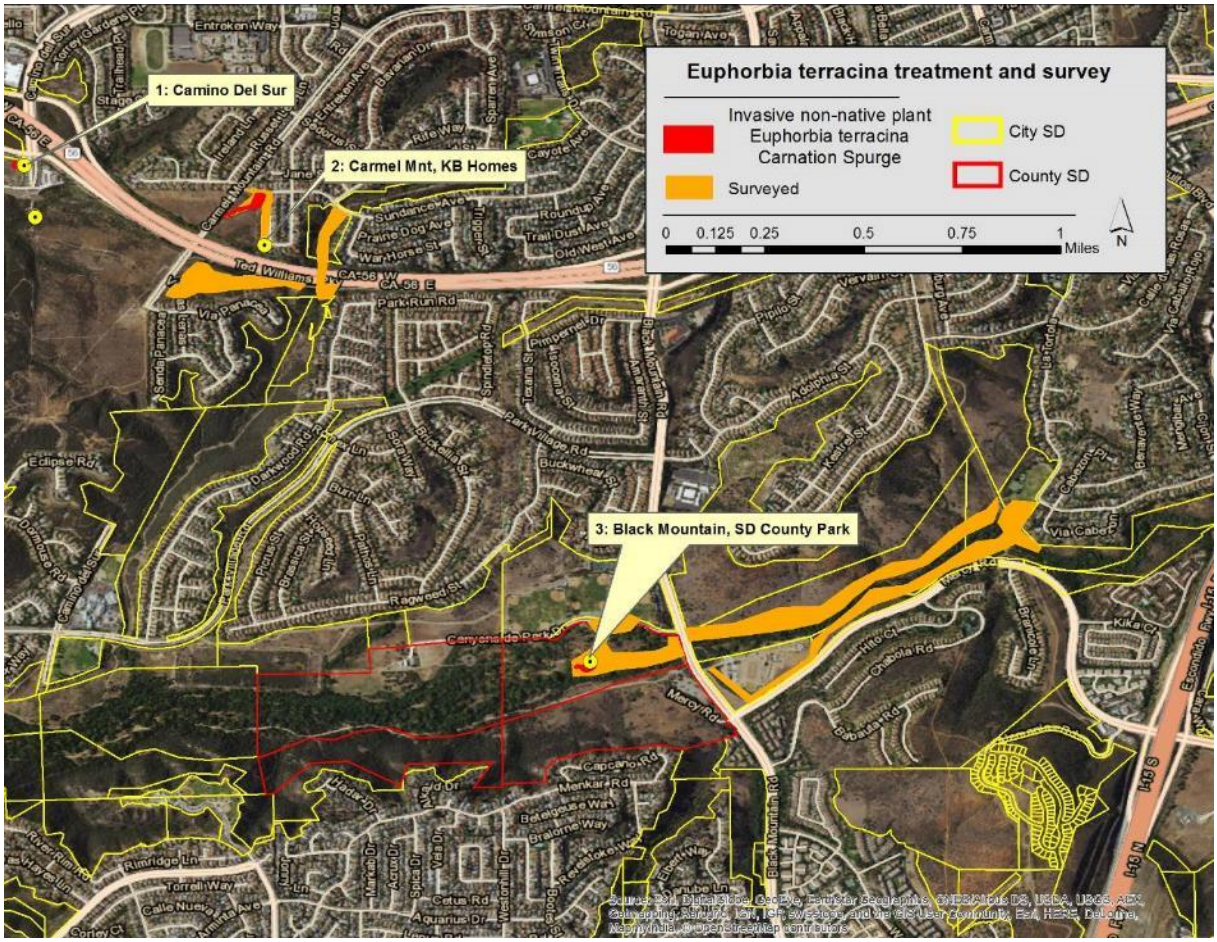

Figure 1. ***Euphorbia terracina*** **sites.**

2) Algerian sea lavender *(Limonium ramosissimum):*
Site #1 at Ocean Terrace (adjacent to Calavera Preserve) was visited. Initial treatment efficacy was similar to other *Limonium* treatment sites: treated areas displayed between 50% and 80% control. *Limonium* plants are difficult to control with one application of Glyphosate herbicide, even at 4% strength. Areas that were clearly treated (dye visible in initial treatment photo) still had large numbers of live individuals (Figure 9). Retreatment was scheduled and completed by the AWM crew this quarter.

