

## San Mateo Thornmint (*Acanthomintha duttonii*) Restoration Project



Photo by Lech Naumovich

### Status Report, February 2015



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## Executive Summary

No planting took place in the growing season of 2014. Creekside Science began a soil core study to determine whether a seedbank could be located. No thornmint germinated from cored soil. This year the Edgewood population was down to 608 individuals, the lowest number since this project began. Three years of record drought and no seeding efforts likely caused this decline. The adjacent habitat continues to improve, and this marked the first year that spring mowing and fall dethatching were deemed unnecessary. Total nonnative cover was only 18%. Bare ground was 31%, thatch was 15%, and total native cover was 36%. Hand weeding continues on the edges of the habitat for *Medicago polymorpha* and *Brachypodium distachyon*. Thanks to the generosity of CitizenInvestor, on December 9, 2014, 30 square meter plots were seeded with 250 seeds each (7500 seeds). The plots were initially scraped clear of nonnative grass and other annual vegetation with a McLeod, then seeds were broadcast and tamped in. Twenty-eight of the plots were uphill of and next to existing plants. Two were established downhill where the original smaller extirpated thornmint colony was located. The San Francisco Public Utilities Commission has received a permit for another rare plant project that was impacting their desire to engage in introductions on their property. We are hopeful we may begin moving forward again on that angle of the project.

## Introduction

*Acanthomintha duttonii* (Abrams) Jokerst (San Mateo thornmint) is a federal and state endangered annual mint known from only one extant population in Edgewood County Park and Natural Preserve in San Mateo County, CA. This one population has been in decline for years. Pavlik and Espeland (1998) estimated over 53,000 individuals in 1994, and only 249 individuals were censused in 2008. A restoration project began in 2008 with the goal of conducting habitat enhancement experiments at the existing site, conducting habitat suitability surveys for potential introductions, collecting and banking seed from the existing population, and initiating a seed increase program that is in its fifth year. One major success of this project has been two years of seeding at Edgewood, resulting in a population high of 3,450 on May 24, 2011. Details on the project to that point can be found in previous status reports.

## Soil Coring

To determine whether a thornmint seedbank exists, we collected soil cores adjacent to extant and in historical sites. Cores were grown out to determine whether any of the seeds within are thornmint, or even other species that are no longer found at the site. The purpose was to inform us of whether a thornmint seedbank exists, about how long dormant seeds may remain viable, at what depths those seeds can be found, and whether the surrounding vegetation community has changed.

### Methods

We worked solely at the Edgewood population, as that is the only location where we know down to the meter where current and historical plants were found. We were recently shown the site where thornmint was originally found at Edgewood. Discoverer Susanne Sommers took a group to the site and its remembered perimeter was flagged. This new site is within 200m of the extant population at Edgewood.

The extant population is mapped to the meter, and we selected sampling sites at least 1.5 meters from plants known from 2011 to 2013. At the other site, we surveyed for germinated plants before coring. No thornmint were found. We created 16 sample cores total, 10 adjacent to occupied habitat, and 6 in historical habitat.

At each sample site, a hand tool (McLeod) was used to remove the top 1-3 centimeters of thatch and soil in one square foot. A manual soil corer of ~2" diameter was used to take the soil cores to varying depths, based on rockiness of soil and ability to remove the corer in the sticky clay. Each 10 cm segment was placed in a plastic bag labeled with site and depth (Table 1). Extraneous soil was replaced in the hole after the cores were collected.

**Table 1.** Core depths. Each 0.1-m section of the core was grown out separately.

Core number	Depth (m)
1	0.9
2	0.5
3	0.5
4	0.8
5	0.7
6	0.7
7	0.3
8	0.5
9	1.1
10	0.5
11	0.4
12	0.5
13	0.5
14	0.5
15	0.6
16	0.7

At the Morgan Hill Creekside Science location, the cores were spread out in labeled trays, placed outside in filtered sun and fluctuating temperatures needed for thornmint germination. Netting was placed over the work benches to prevent bird predation, and copper slug tape was applied to the workbench bases to prevent slug and snail predation. The trays were kept moist to encourage germination.

