Arana Gulch Habitat Management Plan
City of Santa Cruz

Year 1 (2014) Annual Report

CDFW Permit No. 2081 (a)-13-013-RP
Coastal Development Permit No. 3-11-074 (Arana Gulch)

FINAL REPORT

November 24, 2015

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1. Executive Summary

This monitoring report evaluates the City's progress implementing the Arana Gulch Habitat Management Plan (HMP). The HMP guides the long-term restoration of the 67 acre Arana Gulch Open Space. The plan provides management goals and objectives to enhance three specific management areas: Hagemann Gulch Riparian Woodland Management Area, Arana Creek Wetland and Riparian Management Area and the Coastal Prairie/Tarplant Management Area.

The HMP was developed as part of the California Coastal Commission's (CCC) Coastal Development Permit process for the adoption of the Arana Gulch Master Plan (Master Plan). The Master Plan includes management guidelines for access, resource management, and education. Since Arana Gulch lies with the CCC's Coastal Zone, a permit was necessary to implement the Master Plan. The CCC conditionally approved the permit on December 8, 2011. Special permit conditions required, among other things, developing and implementing an HMP, establishing a technical advisory group to advise the City on habitat management actions, and submitting annual monitoring reports to document compliance with the HMP.

The City finalized and began implementing the HMP in 2013. A technical advisory group was formed, the Adaptive Management Working Group (AMWG). In 2013 and 2014, the AMWG provided input to the City during the implementation of the HMP and this annual report. The AMWG also provided guidance to minimize impact to the habitats during the construction of the Multi-Use Trail component of the Arana Gulch Master Plan.

The purpose of this annual report is to describe the current condition of the Arana Gulch habitat areas, evaluate the performance of each area in relation to the interim performance standards outlined in the HMP and included in the CDP, and provide management recommendations for the following year to ensure progress toward and achievement of success criteria. Because this was the first year of project implementation, the City focused most of its efforts on construction of the Master Plan project components and improving the habitat of the Santa Cruz tarplant, a federally Threatened and a California State Endangered species. This focus is reflected in the management actions taken by the City and the progress towards meeting HMP objectives. The habitat management activities undertaken in 2014 are summarized below.

Master Plan Improvements

Construction of the Arana Gulch Multi-Use Trail and the Agnes Street Connector Trail occurred in 2013 and 2014. Trail construction activities included the modification of topsoil in order to create a north-south construction road through the northern portion of the greenbelt, fenced construction areas along the new trail routes, and modifications to public access during the construction period. In addition, the multi-use trails project involved salvage and re-distribution of topsoil from two locations where trail

construction was located within 20 feet of mapped tarplant areas. The AMWG provided the City with several management recommendations throughout the construction process, including where to spread salvaged topsoil as part of the Agnes Street Connector Trail.

Trail construction over Hagemann Gulch and Arana Creek affected riparian woodland and the City prepared a revegetation plan pursuant to a CDFW Streambed Alteration Agreement; revegetation will be installed in winter 2014/2015. Construction associated with the two multi-use trails was completed in December 2014. Additionally, in 2013, the City constructed the Marsh Vista Trail. This pedestrian trail is located along the east side of Arana Creek.

Summary of Coastal Prairie/Santa Cruz Tarplant Management Area Activities

Management actions in Year 1 were primarily focused on conducting interim management actions in preparation of seasonal grazing. Baseline site conditions, which were first documented in summer 2013, were re-sampled in spring 2014 with plant species composition and cover values recorded at permanent transects (Stanton, 2014a and Stanton, 2014b). Permanent photo-points required as part of the CDP will be established once the grazing fences are in place and prior to grazing (A. Stanton, pers. comm., 2014). Documentation of baseline conditions, using permanent transects was done in compliance with the HMP.

As per guidelines in the HMP, seasonal mowing was conducted in the prairie in spring and early summer 2014 to reduce the canopy height of the non-native grasses and forbs to benefit the coastal prairie species diversity and habitat function. Mowing was done as cattle grazing had not yet been initiated. Volunteers conducted biomass removal at three locations in the mowed areas in June 2014. In April 2014 the AMWG requested that test plots be established to evaluate how the timing of mowing affects the composition and cover of vegetation. Two 100 x 100 foot plots were established. Livestock infrastructure was installed in November and December 2014 and January 2015. These prairie management actions were done in compliance with the HMP.

A census of SCT was conducted in summer/fall 2014; four plants were found in a small section of Tarplant Area A. Increasing the SCT population is an HMP goal. The population has declined from 18 plants in 2013 and is well below a population of approximately 348 plants in 2006.[1] In compliance with the HMP, a soil seed bank assessment was conducted by Susan Bainbridge (UC Berkeley Jepson Herbarium) to document the viability of SCT seed within the four known colonies (Areas A-D). The assessment found no viable seeds in Areas B and C, yet viable seeds were found in Areas A and D. There was a significant decrease in viable seeds since a previous assessment in 2001, both in number of seeds and seed density. Preliminary results indicate the SCT seed bank has been lying mostly dormant and aging over several years and genetic

diversity has likely declined. Because the seedbank density and viability is low, the AMWG did not recommend especially invasive management practices (scraping) to recover this population. Ms. Bainbridge is growing 14 seedlings for seed production. The AMWG recommended additional seed collection and ex-situ propagation; however seed collection and ex-situ propagation must be pre-approved by CDFW and the City's permit with CDFW prohibits seed collection if there are less than 50 SCT plants.

The AMWG provided input to the City on revegetation along the edge of the new multi-use trails, along the temporary N-S construction road, and along trails within the grassland that will be closed. Due to an abundance of native plant recruitment and the potential of hydroseeded plants competing with native plant recruitment, supplemental hydroseeding or scarification was not recommended (AMWG meeting minutes, March 26, 2014). The trail construction plans were amended to omit supplemental seeding along the edges of the new multi-use trails. Due to the steepness of slope and minor erosion control issues, sterile hydroseed mix was applied to a small trail closure which is directly west of the park entrance sign on the south side of the park and areas identified for seeding in the CDFW-approved riparian revegetation plan (i.e., areas near Arana Creek causeway and Hageman Gulch bridge). Slopes adjacent to the Arana Gulch Multi-Use Trail were hydromulched for erosion control. These actions were implemented as part of the City's trail construction project and the AMWG provided input to the City consistent with their role as outlined in the HMP.

In compliance with the HMP, in April and October 2014, patches of invasive, non-native plant species within the central prairie/grassland were identified and mapped to facilitate decisions on weed removal and control. In November 2014, the AMWG provided input for the removal of woody plant species from within the fenced grazing area which have been slowly encroaching on the coastal prairie. The City hired a contractor to remove small oaks, fruit trees, coyote brush, and Himalayan blackberry bushes from within the grazing area. Large oak trees were pruned and will remain in the prairie to provide pockets of shade for the cattle. The AMWG advised the City to wait until spring 2015 to remove the remainder of the woody plants from within the grassland (outside of the cattle grazing areas) when herbicide treatment can be applied more effectively and the coastal prairie delineation will be complete (AMWG meeting minutes, November 4, 2014).

Summary of Hagemann Gulch Riparian Woodland and Arana Gulch Creek Riparian Woodland and Wetland Areas Activities

A survey to identify and map occurrences of invasive, non-native plant species within the Arana Gulch Creek Riparian Woodland and Wetland Management Area was initiated in fall 2014. Additional weed mapping will occur in 2015. Reducing the cover of non-native, invasive woody plant thickets in these two management areas are objectives of the HMP and mapping the occurrences is in compliance with the HMP.

[1] See Section 3.3, page 52 of Arana Gulch HMP.

A revegetation plan was prepared for an area along Arana Creek pursuant to a Streambed Alteration Agreement (SAA) with CDFW to compensate for the removal of riparian vegetation as part of the construction of the Arana Gulch Multi-Use Trail. The AMWG made recommendations to the City on the riparian revegetation plan. These recommendations were reviewed and approved by CDFW. Some of the riparian revegetation required under the approved SAA was installed in December 2014 (i.e., willow cuttings); the remainder of the revegetation will be installed in 2015. Riparian revegetation for the trail construction project was not a requirement of the HMP; however, increasing native plant cover within the Arana Gulch Creek riparian woodland is consistent with HMP goals for restoring the tidal reach of Arana Gulch Creek.

Management Activities Proposed for 2015 (Year 2)

The following management actions are identified for 2015:

- Seasonal cattle grazing will be initiated within the prairie/SCT management area. The City developed a grazing contract and Stocking and Work Program which was reviewed and approved by the AMWG. In December 2014, the contract was awarded to a local rancher with experience grazing lands with threatened and endangered species. Additional activities in this management area include monitoring plant composition, plant cover and residual dry matter (RDM) within grazed areas, implementing removal/control of weed infestations, and establishing permanent photo stations.

- The boundaries of the prairie/SCT management area will be delineated and selected woody plants within the area will be removed. In spring 2015, designated woody plants growing outside of the grazing area, yet within the designated grassland, will be removed and herbicide treatment will be applied, if needed. Continual treatments will need to be planned and implemented to keep woody plants from encroaching into the prairie. Three test scrape plots created in the northern portion of the greenbelt will be monitored in 2015 as to plant composition and cover.

- A census of SCT will be conducted in summer 2015. Seed collection of SCT may be done if more than 50 SCT are present, pending prior approval from CDFW.

- The City will implement management actions within the other two management areas. The City will complete the identification and mapping of weed infestations within the Arana Gulch Creek Riparian Woodland and Wetland Management Area. Upon completion of weed mapping, the AMWG will provide recommendations to the City on prioritizing invasive plant removal actions. The City will initiate removal/control of mapped weed occurrences pending funding and other resources.

- The City will continue to confer with the Resource Conservation District (RCD) on Arana Creek watershed management, including measures to reduce erosion and sediment entry into the watershed. The City provides funds to the RCD to apply for grant opportunities to implement erosion control projects.

- The City will begin to identify and map invasive, non-native plant species within the Hagemann Gulch Riparian Woodland Management Area. Upon completion of weed mapping, the AMWG will provide recommendations to the City on prioritizing invasive plant removal actions in this management area.

- The City will continue to confer with the AMWG on adaptive habitat management activities in 2015 through periodic meetings and group email correspondence. The tentative schedule is to hold AMWG meetings in January, April, July, and November 2015.

2. Introduction

2.1 Background

Arana Gulch is 67 acres of open space owned by and located within the City of Santa Cruz. The eastern half of the property features the riparian corridor of Arana Gulch Creek and a tidal wetland where the creek drains into Monterey Bay at the Santa Cruz harbor. The western half is remnant coastal prairie grassland that supports the Santa Cruz tarplant, a federally Threatened and a California State Endangered species. A steep and narrow intermittent drainage called Hagemann Gulch crosses the property on the western boundary. The features of the greenbelt property are depicted on Figure 1.

The City of Santa Cruz developed a master plan for the property to improve natural resource protection and restoration, public access and education. Implementation of the Arana Gulch Master Plan required the City to obtain a coastal development permit (CDP) from the California Coastal Commission because a portion of the planning area lies within the designated Coastal Zone. The CDP (3-11-074) included both standard and special conditions, requiring, among other things, developing the Arana Gulch Habitat Management Plan (HMP) to guide the long-term restoration of the open space. Specifically, Special Condition 3 of CDP 3-11-074 states:

> Arana Gulch Habitat Management Plan. PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the Permittee shall submit for Executive Director review and approval three copies of a final Arana Gulch Habitat Management Plan (HMP). The HMP shall provide for the restoration, enhancement, and long-term management of all Arana Gulch habitat areas (including, as referenced by the Arana Gulch Master Plan, the Coastal Prairie/Tarplant Management Area, the Arana Gulch Riparian and Wetland Management Area, and the Hagemann Gulch Riparian Woodland Management Area) as self sustaining and functioning habitats in perpetuity. The HMP shall be prepared by a qualified expert in restoration ecology for each of the habitat types, and shall take into account the specific conditions of the site as well as restoration, enhancement, and management goals. The HMP shall be substantially in conformance with the Master Plan documents submitted to the Coastal Commission, including the August 1, 2005 document entitled "A Management Program for Santa Cruz Tarplant (Holocarpha macradenia) at Arana Gulch"), including that it can be submitted in a package that includes relevant Master Plan documentation with an addendum that addresses this condition, provided all language is modified to be directive (e.g., "shall" rather than "should") and it complies with the following requirements and includes:
>
> (a) A baseline assessment, including photographs, of the current physical and ecological condition of the restoration and enhancement areas. All existing topography, wet features, and vegetation shall be depicted on a map.

(b) A description of the goals of the plan, including in terms of topography, hydrology, vegetation, sensitive species, and wildlife usage.

(c) A description of planned site area preparation and invasive plant removal.

(d) Any planting either of seeds or container plants shall be made up exclusively of native taxa that are appropriate to the habitat and Arana Gulch region. Seed and/or vegetative propagules shall be obtained from local natural habitats so as to protect the genetic makeup of natural populations. Horticultural varieties shall not be used.

(e) A plan for monitoring and maintenance of habitat areas in perpetuity, including:

- A schedule.
- A description of field activities, including monitoring studies.
- Monitoring study design for each habitat type, including, as appropriate: goals and objectives of the study; field sampling design; study sites, including experimental/revegetation sites and reference sites; field methods, including specific field sampling techniques to be employed (photo monitoring of experimental/re-vegetation sites and reference sites shall be included); data analysis methods; presentation of results; assessment of progress toward meeting success criteria; recommendations; and monitoring study report content and schedule.
- Adaptive management procedures, including provisions to allow for modifications designed to better restore, enhance, manage, and protect habitat areas.
- Provision for submission of reports of monitoring results to the Executive Director for review and approval in perpetuity, beginning the first year after initiation of implementation of the plan. Such Monitoring Reports shall be submitted annually until success criteria are met, and then shall be submitted on an every 3-year basis after that. Each Monitoring Report (annual and 3-year) shall be cumulative and shall summarize all previous results. Each report shall clearly document the condition of the habitat areas, including in narrative (and supporting monitoring data) and with photographs taken from the same fixed points in the same directions as the baseline assessment and prior Monitoring Reports. Each report shall include a performance evaluation section where information and results from the monitoring program are used to evaluate the status of the restoration, enhancement, and long-term management in relation to the interim performance standards and final success criteria. To allow for an adaptive approach, each report shall also include a recommendations section to address changes that may be necessary in light of monitoring results and/or other information, including with respect to current restoration information and data related to the habitat areas in question, and to ensure progress toward and achievement of success criteria. Actions necessary to implement the recommendations shall be implemented within 30 days of Executive Director approval of each Monitoring Report, unless the Executive Director identifies a different time frame for implementation.

(f) Interim success criteria to be achieved in the first year of implementation, tied directly to the annual reporting requirement. Also, measureable goals to achieve habitat improvement over time, subject to modification by the Adaptive Management Working Group.

(g) Implementation procedures, cost estimates, identification and allotment of funding for all HMP activities, and related reporting procedures.

(h) Provisions for minor adjustments to the HMP by the Executive Director if such adjustments: (1) are deemed reasonable and necessary; and (2) do not adversely impact coastal resources.

(i) Identification of the membership of the Adaptive Management Working Group, which initial composition and any future changes shall be subject to Executive Director approval. The Adaptive Management Working Group shall guide all HMP activities under the plan.

(j) All details associated with the grazing program, subject to Adaptive Management Working Group and Executive Director approval, in substantial conformance with the proposed cattle grazing program (see Exhibit P Tab 4).

PRIOR TO COMMENCEMENT OF CONSTRUCTION, the HMP shall be implemented by establishing the Adaptive Management Working Group (AMWG), receiving prioritized first-year management recommendations from the AMWG, and initiating implementation of the highest priority recommendations in the field.

The Permittee shall undertake development in accordance with the approved Arana Gulch Habitat Management Plan.

The HMP guides management of three habitat areas within Arana Gulch: the Hageman Gulch Riparian Woodland Management Area, the Arana Creek Wetland and Riparian Management Area and the Coastal Prairie/Tarplant Management Area. Within the Coastal Prairie/Tarplant Management Area, the HMP focuses on restoration of the coastal prairie and recovery of the Santa Cruz tarplant (SCT); this management area received the most attention in Year 1 due to the urgency to revitalize the SCT population. The population of SCT at Arana Gulch has varied greatly in response to previous management actions; in some years the population increased and in some years it dramatically decreased. Unfortunately, despite efforts from the City, the overall trend has been a decline in the population over the last two decades.

The HMP outlines various management tools for managing the three habitat areas on the site[2]. A key tool described in the HMP is an adaptive management framework for habitat restoration actions. Under this framework, and as required by the CDP, an Adaptive Management Working Group (AMWG) was formed to provide scientific expertise on resource management activities to the City and the CCC[3]. In 2013 and 2014, the AMWG

[2] See Section 3.1, page 33 of Arana Gulch HMP.
[3] See Section 2.2, Page 22 of Arana Gulch HMP.

provided input to the City during the development of the HMP and implementation of several components of the Master Plan.

Importantly, the timing of the implementation of the HMP coincided with the construction of the Arana Gulch Multi-Use Trail project. Bike paths, hiking trails, cattle grazing infrastructure, and bridges were built within Arana Gulch. The project will be completed in early 2015. The trail project was planned as part of the Arana Gulch Master Plan. Many of the construction activities associated with the trail project are relevant to the restoration effort. As such, this report also documents the construction activities that relate to the HMP. The AMWG also provided input to reduce potential impacts from the construction project.

This is the first annual report since adoption of the plan and many objectives of the plan have not yet been realized as the long-term habitat management effort has just begun. This is the first of many annual reports to follow. It is intended to report on the progress of the plan in the previous year as well as prepare for future management actions. The HMP is grounded in an adaptive management framework. Implementation actions will constantly be reviewed and improved upon. Therefore, this annual report is not intended to layout every action to be implemented for the upcoming year. It will highlight the actions that have been identified from the previous AMWG meetings and additional actions will need to be identified during the AMWG meetings throughout the year.

Figure 1. Location Map

2.2 Project Purpose and Report Organization

The purpose of this annual report is to describe the current condition of the Arana Gulch habitat areas, evaluate the performance of each area in relation to the interim performance standards outlined in the HMP and included in the CDP, and provide management recommendations for the following year to ensure progress toward and achievement of success criteria. In addition to activities approved under the CDP, this report also reports on activities authorized by a Scientific, Educational, or Management Permit issued by the California Department of Fish and Wildlife (Permit No. 2081 (a)-13-013-RP). This report includes all activities conducted in the calendar year 2014 which is considered to be Year 1 pursuant to actions outlined in the HMP and the CDFW 2081(a) permit. Additionally, this report describes activities associated with the concurrent construction of the City's Arana Gulch Multi-Use Trail and other public access improvements where such activities intersect with the goals and objectives of the HMP. The City conferred with technical specialists, including AMWG members, regulatory agency personnel, the City of Santa Cruz Public Works Department, and members of the public while implementing adaptive habitat management activities on the greenbelt.

The habitat management actions associated with the construction of the City's Arana Gulch Multi-Use Trail and other Master Plan improvements are described in Section 3. The adaptive management framework of the HMP is presented in Section 4. Actions implementing the HMP are presented in Sections 5 through 7 under their respective management area. Each management area section includes a summary of the implemented actions as they pertain to the goals and objectives in the HMP, and a performance evaluation. Recommendations for Year 2 (2015) are summarized in Section 8. Please refer to the HMP for technical background information on the Arana Gulch greenbelt and HMP goals and objectives.

3. Adaptive Management Framework

3.1 Adaptive Working Group (AMWG)

The City has adopted an adaptive management framework for implementation of the HMP. The City engaged the services of Alison Stanton to facilitate and coordinate habitat management activities with the AMWG. Three meetings were held with the AMWG in 2014; the minutes from the March 26, July 16, and November 4 meetings are presented in Appendix D. In addition, Ms. Stanton coordinated and facilitated group email correspondence between AMWG members to solicit input on management activities. The HMP outlines the formation of the AMWG, voting procedures, and other procedures.[4] The list of current members is presented in the meeting minutes (Appendix D). The CCC has requested additional members for the AMWG; a grazing specialist from UC Extension is expected to join the AMWG in January 2015 and the group is actively searching for a wildlife biologist.

The AMWG provided input to the City on habitat management activities within Arana Gulch throughout 2014. A detailed discussion of AMWG recommendations is included in the sections for each management area. In short, the AMWG provided recommendations on the type and location of revegetation within the Arana Gulch Multi-Use Trail construction area, seasonal mowing of the central grassland (including test plots), and the location of grazing infrastructure (i.e., water troughs). The City also coordinated with volunteers from the California Native Plant Society to rake cut biomass at three circular plots in the central grassland.

The AMWG also provided input to the City on the riparian revegetation proposed to compensate for the removal of riparian vegetation as part of the construction of the Arana Gulch Multi-Use Trail. In response to AMWG input, the City revised their revegetation plan and submitted the changes to CDFW for their review and approval pursuant to an approved Streambed Alteration Agreement (SAA) issued for that project.

The AMWG also provided input to the City on the techniques for spreading topsoil in the vicinity of Area C as part of the Agnes Street Trail Segment project. The AMWG reviewed and commented on the grazing contract, stocking and work program, and public outreach plans and materials for the re-introduction of cattle onto the greenbelt lands.

3.2 Public Outreach

In 2013 the City developed a webpage on the City of Santa Cruz website to communicate restoration efforts to the public and to provide a place for documents related to the requirements of the CDP. The AMWG reviewed the webpage and offered suggestions to the City on adding information and tools to facilitate communication of the HMP activities to the public and to receive public comment. The City updated the website in December 2014.

[4] See pages 22-24 of Arana Gulch HMP

The AMWG meetings are open to the public and provide a forum for members of the public to express their ideas directly to the members and City. Public comments are also generated through the City's website and the AMWG will be briefed of public comments and concerns during AMWG meetings. Signage will be installed onsite with a web address.

In preparation of the grazing and in anticipation public comments resulting from installing cattle fencing in the grassland, the City implemented an outreach campaign. Rangers discussed the importance of keeping dogs on-leash when they encountered violators of the rule. The City worked with the AMWG to create a brochure informing the public of why grazing was being implemented and listing safety tips for human/dog and cattle interactions. A copy of the brochure is presented in Appendix B. In December 2014, the brochure was mailed to surrounding neighbors and emailed through an Arana Gulch email distribution list. The brochure was posted onsite and on the AMWG website in January 2015. Grazing was also announced at the ribbon-cutting ceremony where staff handed-out the brochures. Alison Stanton also led a tour to discuss habitat management at Arana Gulch at the ceremony. The City is planning a press release for after the cattle begin grazing.

3.3 Evaluation of HMP Goals

Consistent with the goals of the HMP, three meetings were held with the AMWG in 2014 (Objective 1A). The City dedicated funding to implement the habitat management actions identified in the HMP, as informally prioritized by the AMWG. The City and the AMWG are expected to formally prioritize HMP management actions in 2015; the results of this prioritization will be included in the 2015 annual report. The City has dedicated Arana gulch management as a line item in the City Parks and Recreation Departments operating budget. The City developed a web site to post information about the HMP and received input from the AMWG and the public consistent with Objective 3A. Additional recommendations for public outreach were identified by the AMWG and the public and the City is scheduled to implement them in 2015 (i.e., signs for cattle grazing and developing a brochure on cattle grazing). Table 1 presents a summary of the objectives for adaptive management, actions implemented in 2014 and whether the actions were in compliance with the HMP.

Table 1. Monitoring of Adaptive Management Variables

Objective and Variable	Actions in Year 1 (2014)	Year 1 (2014) Results	Objective Met?
Goal 1. Maintain an adaptive management framework that allows stakeholders to scientifically conduct and evaluate actions			
Objective 1A. Conduct at least 3 AMWG meetings in 2013 with a quorum of members present each time. In subsequent years, the frequency of meetings beyond an annual November meeting can be determined by the needs of the AMWG. Conduct at least 3 AMWG meetings/year with a quorum	Meetings held April 23 and July 16 in 2013 and on March 26,July 16, and November 4, 2014	Meeting minutes presented in Appendix D	Yes, three meetings held in 2014. Meeting date(s) TBD for 2015; meetings tentatively scheduled for January, April, July and November 2015
Objective 1B. Maintain funding levels to achieve a level of habitat management that is 1) indefinitely sustainable into the future, and 2) shows a stable or increasing trend in measured biological variables over a biologically appropriate timescale.	Funding allocated by City; line item established in operating budget	Funding allocated by City for fiscal year July 1, 2014 to June 30, 2015 is $20,000 (excluding consultant fees)	Funding allocated by City for fiscal year July 1, 2014 to June 30, 2015 is $20,000 (excluding consultant fees); funding for next fiscal year TBD
Goal 2. Conduct a two-tracked program of management and research with built-in monitoring			
Objective 2A. Maintain a Management Track that leads to stable or increasing trend in measured biological variables over a biologically appropriate timescale.	The City incorporated many of the AMWG recommendations into multiple management actions	Considered by City and AMWG during management decisions	Yes, measurable monitoring tasks will be initiated in 2015
Objective 2B. Utilize a Key Management Question (KMQ) framework to guide the Research Track when research is needed to achieve the specific goals and objectives for SCT and the coastal prairie.	Seed bank assessment was identified as the first research need	Seed bank assessment was conducted	Yes, KMQ was used on seedbank analysis. KMQ will continue to be used when research tasks are proposed
Goal 3. Develop public educational opportunities associated with Arana Gulch and efforts to conserve and restore its rare resources			
Objective 3A. Maintain a website to communicate restoration efforts to the public and provide a place for documents related to the requirements of the CDP, such as Monitoring Reports.	Webpage on City website developed in 2013	Webpage needs restructuring to meet goals and objectives	Yes, City has improved website in 2014 and the webpage will be periodically updated with reports and information as needed in 2015.