Site #5 at La Costa Ave was visited. The re-treatment at the La Costa Ave site resulted in much higher levels of control (90 to 100%) over the entire site. Initial control ranged from 50% to 90%.

Site # 12 at Chula Vista, owned by the Unified Port of San Diego, was surveyed and treatments supervised. This is a very large site (>28 acres) with both Algerian and European sea lavender. The site is composed of both high quality estuary and degraded flat areas where a power plant was removed.

3) European sea lavender *(Limonium duriusculum)*:
Site #2 at Solana Beach was visited. Previously pulled plants did not re-sprout frequently. Scattered seedlings were present.

4) Eupatory *(Agertina adenophora)*:
Eupatory site #1 at Sweetwater Authority was visited and scheduled for treatment.

5) Ward's weed *(Carrichtera annua)*:
Ward's weed was surveyed for at sites #1 & 2. Treatments were very effective. No new plants were found in open space areas. Even with summer rains, plants did not sprout from the seedbank. The pre-emergent seems to be working on the two sites. Part of site #1 is in a landscaped area (City of Carlsbad Park). This site did have four seedlings which were pulled.

6) Canary Island St. John's wort *(Hypericum canariense)*:
Initial treatments at site #4 at Balboa Park were completed. Coordination meetings with City staff were held. Monitoring of crews and treatment areas occurred. Treatments appeared effective, but it is difficult to fully determine efficacy within the first few months of treatment.

TASK 2 – AWM: Invasive Plant Level 1 Management

Level of Effort: (<10%) of overall contract

Table 2. Summary of treatments performed by AWM on Level 1 species this quarter.

Scientific Name	Common Name	# of Sites Worked	Total Acres Surveyed	Total Acres Treated	Plants treated
Euphorbia terracina	carnation spurge	2	4.64	4.30	seedlings

*Acreage total (site acreage X number of visits)

Carnation spurge *(Euphorbia terracina*): Sites #2 & #3

Table 3. Summary of surveys and treatments by site.

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #2: KB Homes	carnation spurge	2	1.94	1.94	seedlings
Site #3: Black Mountain Park, Los Penasquitos	carnation spurge	2	0.38	0.21	seedlings

*Acreage per visit

Both sites were re-treated twice in case seedlings were missed during initial treatments or sprouted in response to summer rains. Seedlings were found and treated at both sites.

TASK 3 – AWM: Invasive Plant Level 2 Management.

Level of Effort: (>40%) of overall contract

AWM IPC surveyed, treated, and manually removed 4 invasive weed species at 11 sites this quarter: yellow starthistle, Canary Island St. John's wort, European sea lavender, and Algerian sea lavender. AWM IPC made optimal pesticide applications, protected the natural environment by preventing off-site movement of pesticides, and utilized Best Management Practices (BMPs) that prevented unintentional discharges to surface waters. For each site, AWM IPC followed the following procedures:

1. Identified the pest species to be treated.
2. Reviewed site conditions, such as soil texture, slope, standing water, irrigation or storm drains.
3. Identified and avoided streamside management areas and surface waters to prevent drift and application of pesticides not labeled for aquatic use onto surface waters.
4. Identified most appropriate method of control based on integrated pest management methods, designed to minimize the scale and number of pesticide applications.
5. Applied the least persistent and least toxic pesticide that effectively mitigates the target pest.

Table 4. Summary of treatments performed by AWM on Level 2 species this quarter.