## Results

Raw data are shown in Appendix A. No thornmint emerged from the cores. Only 13 of 95 cores yielded any plants. All were fairly common native forbs, except for two grasses which appeared to be a native bunchgrass (*Elymus multisetus*) and a nonnative annual grass (*Festuca perennis*). Four cores had plants in the first 0.1 m depth, five from 0.1 to 0.2 m, two from 0.2 to 0.3, one from 0.3 to 0.4, and one (*Hesperis matronalis*) at 0.9 to 1 m.

## Population Status

### Methods

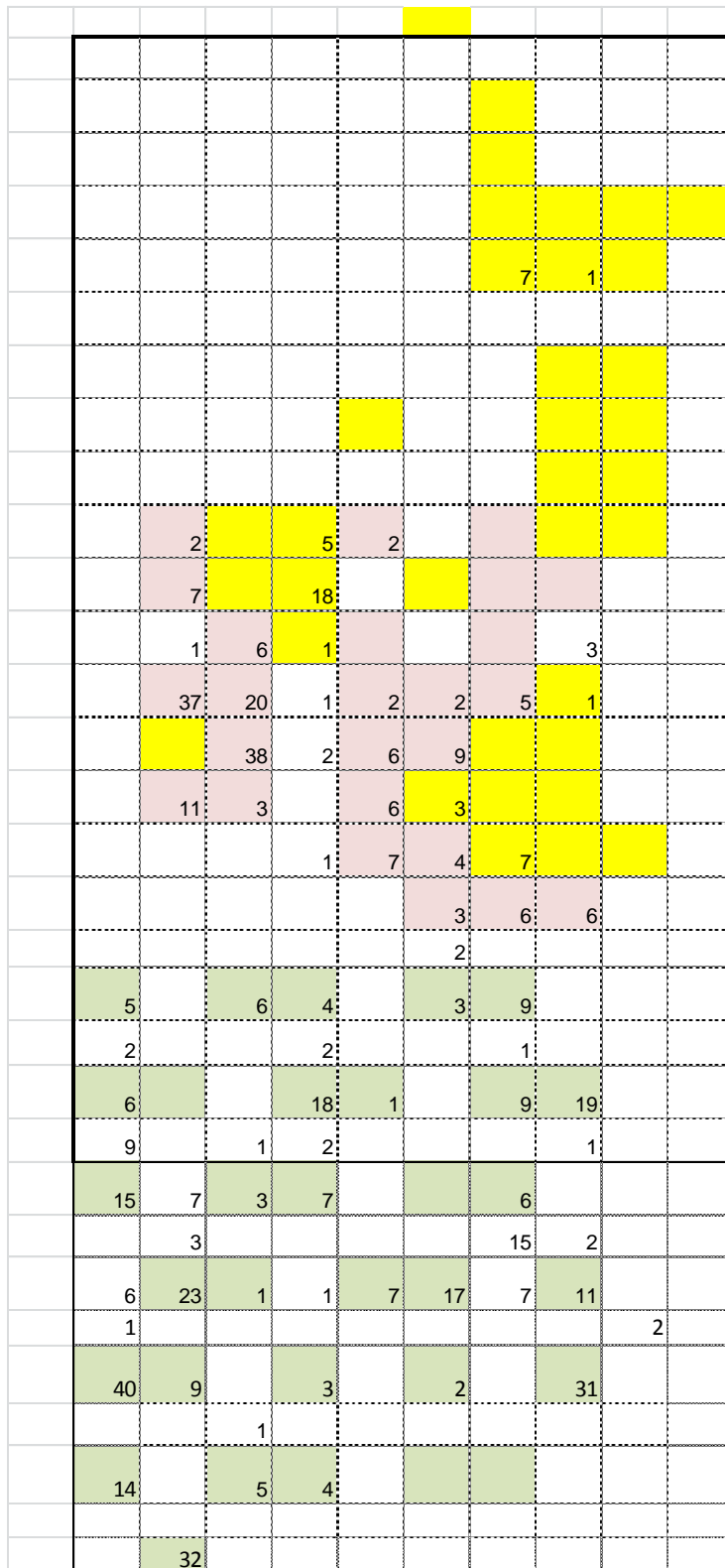
A permanent plot was established at the reference site in 2007 to map thornmint occupancy to the square meter. The plot was reestablished in 2014. With volunteers, individual thornmint were counted and mapped to each square meter. Plants are further tracked by three cohorts: the wild or untreated population, plots seeded November 2009, and plots seeded December 2010. Plots seeded November 2009 received 500 seeds per square meter plot (N = 25). Five of the 25 plots were a control (they were seeded, but not treated), 15 were scraped before seeding, and five were hand

weeded before seeding. The plots seeded December 2010 were all scraped, based on the success of the previous year and the relative efficiency of the technique vs. hand weeding. Those plots received 300 seeds per square meter plot (N= 30 plots).