4. Implementation of Master Plan Improvements

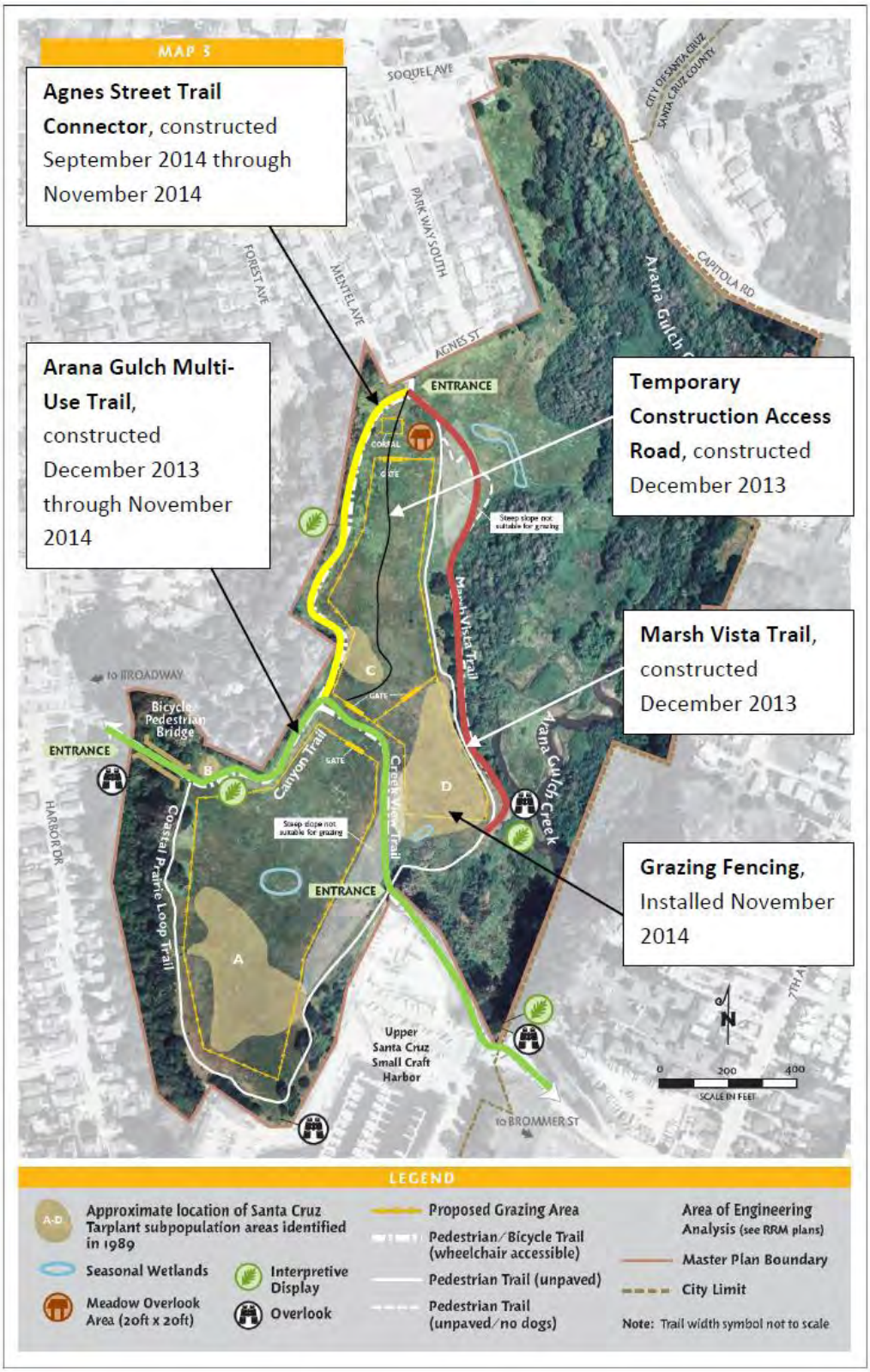
Construction of the Arana Gulch Multi-Use Trail was initiated in fall 2013 and was completed in December 2014. This east-west trail extends from Brommer Street (east of the greenbelt) westward to Broadway Street (west side of greenbelt, across Hagemann Gulch). The Agnes Street Trail extends southward from Agnes Street to join the east-west multi-use trail mid way within the greenbelt. The Marsh Vista Trail, a pedestrian trail located along the east side of Arana Creek, was constructed in 2013. The location of these trails is presented in Figure 3. Activities associated with Master Plan improvements are described in this section. The schedule of when master plan improvements were implemented is provided in each section below.

4.1 Multi-Use Trail Temporary Construction Access Road

To facilitate construction of the east-west trail a fenced, temporary construction access road was placed from Agnes Street to the trail work area through the northern portion of the greenbelt. In December 2013, the natural ground surface was covered with filter fabric and base rock. The location of the temporary construction access road is depicted on Figure 3. The character of the construction access road is depicted in Figure 2, below. The temporary access road was removed in December 2014. The construction plans specified revegetation of the construction road by hydroseeding a native grass mix; however, the AMWG made recommendations to the City that the construction access road be allowed to naturally revegetate. In December 2014 the City applied hydromulch on slopes adjacent to the Arana Gulch Multi-Use Trail, and near the abutments of the Hageman Gulch bridge and Arana Creek causeway. Hydroseeding, with sterile seed, was done in areas identified for seeding in the CDFW-approved riparian revegetation plan (i.e., at the Arana Creek causeway and Hageman Gulch bridge abutments) for erosion control.

Figure 2. Temporary construction access road from Agnes Street to the east-west trail, September 2014

Figure 3. Master Plan Improvements, 2013 - 2014



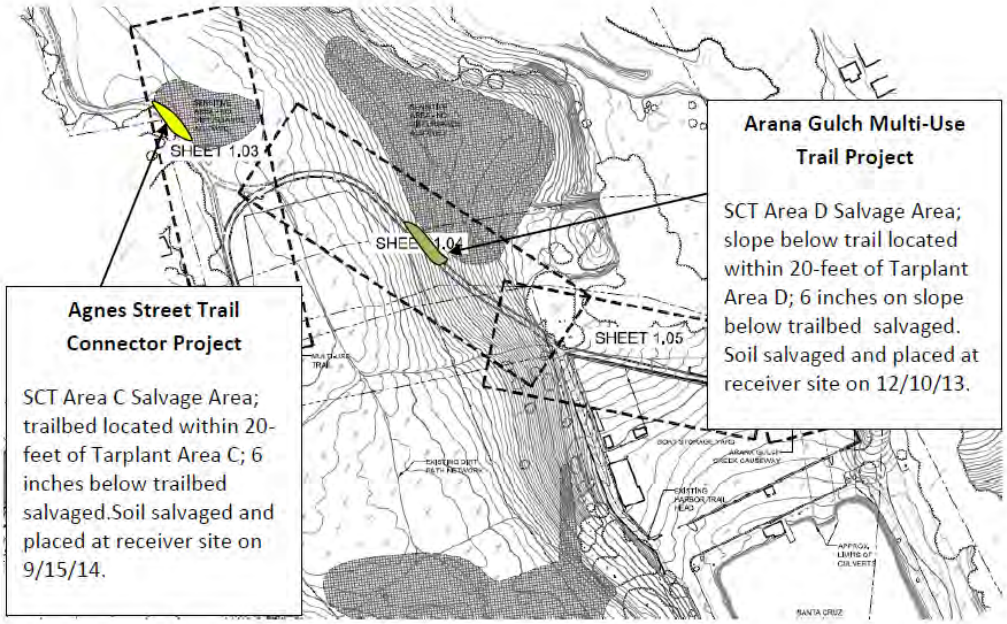
4.2 Multi-Use Trail Soil Salvage Adjacent to Mapped Tarplant Areas

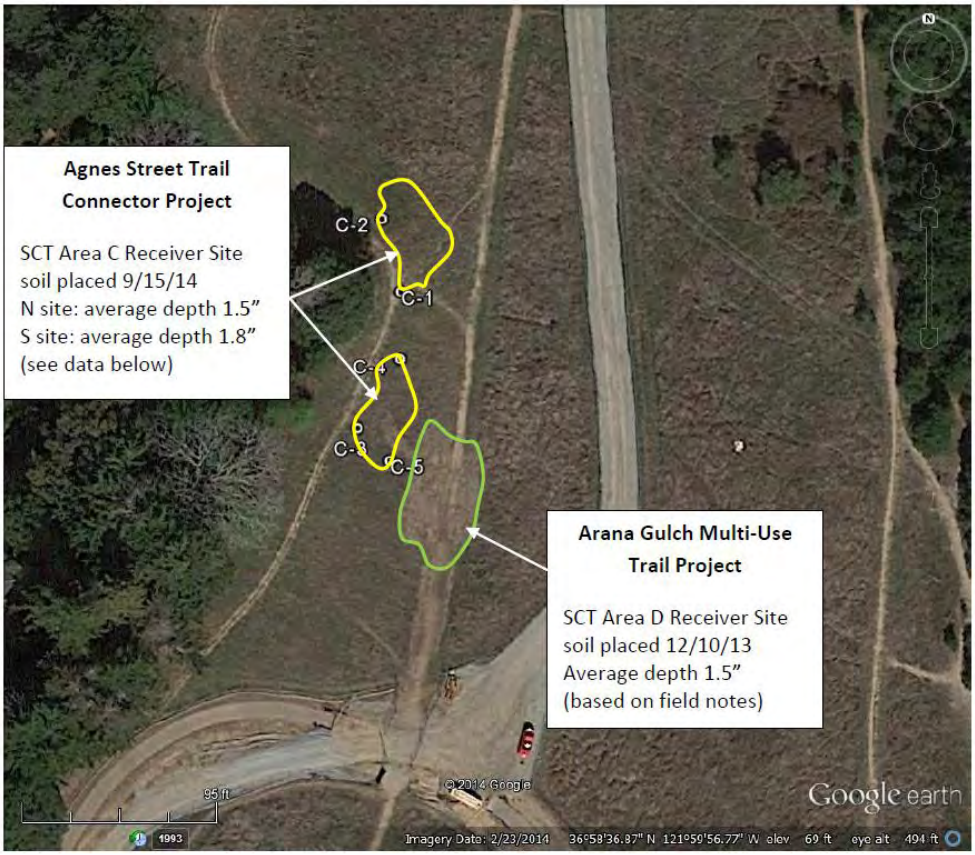
Project conditions of approval require the salvage of topsoil from areas within 20-feet of mapped tarplant if such areas are disturbed during trail construction. The east - west trail construction disturbed a section of soil upslope of Tarplant Area D in December 2013. On December 10, 2013, the upper 6 inches of topsoil from an area upslope of Tarplant Area D was salvaged and spread onto an approximately 3,750 square foot area south of Tarplant Area C. Field notes from 2013 documented the average thickness of placed soil was 1.5 inches on the natural ground surface. In November 2014, the AMWG requested soil samples be taken in the receiver site to document the thickness of the salvaged soil placement; however, a season of grass growth has occurred since the soil placement and no discernible layer of salvaged soil could be determined. The location of the Tarplant Area D salvage and receiver sites is depicted on Figure 5. Figure 4 shows a picture of the receiver site in December 2013 after soil placement.

In July 2014, native and non-native plants established at the Tarplant Area D receiver site. Native species observed included coast tarweed (*Deinandra corymbosa)* and California poppy (*Eschscholzia californica)* and non-native species include hare barley (*Hordeum murinum ssp. leporinum)*, oats (*Avena spp.)*, wild lettuce (*Lactuca sp.)*, cat's ear (*Hypochaeris sp.)*, filaree (*Erodium sp.)*, wild radish (*Raphanus sativus)*, ryegrass (*Festuca perennis)*, and ripgut brome (*Bromus diandrus)*.

Figure 4. Salvaged soil from area adjacent to Tarplant Area D placed at receiver site, December 2013

Figure 5. Location of Multi-Use Trail Soil Salvage and Receiver Sites





The Agnes Street Trail Connector construction disturbed a section of soil within 20 feet of Tarplant Area C in September 2014. On September 15, 2014, the upper 6 inches of topsoil from this area was salvaged and spread onto areas southwest and northwest of Tarplant Area C. The two receiver areas encompass approximately 2,900 square feet. The AMWG recommended the salvaged soil be spread very thinly throughout the coastal prairie from the northern part of Areas C and D moving southwest across the terrace (AMWG meeting minutes, July 16, 2014); however, trail construction activity limited the placement area. Spreading was done mechanically as per construction specifications and was spread as thin as feasible with this method. In November 2014, based upon guidance from the AMWG, a transect was established across each receiver site wherein 40 sample holes were dug to record the depth of the receiver soil. Based on these samples, the salvaged topsoil was placed at an average thickness of 1.5 inches (north site) and 1.8 inches (south site) on the natural ground surface; the range of thickness was 0.5 inch to 4.25 inches. The location of the salvage and receiver sites, as well as data from the November 2014 soil sampling are shown in Figure 3. The placement area for the salvaged soil is shown in Figure 6, below.

Figure 6. Salvaged soil from area adjacent to Tarplant Area C placed at receiver site, September 2014

4.3 Natural Recruitment of Native Plants along East-West Trail

The construction of the multi-use trail included removal of soil under the trail's footprint in preparation for trail materials, base rock and pervious surface, to be installed. The excavated soil was taken off-site. Areas in close proximity to the paved trail (i.e., areas within the designated, fenced construction work area) were also disturbed. In spring and summer 2014, field observations of the east-west trail construction area documented the presence of naturally establishing native and non-native plant species within the disturbed soil areas. In June 2014, individuals of the native coast tarweed (*Deinandra corymbosa)* were observed within the east-west trail construction zone. Plants were numerous alongside the newly constructed trail where soil had been disturbed, as depicted in Figure 7. Other plant species

naturally establishing in this construction area include several weedy, non-native species, such as wild oats (*Avena spp.)*, wild radish, milk thistle (*Silybum marianum)*, and bull thistle (*Cirsium vulgare).*

Figure 7. Coast tarweed (indicated by arrows) growing along edge of east-west trail, June 2014

4.4 Agnes Street Connector Trail

Construction of the Agnes Street Connector Trail was initiated in September 2014. Trail construction was completed in December 2014. As discussed under Section 3.2, above, soil was salvaged near Tarplant Area C as part of trail construction operations.

4.5 Grazing Infrastructure and Stocking Program

The City's trail construction contractor installed fences, access gates, and other features to support cattle grazing during November through January. Support features include the water line/water troughs and a temporary holding corral near Agnes Street. The City incorporated AMWG recommendations to install extra connectors on the underground waterline to allow for flexibility in water trough placement to respond to resource management needs. In December 2014, an agreement for cattle grazing was developed with a local cattle rancher. Cattle are expected to be placed into the grazing areas in February 2015 as per the HMP Grazing Program and Stocking and Work Program.

5. Habitat Management and Monitoring - Coastal Prairie/Santa Cruz Tarplant Management Area

Activities within this management area were conducted as outlined in Section 3.0 of the HMP as well as from input received from the AMWG. Some management actions, such as grazing, were not implemented in 2014 as trail construction activities were occurring and grazing fences and associated infrastructure had not yet been installed. Grazing is expected to be initiated in February 2015.

5.1 Management Actions

Several grassland management actions were implemented in 2014, these actions are described below.

5.1.1 Santa Cruz Tarplant

Management actions for the Santa Cruz Tarplant (SCT) consisted of seasonal mowing of the Tarplant Areas A-D and surrounding grassland. Tarplant Areas A-D were flail-mowed in late April, with the exception of the western edge of Tarplant Area A; this area was not mowed. All of Tarplant Areas A-D was flail-mowed again in early June.

Susan Bainbridge of UC Berkeley Jepson Herbarium conducted a soil seed bank assessment for SCT. Under a CDFW 2081(a) permit between CDFW and UC Berkeley, she analyzed soil and seed bank viability within Tarplant Areas A, B, C, and D. Her preliminary results were presented at the July 16th AMWG meeting. No viable seeds were found in samples from Tarplant Areas B and C; however some viable seeds were found from the samples taken from Tarplant Areas A and D. The AMWG has recommended additional seed collection and ex-situ propagation; however seed collection and ex-situ propagation must be pre-approved by CDFW. The City's permit with CDFW prohibits seed collection if there are less than 50 SCT present; the City requested guidance from CDFW regarding any seed collection from the four plants documented in 2014; CDFW did not support seed collection as only four plants were present. An amendment to the permit would be necessary to allow for seed collection.

5.1.2 Mowing and Raking of Grassland.

As grazing was not implemented in 2014, the central grassland was mowed twice in 2014. The City flail-mowed the grassland in late April and again in early June as per a recommendation from the AMWG; the April mowing was timed to occur prior to grass seed set, as determined by the AMWG (Tim Hyland, AMWG voting member, email dated 4/14/14). The AMWG recommended that the City test the timing of mowing to inform future fuel break mowing. Prior to the April 24 mowing, Kathleen Lyons, on behalf of the City, mapped the corners of a 100 x 100 ft no-mow test plot; the location of the plots is depicted in Figure 8. The pre-mow grass height in April was visually estimated to be 1 meter (3 feet) height; the post mow height was visually estimated to range between 0.1m to 0.3 m (0.5 foot to 1 foot). At the April mowing all cut material was left onsite; there was no raking or other

removal of cut biomass. Due to drought conditions there was limited re-growth of the grasses and forbs between April and June and on June 2nd the entire central grassland area was cut. Grass height was visually estimated to range between 0.1m to 0.3 m (0.5 foot to 1 foot). The no-mow plot was inadvertently mowed again in June 2014.

Figure 8. Spring Mowing Test Plot Map, April 2014

Following the June mowing, hand raking of three circular plots was recommended by the AMWG and the proposed locations were depicted on a site map. In mid-June prior to raking, the center of each circular plot was flagged in the field and documented by GPS (refer to Figure 9). Kathleen Lyons surveyed each area for SCT and none were detected. Prior to raking Kathleen Lyons conducted worker training for the volunteers regarding the SCT in accordance with requirements of CDFW Permit No. 2081 (a)-13-013-RP. A copy of the worker training brochure supplied to each volunteer is presented in Appendix B. In mid-June volunteers from the Santa Cruz Chapter of the California Native Plant Society and other volunteers hand raked the three circular plots and removed cut grass and forbs, as well as thatch. Raked material was bagged and removed from the greenbelt as green waste.

Figure 9. Biomass Removal Map, June 2014

June 14 Biomass removal

Volunteers will hand rake and remove biomass in July at four points that have infestations of velvet grass or other invasive species. These areas are recorded as dots in the vicinity of recently documented SCT and on the outskirts of velvet grass, so as to catch the velvet grass invasion front while removing thatch in areas where we might expect to see tarplant germinate. The dots are mapped where the biomass removal shall begin; biomass removal should be concentric to those dots and progress as far out from those dots as possible, depending on the available labor.

5.1.3 Grassland Delineation

In January 2015, the City is scheduled to complete the delineation of the coastal prairie that will be maintained as grassland in perpetuity. This delineation will be initiated in the field with a voting AMWG member (Tim Hyland) after the installation of the grazing fences. The preliminary grassland delineation will be discussed with the AMWG in 2015 prior to being finalized. Previous AMWG meetings suggested that the grassland areas to be maintained

include all areas within the grazing fences and a 20-foot wide buffer along the Coastal Prairie Loop Trail.

In November 2014, the AMWG provided input for the removal of woody plant species from the future fenced grazing area which has been slowly encroaching on the coastal prairie. The City hired a contractor to remove small oaks, fruit trees, coyote brush, and Himalayan blackberry bushes from the future grazing area. Large oak trees were pruned and will remain in the prairie to provide pockets of shade for the cattle. The AMWG advised the City to wait until spring 2015 to remove the remainder of the woody plants from within the grassland area when herbicide treatment can be applied more effectively and the coastal prairie delineation has been completed. The City agreed to implement this recommendation.

The AMWG recommended excluding delineation of the northeast portion of the grassland (near Agnes Street) until the quality of the habitat is assessed. For the assessment, the AMWG suggested creating three 100x100-foot scraping plots. In October 2014 the City selected three 50x50-foot scrape plots. The City revised the location and size of the plots so that all plots were on level to slightly sloping land and plots were located a minimum of 20 feet from previously mapped coastal review wetlands. The plots were scraped by a tractor to remove all biomass but not the soil. The removed biomass was spread on the adjacent grassland. The location of the three scrape plots, as well as documentation of the pre-scrape plant species composition and cover values is presented in Figure 10. The corner of each plot was marked in the field with a metal T-post in November 2014. These three plots will be included in the 2015 spring baseline assessment vegetation monitoring.

Figure 10. Location of Scrape Plots, October 2014

Plot Number	Slope	Plant Cover	Species Observed - October 15, 2014
1	0-2%	90% plant cover	*Avena* sp. (dominant) with *Rumex crispus, Convolulus arvensis, Lactuca sp., Carduus sp., Raphanus sativus,* and *Tragopogon porrifolius.*
2	0-2%	90% plant cover	*Avena* sp. (dominant) with *Rumex crispus, Bromus hordeacous, Lactuca sp., Raphanus sativus, Tragopogon porrifolius, Hordeum marianum leporinum,* and *Lolium multiflorum.*
3	5-10%	90% plant cover	*Avena* sp. (dominant) with *Lactuca sp., Raphanus sativus, Carduus sp.,* and *Rubus ameniacus.*

5.1.4 Invasive, Non-native Plant Mapping and Control

The AMWG recommended mapping invasive plants within this management area to document the baseline condition and to guide future management activities for species removal/ control (AMWG meeting minutes, July 2014).

In April and October 2014, Kathleen Lyons mapped the distribution of invasive, non-native plant species by walking transects through the central grassland to detect all invasive, non-

native plant species identified as priority weeds by California Invasive Plant Council (Cal-IPC) (Online Inventory) and/or the Bay Area Early Detection Network (most current list dated 9/23/2010). Fifty-three (53) patches of invasive, non-native species, comprised of 12 species, were identified. The approximate size, density of plants (dense, moderate, and sparse) and the location of each non-native species patch was documented using GPS and mapped on an aerial photo. A map of these patches and the data collected for each patch is presented in Figure 11. Plant species documented in the central grassland include: Italian thistle (*Carduus pycnocephalus)*, bull thistle (*Cirsium vulgare)*, cotoneaster (*Cotoneaster sp.)*, French broom (*Genista monspessulana)*, English ivy (*Hedera helix)*, velvet grass (*Holcus lanatus)*, maidenhair vine (*Muehlenbeckia complexa)*, Prunus (*Prunus spp.)*, Himalayan blackberry (*Rubus armeniacus)*, milk thistle (*Silybum marianum)*, periwinkle (*Vinca major)*, and Bermuda grass (*Cynodon dactylon).*

Figure 11A. Extent of Invasive Plant Species within Central Grassland, April and October 2014 (Northern Area)

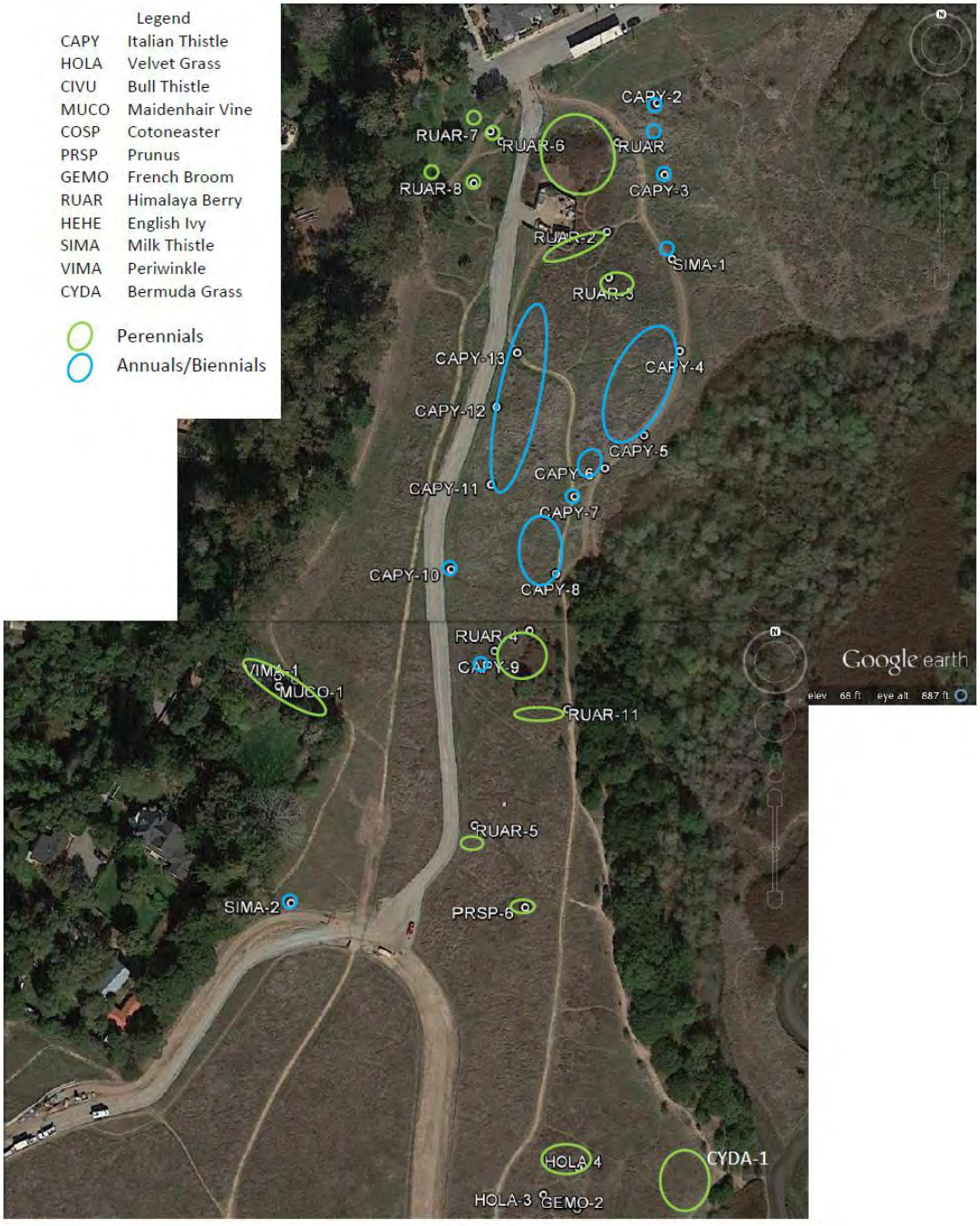


Figure 11B. Extent of Invasive Plant Species within Central Grassland, April and October 2014 (Southern Area)