Scientific Name	Common Name	# of Sites Worked	Acres Surveyed	Acres Treated	Plants treated
*Centaurea solstitialis**	yellow starthistle	3	39.38	2.61	455
Hypericum canariense	Canary Island St. John's wort	1	27.87	10.23	>5,000
Limonium duriusculum & Limonium ramosissimum	European sea lavender & Algerian sea lavender	3	1.90	1.81	>11,500
(Cal-IPC Wetland Recovery Project Funding) Limonium duriusculum & Limonium ramosissimum	European sea lavender & Algerian sea lavender	1	29.66	4.99	>550,000

*Work performed utilizing CDFA funding

Yellow starthistle (*Centaurea solstitialis*): Site #4, #8, and #15*

Yellow starthistle was treated and surveyed at several sites (Figure 2). Treatment occurred at two sites: #16 (Mesa Grande) and #8 (Mendenhall Valley). 10.00 acres were surveyed, and <0.1 acres were treated (29 plants) at Mesa Grande. 42.22 acres were surveyed, and 0.1 acres were treated (426 plants) at Mendenhall Valley. Site #15 (Emerald Crest) was surveyed once (15.08 acres), but no plants were found.

Table 5. Summary of surveys and treatments by site.

Site Name	Common Name	# of Visits	Acres Surveyed**	Acres Treated**	Plants treated
Site #8: Mendenhall Valley*	yellow starthistle	1	42.22	0.1	426
*Site #15: Emerald Crest**	yellow starthistle	1	15.08	0	-
*Site #16: Mesa Grande**	yellow starthistle	1	10.00	0.1	29