### *Results*

Distribution is mapped in Figure 2. The site had 608 individuals, the lowest number since 2009 (Table 2). The total number of thornmint increased in 2010 and 2011 based on seeding efforts. Plots seeded in Nov. 2009 have declined every year. The untreated plots are down to only 53 individuals, which we may assume would represent the entire population of this species if this project had not taken place. The cohort seeded in December 2010 declined slightly from 403 to 373 (Figure 3).

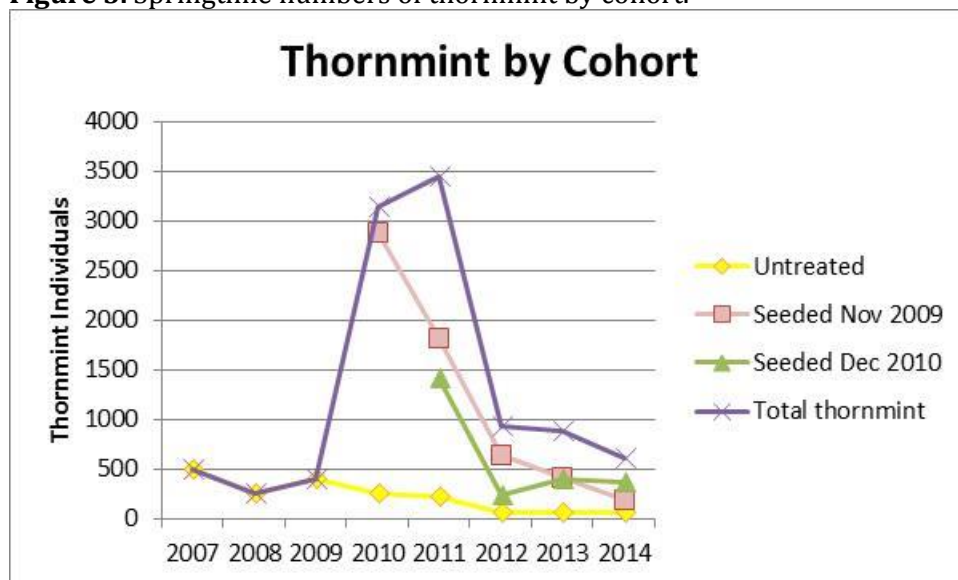
**Figure 2.** Thornmint individuals per square meter. Yellow boxes were occupied in 2008 and represent untreated (wild) population. Pink boxes represent plots seeded November 2009. Green plots were seeded December 2010.



**Table 2.** Thornmint population over time.

Year	Thornmint individuals
1994	53,000
1997	5,289
2004	165
2008	249
2009	395
2010	3,135
2011	3,450
2012	934
2013	875
2014	608

