Management Actions and Population Trends for the Harkins Slough Population of

*Holocarpha macradenia* from 2005-2015

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**History and Description of Property**:

The *H. macradenia* population on Harkins Slough is located on a twenty acre parcel of land adjacent to Harkins Slough in Watsonville, CA. It was put into a Conservation Easement in 2001 that is held jointly by Steve and Jeanne Pedersen of *High Ground Organics* Farm and the *California Departement of Fish and Wildlife.* Historically, the property had been a thriving Native Californian village site until it began it’s life as a dairy in the 1880’s. It has undergone grazing and various farm tillage regimes until being placed in the Conservation Easement. The goal of the easement was to protect and enhance the unique Coastal Prairie habitat and recover the historic *H. macradenia* population.

**Historic Presence of *H. macradenia* on the Property**:

The population of *H. macradenia* was first recorded on the property in 1990 with 40 plants. And later reported in 1993 with 15,000 plants. After the 1993 reporting the population was thought to have vanished until funding was received to restore the coastal prairie grassland and scout out the historic *H. macradenia* population. In September of 2005 108 plants were found. The plants were clustered in a 130’ sq. area at the South West side of the property. This location was on the opposite side of the property to where the original population was documented.

**Summary of Management from 2005 until 2015**:

The 2005 population of *H. macradenia* had germinated, bloomed and seeded without our management interventions. In the fall of 2006 we began a closely managed rotational grazing regime on the property with the goal of removing decades of thatch and invasive weed build up along with creating compaction to encourage seedling recruitment of *H. macradenia* across the site.

Beginning in 2006 until the winter of 2010, the 130’ sq. area that maintains the current above ground population of *H. macradenia* was exclosed from the grazing. This area was managed with various hand weeding and thatch removal regimens. The rest of the property was divided into 7 one-two acre paddocks and animals were rotated through the paddocks from early winter until late summer giving the whole grassland a resting period during the driest months. Seedling germination of *H.macradenia* was monitored on a monthly basis during the active growing season of the plant. Grazing was removed when seedlings began to set flower. The type of animal, number of animals and duration of animals in each paddock was adjusted from year to year and season to season with the goal of creating Residual Dry Matter (RDM) levels (between 400-700 lbs./acre) in paddocks that contained the historic *H.macradenia* population. The grazing was kept lighter with RDM levels (between 700-1,500 lbs./acre) in paddocks that contained native bunch grass colonies. (See figure 2 for details)

In the fall of 2010 four 100 meter square scrapes were conducted across the historic *H.macradenia* range as a more aggressive attempt to revive the historic *H. macradenia* seed bank. The scrapes removed the thatch layer and .5 cm of soil. In the winter of that year, the herd of 4 cows were opened up to the exclosed *H. macradenia* area for a 2 day period after the first rain storm with hopes of creating better compaction that would favor *H. macradenia* seedling recruitment.

From 2011 to the present, the hand weeding management within the exclosed *H. macradenia* area and the rotational grazing regime have come to an end due to the end project funding. A year round grazing regime without any rotations has taken its place.

 **Summary of Population Statistics from 2005 to the present:**

The population reached its highest numbers in 2009 boasting 205 plants. This year not only produced more individual plants, it produced more vigorous plants with 1,082 seed receptacles in total. This year was the first year during our management where one of those 205 plants germinated in the historic area where the original *H. macradenia* population had been recorded. Despite this strong year, the overall trend for the population has barely climbed above the 108 plants we found pre-management in 2005. The population seemed to alternate from one year in the hundreds to the successive year in the teens. The spatial expansion of the population did not occur as we had hoped. Even with mechanical scraping, we only observed two years where 1-2 plants germinated in the historic area on the site.

Figure 1 shows how the population ebbed and flowed each year.

FIGURE 1. POPULATIONS STATISTICS TRACING NUMBER OF INDIVIDUAL PLANTS RECORDED FOR THE HARKINS SLOUGH CNDDB #40 *HOLOCARPHA MACRADENIA* POPULATION FROM 2005-2015

\*Note: Formal surveys were not conducted in 2011, 2012 or 2014. The numbers are estimates from brief walkthroughs of the property in those years

Figure 2 is a chart that summarizes the population statistics on the property and correlates it with management strategies

FIGURE 2. 2005-2015 POPULATION STATISTICS CORRELATED WITH MANAGEMENT FOR THE HARKINS SLOUGH CNDDB #40 *HOLOCARPHA MACRADENIA* POPULATION