* Work performed utilizing CDFA funding

**Net acreage

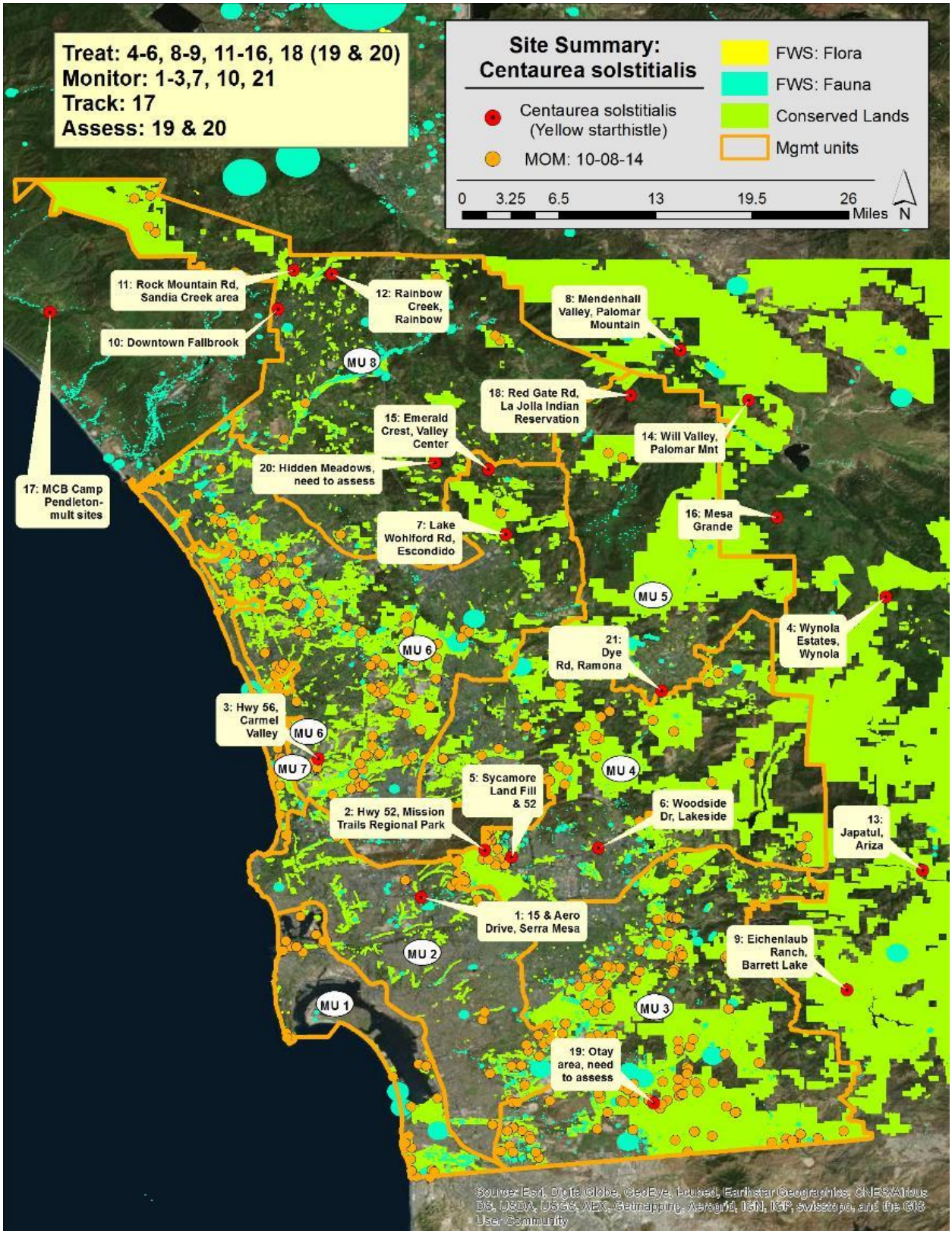

Figure 2. Yellow starthistle sites in San Diego County.

Canary Island St. John's wort (*Hypericum canariense*): Site #4,

Table 5. Summary of surveys and treatments by site.

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #4: Balboa Park	Canary Island St. John's wort	1	27.87	10.23	>5,000

*Acreage per visit

A round of initial treatments was completed at the largest Canary Island St. John's wort population in the county, located in Balboa Park (Figure 3). The population has been worked on by park staff and volunteers several years, but this was the first complete treatment of all invaded areas. Most plants were treated using the cut stump treatment method (Figures 4&5). These shrubs were typically 4' to 6' high. One area that had shorter re-sprouting plants averaging 2' to 3' high was foliar treated (Figure 6).