**Figure 3.** Springtime numbers of thornmint by cohort.



## Habitat Monitoring

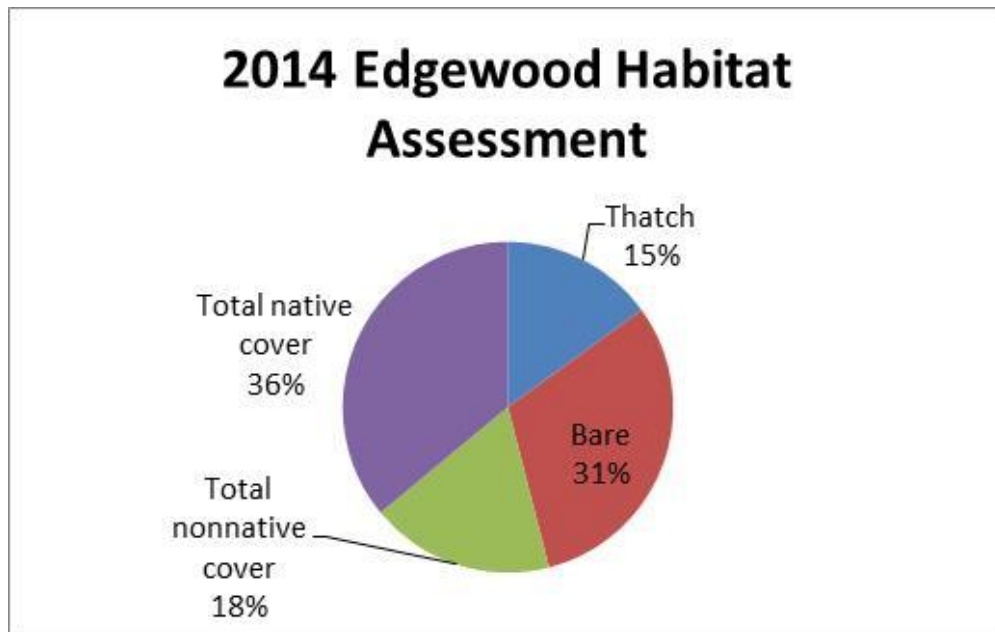
### Methods

A 100-m tape is stretched haphazardly through unoccupied habitat adjacent to extant plants. A minimum of 100 point intercept points are collected. Hits are identified as bare, thatch, or to vegetative species. Monitoring is done at the height of the growing season, usually May.

### Results

Habitat gains continue through mowing, dethatching, and volunteer hand weeding. Bare ground has increased from 4.6% in 2010 to 31%, above the habitat goal of 20% minimum. Combined nonnative and thatch cover is at 33%, slightly above the habitat goal of maximum 30% cover (Figure 4). It is possible treatment won't be needed next year. Hand weeding continues on the edges of the habitat for *Medicago polymorpha* and *Brachypodium distachyon*.

**Figure 4.**



## Seed Collection

No seed collection took place this year because the population was small and because the UC Botanical Garden at Berkeley currently has more than 100,000 seeds from this project.

## Seed Increase

The U.C. Botanical Garden planted 146 pots with an average of 4 plants per pot, for about 584 plants. As of January 22, a total of 29,800 seeds had been cleaned, with perhaps another 200 or so to come.

## Edgewood Planting

A fundraiser by CitizenInvestor procured resources to plant 30 square meter plots were seeded with 250 seeds each (7500 seeds) on December 9, 2014 (Figure 5). The plots were initially scraped clear of nonnative grass and other annual vegetation with a McLeod, then seeds were broadcast and tamped in. Twenty-eight of the plots were uphill of and next to existing plants (Figure 6). Two were established downhill where the original smaller extirpated thornmint colony was located.



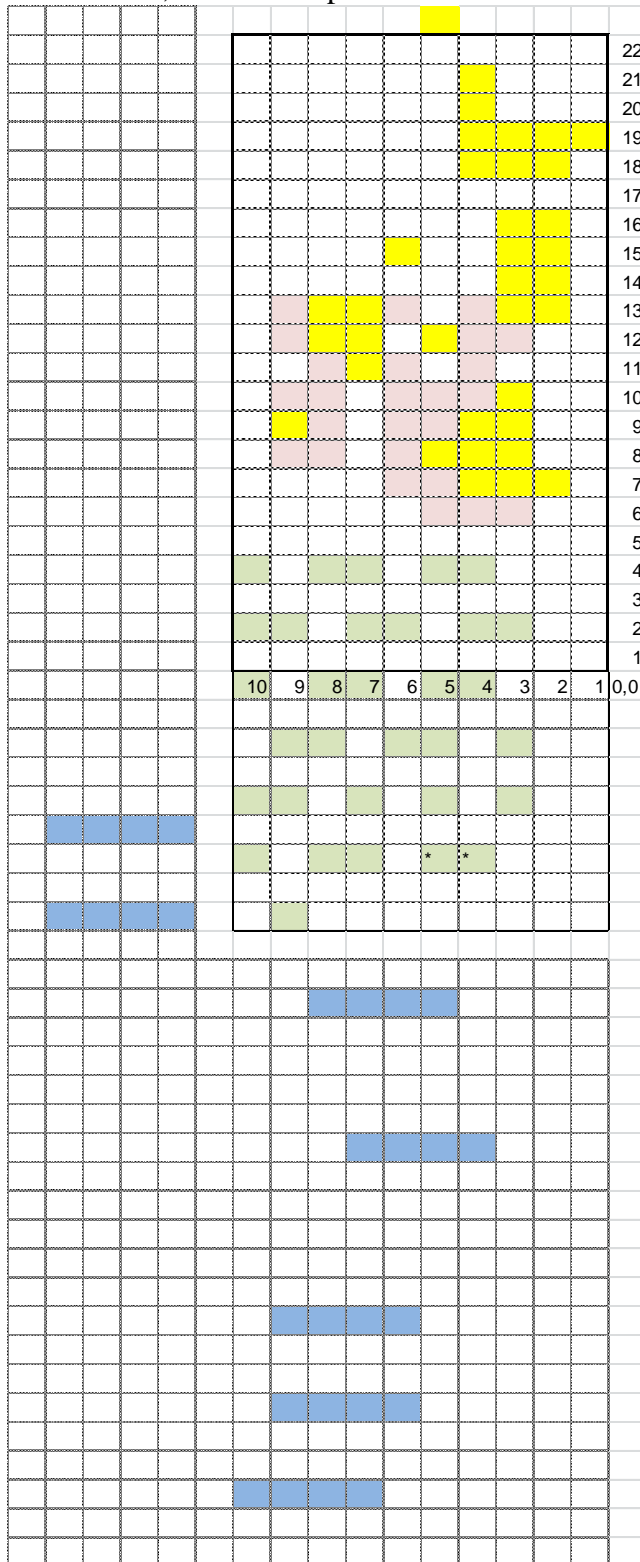
**Figure 5.** Setting up seeding plots.