Legend

CAPY	Italian Thistle	HOLA	Velvet Grass
CIVU	Bull Thistle	MUCO	Maidenhair Vine
COSP	Cotoneaster	PRSP	Prunus
GEMO	French Broom	RUAR	Himalayan Blackberry
HEHE	English Ivy	SIMA	Milk Thistle
		VIMA	Periwinkle

Perennials

Annuals/Biennials

Figure11C. Invasive Plant Species within Central Grassland, April and October 2014

Invasive Weeds Documented Prior to April 2014 Mowing, 4-23-14, with Updates in October 2014				
Map Code	**Common Name**	**Scientific Name**	**Approximate Size (feet)**	**Density of Plants (Dense-Moderate-Sparse)**
CAPY-1	Italian Thistle	*Carduus pycnocephalus*	25x25	Moderate
CAPY-2	Italian Thistle	*Carduus pycnocephalus*	15x10	Dense
CAPY-3	Italian Thistle	*Carduus pycnocephalus*	20x20	Dense
CAPY-4	Italian Thistle	*Carduus pycnocephalus*	30x50	Dense
CAPY-5	Italian Thistle	*Carduus pycnocephalus*		
CAPY-6	Italian Thistle	*Carduus pycnocephalus*	30x20	Moderate
CAPY-7	Italian Thistle	*Carduus pycnocephalus*	10x10	Dense
CAPY-8	Italian Thistle	*Carduus pycnocephalus*	70x50	Sparse
CAPY-9	Italian Thistle	*Carduus pycnocephalus*	5x5	Moderate
CAPY-10	Italian Thistle	*Carduus pycnocephalus*	5x25	Moderate
CAPY-11	Italian Thistle	*Carduus pycnocephalus*	30x20	Moderate
CAPY-12	Italian Thistle	*Carduus pycnocephalus*		
CAPY-13	Italian Thistle	*Carduus pycnocephalus*		
CIVU-1	Bull Thistle	*Cirsium vulgare*	40x20	Moderate
COSP-1	Cotoneaster	*Cotoneaster sp.*	15x15	Dense
COSP-2	Cotoneaster	*Cotoneaster sp.*	50x50	Dense (also RUPR)
COSP-3	Cotoneaster	*Cotoneaster sp.*	20x20	Dense
COSP-4	Cotoneaster	*Cotoneaster sp.*	35x35	Dense
COSP-5	Cotoneaster	*Cotoneaster sp.*	60x25	Dense (also RUPR)
COSP-6	Cotoneaster	*Cotoneaster sp.*	30x20	Dense
COSP-7	Cotoneaster	*Cotoneaster sp.*	40x40	Dense (also RUPR)
COSP-8	Cotoneaster	*Cotoneaster sp.*	20x20	Dense
GEMO-1	French Broom	*Genista monspessulana*	2x2	Sparse
GEMO-2	French Broom	*Genista monspessulana*	10x10	Sparse
HEHE-1	English Ivy	*Hedera helix*	5x5	Sparse
HEHE-2	English Ivy	*Hedera helix*	20x5	Sparse
HOLA-1	Velvet Grass	*Holcus lanatus*	20x20	Dense
HOLA-2	Velvet Grass	*Holcus lanatus*	10x20	Sparse
HOLA-3	Velvet Grass	*Holcus lanatus*	40x40	Moderate
HOLA-4	Velvet Grass	*Holcus lanatus*	40x40	Moderate
MUCO-1	Maidenhair Vine	*Muehlenbeckia complexa*	25x100	Dense
PRSP-1	Prunus	*Prunus sp.*	10x10	Sparse
PRSP-2	Prunus	*Prunus sp.*	10x10	Sparse
PRSP-3	Prunus	*Prunus sp.*	10x10	Sparse
PRSP-4	Prunus	*Prunus sp.*	10x10	Sparse
PRSP-5	Prunus	*Prunus sp.*	2x2	Sparse
PRSP-6	Prunus	*Prunus sp.*	10x10	Sparse
RUAR-1	Himalayan Blackberry	*Rubus armeniacus*	50x50	Dense
RUAR-2	Himalayan Blackberry	*Rubus armeniacus*	20x25	Dense
RUAR-3	Himalayan Blackberry	*Rubus armeniacus*	20x25	Dense
RUAR-4	Himalayan Blackberry	*Rubus armeniacus*	50x50	Dense
RUAR-5	Himalayan Blackberry	*Rubus armeniacus*	5x5	Sparse
RUAR-6	Himalayan Blackberry	*Rubus armeniacus*	10x10	Sparse
RUAR-7	Himalayan Blackberry	*Rubus armeniacus*	20x20	Sparse
RUAR-8	Himalayan Blackberry	*Rubus armeniacus*	40x40	Moderate

RUAR-9	Himalayan Blackberry	*Rubus armeniacus*	10x10	Sparse
RUAR-10	Himalayan Blackberry	*Rubus armeniacus*	50x25	Moderate
RUAR-11	Himalayan Blackberry	*Rubus armeniacus*	20x30	Moderate
SIMA-1	Milk Thistle	*Silybum marianum*	5x5	Sparse
SIMA-2	Milk Thistle	*Silybum marianum*	5x5	Sparse
VIMA-1	Periwinkle	*Vinca major*	5x30	Moderate
Additional Invasive Weeds Documented October 2014				
CYDA-1	Bermuda Grass	*Cynodon dactylon*	100x100	Moderate
CYDA-2	Bermuda Grass	*Cynodon dactylon*	100x100	Moderate

In May 2014 the AMWG identified the following set of priority invasive plant species that immediately threaten the conservation targets at the Arana Gulch Greenbelt as the following[5]:

- Himalayan blackberry (*Rubus armeniacus)*
- Cotoneaster (*Cotoneaster spp*.)
- French broom (*Genista monspessulana)*
- Velvet grass (*Holcus lanatus)*
- Thistles (*Cirsium sp., Carduus sp. and Silybum sp.)*
- Medusa head (*Elymus caput-medusae)*

As per recommendation from the AMWG (email vote, dated May 1, 2014 and AMWG meeting dated November 4, 2014) some of the high priority invasive plant species within the grassland were removed or controlled. The City implemented control actions in November 2014 wherein occurrences of Himalayan berry (*Rubus armeniacus)* were brush mowed. Occurrences of Prunus *sp.* were also cut. The location of the treated areas was marked on the invasive plant maps.

5.1.5 Grazing and Stocking Work Program

Cattle grazing will be initiated in February 2015; no grazing occurred in 2014. The City developed a Stocking and Work Program that is part of a professional services contract that was awarded to a local rancher in December 2014, pursuant to the Grazing program presented in the HMP.[6] The AMWG approved the Stocking and Work Program in November 2014; AMWG approval of this document was required as a condition of the CDP.

Fences, access gates, and other features to support cattle grazing were installed in November and December 2014 and January 2015. Support features include the water line/water troughs and a temporary holding corral near Agnes Street. The City incorporated AMWG recommendations to install extra connectors on the underground waterline to allow for flexibility in water trough placement. Cattle are expected to be placed into the grazing areas in February 2015 as per the HMP Grazing Program and Stocking and Work Program (see Appendix B).

[5] Arana Gulch Priority Weed Control Recommendations, dated May 1, 2014.
[6] See Page 65 of Arana Gulch HMP

5.2 Monitoring and Performance Evaluation

Biological variables were measured within this management area in 2013 and 2014 as outlined in the HMP. Table 2 presents a summary of the biological variables monitored, the Year 1(2014) values, and the desired direction of change. Table 2 also identifies the interim success criteria for implementation of the HMP in the near term. The interim success criteria are a specific requirement of the CDP[7]; these criteria are short term management targets for implementing the HMP in the near term (i.e., to 2020). The monitoring methods, results, and evaluation of HMP goals for this management area are presented below.

5.2.1 Santa Cruz Tarplant

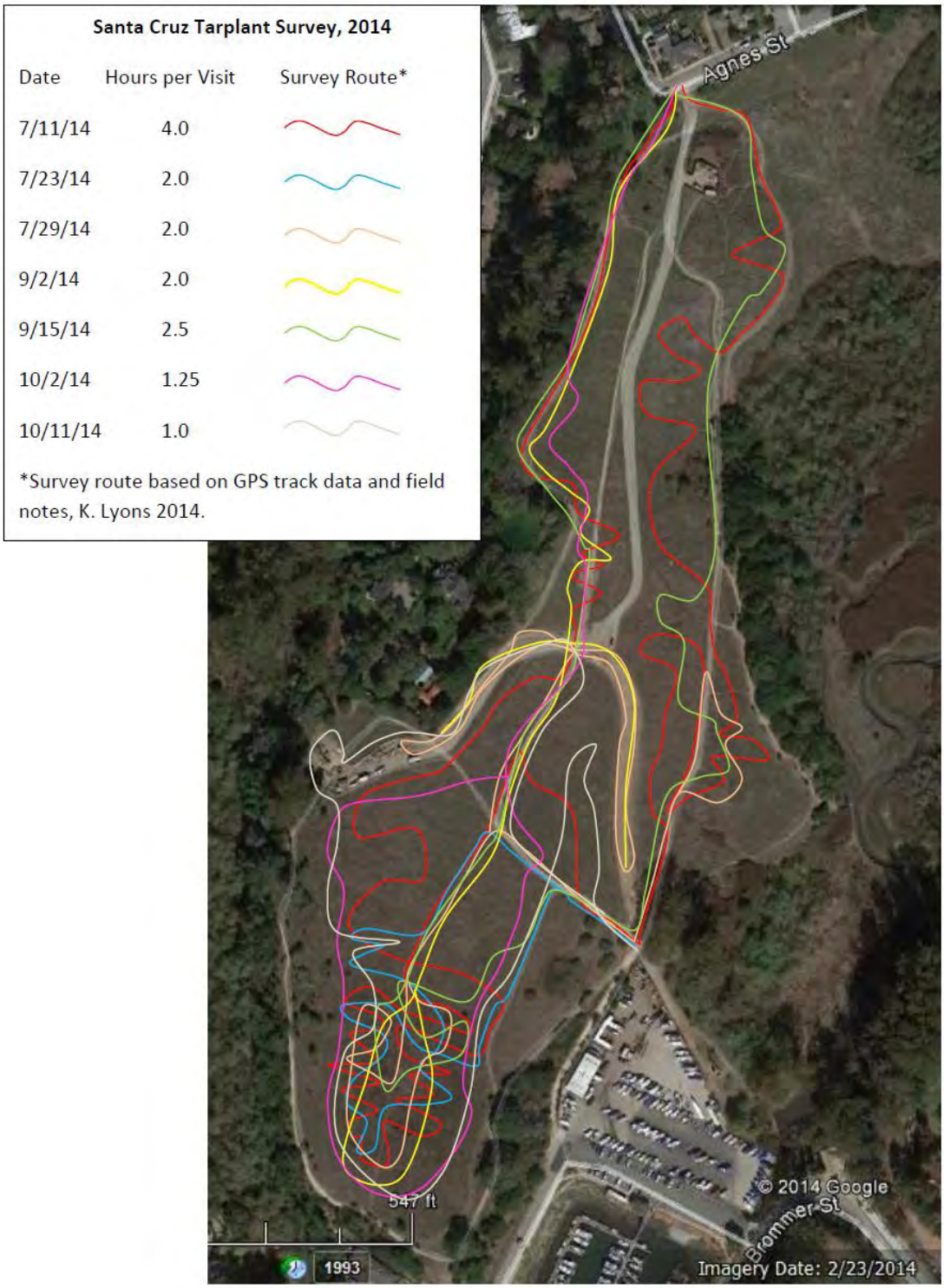
A primary focus for this management area is the recovery of the SCT. The population of SCT at Arana Gulch has declined over the last two decades[8]. The HMP requires an annual census of the population (Goal 1) and a baseline assessment of SCT within the soil seed bank (Goal 4).

5.2.1.1 Monitoring Methods. A census for SCT was conducted by Kathleen Lyons, on behalf of the City. The survey followed guidelines from *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG, 2009), *CNPS Botanical Survey Guidelines* (CNPS, 2001), and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species* (UFWS (1996). Field surveys to determine the presence/absence of SCT were conducted between July and October 2014. This survey period coincided with the blooming period of SCT. A reference population in the DeLaveaga region of the City of Santa Cruz was field checked on July 11, 2014; plants at this location were in flower. Surveys were conducted by walking the coastal prairie of Arana Gulch over multiple days. Survey days were July 11th, 23rd, and 29th, September 2nd and 15th, and October 2nd and 11th. The survey routes and hours spent per survey are presented in Figure 12. The survey routes are based on GPS track data and field notes. When a SCT was observed a waypoint was taken with a handheld Global Positioning System (Garmin 60sce) that recorded the plant's location within the survey area. Field notes were taken to document the height, flowering status and location of each SCT. The survey was conducted in a below-normal rainfall year.

[7] See Page 71 of Arana Gulch HMP

[8] See Section 3.1, page 63 of Arana Gulch HMP.

Figure 12. SCT Census Survey Route and Dates



Susan Bainbridge of UC Berkeley Jepson Herbarium conducted a soil seed bank assessment for SCT. Under a CDFW 2081(a) permit between CDFW and UC Berkeley, she analyzed soil and seed bank viability within Tarplant Areas A, B, C, and D.

5.2.1.2 Monitoring Results. On July 11th, two SCT were documented in a small portion of Tarplant Area A. On July 23rd, two additional SCT were found in the same area. Four plants were found within the greenbelt; all four plants were located in a localized scrape test plot that was created in 2011. The four plants supported a total of eight flowering heads in July. In October 2014, one plant displayed 70 flowering heads, as listed in Table 2 and depicted on Figure 13. The location of the four SCT plants is depicted in Figure 14; Appendix B contains a copy of the California Native Species Field Survey Form submitted to the CNDDB in December 2014, pursuant to the requirements of CDFW Permit No. 2081 (a)-13-013-RP. A photograph of one of the multi-branched SCT within Tarplant Area A is depicted in Figure 13.

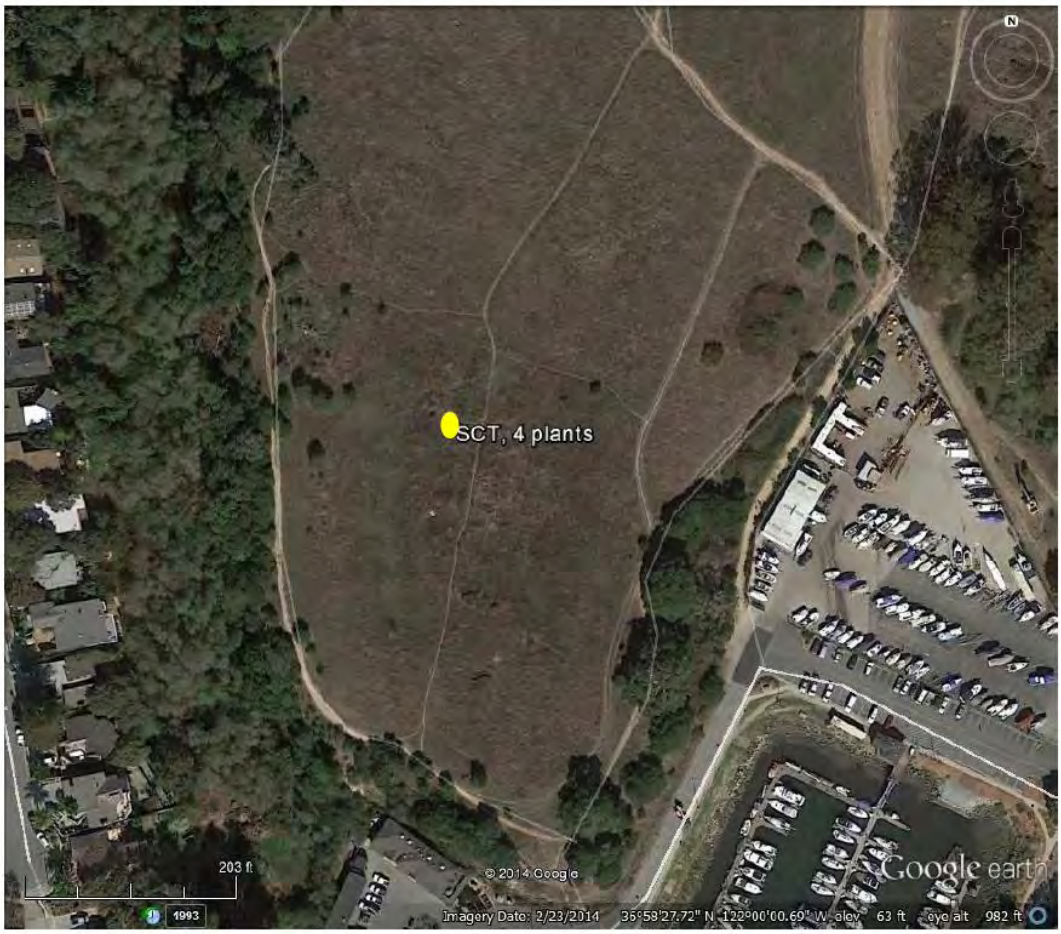
The census documented a decline in the number of SCT compared to 2013, wherein 18 plants were documented from Tarplant Area A. Although the number of plants was less in 2014, there were more flowering heads. In 2013, 54 flowering heads were documented compared to 76 flowering heads in 2014.

Table 2. Results of SCT Census, 2014

Plant Number	Height	Number of Flowering Heads	Stem Branching?	Length of Longest Leaf
1	4”	70	Yes	2”
2	4”	3	Yes	2”
3	2.5”	1	No	1.5”
4	3”	2	Yes	1.5”
Total		**76**		

Figure 13. SCT in Tarplant Area A, October 2014

Figure 14. Location of SCT in 2014
(Location of plants and experimental scrape plot created in 2011)



The SCT soil seed bank assessment found no viable seeds in samples from Tarplant Areas B and C; however some viable seeds were found from the samples taken from Tarplant Areas A and D. The assessment found that there has been a significant decrease in viable seeds since a previous assessment in 2001, both in number of seeds and seed density. Preliminary results indicate the SCT seed bank has been lying dormant and aging for several years.

5.2.1.3 Evaluation of HMP Goals. The HMP has a goal to maintain a viable SCT population, with objectives to increase the number of aboveground SCT to at least the 2006 level by 2015 (Objective 1A). The number of plants observed in 2014 was four plants. These four plants were found in Tarplant Area A within an experimental scrape plot that was created in 2011. The 2014 population is a reduction from 2013 wherein 18 plants were documented (all in Tarplant Area A) (16 found in 2011 scrape plot and 2 plants found elsewhere). The 2014 population is well below the 2006 population level of 348 plants; achieving a minimum of 348 plants is an objective of the HMP. The grassland management actions implemented in 2013 and 2014 (two seasonal mowing per year) did not result in an increase in the population of SCT necessary to meet Objective 1A. Cattle grazing is expected to commence in February

2015 and growing conditions for SCT are expected to improve; however, as SCT germinate after the first significant rainfall event[9], usually in late fall, the full effects of cattle grazing management on SCT germination and plant recruitments will likely not be detected until 2016.

The HMP has an objective to expand the distribution of SCT beyond Tarplant Area A within three years (Objective 1B). In 2014 all aboveground SCT were observed within Tarplant Area A. Thus, Objective 1B was not met this year. As discussed above, cattle grazing is expected to commence in February 2015 and cattle will graze Tarplant Areas A, C, and D as well as surrounding prairie. It is expected that the effects of this management action on aboveground SCT beyond Tarplant Area A will be detected in 2016. Objective 1A specifies expansion of aboveground SCT beyond Tarplant Area A within 3 years (by 2017).

The HMP also has a goal to maintain a genetically and demographically viable soil seed bank in perpetuity (Goal 4), with an objective to increase the density of viable ray achenes in the soil seed bank from the baseline (first 3 years) to assessments done every 5 years (Objective 4A).The results from the 2014 soil seed bank assessment were not available at the time of this annual report so the baseline density of viable ray achenes in unknown. It is expected that the seed bank assessment report will be completed in 2015 and the results presented in the Year 2 (2015) annual report.

5.2.2 Grassland

5.2.2.1 Monitoring Methods. A baseline assessment of vegetation conditions at Arana Gulch is one of the requirements of the Coastal Development Permit.[10] For the baseline assessment, Alison Stanton installed the first permanent point intercept vegetation transects on behalf of the City in June, 2013 (Stanton 2014a)[11]. The AMWG reviewed the study design and protocols in advance.

The 2013 dataset has its limitations from the late timing of the data collection. The annual forbs were all dry by June and it is very likely that annual diversity and some earlier season perennial diversity was under-detected in the sample. However, the first AMWG meeting was not convened until April 23, 2013 and then review of the draft sample design and contracting issues caused a delay in implementation. The 2013 baseline included collection of data on species richness, plant cover, canopy height, and ground cover was recorded. The point intercept method was used wherein "hits" of each species encountered by a pole at every 0.5m along a 25m line for a total of 50 points per transect. Species were identified at each point and ground cover code (litter, bare, gopher disturbance, basal vegetation, rock) was also recorded. The average height of the low canopy layer and the high canopy layer at the 6, 12, 18, and 24 m points was recorded. Thatch depth was not measured as it was not possible to

[9] See Section 3.1.2, page 33 of Arana Gulch HMP.
[10] See Section 3.7 of Arana Gulch HMP for the details of field sample design and data analysis.
[11] See Appendix B, 2014 Baseline Assessment Data for location of permanent transects.

distinguish residue from the previous year's growth (thatch) from senescent material from earlier in the growing season (litter). Thatch and litter were both included in the ground cover code of litter. In addition, a search was conducted within a 5m belt transect, using the transect as the centerline, wherein the presence of any plant species that was not encountered on the transects was recorded. This additional method was used to capture uncommon or rare species and more fully characterize species richness. Photos were taken from the 0m with the camera at eye level and a white board with the name of the transect and compass bearing. A second year of sampling was conducted on April 21-22, 2014. The AMWG recommended mowing of the coastal prairie on April 24th. The 2014 baseline assessment report is included in Appendix A. In April 2014 the vegetation was re-sampled along transects that were established in 2013; additional transects were also established (see Appendix A).

As no grazing was conducted in 2014, there were no observations of grazing operations or documentation of residual dry matter (RDM). The City field checked that the grazing fence was a minimum of 50 feet from the top of the steep slopes to verify conformance with a grazing BMP.

Invasive plant mapping was conducted in 2014 and some occurrences within the grassland were removed/controlled in fall 2014. The location of the treated areas was marked on the invasive plant maps.

5.2.2.2 Monitoring Results. As in 2013, the sampled coastal prairie vegetation at Arana Gulch was comprised almost exclusively of non-native species with high cover, a large thatch accumulation, and almost no bare ground (Stanton 2014b). The baseline results indicated that the sampled coastal prairie vegetation at Arana Gulch was comprised almost exclusively of non-native species with an average absolute cover >200%. The prairie could be characterized as a fairly uniform non-native annual grassland comprised of a tall layer (>1 m) of wild oat and radish along with a shorter ubiquitous layer of mixed annual grasses and forbs (i.e., average canopy height greater than 4 feet). Native species richness was 6 native species recorded in the sampling out of a total of 33 species. Native cover averaged <5% in Tarplant Areas A and D, represented only by small and localized patches of California oatgrass and wild rye, a few scattered individuals of poppy and spreading rush, and single clumps of California rose and coyote bush. No native species were recorded in Tarplant Area C. Bare ground averaged 20% in 2013. In 2013, a total of 32 species were recorded. Purple needle grass (*Stipa pulchra*) was not recorded on the transects in 2013, but otherwise the species were the same. The only native species detected were California oatgrass (*Danthonia californica*), California poppy (*Eschscholozia californica*), California rose (*Rosa californica*), Great Basin wildrye (*Elymus triticoides*), and spreading rush (*Juncus patens*). Coyote brush (*Baccharis pilularis*) and coast live oak (*Quercus agrifolia*) were also present within the 5m belts in Tarplant Area A. All other species were non-native (see Appendix A). French broom (*Genista monspessulana)* was the only invasive species with a High Cal-IPC (Invasive Plant Council) rank that was recorded. It is in Tarplant Area D and was captured by the sampling in one 5m belt transect. Scotch thistle (*Onorpordum acanthium*) is also a High Cal-IPC rank

species that was recorded in sampling in 2013 in Areas A and C, but it was not captured in 2014. A total of three forb species are ranked Moderate including Italian thistle (*Carduus pycnocephalus*), bull thistle (*Cirsium vulgare*), and sheep sorrel (*Rumex acetosella*). The perennial velvet grass (*Holcus lanatus*) and three annuals grasses, wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*) and rattail six weeks grass (*Festuca myuros*), are considered Moderate because of the intense effect these grasses can have on fire regime and their ability to exclude natives.