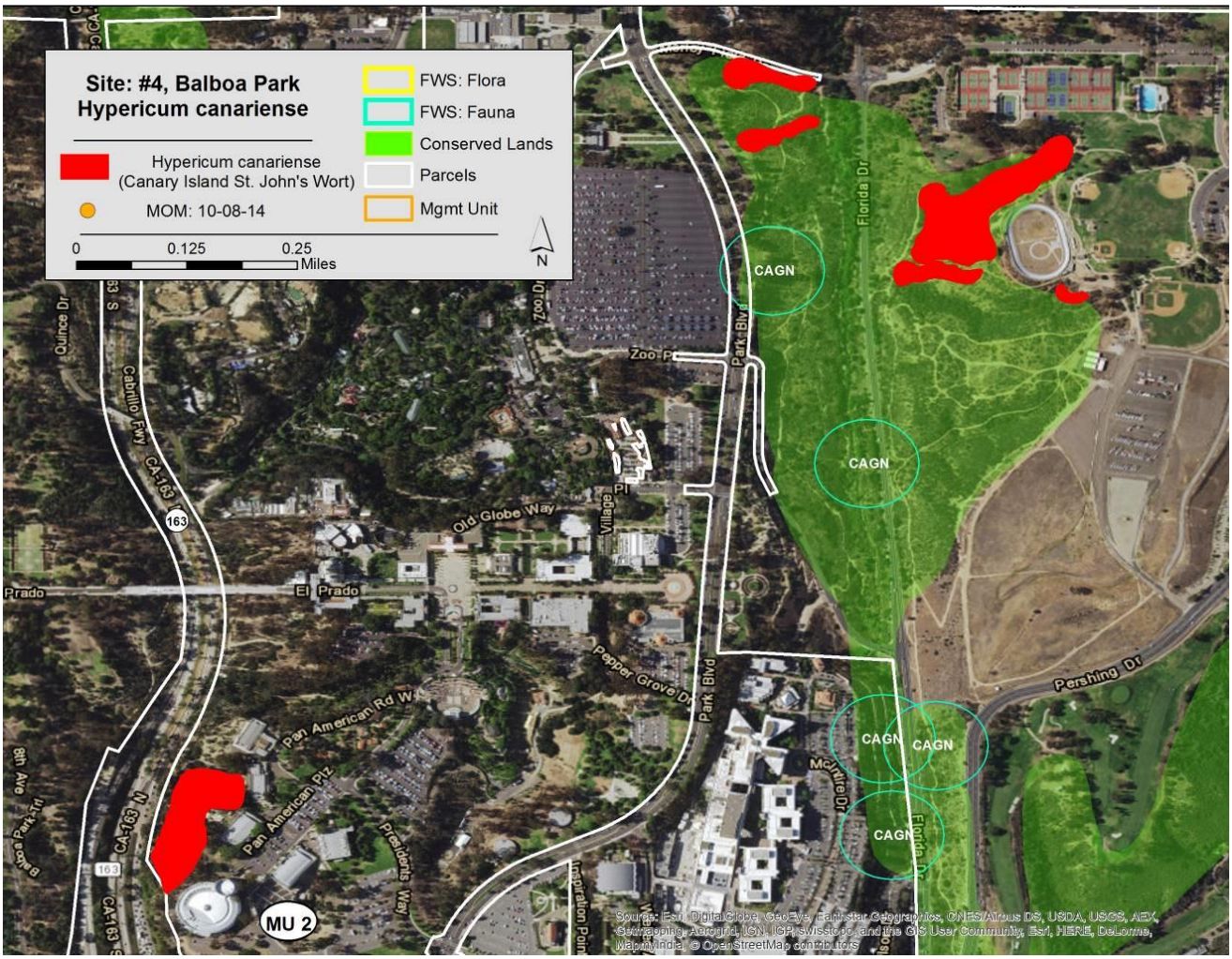

Figure 3. site #4: Balboa Park Canary Island St. John's wort treatment area.

Figure 4. Untreated Canary Island St. John's wort plants (light green shrubs) at site #4 in Balboa Park.

Figure 5. Treatment of Canary Island St. John's wort plants at site #4 in Balboa Park using cut stump method.

Figure 6. Canary Island St. John's wort plants at site #4 in Balboa Park that were treated by foliar application of herbicide; before (above) and after (below) treatment.

European sea lavender (*Limonium duriusculum*): Site #2

Table 6. Summary of surveys and treatments by site.

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #2: San Elijo Lagoon	European sea lavender	1	0.27	0.27	300

*Acreage per visit

European sea lavender site #2 (San Elijo Lagoon) was re-treated (Figure 7). Treatment of Glyphosate (4%) was made using backpack sprayers. One treatment was performed within the City of Solana Beach landscaped areas, with 300 plants being hand removed due to wet weather.

Figure 7. European sea lavender treatments at San Elijo Lagoon and City of Solana Beach landscaped areas.

Algerian sea lavender (*Limonium ramosissimum*) Sites #1, #12, and #5

Table 7. Summary of surveys and treatments by site.

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #1: Calavera Preserve, Ocean Terrace	Algerian & European sea lavender	1	0.17	0.08	>10,000

*Acreage per visit

Table 8. Summary of surveys and treatments by site- funded by a Cal-IPC grant from Southern California Wetland Recovery Project (match/leveraged funding).

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #1: Calavera Preserve, Ocean Terrace	Algerian & European sea lavender	1	1.45	0.38	>50,000

*Acreage per visit

Re-treatments were completed at Site #1 Calavera Preserve (Figure 8). Treatments of Glyphosate (4%) were made using backpack sprayers. This site has both European and Algerian sea lavender plants. Previous treatments were moderately successful with 50-80% efficacy, as is typical when treating sea lavender with Glyphosate (Figures 9&10).