Photo by Lech Naumovich



**Figure 6.** Pink plots were seeded November 6, 2009, in areas unoccupied on May 14, 2009. Yellow plots were not seeded, but occupied in spring 2009. Green plots received seed on December 2, 2010. Blue plots were seeded Dec. 9, 2014. Two more blue plots are not shown.



## **Future Introductions**

Creekside, SFPUC, and USFWS plan to continue discussions about reintroductions and reference seedings. At issue is whether SFPUC can be subject to take or jeopardy decisions in the future for populations they actively introduce. Also being discussed is whether conservation easements will be created around some potential San Mateo thornmint reintroduction sites as mitigation for nearby fountain thistle populations. This would provide long-term protection for both species, but also limit SFPUC land use. Another regulatory option is to declare the new thornmint populations experimental by criteria set forth in article 10(j) of the Endangered Species Act. At this point, December 2015 is the earliest possible next seeding.

## **Conclusion**

The remaining San Mateo thornmint population has declined for the third year since this project began, likely due to a third dry year and lack of seeding. We were grateful to our CitizenInvestors who funded another year of seeding at Edgewood. We are hopeful we will be able to begin introductions on SFPUC property and continue seeding at Edgewood as a reference during the next growing season.

## Appendix A. Soil Core Data

Blanks indicate no plants emerged.

Core	Species
1.1	
1.2	Elymus multisetus?
1.3	
1.4	
1.5	
1.6	
1.7	
1.8	
1.9	
2.1	Acemisson wrangelianus
2.2	Festuca perennis?
2.3	
2.4	
2.5	
3.1	
3.2	
3.3	
3.4	
3.5	
4.1	
4.2	
4.3	
4.4	
4.5	
4.6	
4.7	
4.8	
5.1	Trifolium fucatum
5.2	
5.3	
5.4	
5.5	
5.6	
5.7	
6.1	Hesperovax sparsiflora
6.2	Hesperovax sparsiflora
6.3	
6.4	
6.5	
6.6	
6.7	

7.1	
7.2	
7.3	
8.1	Hesperevax sparsiflora, Brodiaea complex
8.2	Hesperevax sparsiflora
8.3	Hesperevax sparsiflora
8.4	
8.5	
9.1	
9.2	
9.3	
9.4	
9.5	
9.6	
9.7	
9.8	
9.9	
9.10	Hesperevax sparsiflora
9.11	
10.1	
10.2	Acmispon wrangelianus
10.3	
10.4	
10.5	
11.1	
11.2	
11.1b	
11.2b	
11.3b	
11.4b	
12.1	
12.2	
12.3	
12.4	
12.5	
13.1	
13.2	
13.3	Plantago erecta
13.4	
13.5	

14.1	
14.2	
14.3	
14.4	Amsinckia intermedia
14.5	
15.1	
15.2	
15.3	
15.4	
15.5	
15.6	
16.1	
16.2	
16.3	
16.4	
16.5	
16.6	
16.7	