Canopy height was much lower in 2014 because of the record dry conditions. Average canopy height was 1 meter (3.3 feet). Precipitation during the water year from July 1, 2013 to June 30, 2014 totaled only 5.34 inches. In contrast, precipitation in the 2012-2013 year was 18.91 inches. The long term average for the Santa Cruz NOAA weather station is 30 inches. Among the transects sampled, a total of 33 species were recorded as hits or within the 5m belt transects (125m2) that were searched along each transect (Table 2). The low layer of rattail six weeks grass (*Festuca myuros*) that was ubiquitous in 2013 was not as prevalent in 2014. Ripgut brome (*Bromus diandrus*) was much more dominant this year along with wild oat (*Avena fatua*). The wild radish (*Raphanus sativa*) was much more sparsely distributed and shorter, especially in Tarplant Area C. Bare ground averaged 10%, which is less than documented in 2013.

Six patches of Himalayan blackberry (*Rubus armeniacus)* were brush cut and six non-native *Prunus sp.* trees were cut within the grassland in November 2014.

The City field checked the location of the grazing fence and the fencing is placed a minimum of 50 feet from the top of the steep slopes.

5.2.2.3 Evaluation of HMP Goals. The HMP has three goals that apply to the coastal prairie and are not specific to the SCT (which is addressed in the previous section). Goal 2 seeks to maintain a functioning coastal prairie through the reintroduction of grazing and the resultant disturbance regime. Objective 2A identifies implementation of the grazing program by 2014 and Objective 2a requires that the grassland achieve residual dry matter (RDM) measurements within a range appropriate for SCT growth. Grazing was not implemented in 2014 due to construction relating to master plan improvements and a lack of grazing infrastructure. Thus, these two objectives have not yet been met.

Although the City was not able to implement grazing in 2014, it took several steps towards achieving this goal in 2015. The City developed a Stocking and Work Program that is part of a professional services contract that was awarded to a local rancher in December 2014 and grazing is expected to be initiated in February 2015. Observations and BMP implementation monitoring of the grazing program will be implemented concurrent with grazing and will be reported upon in the Year 2 (2015) annual report. The protocol for monitoring of the grazing program in 2015 are outlined in the HMP and include observations of feed and water troughs (3 times during grazing), adherence to BMPs (see Section 3.5.6 in HMP), and documenting

residual dry matter (once a year in September or October). The following BMPs, as identified in the HMP, will be implemented and [12] monitored:

- Install temporary fencing around the seasonal wetland within the southern grazing area to include 50-foot buffer; allow grazing in the seasonal wetland area during dry conditions as recommended by the botanist.
- Locate water trough and any supplemental deed with the grazing areas as far back from the top of the steep slopes as possible; locate the trough and feed outside of sensitive areas (occupied SCT areas/seasonal wetland).
- During months of highest rainfall and storm events, keep minimum number of cow/calf pairs on site to avoid erosion and minimize volume of cattle waste.
- Conduct regular visual inspections of fence line to ensure cattle remain within the designated grazing area.
- During rainfall events, conduct visual inspections (by foot) to ensure no rilling or other erosion within and from the grazing area. Appropriate erosion control measures, such as straw wattles, will be installed, if necessary, to prevent any accelerated or channelized runoff toward steep slopes.
- Avoid motorized vehicle use during rainy season/soil saturation to maximum extent feasible.

The purpose of Goal 3 is to minimize the deleterious effects of high non-native plant cover on species diversity and habitat function. Objective 3A identifies a reduction in canopy height during the basal rosette stage of the SCT (November through April) to 0.5 m (1.6 feet) or less[13]. Although canopy height did decline in 2014, it did not meet the objective of 1.6 feet or less.

Objectives 3B, 3C, and 3D specify attaining cover values for native and non-native species to one more representative of a reference functioning prairie by 2020. Objective 3E specifies an increase in bare ground to a level that enables SCT to complete their lifecycle by 2015. The AMWG is in the process of collecting data on nearby reference sites that can be used to develop performance criteria for percent cover of native and non-native plants, species richness and percent cover that is bare ground. It is anticipated that these criteria will be available in 2015 and will be used to assess performance of the coastal prairie from next year forward.

For the HMP (Objective 3b) , a recent unpublished study that assessed vegetation conditions at six coastal prairie sites situated between Point Lobos and Davenport (Holl and Reed, 2010) was used to analyze the condition of the coastal prairie at Arana Gulch. The sites sampled in that study exhibited a wide range of variation in native species cover (20-40%) and the number of native species recorded per transect varied from a low of 4 to a high of 21. In

[12] See page 68 (Section 3.5.6) of Arana Gulch HMP.
[13] Preliminary discussion with AMWG suggests canopy height during SCT basal rosette stage should be 2-3 inches or less.

Hayes and Holl (2003), native grass cover at 3 coastal prairie sites ranged from 9% at one site to <2% at the other two sites and native forb cover was <5% at all sites. Those sites had been grazed regularly and had not been tilled. In contrast, native annual forb cover of 30% was measured near the SCT population at Porter Ranch, while native grass cover was < 5% (Hayes 2003). The 2013 and 2014 data show that Arana Gulch has a higher amount of non-native plant cover and lower values for native plant cover than these six prairie sites; therefore, Objective 3b has not yet been met. Three of the coastal prairie study sites were from grazed lands. As grazing was not implemented within Arana Gulch in 2014 due to construction relating to master plan improvements and a lack of grazing infrastructure; these coastal prairie values will need to be re-assessed once grazing has been implemented.

5.3 Proposed Actions for 2015

The following actions and expected timing are proposed for 2015:

- Initiate cattle grazing program, beginning in February 2015, with grazing extending to July 2015.
- Monitor grazing operation and implement the HMP-designated BMPs (see Section 3.5.6 in HMP and bullet list above) (February – July 2015).
- Confer with AMWG to amend Objective 3A to reduce canopy height during basal rosette stage for SCT to 2-3 inches or less, rather than 0.5m (1.6 feet) (April 2015).
- Confer with AMWG on preferred method to record RDM (prior to RDM measurements scheduled for September/October 2015)
- Delineate grassland area to be maintained; mow or graze all delineated areas (April 2015).
- Continue to implement invasive plant species control as per AMWG species prioritization, focusing on removal/control of the following species:
    - Himalayan blackberry (*Rubus armeniacus)*
    - Cotoneaster *(Cotoneaster sp.)*
    - French broom (*Genista monspessulana)*
    - Velvet grass (*Holcus lanatus)*
    - Thistles (*Cirsium sp., Carduus sp., Silybum marianum)*
    - Medusa head (*Elymus caput-medusae)*
- Conduct census for SCT (August/September 2015).
- Monitor plant cover, canopy height, species richness, bare ground at permanent transects and compare data to previous years and HMP desired direction of change (April 2015).
- Work with AMWG to develop specific performance targets for percent cover of native species, nonnative species and bare ground, and species richness that will be used to determine whether HMP objectives have been met.
- Establish permanent photo points with GPS location and compass direction (prior to initiation of grazing) (January or February 2015).

Table 3. Biological Variables Monitored in Coastal Prairie/Tarplant Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Interim Target Date	Year 1 (2014) Results	Objective Met?
Goal 1. Maintain a viable SCT population at Arana Gulch						
Objective 1A. Increase number of aboveground SCT to at least the 2006 level by 2015 (Note: 2006=348 plants in Area A)	# of above ground SCT plants	Yearly in Aug./Sept.	Increase	2014	4 SCT in Tarplant Area A	No, decrease from 18 plants (54 flower heads) plants in 2013[14]
Objective 1B. Expand the distribution of SCT beyond Area A within 3 years (Note: Year 3 = 2017)	Distribution of SCT plants	Yearly in Aug./Sept.	Expansion	2017	All SCT located in one patch in Area A	No, decrease from two patches in 2013
Goal 2. Reintroduce grazing to restore a disturbance regime that maintains functioning coastal prairie						
Objective 2A. Implement the Grazing Program by 2014	2A.1 Observation of feed and water troughs	3x during grazing	Stable	2015	N/A, Grazing program not active in 2014.	No, grazing expected to commence in February 2015
	2.A.2 BMP implementation monitoring	3x during grazing	Stable	2015	N/A, Grazing program not active in 2014.	N/A, Grazing program not active in 2014.
Objective 2B. Maintain RDM within a range that allows SCT to complete its lifecycle and protects coastal prairie grassland from erosion (700-	Residual dry matter (RDM)	Yearly in Sept./Oct.	Maintain within range	2017	N/A, Grazing program not active in 2014.	N/A, Grazing program not active in 2014.

[14] HMP acknowledges that number of aboveground SCT is not likely to increase until after grazing program is implemented; SCT increase from grazing may not be fully detected until 2016.

Table 3. Biological Variables Monitored in Coastal Prairie/Tarplant Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Interim Target Date	Year 1 (2014) Results	Objective Met?
1,500 lbs./acre)						
Goal 3. Minimize detrimental effects of high non-native plant cover and restore coastal prairie species diversity and habitat function						
Objective 3A. Reduce canopy height during the basal rosette stage for SCT (Nov. – April) from the baseline level to 0.5m (1.6 feet) or less by 2015	Average canopy height	3x during growing season	Reduction	2015	In April 2014 canopy height was visually estimated at 1 meter (3 feet). Grass height was reduced to 0.1 to 0.3 m (0.5 to 1 foot) after April 2014 mowing. June 2013 baseline documented average maximum canopy height of vegetation at 1.2 m (4 feet)[15]	No, cattle grazing to be initiated in February 2015 to reduce canopy height; un grazed areas will be mowed in spring 2015, as weather permits, to reduce canopy height
Objective 3B. Reduce cover of non-native species in the coastal prairie from the baseline to one more representative of a reference functioning coastal prairie system by 2020;	Percent cover of non-native plants	Yearly at peak growth in April	Reduction	2020	Cover by non-native species is >95% (2013) 51 patches of invasive, non-native plant species (11 species) were identified in April 2014	No, cattle grazing to be initiated in February 2015 to reduce cover of non-native species; Invasive weed control will be initiated in spring 2015

[15] The standard deviation was not calculated for the 2013 data; however, raw data is available if this calculation is needed in the future.

Table 3. Biological Variables Monitored in Coastal Prairie/Tarplant Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Interim Target Date	Year 1 (2014) Results	Objective Met?
Objective 3C. Increases cover of native species from baseline levels to one more representative of a reference functioning coastal prairie system by 2020.	Percent cover of native plants	Yearly at peak growth in April	Increase	2020	Cover of native species is <1%; reference systems have range of 20-40% cover as per Holl and Reed (2010), Hayes and Holl (2003)	No, grazing to be initiated in February 2015 to increase cover of native species
Objective 3D. Increase native species richness from baseline levels to one more representative of a reference functioning coastal prairie system by 2020.	Native species richness	Yearly at peak growth in April	Increase	2020	Native species richness is 6 species (2013) and 7 species (2014); reference systems have range of 4 to 21 species as per Holl and Reed (2010), Hayes and Holl (2003)	Undetermined increase of one species from 2013 to 2014
Objective 3E. Increase cover of bare ground in the coastal prairie from baseline level to a level that enables SCT plants to complete their lifecycle by 2015.	Percent bare ground	3x during growing season	Increase	2015	Cover of bare ground is 15% (2013) and 10% (2014)	No, amount of bare ground has not increased as per 2013 and 2014 baseline transects; however cattle grazing to be initiated in February 2015 which is expected to increase bare ground
	Permanent photo points with GPS location and compass direction	Before, during and post construction and then yearly at peak growth	Improving	2015	None established to date	No, photo points to be established once grazing fence is installed; expected to be in January or February 2015

Table 3. Biological Variables Monitored in Coastal Prairie/Tarplant Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Interim Target Date	Year 1 (2014) Results	Objective Met?
Goal 4. Maintain a genetically and demographically viable soil seed bank in perpetuity.						
Objective 4A. Increase the density of viable ray achenes in the soil seed bank from baseline in the first 3 years and then assessed every 5 years.	Seed bank density (#of viable ray achenes)	Yearly	Increase	2015	No viable sees in Areas B and C; viable seed found in Areas A and D	TBD

6. Habitat Management and Monitoring - Hagemann Gulch Riparian Woodland Management Area

Activities within this management area were limited in 2014 and were centered on construction of the Arana Gulch Multi-Use Trail and the bridge over Hagemann Gulch. This construction project required the implementation of erosion control and wildlife protection measures prior to construction, consistent with Goal 3 of the HMP. Historic "Rose of Castille" bushes were relocated to City Hall, consistent with Goal 5 of the HMP and a riparian revegetation plan was prepared and approved by CDFW to compensate for impacts of the bridge project.

6.1 Management Actions

6.1.1 Bridge Construction Project

Management actions within the Hagemann Gulch Riparian Woodland Management Area consisted of construction-period fencing around the work area for the bridge abutments. Erosion control and chain-link fencing was installed along the slope to prevent bridge construction materials from entering the gulch. These measures were in place until the completion of bridge construction, which was December 2014.

The City prepared a riparian revegetation plan which was reviewed by the AMWG and approved by CDFW to compensate for impacts to native trees and shrubs by the bridge project. This plan is presented in Appendix C. Six native California roses (*Rosa californica)* will be planted near the eastern bridge abutment in 2015 as specified in the CDFW-approved Revegetation Plan.

6.1.2 Integrated Pest Management (IPM)

No management actions were implemented in 2014.

6.1.3 Fire Hazard

No management actions were implemented in 2014.

6.1.4 Wildlife Protection

Prior to construction of the Arana Gulch Multi-Use Trail and the bridge over Hagemann Gulch, surveys were conducted to document the presence or absence of locally unique and sensitive wildlife species and to identify management actions should any species be present. As per these surveys, only roosting bats were found to be potentially present in eucalyptus trees slated for removal. To protect any foliage-roosting bats that may have been present in the trees that were removed, all tree limbs and foliage were cut and left to lay overnight to allow any bats to arouse and leave prior to chipping.

6.1.5 Appropriate Uses in Hagemann Gulch

No management actions were implemented in 2014.

6.1.6 Rose of Castille Bushes

The "Rose of Castille" bushes located near the Hagemann Gulch bridge construction area were relocated to City Hall in 2013, in consultation with the City Arborist. The condition of these shrubs will be assessed in 2015.

6.2 Monitoring and Performance Evaluation

6.2.1 Monitoring Methods

A survey was conducted in November 2012 and January 2013 by Dana Bland and Inger-Marie Laursen (wildlife biologists) to ascertain where potential butterfly roost trees were located within/adjacent to the Hageman Gulch bridge construction area. The survey consisted of three early morning surveys when the air temperature was below 55 ^{o}F (13 ^{o}C) in order to be able to detect butterfly clusters before the butterflies began flying. Those areas having eucalyptus, willow, or oak trees were surveyed. All data was recorded on a data sheet.

A survey was conducted to determine presence or absence of San Francisco dusky-footed woodrat nests/houses within the Hagemann Gulch bridge construction zone. The survey was conducted in November 2013, wherein the footprint of the abutment work areas were field inspected for woodrat nests/houses.

Prior to construction of the bridge over Hagemann Gulch, surveys were conducted to document sensitive bird and bat roosts and/or nests occurring within 25 meters of the bridge construction zone. The bat survey was conducted over three days in October and November 2013. All trees to be removed, as well as adjacent areas, were surveyed during the day for features that may provide day and maternity roosts such as hollows, crevices, and peeling bark.

6.2.2 Monitoring Results

One monarch butterfly was observed during the November 2012 butterfly survey. The monarch butterfly was observed near a large eucalyptus tree and may have been seeking nectar from the flowers on the eucalyptus tree. No monarch butterflies were observed roosting in any of the trees, therefore no specific protection measures were required or implemented.

No woodrat nests/houses were documented within the bridge abutment construction work area during the November 2013 survey, therefore no specific protection measures were required or implemented.

The bat survey found that the eucalyptus trees do not have the dead wood that provides cavities and crevices for bats to roost in. None of the coast live oak trees to be removed had cavities, hollows or peeling bark that could provide roosting habitat for bats. To protect any foliage-roosting bats that may have been present in the trees that were removed, all tree limbs

and foliage were cut and left to lay overnight to allow any bats to arouse and leave prior to chipping (survey report in Appendix C).

No nesting by sensitive birds were documented within the construction zone (or within 25 meters of the construction zone) while tree removal occurred for the Hagemann Gulch bridge. This work was conducted in November 2013, outside the bird nesting season.

6.2.3 Evaluation of HMP Goals

Table 4 presents a summary of the biological variables monitored, the Year 1(2014) values, and the desired direction of change.

The HMP has a goal to seek funding to develop an integrated pest management (IPM) plan to reduce the understory of invasive non-native species in Hagemann Gulch (Goal 1, Objectives 1A, 1B, and 1C). The City has not begun this task; however, the AMWG has suggested that the City initiate this task identifying the invasive, non-native plant species growing within the gulch. The City will initiate this work as funding allows; however, this may not be feasible until 2016. These objectives have not yet been met.

Goal 2 (Objective 2A) of the HMP for this management area identifies the need to reduce the fire hazard within the gulch. The objectives include reducing the cover of woody thickets (comprised of invasive, non-native species) and prioritize the removal of eucalyptus trees, as feasible. Construction of the multi-use bridge resulted in the removal of a several eucalyptus trees near the western abutment and from the central gulch; however, several large stands of eucalyptus trees remain. As noted above, the City has not implemented the IPM plan for the removal of the woody invasive plant species that would address the fire hazard. The City will initiate this work as funding allows; however, this may not be feasible until 2016. This objective has not yet been met.

Protection of wildlife habitat features is a goal of the HMP (Goal 3). Objective 3A requires the identification and protection of San Francisco dusky-footed woodrats with the bridge construction zone (within 25m of the bridge). No woodrat nests/houses were documented within the construction zone; however, no survey has been conducted for the area 25m outward from the bridge to establish a baseline for this area. The City will initiate this work as funding allows; however, this may not be feasible until 2016. To date, this objective has not yet been met. Objective 3B requires monitoring for sensitive bird and bat roots and/or nests occurring within 25m of the Hagemann Gulch bridge, with monitoring and protection of such resources for 3-5 years post-construction. The 2013 bat survey found that the trees in the area provide only foliage roosting habitat. No cavities or crevices were found to support sensitive bat roosts. As the baseline is zero, no additional monitoring is required; however, the City could elect to monitor bat roosts to document if there is an increase in bat roosting after the trail and bridge project. Similarly, the 2014 nesting bird survey was negative for sensitive bird nesting. As the baseline is zero, no additional monitoring is required; however,

the City could elect to monitor the area for sensitive bird nesting to document if there is an increase in such nesting after the trail and bridge project. These objectives have been met.

Goal 4 for this management area requires observing uses in Hagemann Gulch after trail and bridge construction and to determine if there are changes in use from site improvements. As 2015 will be the first year after trail construction, City park rangers will routinely patrol the greenbelt to detect appropriate and inappropriate uses; their findings will be included in the Year 2 (2015) annual report; therefore, Objective 4A has not yet been met.

Goal 5 of the HMP is to preserve the "Rose of Castille" bushes located near the Hagemann Gulch bridge construction area. To preserve these shrubs, the City elected to relocate them to City Hall in 2013, in consultation with the City Arborist. The condition of these shrubs will be assessed in 2015 and described in the Year 2 (2015) annual report; therefore, Objective 5A and B have not yet been met.

6.3 Proposed Actions for 2015

The following actions and expected timing are proposed for 2015:

- Monitor appropriate uses within Hagemann Gulch through periodic City ranger patrols (January– December 2015).
- Install six California rose (*Rosa californica)* as part of riparian revegetation plan; maintain throughout year with weeding and supplemental irrigation; monitor plant survival (spring- summer 2015).

Table 4. Biological Variables Monitored in Hagemann Gulch Riparian Woodland Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Year 1 (2014) Results	Objective Met?
Goal 1. Seek funding to develop a integrated pest management (IPM) plan to reduce the understory of invasive non-native species in Hagemann Gulch					
Objective 1A. Use a combination of methods to reduce the cover of non-native invasive woody plant thickets from baseline levels in the first year.	Non-native invasive woody plant cover	Before and after every removal effort	Decrease	Eucalyptus trees removed near western bridge abutment and along bridge sightline	Partial compliance; some eucalyptus trees removed but large stands remain.
Objective 1B. Monitor re-sprouting of removed vegetation and recruitment of new seedling on a regular basis, for at least 5 years after initial removal efforts.	Re-sprout and seedling emergence of target weeds	After every removal effort	Decrease	No action	No
Objective 1C. If passive restoration is not adequately controlling erosion, use revegetation with appropriate native species or other cultural methods to limit the amount of exposed soil and the potential for re-infestation and erosion.	Area of exposed soil (bare ground)	After every removal effort	Decrease	No action	No
Goal 2. Reduce the fire hazard within Hagemann Gulch					
Objective 2A. Reduce the cover of woody thickets as per Objective 1A to reduce overall fire risk.	Non-native invasive woody plant cover	Before and after every removal effort	Decrease	Eucalyptus trees removed near western bridge abutment and along bridge	Partial compliance; some eucalyptus trees removed but large stands remain.

Table 4. Biological Variables Monitored in Hagemann Gulch Riparian Woodland Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Year 1 (2014) Results	Objective Met?
				sightline	
Objective 2B. Prioritize the removal of eucalyptus trees where feasible.	Area occupied by eucalyptus	After every removal effort	Decrease	Eucalyptus trees removed near western bridge abutment and along bridge sightline	Partial compliance; some eucalyptus trees removed but large stands remain.
Goal 3. Protect wildlife habitat features in Hagemann Gulch					
Objective 3A. The number of SF dusky-footed woodrat nests occurring within Hagemann Gulch bridge construction zone will be identified and the nests protected.	Number of SF dusky-footed woodrat nests within 25m of Hagemann Bridge construction zone	Yearly	Stable	None detected within construction area Hagemann Gulch bridge; unknown number within 25m of bridge	Undetermined; unknown number of woodrat nests within 25m of bridge
Objective 3B. Monitoring for sensitive bird and bat roosts and/or nests occurring within 25 m of the Hagemann Gulch bridge construction zone will be identified and protected and continued for 3-5 years post-construction.	Sensitive bird or bat detections within 25m of Hagemann Bridge construction zone	Yearly	Stable	None detected within 25m Hagemann Gulch bridge	Undetermined; baseline is zero.
Goal 4. Increase appropriate uses in Hagemann Gulch					
Objective 4A. Observe the condition of all improvements at least 4 times per year in	Observation of infrastructure	4x per year	Stable	No action	Undetermined; first year of monitoring will be 2015

Table 4. Biological Variables Monitored in Hagemann Gulch Riparian Woodland Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Year 1 (2014) Results	Objective Met?
the first 3 years and at least twice a year thereafter.	conditions				
Goal 5. Preserve the "Rose of Castille" historic roses					
Objective 5A. Relocation of the roses will occur only if no other alternative is feasible for development of the Hagemann Gulch Bridge. Any relocation will be done in the vicinity of the existing trees, in consultation with the City Arborist.	Presence of Rose of Castile	Yearly in June/July	Stable	Shrubs relocated to City Hall	Undetermined; survival to be assessed in 2015
Objective 5B. Address the public education benefits of identifying the Rose of Castille and providing interpretative panels.	Presence of Rose of Castile	Yearly in June/July	Stable	No action	Undetermined; opportunities to provide public education to be assessed in 2015

7. Habitat Management and Monitoring - Arana Gulch Creek Riparian Woodland and Wetland Management Area

Activities within this management area were limited in 2014; however, the Arana Gulch Multi-Use Trail including the causeway over Arana Gulch Creek was constructed. This construction project required the implementation of erosion control, wildlife protection measures prior to construction, and revegetation of areas near the causeway consistent with construction permit conditions. Consistent with Goal 3 of the HMP, the City continued to work with the Resource Conservation District of Santa Cruz County (RDCSCC) on measures to implement habitat enhancement actions within the Arana Gulch watershed. In addition, the City initiated an IPM plan to reduce the non-native understory in the management area by identifying and mapping invasive weeds, consistent with Goal 4 of the HMP.

7.1 Management Actions

7.1.1 Trail and Causeway Construction Project

Management actions within the Arana Creek Riparian Woodland and Wetland Management Area consisted of construction-period fencing around the work area for the abutments of the causeway over Arana Gulch Creek. Erosion control and chain-link fencing was installed along the slope to prevent construction materials from entering the creek and adjacent areas. These measures were in place until the completion of trail and causeway construction, which was December 2014.

The City prepared a riparian revegetation plan which was reviewed by the AMWG and approved by CDFW to compensate for impacts to native trees and shrubs by the causeway construction. Twenty dormant willow cuttings were installed at the toe of the eastern slope in December 2014. Eighty creeping wild rye (*Elymus triticoides)*, 16 California rose (*Rosa californica)*, 16 mugwort (*Artemisia douglasiana),* and 3 coast live oak (*Quercus agrifolia)* will be planted west of the causeway; this revegetation is expected to be implemented in 2015. The slope by the causeway was hydroseeded with sterile seed in December 2014 as per the CDFW-approved revegetation plan.

7.1.2 Wildlife Protection

Prior to spring 2014 construction of the trail and causeway, a survey was conducted to document the presence or absence of sensitive bird species and nesting activity and to identify management actions should any species be present.

7.1.3 Integrated Pest Management (IPM)

The AMWG recommended mapping invasive plants within this management area to document the baseline condition and to guide future management activities for species removal/ control (AMWG meeting minutes, July 2014).

In October 2014, the City and Kathleen Lyons walked portions of the perimeter of the management area to identify and map occurrences of invasive, non-native plant species within the management areas. Access is limited in several areas of the management area and future field surveys are needed to map additional occurrences. The existing mapping and additional surveys will be conducted to document the baseline condition and to guide future management activities for species removal/ control.