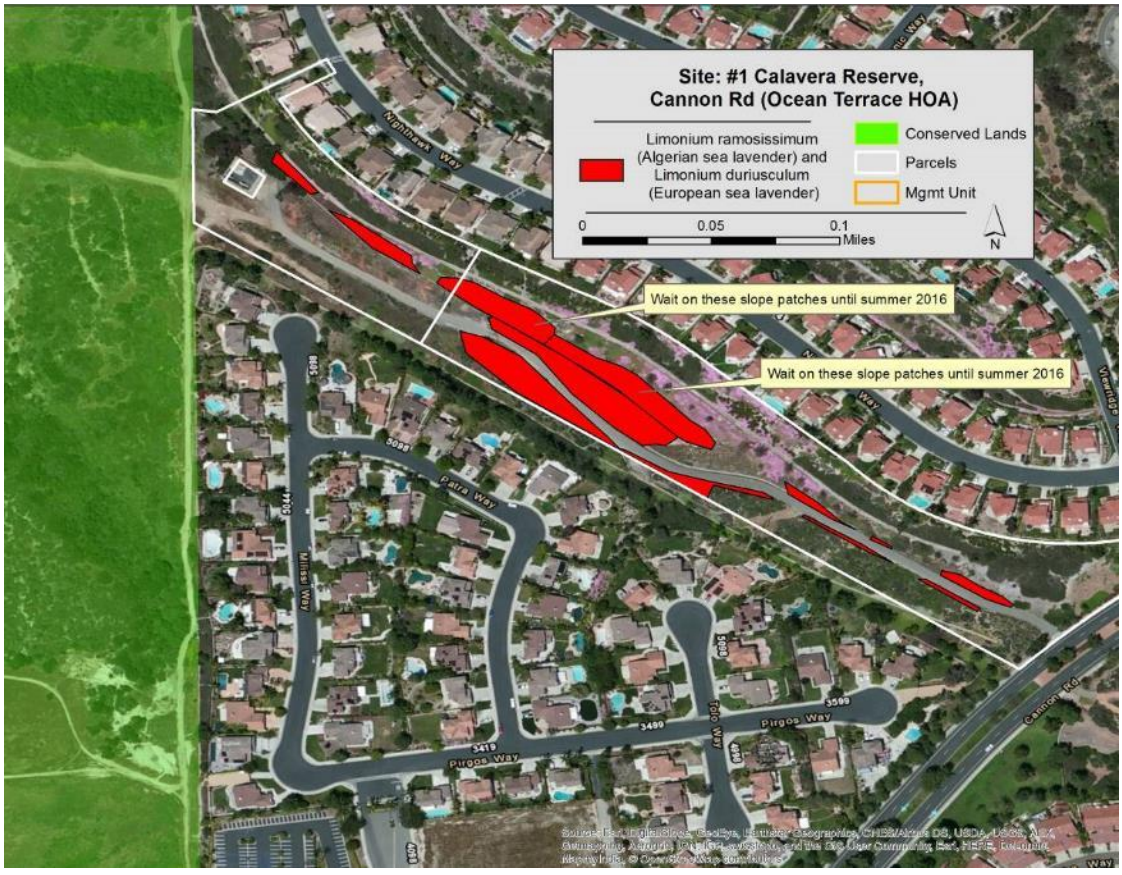

Figure 8. Algerian sea lavender treatments at site #1 Calavera Reserve.

Figure 9. Algerian sea lavender at site #1 Calavera Preserve after herbicide treatment last quarter (top) and before re-treatment (bottom). Initial treatment was about 50% effective.

Figure 10. Algerian sea lavender at site#1 Calavera Preserve after initial foliar herbicide treatment. 60-70% control observed.

Table 9. Summary of surveys and treatments by site- funded by a Cal-IPC grant from Southern California Wetland Recovery Project (match/leveraged funding).