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Total Individuals** | **Total # Seed Receptacles** | **Average Plant Height in cm** (ground to top of tallest seed receptacle) |  **# of Individuals in Historic Area** | **Management of Historic *H. macradenia* Area** | **Management of 130’ sq. exclosure with above ground plants** |
| **2005** | 108 | 193 | 18.3 +/- 6.0 | 0 | No management 9,000 lbs./acre RDM | No management |
| **2006** | 15 | 67 | 15 | 0 | Rotational grazing of 50 goats and 4 cows Jan-July. 1,000-2,000 lbs./acre RDM  | Kept annual weeds hand clipped to 4” and removed all thatch. Hand weeded 5” radius around each seedling |
| **2007** | 146 | 176 | 7.9 | 0 | Rotational grazing of 20 goats and 4 cows Jan-July. 700-1,000 lbs./acre RDM | Kept annual weeds hand clipped to 2.5” and removed thatch. Hand watered plants monthly from May-July |
| **2008** | 12 | 13 | 4.7 | 0 | Rotational grazing of 15 goats and 3 horses Jan-July. 500-1,000 lbs/acre. RDM | Kept annual weeds hand clipped to 2.5” and removed thatch |
| **2009** | 205 | 1082 | 13.4 | 1 | Rotational grazing of 4 goats, 3 horses and 2 cows Jan-July. 500-1,000 lbs./acre RDM | Kept annual weeds hand clipped to 2.5” and removed thatch |
| **2010** | 57 | 117 | 12.2 | 2 | Rotational grazing of 4 goats and 5 cows Jan-July4 100 meter square scrapes conducted in August. 500-1,000 lbs./acre RDM | 4 cows spent 2 hours in the exclosure in November when the soil was saturated to create compaction |
| **2011** | 10-20 | No data | No data | None seen |  Rotational grazing of 4 goats, 3 cows and intermittent horse grazing Jan-July. 500-1,000lbs./acre RDM | No management |
| **2012** | 10-20 | No data | No data | None seen | 4 goats and 3 cows with 3 intermittent horses grazed year round without paddock rotation 500-700 lbs./acre RDM  | No management |
| **2013** | 15 | 39 | 7.5 | 0 | 9 goats and 3 cows with 3 intermittent horses grazed year round without paddock rotation. 300-500 lbs./acre RDM | No management |
| **2014** | 7 | No data | No data | None seen | 9 goats and 3 cows with 3 intermittent horses grazed year round without paddock rotation. 300-500 lbs./acre RDM | Goats broke through exclosure and denuded site of all vegetation and potential *H. macradenia* seedlings |
| **2015** | 131 | 386 | 10.3 | 0 | 9 goats and 3 intermittent horses grazed year round without rotation. 3 cows grazed until they were removed in August. 3 more cows will return mid December. 300-500 lbs./acre RDM  | Exclosure repaired and animals kept out |

**Conclusions about Management and Population Trends:**

As can be noted in the population trend summary, the Harkins Slough population has not significantly recovered in numbers or in spatial extent since the initiation of management in 2006. The 130’ square exclosed area where the current *H.macradenia* individuals are blooming seems to have benefitted from the 2010 intentional and 2014 accidental grazing periods that created compaction prior to seed germination.

In the first few years we relied heavily on goats to clear the 6 ft. tall stands of accumulated weeds that were choking out potential seedlings in the historic *H. macradenia* area on the property so that we could create the low amount of Residual Dry Matter (RDM) that favors *H. macradenia* germination. In 2007, after two years of intensive goat and cattle grazing, we had lowered the RDM from 9,000 lbs./acre to 1,000 lbs./ acre in the historic area. Since we still weren’t seeing *H. macradenia* germinate in the historic area we figured the goats were not heavy enough to create the compaction that *H. macradenia* needed. In 2008 we brought in horses in hopes of creating the desired compaction.In the spring of 2009, we were encouraged to see 1 *H. macradenia* seedling germinate in the historic area followed by 2 in 2010. In 2009, 2010 and 2011, we also witnessed significantly increased cover of *Hemizonia corymbosa* throughout the historic *H. macradenia* area. This small success led us to phase out goats for larger grazers that would create more soil compaction. But despite continued grazing by cows and horses in the spring of 2011-the present, no seedlings have been observed in the historic area in these subsequent years.

In response to the fact that we weren’t seeing the level of recovery we hoped for in the historic area we conducted a series of four 100 meter squared scrapes in August of 2010. The goal was to remove thatch and .5 cm of soil in hopes of jumpstarting the germination of the historic seed bank. We kept these scrapes clipped or grazed to 4”. To date *H. macradenia* has not come up in any of these scrapes.

From the winter of 2011- winter of 2015 the land has not been monitored although it was heavily grazed during those drought years bringing the RDM levels down to 300-500 lbs./acre. In the summer of 2015 we did monitor the property and did not find any *H. macradenia* present in the historic area, but we did not get on the property early enough to see if any seedlings had germinated early in the season and than been trampled by animals or if flowering plants had been grazed.

**Final Thoughts and Hopes for the Future:**

 All in all, it seems that compaction from heavy hooved grazers and the lowering of the RDM levels to around 500 lbs./acre has benefited the existing *H. macradenia* population and the historic seed bank. But the successes are so small and ebb and flow so much it is hard to figure out how to fully recover this population to its historic levels. We wonder if our historic seed bank is no longer viable. We wonder if we should complement the grazing regime with a re-introduction of seed we grew out from a few seeds collected from the population in 2005. We look forward to learning from the collective group of land managers to see if we can find a positive next step to take with this population.