The survey in October 2014 included visual searches from accessible locations within the management area to detect invasive, non-native plant species. Species documented were those identified as priority weeds by (Cal-IPC and/or the Bay Area Early Detection Network). The approximate size, density of plants (dense, moderate, and sparse) and the location of each non-native invasive species patch was documented using GPS and mapped on aerial photos. A map of data collected to date is presented in Figure 15.

Invasive non-native plant species documented to date in the management area include: (*Acacia spp.)*, perennial pepperweed (*Lepidium latifolium*), eupatorium (*Ageratina adenophora)*, iceplant (*Carpobrotus edulis)*, Italian thistle (*Carduus pycnocephalus)*, bull thistle (*Cirsium vulgare)*, jubata grass (*Cortederia jubata)*, cotoneaster (*Cotoneaster sp.*), Bermuda grass (*Cynodon dactylon*), eucalyptus (*Eucalyptus sp.)*, French broom(*Genista monspessulana*), English ivy (*Hedera helix*), velvet grass (*Holcus lanatus*), Himalayan blackberry (*Rubus armeniacus*), thornless blackberry (*Rubus ulmifolius)*, spiderwort (*Tradescantia fluminensis)*, and periwinkle (*Vinca major)*.

Figure 15A. Location of Invasive Plant Species within Arana Gulch Creek Riparian Woodland and Wetland Management Area, Preliminary October 2014

Figure 15B. Location of Invasive Plant Species within Arana Gulch Creek Riparian Woodland and Wetland Management Area, Preliminary October 2014

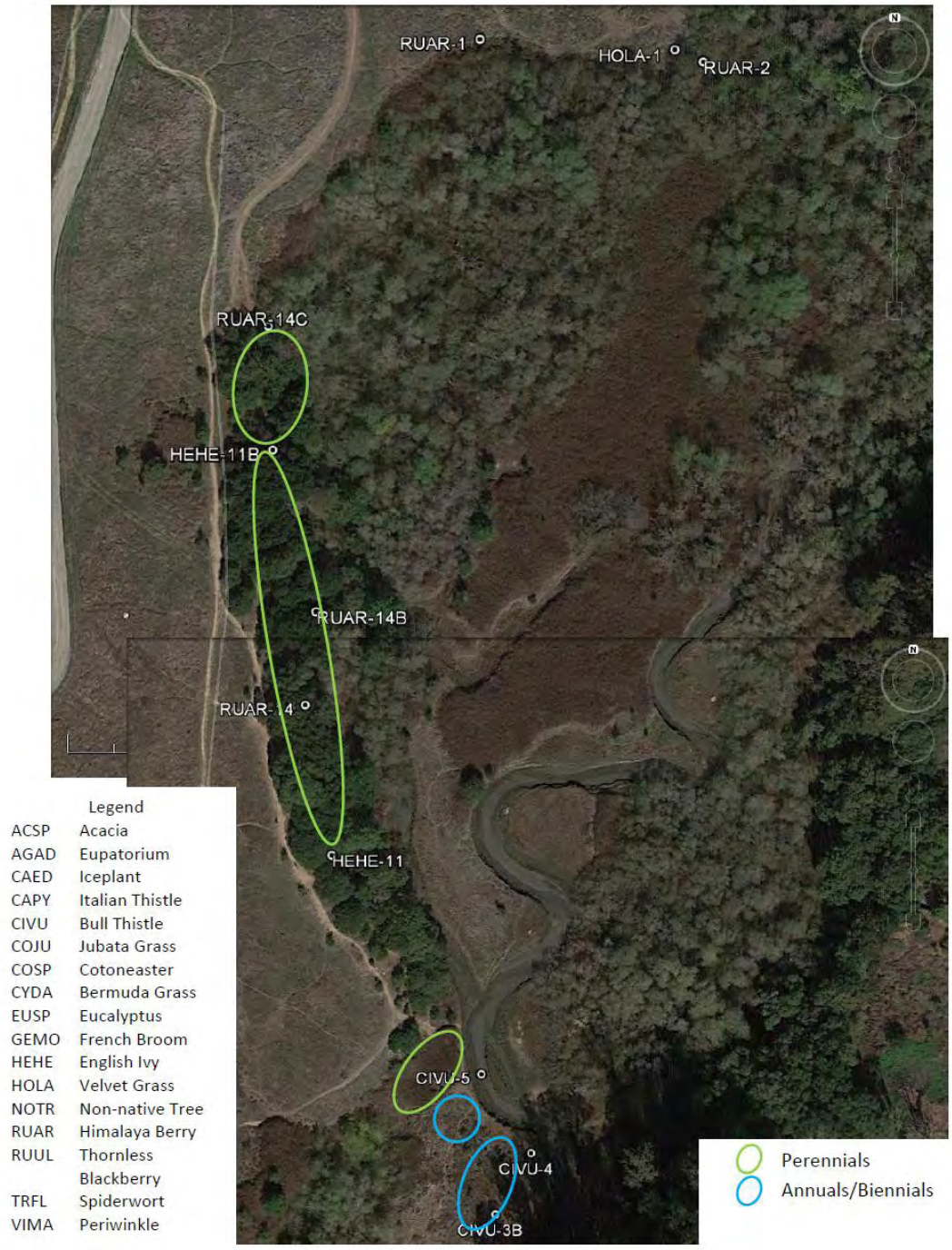


Figure 15C. Location of Invasive Plant Species within Arana Gulch Creek Riparian Woodland and Wetland Management Area, Preliminary October 2014

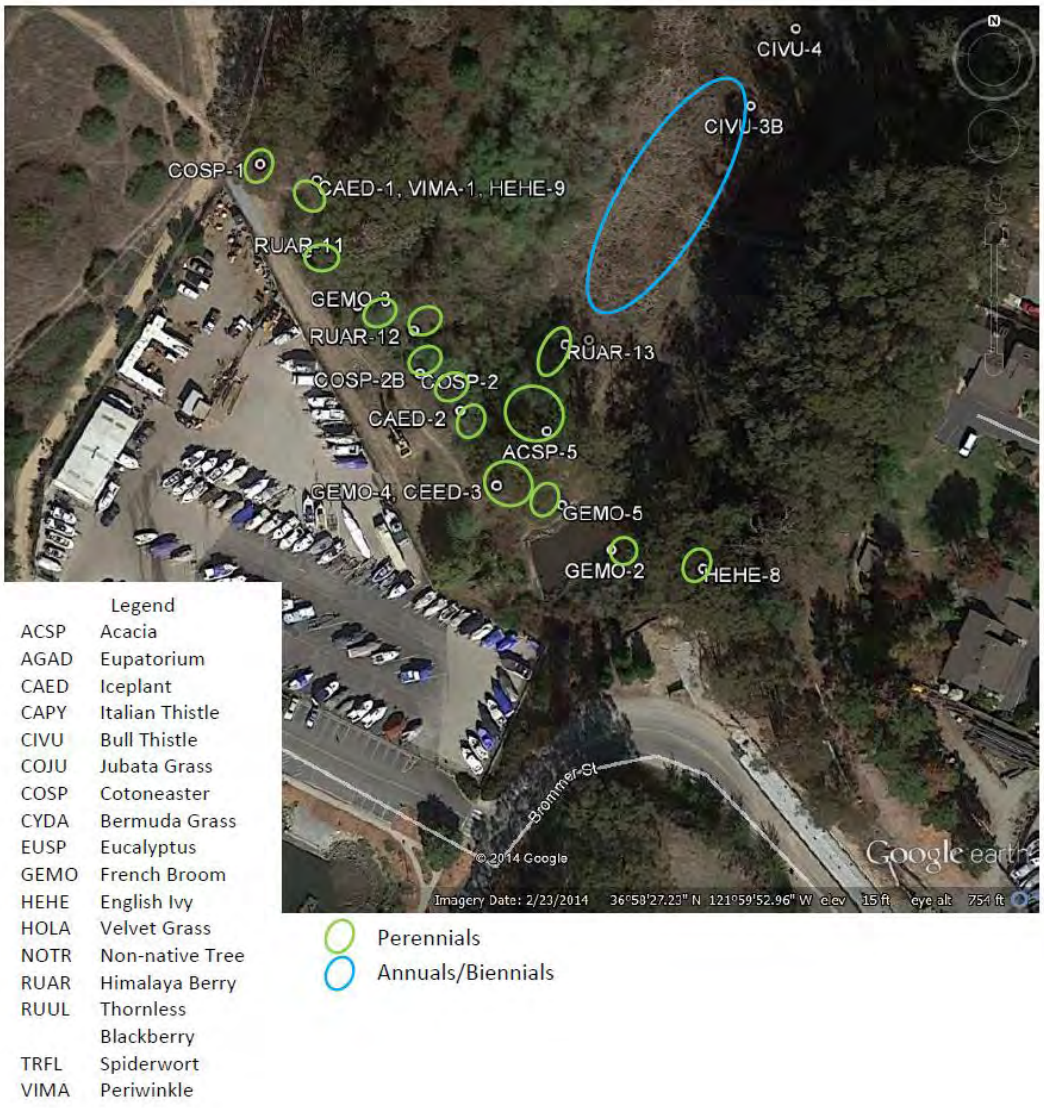
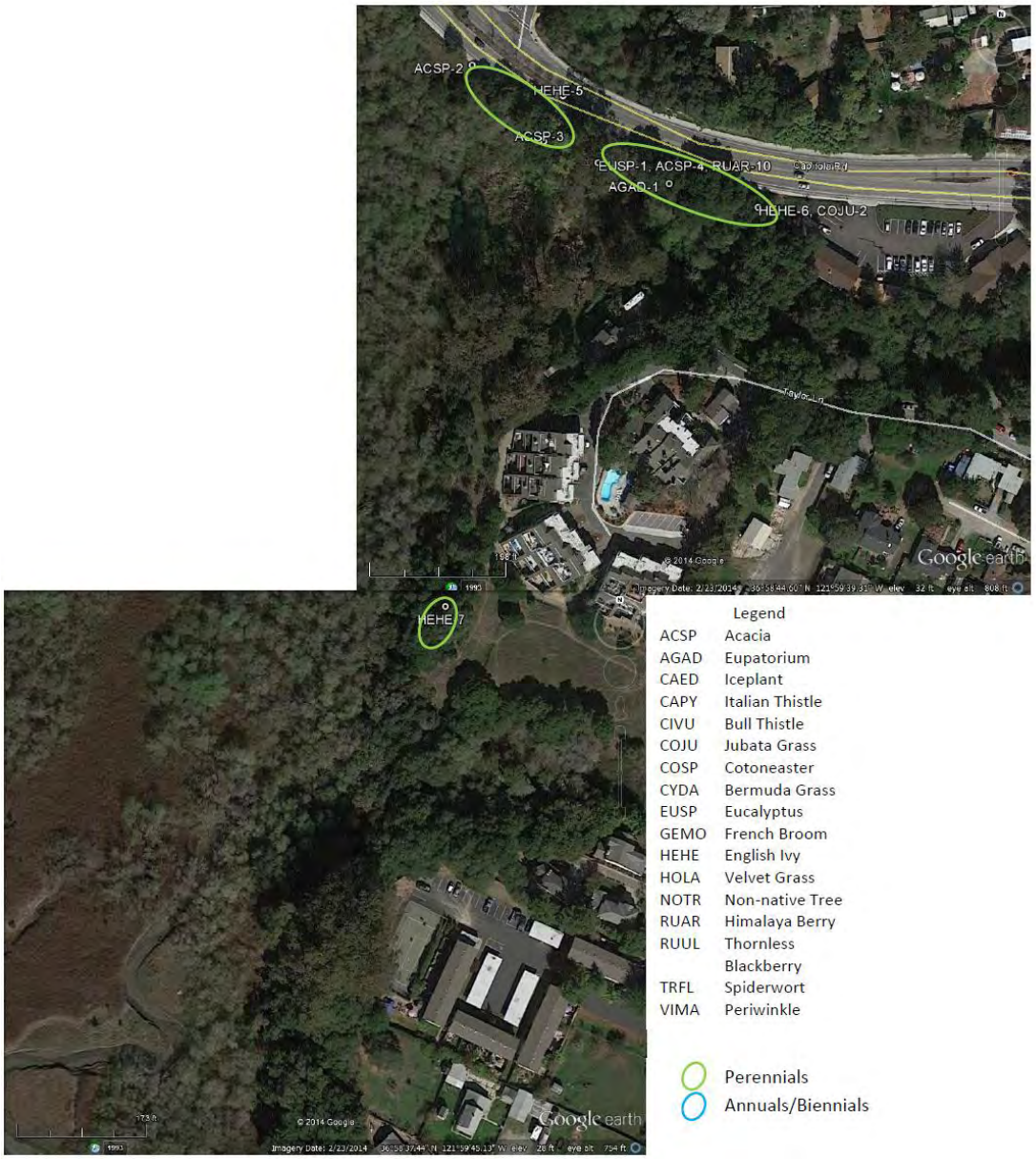


Figure 15C. Location of Invasive Plant Species within Arana Gulch Creek Riparian Woodland and Wetland Management Area, Preliminary October 2014



7.1.4 Coordination with the RCDSCC

The City coordinated with the RCDSCC in 2014 on measures to improve habitat conditions in the watershed. The RCDSCC was awarded a contract by the Santa Cruz Port District and the City to complete Arana Gulch Watershed Coordinator tasks. These tasks included:

- Convening a TAC and conducting stakeholder outreach to assess restoration priorities
- Prepared grant applications

- Conducted watershed reconnaissance surveys, and
- Conducted outreach and community activities.

In 2014, the TAC noted watershed issues that have the potential to deliver significant amounts of new sediment to the harbor (two gullies in upper watershed). The TAC also found that Arana gulch is not currently considered a high priority stream for salmonid recovery, which reduces potential grant funding sources. The watershed may provide groundwater recharge opportunities and the RCDSCC is pursuing studies on this. A reconnaissance of the Arana Gulch watershed, comparing existing conditions to the 2002 Arana gulch Enhancement Plan is scheduled for 2015. The results of that study will be summarized in the 2015 annual report. .

7.2 Monitoring and Performance Evaluation

7.2.1 Monitoring Methods

A survey was conducted on April 8, 2014 by Dana Bland (wildlife biologist) to ascertain if passerine birds were nesting within 250 feet of the trail/causeway work area. In addition, the survey was conducted to determine if raptors were nesting within 1,000 feet of the work area. The biologist walked the bridge and trail alignment and adjacent areas in the early morning to search for nesting birds. The type of bird behavior was used to indicate active nesting, such as defensive displays, consistent calling, carrying nest material, chicks calling, and adults calling food to a nest. All data was recorded in a notebook.

7.2.2 Monitoring Results

No nesting behavior of passerines was observed within 250 feet of the work area and no raptors of any kind were observed within 1,000 feet of the work area during the April 2014 survey; no specific protection measures were required or implemented.

The City installed 20 dormant willow cuttings at the toe of the eastern slope of Arana gulch Creek in December 2014. Eighty creeping wild rye (*Elymus triticoides)*, 16 California rose (*Rosa californica)*, 16 mugwort (*Artemisia douglasiana)*, and 3 coast live oak (*Quercus agrifolia)* will be planted west of the causeway; this revegetation is expected to be implemented in 2015.

7.2.3 Evaluation of HMP Goals

Table 4 presents a summary of the biological variables monitored, the Year 1(2014) values, and the desired direction of change.

The HMP has a goal to seek funding to reduce sediment and improve steelhead conditions within the Arana Gulch watershed (Goal 1 of HMP), a goal to stabilize the tidal reach of Arana Gulch Creek (Goal 2), and to restore the eroded gully on the greenbelt (Goal 3). The City conferred with the RCDSCC in 2014 to discuss management activities within the

watershed and with the greenbelt property. The City coordination with the RCDSCC is in compliance with goals of the HMP.

Goal 4 is to develop an integrated pest management (IPM) plan to reduce the understory of invasive non-native species in the management area (Goal 4). The City initiated this task by beginning to identify and map occurrences of invasive, non-native plant species growing within the management area. The City will continue this work in 2015.

7.3 Proposed Actions for 2015

The following actions and expected timing are proposed for 2015:

- Continue to engage with the RCDSCC on watershed and greenbelt projects through annual meeting with the RCDSCC. (January– December 2015).
- Install riparian plantings near trail and causeway, consisting of 80 creeping wild rye (*Elymus triticoides)*, 16 California rose (*Rosa californica)*, 16 mugwort (*Artemisia douglasiana),* and 3 coast live oak (*Quercus agrifolia)* as part of riparian revegetation plan; maintain throughout year with weeding and supplemental irrigation; monitor plant survival (spring- summer 2015).
- Complete identification and mapping on invasive, non-native plant species.

Table 5. Biological Variables Monitored in Arana Gulch Creek Riparian Woodland and Wetland Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Year 1 (2014) Results	Objective Met?
Goal 1. Reduce sedimentation and improve steelhead habitat conditions within the Arana Creek watershed					
Objective 1A. High priority sediment-related projects identified in the Arana Creek watershed enhancement plan area implemented.	# of completed sediment-related projects with the RCDSCC	Yearly	Increase	No action	No
Objective 1B. High priority steelhead habitat improvements identified in the Arana Creek watershed enhancement plan area implemented.	# of completed steelhead habitat improvement projects with the RCDSCC	Yearly	Increase	No action	No
Goal 2. Stabilize the tidal reach of Arana Gulch Creek					
Objective 2A. Engage the RCDSCC Arana Gulch Working Group staff to attend targeted AMWG meetings to identify possible solutions for the tidal reach of Arana Gulch Creek.	RCDSCC attendance at AMWG meetings	Yearly	Increase	City has engaged with RCDSCC	Yes. City will continue to coordinate with RCDSCC in 2015
Objective 2B. Work with the RCDSCC staff to obtain funding to design and implement a bank restoration project that reduced head cutting and bank erosion along the tidal reach of Arana Gulch Creek.	Funding level for the tidal reach restoration	Yearly	Obtain/increase	No action	No

Table 5. Biological Variables Monitored in Arana Gulch Creek Riparian Woodland and Wetland Management Area

Objective	Variable	Measurement Frequency	Desired Direction of Change	Year 1 (2014) Results	Objective Met?
Goal 3. Restore the eroded Greenbelt Gully					
Objective 3A. Work with the RCDSCC staff to pursue funding for the Greenbelt Gully restoration project.	Funding level for the Greenbelt Gully project	Yearly	Obtain/increase	No action	No
Goal 4. Seek funding to develop an integrated pest management (IPM) plan to reduce the understory of non-native species in the Arana Gulch Creek Management Area					
Objective 4A. Remove and reduce the cover of non-native invasive species in the riparian woodland relative to baseline conditions including: black acacia found near the culverts, dense thickets of Himalayan berry, scattered French broom, tall white top, and periwinkle.	Non-native invasive woody plant cover	Yearly	Decrease	Initiated mapping of invasive plants in October 2014	No, but initiated mapping of invasive, non-native plant species
Goal 5. Provide education opportunities and increase appropriate uses					
Objective 5A. Observe the condition of all improvements at least 4 times per year in the first 3 years and at least twice a year thereafter.	Observation of infrastructure conditions	4x per year	Stable	No action	Undetermined; first year of monitoring will be 2015

8. Conclusions from Year 1 and Recommendations for Year 2 (2015)

8.1 Conclusions from 2014

The City began implementation of the HMP in 2014. Many of the management actions in this first year were associated with the construction of the Arana Gulch Multi-Use Trail and the Agnes Street Trail Connector.

8.1.1. Coastal Prairie/Santa Cruz Tarplant Management Area

Within the Coastal Prairie/SCT Management Area the trail construction work was successful in salvaging soil located within 20 feet of two tarplant areas and spread this soil onto receiver sites in compliance with the HMP; however, the placement location and soil spreading near Tarplant Area C was not implemented as suggested by the AMWG. The revegetation plan for areas disturbed by construction was revised to exclude supplemental seeding from most areas so as to not compete with native plant recruitment and disturbed areas were hydromulched for erosion control. Revisions to the construction plans, as recommended by the AMWG, are consistent with the adaptive management tenets of the HMP.

Cattle grazing infrastructure was successfully installed and a Stocking and Work Program was prepared. The City awarded a professional services contract to a local rancher. Cattle grazing is expected to commence in February 2015. Implementing cattle grazing is in compliance with the HMP. Objectives of the HMP relating to improving the coastal prairie to a more functioning system have not yet been met.

Grassland management actions were limited in 2014 due to trail construction and the lack of grazing infrastructure; however flail mowing was conducted in April and June 2014 and some test plots were established. Management of the grassland is required under the HMP; therefore the City is in compliance with the HMP.

A census of SCT was conducted in 2014; four above-ground plants were documented from Tarplant Area A. The HMP objective of reaching 348 plants was not met in 2014. A soil seedbank assessment was conducted in spring 2014; preliminary results indicate the seed bank has been lying dormant and aging for several years. The baseline density of ray achenes has not yet been reported; the assessment report findings are expected in 2015.

8.1.2. Hagemann Gulch Riparian Woodland and Arana Gulch Creek Riparian Woodland and Wetland Management Areas

Management actions were initiated in the Arana Creek Riparian Woodland and Wetland Management Area and the Hagemann Gulch Riparian Woodland Management Area in 2014. Objectives to preserve wildlife during the trail construction period were implemented in compliance with the HMP. Components of an IPM plan were initiated for the Arana Creek

area through the identification and mapping of invasive, non-native plant species, in compliance with the HMP, yet objectives for removal and control have not yet been met. Some eucalyptus trees were removed from Hagemann Gulch Riparian Woodland Management Area concurrent with trail construction; however, invasive mapping or other invasive plant controls have not yet been implemented. These objectives of the HMP have not yet been met. The City coordinated with the RCDSCC on management issues within the Arana Gulch watershed in compliance with the HMP.

8.1.3. Adaptive Management and Public Outreach

The City engaged with the AMWG in 2014 through three meetings as well as email correspondence. The City received input from the AMWG on management actions and implemented the requested management actions. Consultation with the AMWG in 2014 was done in compliance with the HMP. The City established a web site for public outreach and responded to comments from the public and the AMWG on ways the site could be improved. These actions were in compliance with the HMP.

8.1.4 Schedule and Budgeting

The City established a line item in their operating budget for Arana Gulch and allocated funds for fiscal year July 1, 2014 to June 30, 2015 ($20,000, excluding consultant fees). Establishing funding for management actions is in compliance with the HMP.

8.2 Recommendations for 2015

The City will discuss with the AMWG recommendations for management actions for 2015 at the January 2015 meeting. The AMWG will provide input to the City on actions based on management priorities. The following summary of actions is preliminary and may be revised based on input from the AMWG and available funding.

8.2.1 Coastal Prairie/Santa Cruz Tarplant Management Area

HMP activities for 2015 (Year 2) is the initiation of seasonal cattle grazing within the prairie/grassland. The City will implement the Stocking and Work Program. Additional management activities include monitoring plant composition, plant cover and residual dry matter (RDM) within the grazed areas, grassland conditions along the permanent transects, establishing permanent photo-stations, and continuing to remove and control high-priority invasive, non-native plant species.

The City will also implement seasonal mowing within the non-grazed areas delineated to be retained as grassland. A census of the SCT will be conducted in summer 2015. Seed collection of SCT may occur depending on the SCT population and prior approval from CDFW.

8.2.2 Hagemann Gulch Riparian Woodland Management Area

HMP activities identified for 2015 (Year 2) will be to monitor appropriate uses within the gulch concurrent with public use of the trail and bridge. City park rangers will monitor use as

per their regular patrol duties within the greenbelt. Riparian revegetation as per an approved CDFW Streambed Alteration Agreement (SAA) will occur in 2015. Plantings will be maintained and monitored throughout 2015 as per the SAA. The number and location of woodrat nest/houses within 25m of the bridge will be documented in 2015 to create a baseline.

8.2.3 Arana Gulch Creek Riparian Woodland and Wetland Management Area

HMP activities identified for 2015 (Year 2) will be completion of identifying invasive, non-native plant species and initiating removal/control of high-priority infestations, with input from the AMWG on prioritizing species and removal locations. Riparian revegetation as per an approved CDFW Streambed Alteration Agreement (SAA) will occur in 2015 (installation of willow cuttings occurred in December 2014). Plantings will be maintained and monitored throughout 2015 as per the SAA.

8.2.4 AMWG and Public Outreach

In 2015 the City will continue to confer with the AMWG on adaptive habitat management activities throughout 2015 through scheduled meetings and group email correspondence. The AMWG will provide recommendations to the City on management priorities, grazing monitoring and public outreach. The City will solicit input from the public on HMP actions through the City webpage and through public input at the scheduled AMWG meetings.

8.2.5 Schedule and Budgeting

Table 6 presents a schedule for the HMP actions scheduled for 2015. The City has allocated funds for fiscal year July 1, 2014 to June 30, 2015 ($20,000, excluding consultant fees); funding for fiscal year July 1, 2015 to June 30, 2016 has yet to be determined.

Table 6. Timeline for Habitat Management Actions Proposed for Year 2 (2015)

	2015												2016
Task	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
Coastal Prairie/Santa Cruz Tarplant Management													
Objective1. Santa Cruz tarplant census													
Objective 2. Monitor grazing program and variables													
Objective 3. Monitor baseline condition and photo points													
Hagemann Gulch Riparian Woodland Management													
Objectives 1 and 2. Implement IPM Plan and reduce fire hazard													
Objectives 3 and 4. Document wildlife habitat features and implement infrastructure monitoring[16][17]													
Objective 5A and 5B. Monitor survival of Rose of Castille shrubs													
Arana Gulch Creek Riparian Woodland and Wetland Management													
Objectives 1, 2, and 3. Collaborate with RCDSCC													
Objective 4. Complete mapping													

[16] Task includes documenting woodrat nests/houses within 25m of bridge to create baseline for future monitoring; annual monitoring of sensitive bird and bat species not required as none detected in baseline surveys.
[17] Includes completion of riparian revegetation at bridge and implementing year-long maintenance and monitoring.