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #12: Chula Vista Nature Reserve, SD Port	Algerian & European sea lavender	1	28.21	4.61	>500,000

*Acreage per visit

Work at site #12 (Chula Vista Nature Reserve) began. This site has both European and Algerian sea lavender (Figure 11). The site has high quality estuary, least tern breeding areas, and degraded upland areas where a power plant was decommissioned. The site is important because it is within the San Diego Bay, and is a seed source for a very large area. At this site, all work this quarter was funded by a Cal-IPC WRP Grant. Future re-treatment work will be funded by this SANDAG program. Treatments of Glyphosate (4%) were made using backpack sprayers in estuary areas (Figure 12). In degraded areas, a mix of Imazapyr and Glyphosate was used (to help suppress seedlings). Initial treatments had high efficacy in estuary areas with very little impact on natives intermixed with the sea lavender plants (Figure 13). The disturbed areas had more moderate levels of control, typical of other sea lavender sites.

Figure 11. Site #12 Chula Vista Nature Reserve treatment area.

Figure 12. IPC staff treating Algerian sea lavender at Site #12 Chula Vista Nature Reserve.

Figure 13. Algerian sea lavender at Site #12 Chula Vista Nature Reserve after initial herbicide treatment. >90% control and minimal impact to adjacent native vegetation observed.

Table 10. Summary of surveys and treatments at Site#5 along La Costa Ave.

Site Name	Common Name	# of Visits	Acres Surveyed*	Acres Treated*	Plants treated
Site #5: La Costa Ave, above Batiquitos Lagoon	Algerian sea lavender	1	1.46	1.46	>1,000

*Acreage per visit

Site #5 along La Costa Avenue in Carlsbad (above Batiquitos Lagoon) was re-treated (Figure 14). This site is owned by the City of Carlsbad. About 1.46 acres were surveyed and re-treated. Treatments of Glyphosate (4%) were made using backpack sprayers.

Figure 14. Algerian sea lavender treatments at site #5 along La Costa Ave.

TASK 4 – AWM: Invasive Plant Level 3 Management.

Level of Effort: (<20%) of overall contract

- No charges during this quarter.

TASK 5 – Coordinator: Tracking and Updating Invasive Species for Priority Removal.

Level of Effort: (5%) of overall contract

- Presentations were made on the program by Jason Giessow at the Cal-IPC Symposium that was held in San Diego.
- Coordination with CDFW (Warren Wong), and Camp Pendleton (Patrick McConnell) occurred on Early Detection Rapid Response implementation and priorities.
- A San Diego County Weed Management Area (WMA) steering committee meeting was attended. UC Co-operative Extension (Chris McDonnel) is facilitating/leading the meeting. The County of San Diego is supporting the WMA by providing meeting space and web site support. EDRR materials will be available at the web site. A sub-committee will be formed to help coordinate and involve the region in detection and reporting of EDRR species.

Work Anticipated for 3rd Quarter Period, Jan 1, 2016 – Mar 31, 2015:

Task 1 – Invasive Plant Species Coordinator:

- Update work plan if needed.
- Coordinate ROE work with AWM, update database.
- Monitor and coordinate with AWM during implementation.
- Survey sites as needed.

Task 2 – AWM: Invasive Plant Level 1 Management.

- Survey, map, and treat any reported sightings of target Level 1 plants.
- Supervision of staff, provide training, guidance, and preparation for field work.
- Collect GIS points of targeted weeds, if found.

Task 3 – AWM: Invasive Plant Level 2 Management.

- Supervision of staff, provide training, guidance, and preparation for field work.
- Coordinate and finalize tracking methods for work completed.
- Initiate and continue work outlined in work plan.
- Obtain signed ROEs.
- Collect GIS points of targeted weeds.

Task 4 – AWM: Invasive Plant Level 3 Management.

- No work planned.

Task 5 – Coordinator: Tracking and Updating Invasive Species for Priority Removal.

- Continue coordination with Department of Defense, California Department of Parks and Recreation, and the Weed Management Area.
- Continue to aggregate data and track new prospective EDRR target species.
- Increase the number of EDRR identification sheets for priority species (for land managers and regional biologists).