Table 6. Timeline for Habitat Management Actions Proposed for Year 2 (2015)

	2015												2016
Task	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**
of invasive non-native woody plant species and target weeds													
Objective 5. Infrastructure monitoring[18]													
Adaptive Management													
Objective 1. Conduct AMWG meetings													
Prepare Yearly Monitoring Report													

[18] Includes completion of riparian revegetation at causeway and implementing year-long maintenance and monitoring.

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Appendix A 2014 Baseline Assessment

Arana Gulch Coastal Prairie
Baseline Assessment Study: Spring 2014

Prepared for the City of Santa Cruz Planning Department,
Department of Parks and Recreation,
and the Arana Gulch Adaptive Management Working Group

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June 2014

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Introduction

A baseline assessment of vegetation conditions at Arana Gulch is one of the requirements of the Coastal Development Permit issued to the City of Santa Cruz by the California Coastal Commission. Section 3.7 of the Arana Gulch Habitat Management Plan (HMP) (Stanton 2013) describes the purpose and justification of this baseline assessment of the Santa Cruz tarplant (SCT)/Coastal Prairie Management Area presented here including the details of field sample design and data analysis. The purpose of the baseline assessment is to characterize existing vegetation and ground cover conditions in areas that will be grazed under guidance of the Grazing Program specified in the HMP. Important monitoring variables include plant cover, canopy height, species richness, and ground cover. These data will enable a quantitative evaluation of changes in vegetation condition over time in response to grazing and will help the Arana Gulch Adaptive Management Working Group (AMWG) assess progress in meeting the specific goals and objectives of the HMP.

Arana Gulch has been subject to a long history of disturbance, including intensive agriculture and dairy farming. Cattle grazing stopped in 1988 and subsequent disturbance has taken the form of management actions performed by the City since 1994 including mowing, soil scraping, and two prescribed fires. During this time, the population of SCT experienced a steady decline after a brief population explosion in 1997-1998 following a 3 acre soil scraping and subsequent prescribed fire that coincided with the wettest winter on record. Reversing that decline in the SCT population is the first of four goals for the SCT and Coastal Prairie Management Area specified in the HMP:

Goal 1: Maintain a viable Santa Cruz tarplant (SCT) population at Arana Gulch.

Goal 2: Reintroduce grazing to restore a disturbance regime that maintains functioning coastal prairie.

Goal 3: Minimize the detrimental effects of high non-native plant cover and restore coastal prairie species diversity and habitat function.

Goal 4: Maintain a genetically and demographically viable soil seed bank in perpetuity.

An initial soil seed assessment conducted in December 2013 will set a baseline for measuring progress toward Goal 4. This baseline assessment study addresses coastal prairie habitat conditions and was specifically designed to evaluate whether grazing can meet the following objectives under Goal 3 to restore coastal prairie species diversity and habitat function:

> Objective 3A: Reduce canopy height during the basal rosette stage for SCT (November-April) from the baseline level to a level that enables SCT plants to complete their lifecycle (0.5m or less) by 2015.

Objective 3B: Reduce the cover of non-native species in the coastal prairie from the baseline level to one more representative of a reference functioning coastal prairie system by 2020.

Objective 3C: Increase cover of native species from baseline levels to one more representative of a reference functioning coastal prairie system by 2020.

Objective 3D: Increase native species richness from baseline levels to one more representative of a reference functioning coastal prairie system by 2020.

Objective 3E: Increase the cover of bare ground in the coastal prairie from the baseline level to a level that enables SCT plants to complete their lifecycle by 2015.

The objectives do not specify acceptable numeric levels for vegetation cover, species richness, or amount of bare ground and instead refer to reference functioning coastal prairie as the desired standard. What it means to be a functioning coastal prairie has been characterized in different ways and depends on many factors including the position of the coastal terrace, soil type, hydrology, dominant species, and past land-use history (Stromberg et al 2001). A past study of California coastal grasslands concluded that past cultivation was the one factor that most strongly negatively affects native cover and species richness (Stromberg and Griffin 1996). Intensive tilling alters soil stratigraphy, topography, drainage, and the soil microbial communities, resulting in conditions conducive to exotic species invasion and a depleted native seed bank. Establishing realistic numeric vegetation objectives for the vegetation in Arana Gulch will require consideration of the intensive past land-use history at the site along with this baseline assessment, future monitoring data, and data from the literature.

The purpose of the 2014 spring baseline assessment in the coastal prairie at Arana Gulch was to re-sample the permanent point intercept vegetation transects installed in June, 2013. Trail construction at the site began in early November 2013 and grazing will not begin until all construction and the fences are completed later in 2014. This timing made it possible to obtain a second year of baseline data.

Unfortunately, the 2013/2014 water year has been one of the driest periods since record keeping began in 1893. Precipitation during the water year from July 1, 2013 to June 30, 2014 totaled only 5.34 inches (Table 1). In contrast, precipitation in the 2012-2013 year was 18.91 inches. The long term average for the Santa Cruz NOAA weather station is 30 inches.

Table 1. Monthly rainfall (inches) over the last two years at the University of California Cooperative Education (UCCE) station at DeLaveaga.

Water year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2013-2014	0.01	0.02	0.11	0.06	0.31	0.11	0.01	2.85	1.36	0.42	0.03	0.05	5.34
2012-2013	0	0	0	0.11	5.97	8.96	0.92	0.32	1.7	0.88	0.02	0.03	18.91

The very dry conditions represents a less than optimal scenario for a baseline assessment. However, two years of vegetation and ground cover data is preferable to one year when it comes to evaluating the changes expected from grazing and the Objectives addressed under goal 3 of the HMP. Together these data can help the AMWG begin refining the objectives under Goal 3 to create better conditions for SCT germination and establishment

Methods

The same point intercept method was used in 2014. We recorded "hits" of each species encountered by a pole at every 0.5m along a 25m line for a total of 50 points per transect. We identified all species at each point and recorded the ground cover code (litter, bare, gopher disturbance, basal vegetation, rock). We also measured the average height of the low canopy layer and the high canopy layer at the 6, 12, 18, and 24 m points. It was not possible to measure thatch depth since we could not distinguish residue from the previous year's growth (thatch) from senescent material from earlier in the growing season (litter). Thatch and litter were both included in the ground cover code of litter. In addition, we conducted a search within a 5m belt transect, using the transect as the centerline, and recorded the presence of any plant species that was not encountered on the transects. This additional method is often used to capture uncommon or rare species and more fully characterize species richness. Photos were taken from the 0m with the camera at eye level and a white board with the name of the transect and compass bearing.

The survey was conducted on April 21-22, in advance of a scheduled AMWG recommended mowing of the coastal prairie on April 24. In Unit C, CT1 was never installed in 2013 because it was in thick patch of Italian thistle and several transects were destroyed by the construction access road. Transect CT4 was eliminated and only the 0 meter mark of CT5 was present so we re-installed the 25m end using a new compass bearing. In addition, CT3 and CT6 were not re-located, but it is possible that the re-bar is intact and will become apparent once the grazing starts. To have a sufficient sample size two new transects were installed at CT 7 and CT8 (Figure 1).

Figure 1. Permanent transect placement on the coastal prairie at Arana Gulch in 2014. (The dark center line represents approximate location of central trail and the area with hash lines is a steep slope outside the grazing area.)

To establish new transects, we used the same method as in 2013 using GPS to locate a pre-selected starting point and then using a random compass bearing to establish the line. The range of available compass bearings was limited as necessary to insure that there was at least a 5m buffer with future fences, existing dirt trails, or other features that needed to be avoided.

In Unit A, AT2 was destroyed by the construction road and staging for the Hagemann Gulch bridge. A new AT2 was installed south of the staging area. A new 25m mark was installed for AT4 because it had been destroyed by a new user trail. All other transects in Unit A were intact. In Unit D, a new 25m mark was installed at DT3. DT1 and DT2 were not located, so DT 2 was re-installed and a new DT5 was installed. DT4 was intact.

Data analysis

In 2013 we conducted a power analysis using a statistical power calculator provided by DSS Research (http://www.dssresearch.com/toolkit/sscalc/size_a1.asp) to determine sample size for each enclosure. For Area C, a sample size of 5 transects provided sufficient power. In Area A, after sampling all 8 transects we determined that we needed an additional 3 transects for a sample size of 11. In Area D, 4 transects were sufficient.

To calculate percent cover for each species on a transect the number of hits was multiplied by 2 because there were 50 points. The transect is the sample unit and for each we calculated the percent cover by species, the total number of species encountered, and the % ground cover of litter, bare, gopher, basal vegetation, and rock. We also calculated average vegetation height (cm) of the low and high canopy layers for each transect. Cover values were grouped by guilds: exotic annual forb (EAF), exotic annual grass (EAG), exotic perennial forb (EPF), exotic perennial grass (EPG), native annual forb(NAF), native annual grass (NAG), native perennial forb (NPF), and native perennial grass (NPG).

We present a comparison between the 2013 and 2014 cover data by guild with error bars constructed using one standard deviation from the mean. However, no statistical tests were performed because no management was applied in either year and differences are due to the sample timing (June in 2013 and April in 2014) and a large difference in precipitation as described in Table 1.

Results

Among the transects sampled, a total of 33 species were recorded as hits or within the 5m belt transects (125m^2) that were searched along each transect (Table 2). In 2013, a total of 32 species were recorded. Purple needle grass (*Nassella pulchra*) was not recorded on the transects in 2013, but otherwise the species were the same. The only native species detected were California oatgrass (*Danthonia californica*), California poppy (*Eschscholozia californica*), California rose (*Rosa californica),* Great Basin wildrye *(Elymus triticoides),* and spreading rush *(Juncus patens).* Coyote bush (*Baccharis pilularis*) and coast live oak (*Quercus agrifolia*) were also present within the 5m belts in Area A. All other species were non-native.

Table 2. Species recorded during the 2014 summer baseline assessment at Arana Gulch. Life forms utilize the following codes: exotic annual forb(EAF), exotic annual grass (EAG), exotic perennial forb(EPF), exotic perennial grass (EPG), native annual forb(NAF), native annual grass (NAG), native perennial forb (NPF), and native perennial grass (NPG).

Scientific name, TJM 2	Area(s) found	Common name	Life form	Family
Anagallis arvensis	A,C,D	Scarlet pimpernel	EAF	PRIMULACEAE
Avena fatua	A,C,D	Wild oat	EAG	POACEAE
Briza maxima	A,D	Rattlesnake grass	EAG	POACEAE
Briza minor	A,D	Quaking grass	EAG	POACEAE
Bromus diandrus	A,C	Ripgut brome	EAG	POACEAE
Bromus hordeaceus	A,D	Soft chess	EAG	POACEAE
Carduus pycnocephalus	C	Italian thistle	EPF	ASTERACEAE
Cerastium glomeratum	C	Mouse-ear chickweed	EAF	CARYOPHYLLACEAE
Convolvulus arvensis	A,C,D	Bindweed	EPF	CONVOLVULACEAE
Danthonia californica	A	California oatgrass	NPG	POACEAE
Elymus triticoides	D	wild rye	NPG	POACEAE
Erodium botyrs	A,C	long bill stork's beak	EAF	GERANIACEAE
Erodium cicutarium	A,D	red stem filaree	EAF	GERANIACEAE
Eschscholzia californica	A	California poppy	NPF	PAPAVERACEAE
Festuca perennis (Lolium multiflorum)	A,C,D	Italian ryegrass	EAG	POACEAE
Geranium dissectum	D	Cutleaf geranium	EAF	GERANIACEAE
Holcus lanatus	A,CD	velvet grass	EPG	POACEAE
Hypochaeris glabra	A,C,D	Smooth cat's-ear	EAF	ASTERACEAE
Juncus patens	A,C,D	Spreading rush	NPG	JUNCACEAE
Nassella pulchra	A	Purple needle grass	NPG	POACEAE
Plantago lanceolata	A,C,D	English plantain	EPF	PLANTAGINACEAE
Raphanus sativus	A,C,D	wild radish	EAF	BRASSICACEAE
Rosa californica	A	California rose	Shrub	ROSACEAE
Rumex acetosella	A,D	Sheep sorrel	EPF	POLYGONACEAE
Rumex crispus	A,C	Curly dock	EPF	POLYGONACEAE
Trifolium subterraneum	A	Subterranean clover	EAF	FABACEAE
Vicia sativa subsp. sativa	A,C,D	common vetch	EPF	FABACEAE
Festuca (Vulpia)myuros	A,C,D	Rattail six weeks grass	EAG	POACEAE
OTHER SP. DETECTED IN 5M BELTS				
Baccharis pilularis	A	Coyote brush	Shrub	ASTERACEAE
Genista monspessulana	D	French Broom	Shrub	FABACEAE
Lactuca serriola	C,D	Prickly lettuce	EPF	ASTERACEAE
Quercus agrifolia	A	Coast live oak	Tree	FAGACEAE
Tragopogon pratensis	A,C,D	Salsify	EPF	ASTERACEAE

French broom was the only invasive species with a High Cal-IPC (Invasive Plant Council) rank that was recorded. It is in Area D and was captured by the sampling in one 5m belt transect. Scotch thistle (*Onorpordum acanthium*) is also a High species that was recorded in sampling in 2013 in Areas A and C, but it was not captured in 2014. A total of three forb species are ranked Moderate including Italian thistle (Carduus pycnocephalus), bull thistle (*Cirsium vulgare*), and sheep sorrel (*Rumex acetosella*). The perennial velvet grass (*Holcus lanatus*) and three annuals grasses, wild oat (Avena fatua), ripgut brome (*Bromus diandrus*) and rattail six weeks grass (Fetuca myuros), are considered Moderate because of the intense effect these grasses can have on fire regime and their ability to exclude natives.

The photos from each transect line are included separately as Appendix A.

Area A

Area A is the only unit where SCT have been observed in recent years. Plant cover data was calculated for 19 species (Figure 2). *Avena fatua* was the most dominate species with 45% cover, followed by *Festuca myurous* with 35% cover. The third highest cover values were shared among *Bromus diandrus*, *Erodium cicutarium*, and *Platanus major*. Compared to 2013, overall cover values were lower for most species. For instance, cover of *Festuca* was over 70% in 2013 compared to only 45% in 2014, while cover of *Raphanus sativa* declined from 16% to less than 1%. A total of nine species had less than 1% cover, including the natives *Juncus patens* and *Nasella pulchra*. *Danthonia californica* was captured on 3 transects with anverage cover of 4%.

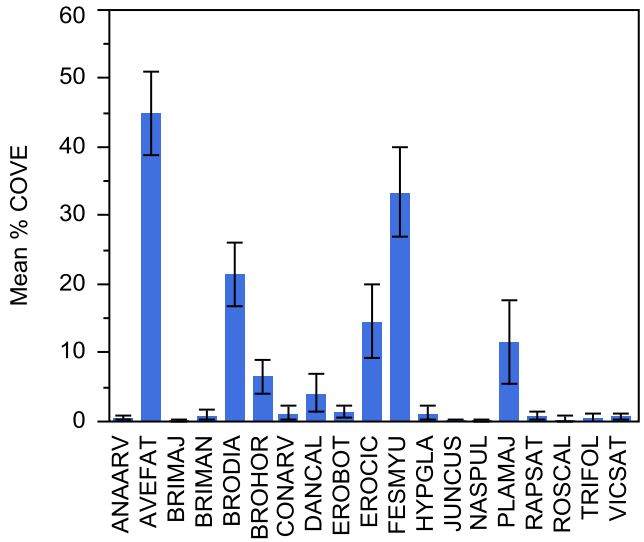


Figure 2. Mean percent cover of species sampled in Area A at Arana Gulch. Each error bar is constructed using 1 standard error from the mean.

As expected, average cover values of the different plant guilds were somewhat lower than in 2013, but the patterns of dominance were the same (Figure 3A). Exotic annual grasses (EAG) were most dominant followed by exotic annual forbs (EAF) and exotic perennial forbs (EPF). *Danthonia californica* comprised the majority of the native perennial grass (NPG). No native perennial forbs (NPF) were encountered on the transects in 2014, but scattered individuals of *Eschscholozia californica* were observed in the 5m belt transects. The shrub cover was present as a single clump of *Rosa californica*. Compared to 2013, less bare ground and disturbance mounds from gophers was recorded (Figure 3B). Thatch and basal vegetation still accounted for more than 70% of the ground cover.

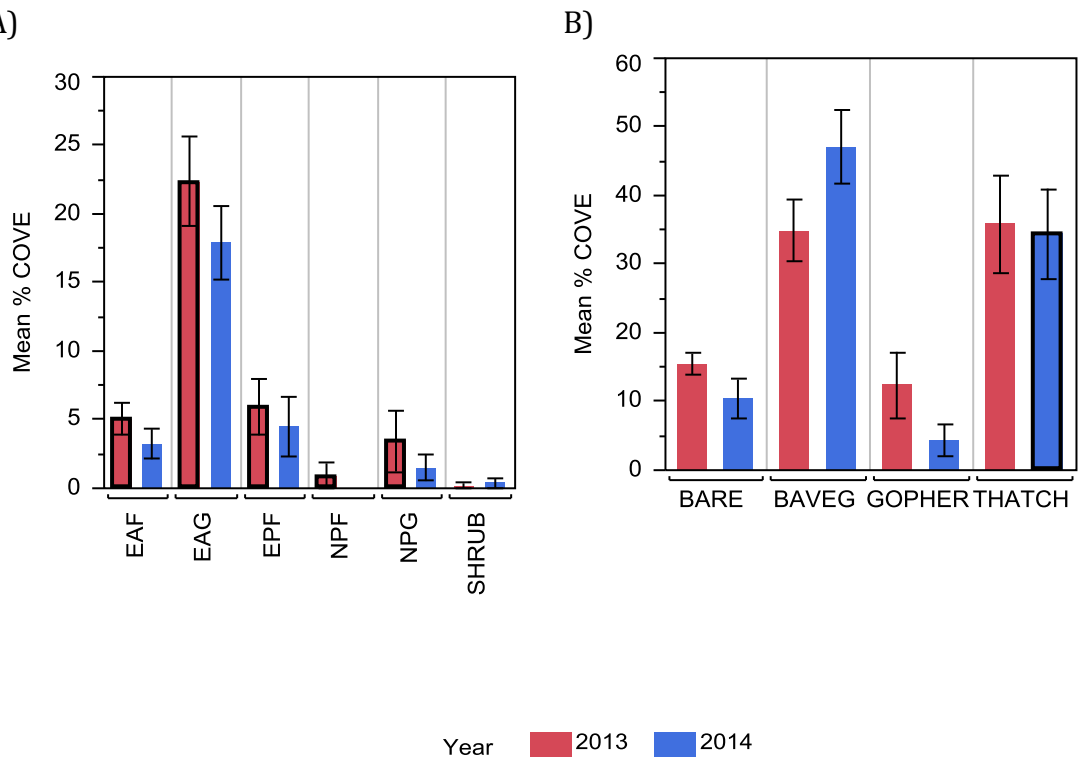


Figure 3. A) Mean percent cover of 5 plant guilds and B) ground cover sampled across Area A at Arana Gulch in 2013 and 2014. BAVEG = basal vegetation. Each error bar is constructed using 1 standard error from the mean.

Fewer species were recorded on each transect and within the 125 m^2 plot than in 2013 (Table 3). The average of 7.3 species per transect was lower than Area C or D. The species that were not recorded in 2014 on the transects include *Eschscholozia californica* , *Festuca perennis, Rumex acetosella, R. crispus*, and *Trifolium sp*. Native species richness was still less than 1%.

Table 3. Mean number of species recorded along 25 m transects and detected within a 5m belt in Area A (with one standard deviation in parentheses).

Species Richness	2013	2014
# Species per transect	9.5 (2.7)	7.3 (2.1)
# Additional species in plot	3.9 (2.5)	3 (2.7)
Total # species/125 m^2	13.4 (3.8)	10.3 (4.1)
# Native species per transect	0.4 (0.5)	0.5 (0.5)
# Additional native sp. in plot	0.3 (2.5)	0.5(0.8)

Area C

Plant cover data was calculated for 14 species in Area C (Figure 4), two more than in 2013. Only one transect from 2013 was intact, so this data is not strictly comparable to 2013. CT 7 was installed on the east side of the construction road near were CT 3 and CT6 were installed in 2013, but the new transect ran through an infestation of Italian thistle (*Carduus pycnocephalus*) that was present but not recorded in 2013. Similar to 2013, *Bromus diandrus, Festuca myurous,* and *Avena fatua* were most dominate, but the cover of *Raphanus sativa* was much lower in 2014.

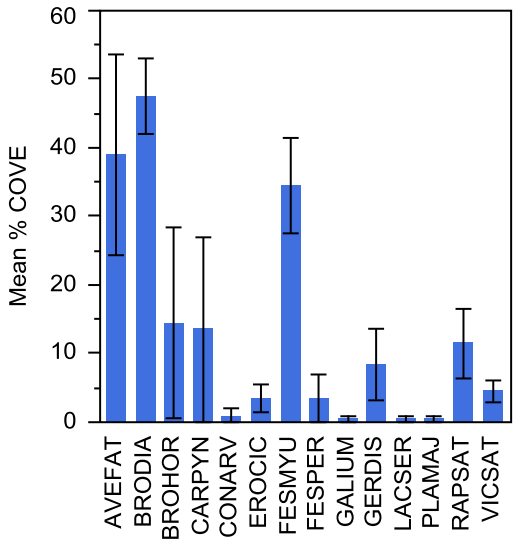


Figure 4. Mean percent cover of species sampled in Area C at Arana Gulch. Each error bar is constructed using 1 standard error from the mean.

Cover of exotic annual forbs (EAF) was lower in 2014 because less wild radish (*Raphanus sativa)* emerged (Figure 5A). Cover of EPF was somewhat higher because the Italian thistle

was avoided in 2013, but EAG was similar to 2014. Not surprisingly, a greater amount of thatch was recorded in 2014 (Figure 5B).

No native species were captured by the transect sampling or in the 5m belt transects in Area C. On average, 8 species were recorded on each transect (Table 4). Two fewer species were detected in the 5m belt transects in 2014.

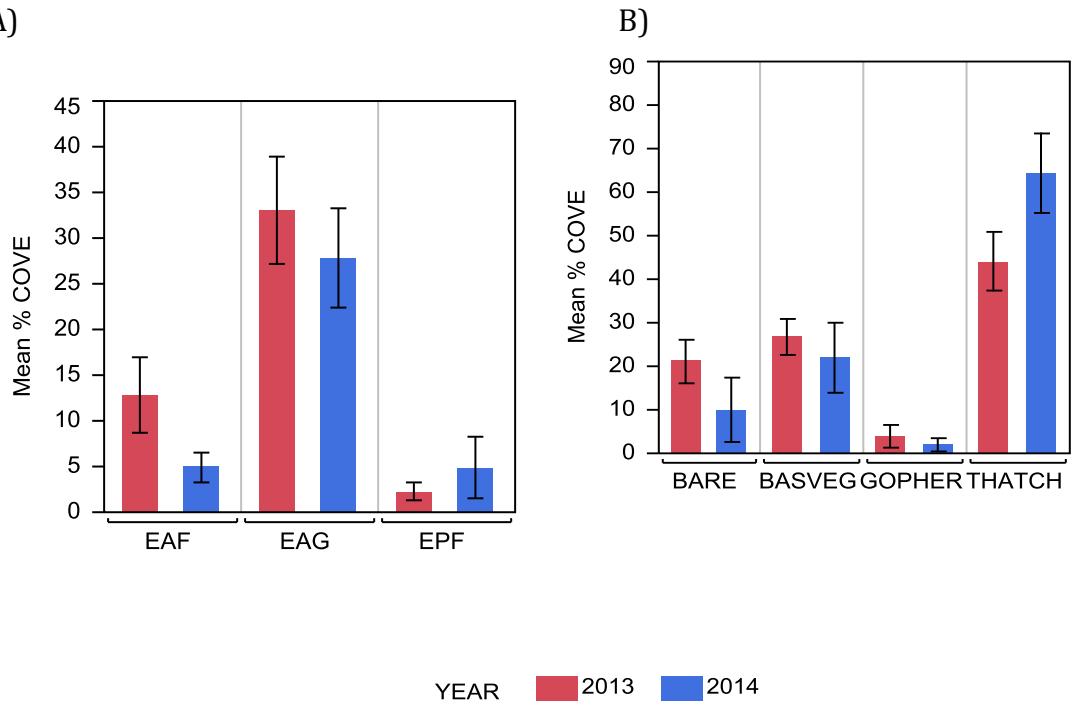


Figure 5. A) Mean percent cover of 3 plant guilds and B) ground cover sampled across Area C at Arana Gulch. BASVEG = basal vegetation. Each error bar is constructed using 1 standard error from the mean.

Table 4. Mean number of species recorded along 25 m transects and detected within a 5m belt in Area C (with one standard deviation in parentheses).

Species Richness	2013	2014
# Species per transect	8 (1.0)	8.3 (1.7)
# Additional species in plot	4.6	2 (1.4)
Total # species/125 m^2	12.6 (2.7)	10.3 (3.0)
# Native species per plot	0	0

Area D

Plant cover data was calculated for 14 species in Area D (Figure 6). As in Area C, only one of the transects from 2013 was intact so this data is also not strictly comparable to year one.

The pattern of dominance was markedly different. In 2013, *Festuca myurous* was the most dominate species with 70% cover, followed by filaree (*Erodium cicutarium)* with 53% cover. In 2014, filaree had the greatest cover with 35% and cover of *Festuca myurous* was only 25%.

Area D has an infestation of the invasive perennial velvet grass (*Holcus lanatus)* and French broom (*Genista monspessulana*) is beginning to emerge from the wet area. However, there are also some nice patches of *Leymus triticoides*, a native perennial grass. Exotic annual grasses (EAG) are not as overwhelmingly dominant in Area D as they are on much of the rest of the coastal prairie (Figure 7A). *Holcus lanatus* comprised the entire EPG guild and *Leymus triticoides* comprised the entire NPG guild. *Rumex acetosella* and *Vicia sativa* were the only exotic perennial forbs (EPF). Ground cover was mostly thatch and basal vegetation (Figure 7B).

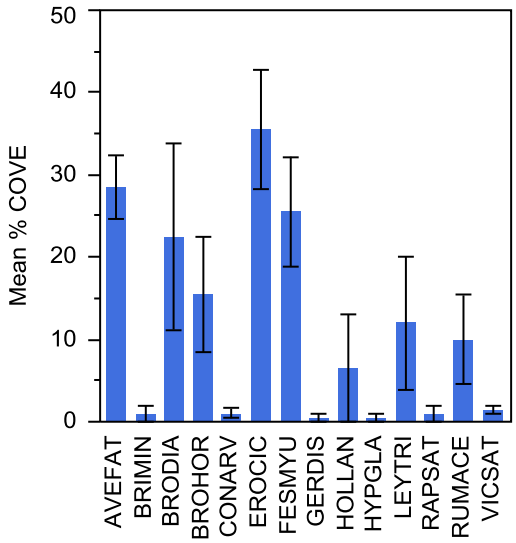


Figure 6. Mean percent cover of species sampled in Area D at Arana Gulch. Each error bar is constructed using 1 standard error from the mean.

Fewer species were recorded on each transect and within the 125 m^2 plot than in 2013 in Area D (Table 5). The species that were not recorded in 2014 on the transects include *Briza major* and *Festuca perennis.* Native species richness was still less than 1%.

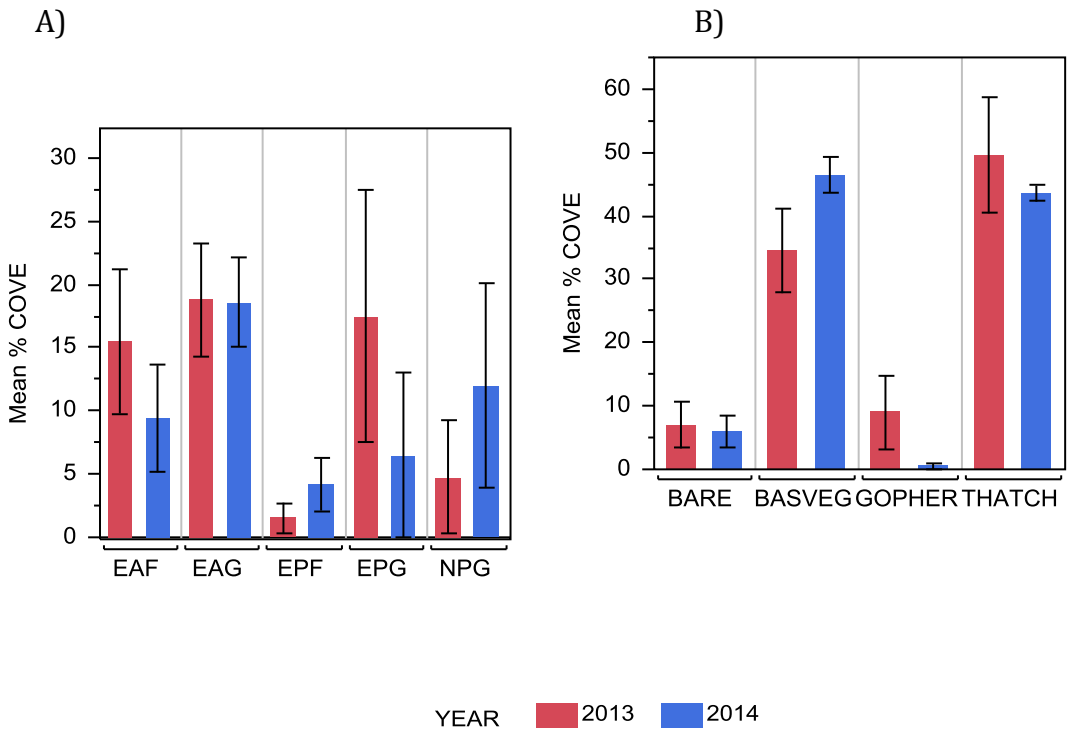


Figure 7. A) Mean percent cover of 5 plant guilds and B) ground cover sampled across Area D at Arana Gulch. BASVEG = basal vegetation. Each error bar is constructed using 1 standard error from the mean.

Table 5. Mean number of species recorded along 25 m transects and detected within a 5m belt in Area D (with one standard deviation in parentheses).

Species Richness	2013	2014
# Species per transect	10.3 (1.5)	8.8 (1.5)
# Additional species in plot	4.5 (2.6)	3.3 (3.3)
Total # species/125 m^2	14.8 (1.3)	12 (4.8)
# Native species per transect	0.5 (1.0)	0.5 (0.6)
# Additional native sp. in plot	0.3 (0.5)	0.5(0.6)

Canopy height and summed cover

The low precipitation in 2014 resulted in a maximum canopy height that was 49-64% lower across all three areas than it was in 2013 (Table 6). The average tall canopy was over one meter (111cm) in 2013 but less than half a meter (47cm) in 2014. The variation in

measured heights was also much lower, both within and among sites. Canopy height in Area D was not lower than Areas A and C as it was in 2013.

Table 6. Mean height of the low and the high canopy layers in 2013 and 2014 (with one standard deviation in parentheses).

Area	2013		2014	
	Low canopy	High Canopy	Low canopy	High Canopy
A	39 (13)	122 (42)	28 (9)	44 (12)
C	59 (12)	126 (48)	29 (8)	55 (17)
D	38 (7)	86 (5)	33 (5)	44 (4)

Plant cover was summed for each guild by transect and then the mean was calculated to illustrate the dense multi-layered canopy present throughout the coastal grassland for all three units (Figure 8). The EAG guild was dominant with absolute cover of more than 100%. In 2013, absolute cover of annual grasses was about 150%. The EAF guild was considerably smaller than in 2013 because much less wild radish was present. The EPF guild was similar. The EPG and NPG guilds both had an average 6% of absolute cover. Absolute plant cover of all exotic species was 160% with only 6% native cover. Average bare ground cover across all sites was 9.3% (Stdev9.6).

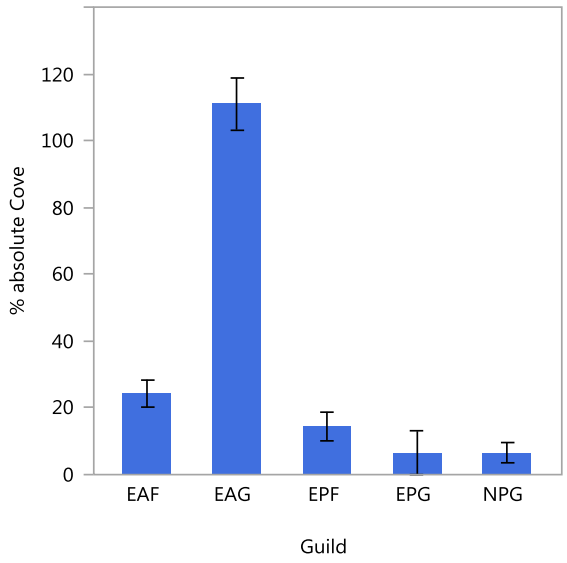


Figure 8. Mean absolute percent cover of five plants guilds across Areas A-C at Arana Gulch. Each error bar is constructed using 1 standard error from the mean.

Discussion

As in 2013, the sampled coastal prairie vegetation at Arana Gulch was comprised almost exclusively of non-native species with high cover, a large thatch accumulation, and almost no bare ground. Canopy height was much lower in 2014 because of the record dry conditions. The low layer of *Festuca myuros* that was ubiquitous in 2013 was not as prevalent in 2014. *Bromus diandrus* was much more dominant this year along with *Avena fatua*. The *Raphanus sativa* was much more sparsely distributed and shorter, especially in Area C.

During the development of the HMP there was not yet any baseline data to quanitfy existing conditions and so the interim restoration criterion was established as a return to an ideal of a functional reference coastal prairie. Limited data on vegetation conditions at reference coastal prairies is available because there are so few left. One of the most recent unpublished studies collected data on vegetation conditions at 6 coastal prairie sites situated between Point Lobos and Davenport, but Arana Gulch was excluded because of low native cover compared to the other the sites (Holl and Reed, 2010). The sites sampled in that study exhibited a wide range of variation in native species cover (20-40%) and the number of native species recorded per transect varied from a low of 4 to a high of 21. In Hayes and Holl (2003), native grass cover at 3 coastal prairie sites ranged from 9% at one site to <2% at the other two sites and native forb cover was <5% at all sites. Those sites had been grazed regularly and had not been tilled. In contrast, native annual forb cover of 30% was measured near the SCT population at Porter Ranch, while native grass cover was < 5% (Hayes 2003). Combining these data with future monitoring data will help to establish more specific achievable objectives for the vegetation at Arana Gulch.

The 2014 dataset has its limitations from the historic low precipitation. In combination with the late timing of the 2013 data, the final baseline dataset remains less than optimal and represents drier than normal conditions. Grazing is scheduled to begin in December 2014 and even if this coincides with a much wetter winter an observed decrease in canopy height and non-native cover and an increase in bare ground at Arana Gulch could be declared an interim success. The highest priority goal is improved recruitment of SCT, so an increase in the number of plants at the site would also be an interim success. The opposite scenario could not be declared a failure, however. It could take longer than one year for SCT to respond to grazing and changes in vegetation, especially if conditions remain dry. These baseline data and a first year of monitoring data under grazing in April 2015 will help the AMWG begin refining the objectives under Goal 3.

Literature cited

Hayes, G. 2003. *Holocarpha macradenia* (Santa Cruz tarplant) Plant community composition, seedling density, pollination, seed dispersal and plant vigor/phenology. Report prepared for the State of California Department of Fish and Game, Sacramento, CA.

Hayes, G.F., and Holl, K.D. 2003. Site-specific responses of native and exotic species to disturbances in a mesic grassland community. *Applied Vegetation Science* **6**, 235-244.

Holl, K.D., and Reed, L.K., 2010. Reference and baseline samplings of Younger Lagoon Natural Reserve -2010. Unpublished report prepared for the California Coastal Commission.

Stanton, A.E. 2013. Habitat Management Plan for Arana Gulch. Unpublished report prepared for the City of Santa Cruz and the California Coastal Commission.

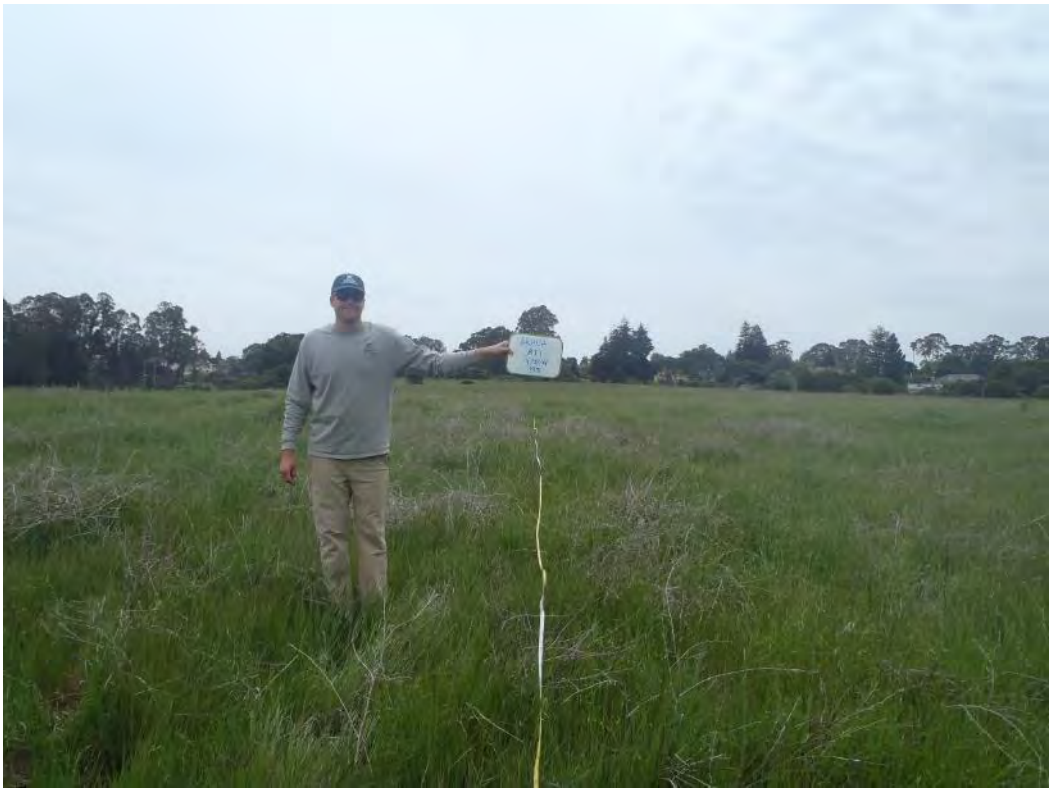
Stromberg, M.R., and Griffin, J.R. 1996. Long-term patterns in coastal California grasslands in relation to cultivation, gophers, and grazing. *Ecological Applications* **6**, 1189-1211.

Stromberg, M. R., Kephart, P., and Yadon, V. 2001. Composition, invasibility, and diversity in coastal California grasslands. Madroño **48**, 236-52.

Appendix A 2013 and 2014 baseline monitoring photos

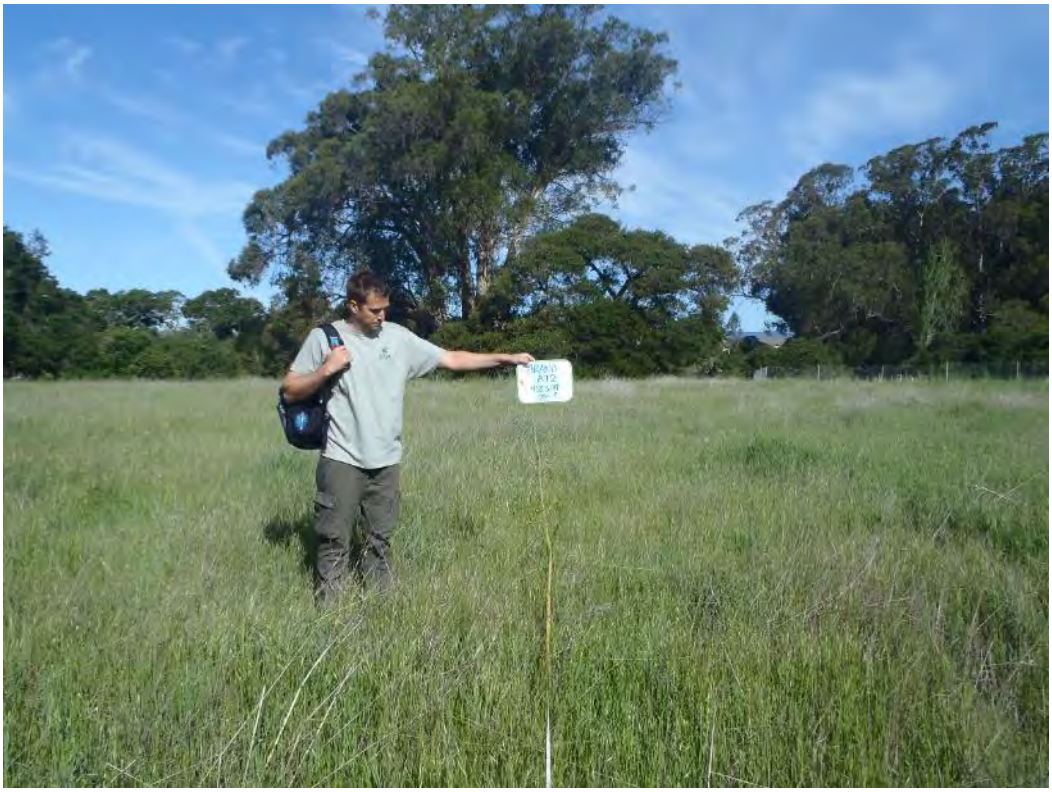
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 1



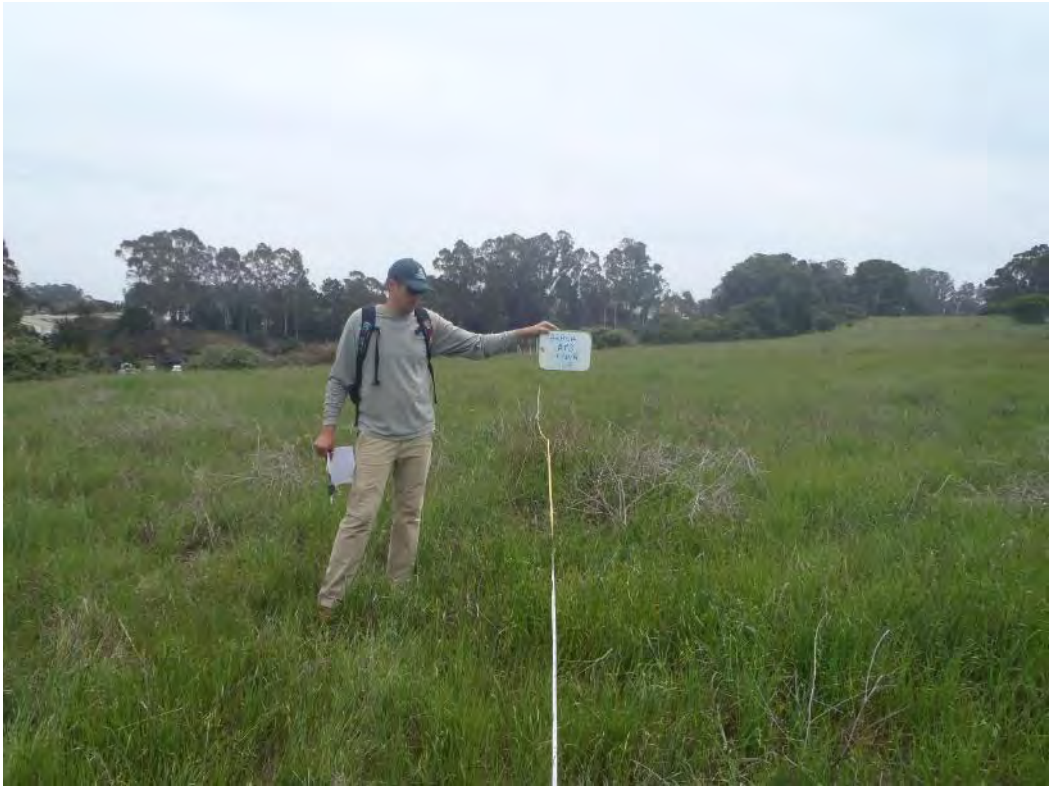
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 2 from 2013 was destroyed by construction



Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 3

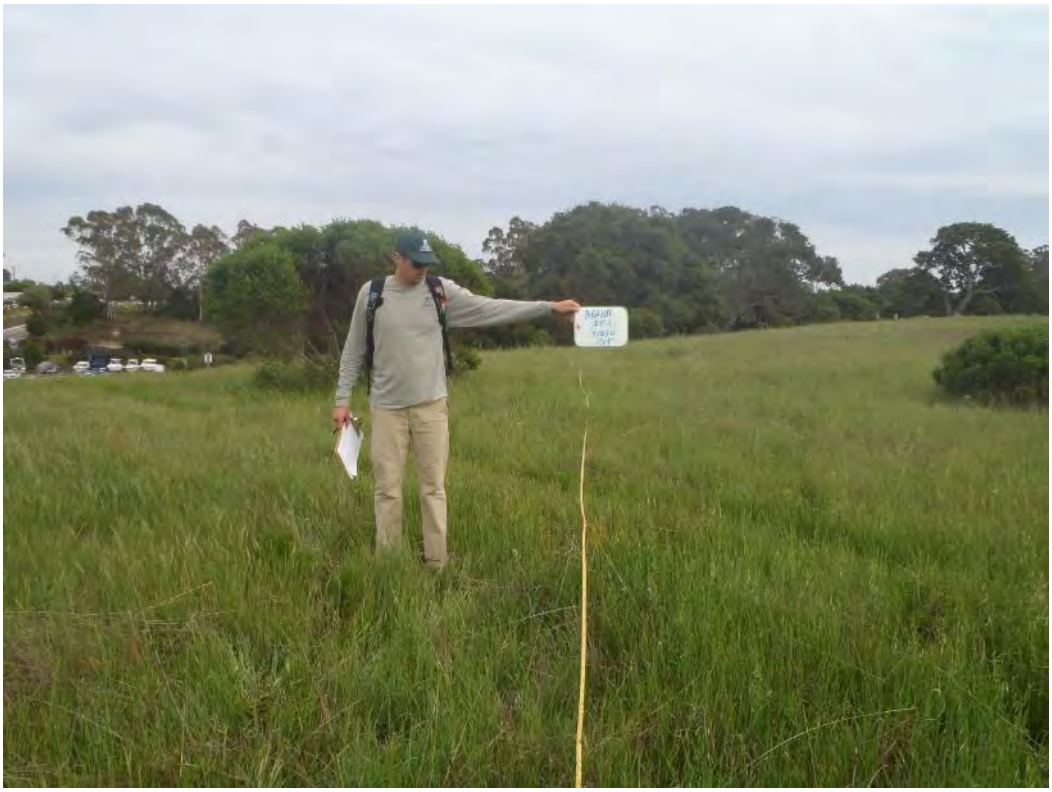


Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

A new 25m mark was installed for AT4 because it had been destroyed by a new user trail.

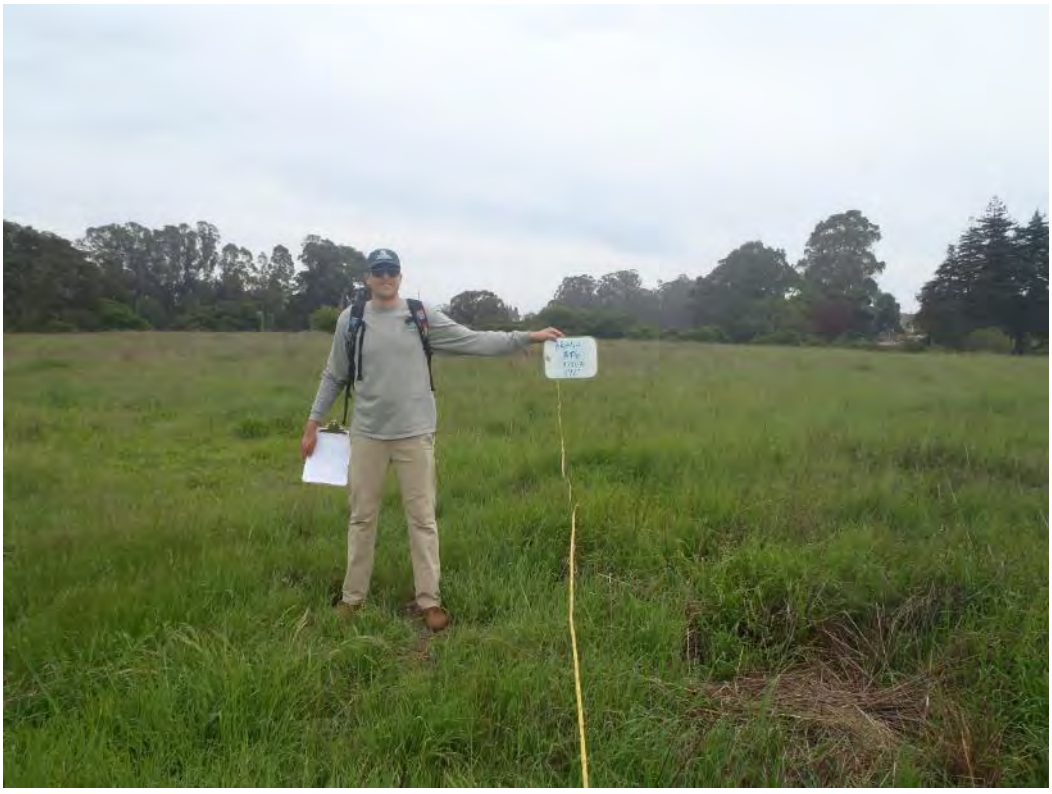
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 5



Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 6

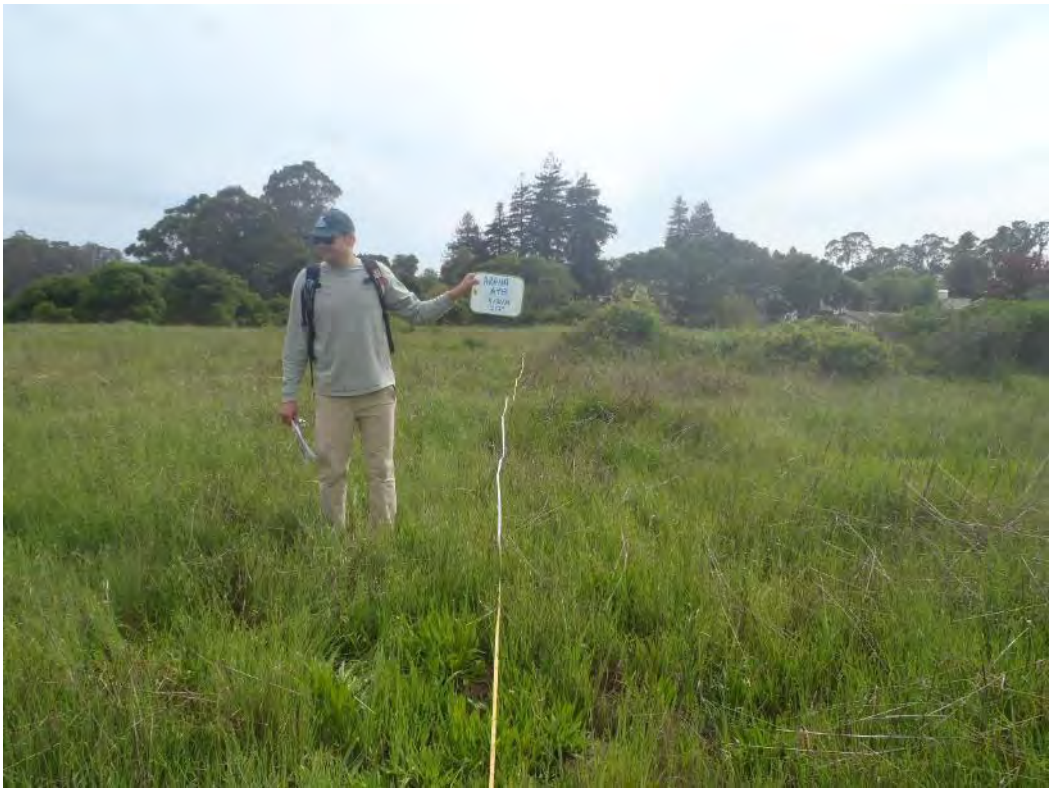


Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 7

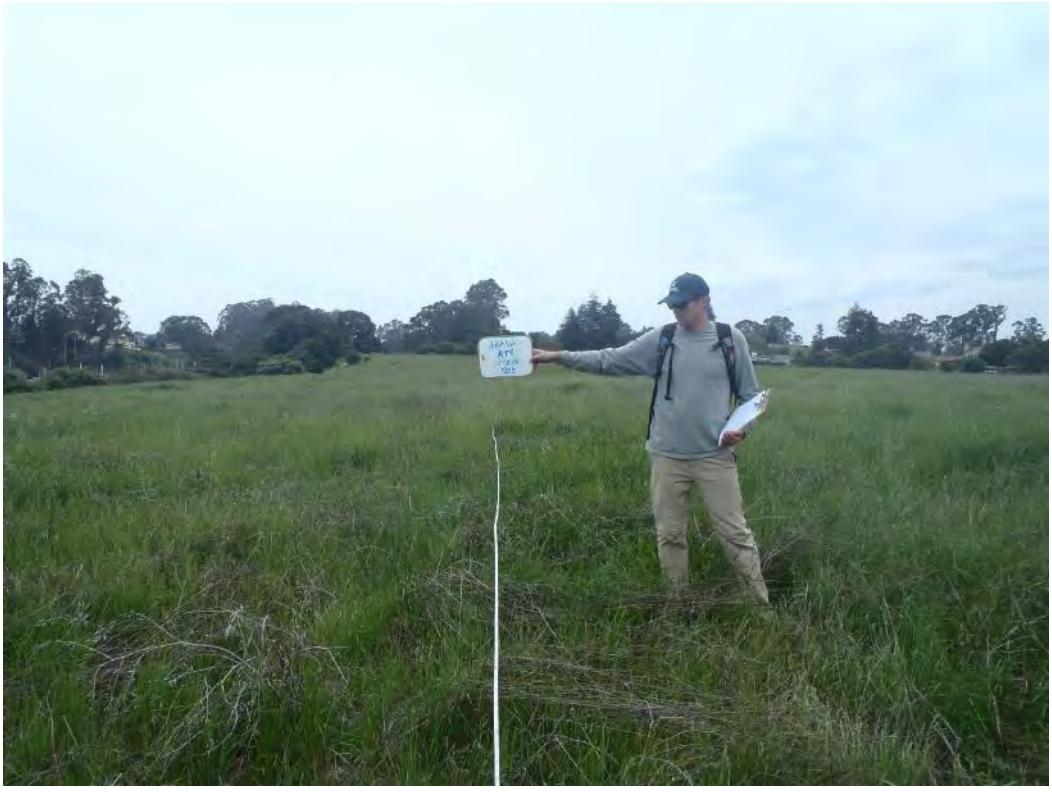
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT8



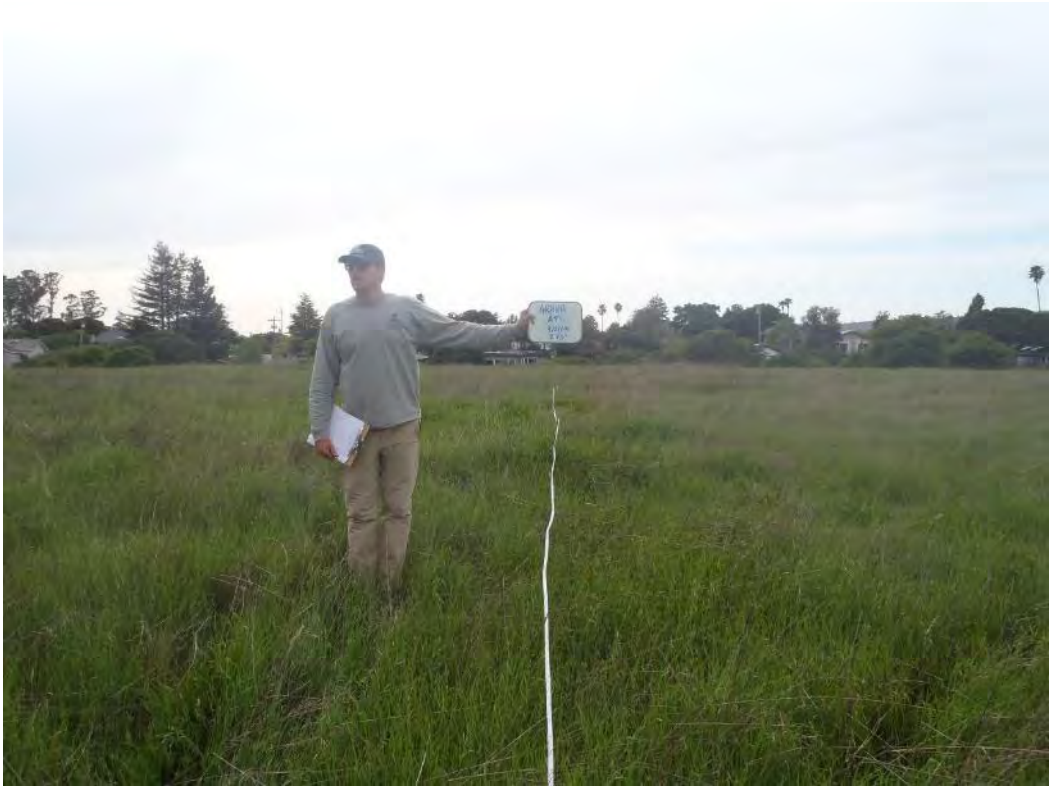
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 9



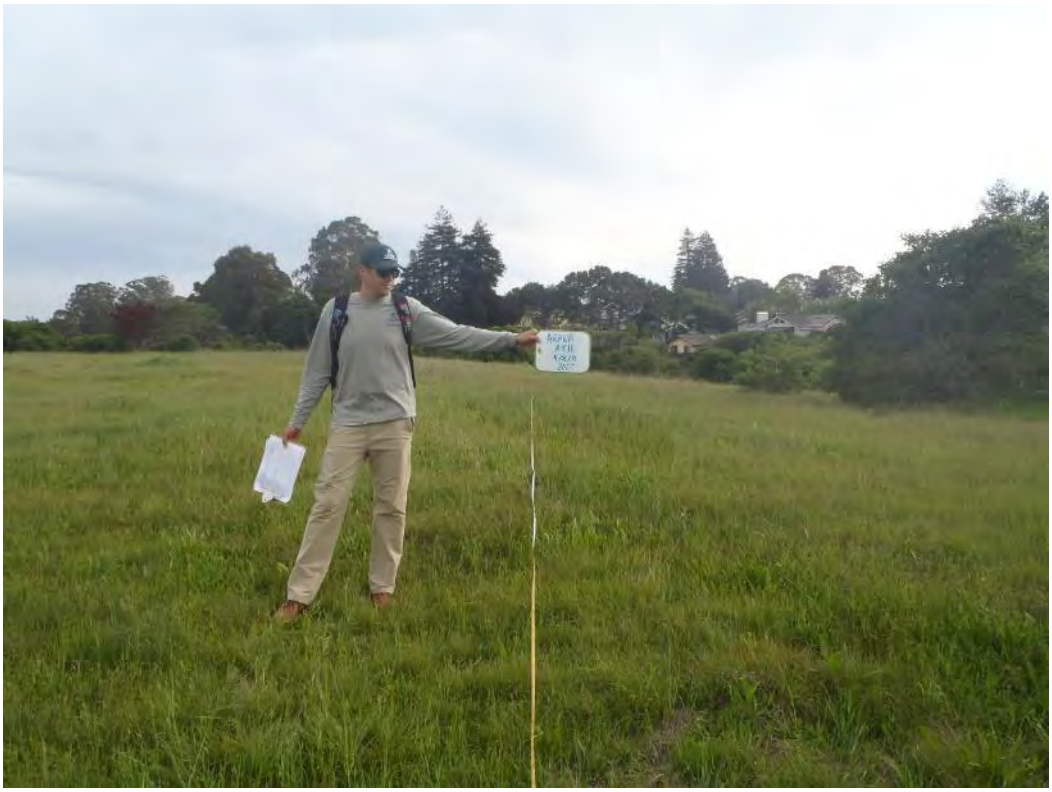
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT10

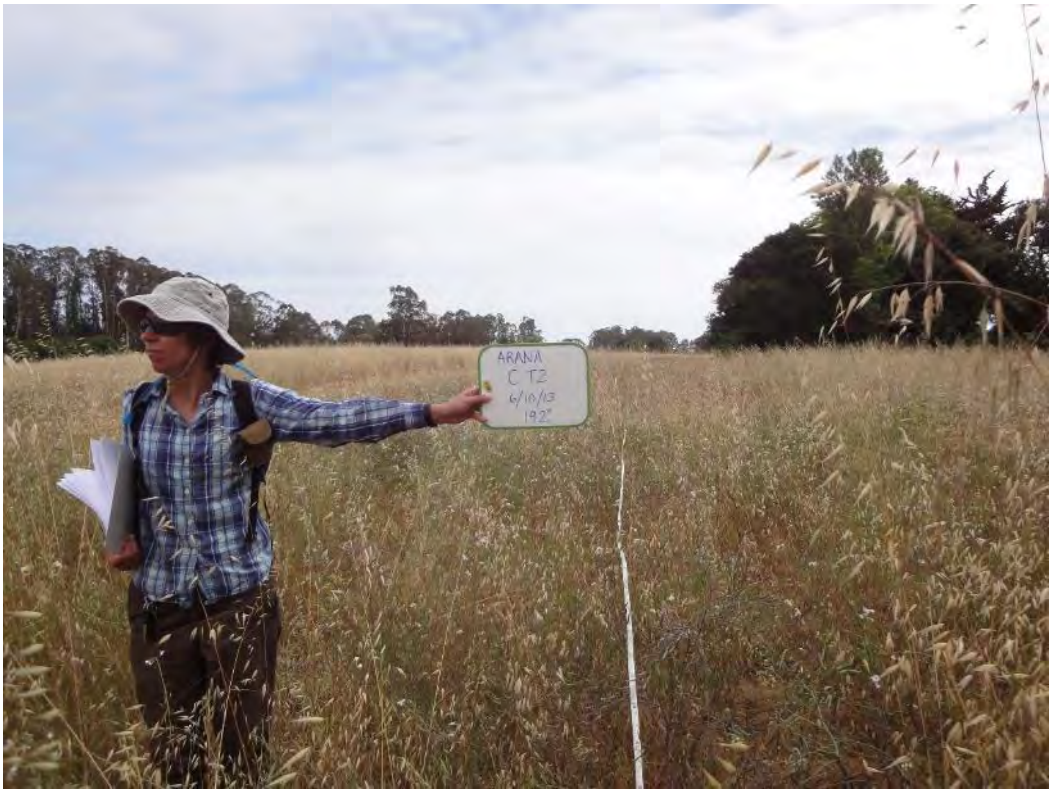


Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

AT 11



Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos



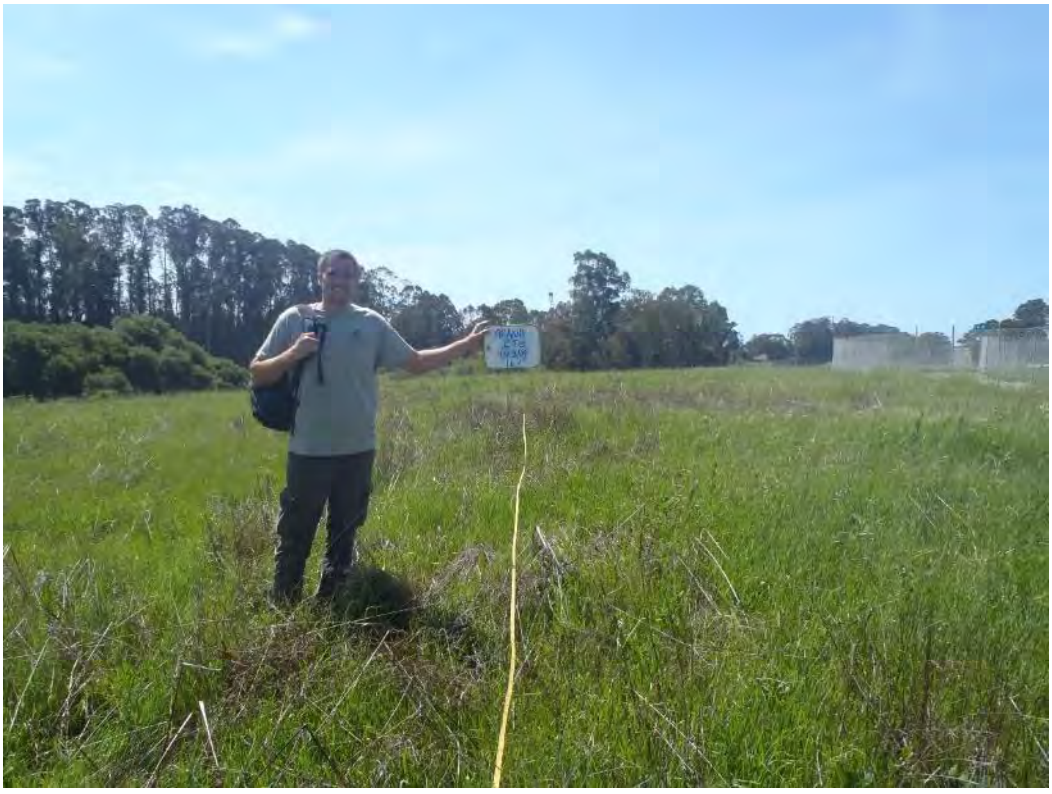
CT2

Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

A new 25m end was installed on CT 5 in 2104

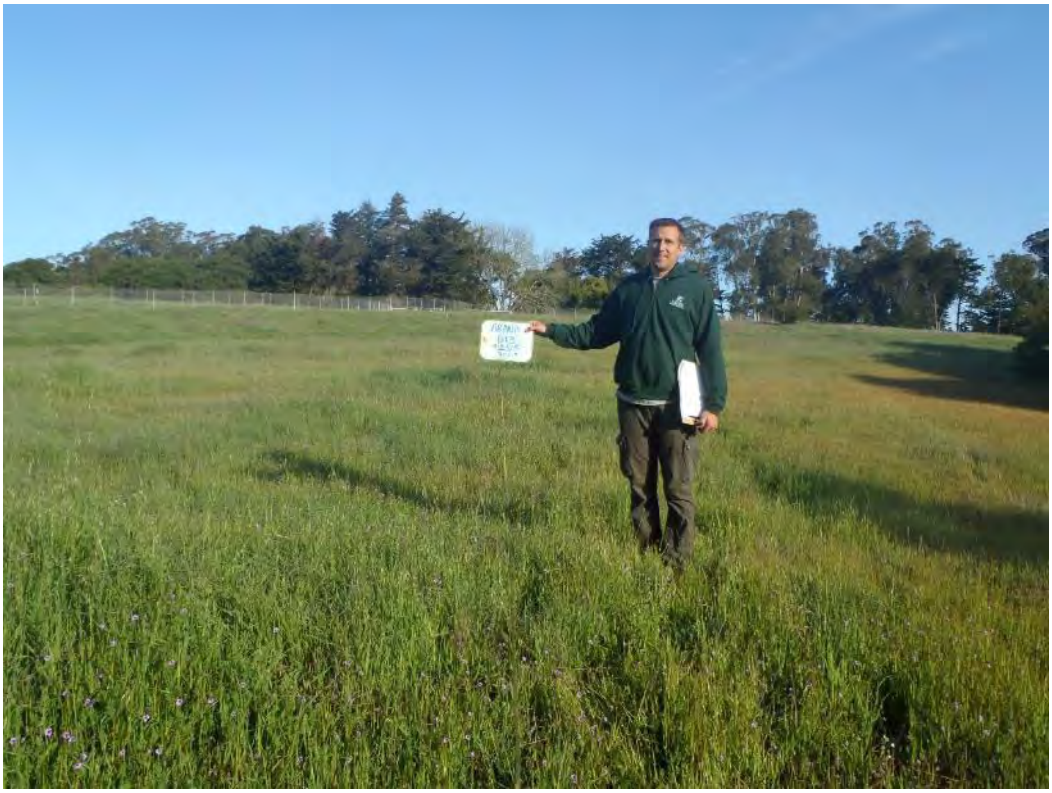
Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

CT 7



CT8

Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos



The photo for DT 2 is missing. DT3

DT4

Appendix A Arana Gulch 2013 and 2014 baseline monitoring photos

DT5

Appendix B Coastal Prairie/Santa Cruz Tarplant Management Area

Appendix B-1: CNDDB Field Survey Form

Appendix B-2: SCT Worker Training Brochure

Appendix B-3: HMP Grazing and Stocking and Work Program

Appendix B-4: Educational Brochure on Cattle Grazing

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 07/29/2014

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Holocarpha macradenia*

Common Name: Santa Cruz Tarplant

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 4 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? 6 Yes, Occ. # [ ] No [ ] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Kathleen Lyons, Biotic Resources Group
Address: 2551 S. Rodeo Gulch Road #12
Soquel, CA 95073
E-mail Address: brg@cruzio.com
Phone: 831-476-4803

Plant Information

Phenology:
0 % vegetative | 100 % flowering | 100 % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description *(please attach map AND/OR fill out your choice of coordinates, below)*

County: Santa Cruz Landowner / Mgr: City of Santa Cruz
Quad Name: Santa Cruz Elevation: 59
T 11S R 01W Sec 17 , ___ 1/4 of ___ 1/4, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): GPS
T ___ R ___ Sec ___ , ___ 1/4 of ___ 1/4, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: Garmin 60sx
DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** (●) Horizontal Accuracy: 20 feet meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) (●)
Coordinates: N36 58.469' W 122 00.027'

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Grassland dominated by Avena sp.; plants found in localized scrape test plot created in 2011 in portion of prairie/grassland identifed as Area A; associated species include Lotus corniculatus, Mentha pulegium, Madia sativa,

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good ( ) Fair (●) Poor
Immediate AND surrounding land use: open space
Visible disturbances: none
Threats: non-native grasses and forbs, lack of ground disturbance
Comments: Area subject to Habitat Management Plan and 2081(a) permit (Permit No 2081(a)-13-013-RP)

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[x] Other: compared with reference site (Delaveaga Park population)

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[x]
Habitat	[ ]	[ ]	[x]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? (●) yes ( ) no

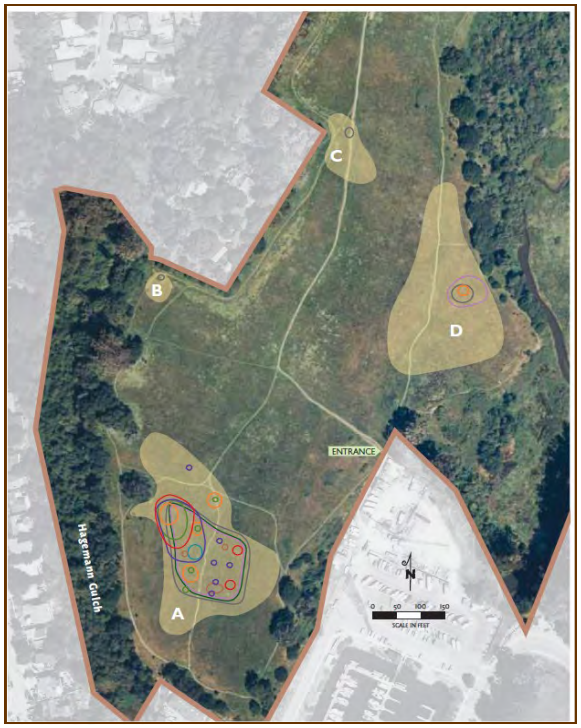
Contact Persons:

Principal Officer for City of Santa Cruz:

Mauro Garcia, Superintendent City of Santa Cruz
Department of Parks and Recreation
mgarcia@cityofsantacruz.com
(831) 420-5366

Monitoring Botanist:
Kathleen Lyons
Biotic Resources Group
(831) 476-4803

Santa Cruz Tarplant Colonies



I have read this worker training information and understand the actions required to avoid impacts to the species.

He leído esta información de capacitación para trabajadores y comprendo las acciones requeridas para evitar que se causen impactos negativos a esta especie de planta.

_____
Signed/Firma

Date/Fecha_____

ARANA GULCH GREENBELT
CITY OF SANTA CRUZ

Worker Training for Santa Cruz Tarplant

Capacitación para Trabajadores Sobre la Tarplant de Santa Cruz

Effective
December 2013

Santa Cruz Tarplant

The Santa Cruz tarplant is an annual plant in the sunflower family and is considered threatened by Federal law and endangered under State law.

The tarplant grows on coastal terraces in central California. At Arana Gulch the plant has been documented from four colonies on the grassy terrace (A-D). In the 1980's when the area was a dairy farm, 35-40 cattle grazed the terrace and the tarplant population was greater than 100,000. Grazing ceased in 1988 and the population declined as annual non-native grasses dominated the vegetation. 16 plants were found on the greenbelt in 2013. The plant blooms in July and August.

The Arana Gulch Habitat Management Plan outlines actions to aid in the recovery of the species, such as the re-introduction of cattle into the grassland, seasonal mowing, seasonal raking and other actions.

Measures to Avoid Impacts

The City of Santa Cruz has received a Scientific, Education, and Management Permit from the California Department of Fish and Wildlife (Habitat Conservation Planning Branch) that covers potential "take" of the Santa Cruz Tarplant during implementation of the Arana Gulch Habitat Management Plan. The permit allows for certain land activities, such as grazing, soil scraping, mowing, raking, prescribed burning, and out-planting/seeding that is implemented in accordance with the Management Plan.

To avoid unnecessary impacts to the Santa Cruz Tarplant, the following avoidance measures have been developed for all site workers, including volunteers, while implementing land management activities within the grassland portion of the greenbelt.

These measures include:

- Receive information on the Santa Cruz tarplant through receipt of this worker education brochure. Sign the brochure to indicate your understanding of the required avoidance measures.
- Understand the locations of previously identified tarplant colonies relative to your work area.
- Be prepared to stop work if a plant meeting the field indicators of the Santa Cruz tarplant is observed in your work area.
- Report any observations of Santa Cruz Tarplant to your project supervisor and/or their field representative.
- All work is to stay within your designated work area.
- Contact your project supervisor or field representative to report problems or other concerns.

Tarplant de Santa Cruz

La planta conocida como tarplant de Santa Cruz está en la misma familia con los girasoles, saliendo anualmente. Está designada por leyes federal y estatal como amenazada y en peligro de la extinción, respectivamente.

La tarplant crece en terrazas de la costa central de California. En el Barranco Arana se ha documentado la presencia de cuatro colonias de la planta dentro de las praderas (colonias A – D). En la década de los 1980, cuando el área era una granja lechera, pastaban entre 35 – 40 vacas en la terraza y la población del tarplant era mayor de 100,000. Paró el pasteo del ganado en el 1988 y la población de la planta disminuyó al dominar la vegetación los sacates anuales no nativos. Se hallaron dieciseis plantas en la zona en 2013. La planta produce flores en julio y agosto.

El proyecto de preservación de los senderos incluye la instalación de cercas para permitir la reintroducción del ganado en la zona verde para ayudar en la recuperación de esta especie de planta.

Stocking and Work Program for Arana Gulch Grazing Services

November 24, 2014 (Version 1)

The *2013 Arana Gulch Habitat Management Plan* (HMP) uses an adaptive management framework to plan for the long-term enhancement of Arana Gulch habitat areas. The adaptive management framework recognizes that there is uncertainty in biological systems, which requires a learn-by-doing approach. In its basic structure, adaptive management includes a cycle of planning, implementing, monitoring, analyzing and adjusting. The Plan identifies grazing as an important management tool to control the invasion of non-native plant species and create more favorable habitat conditions for the federally Endangered Santa Cruz Tarplant (SCT), among other native plant species.

This Stocking and Work Program establishes the grazing practices to be implemented at the Arana Gulch coastal prairie. The primary focus of grazing at Arana Gulch is to create suitable conditions for the SCT and improve the SCT population. The grazing program at Arana Gulch will strive to meet the following goals and objectives specified in the HMP:

- **Goal 1:** Maintain a viable SCT population.
  - *Objective 1A,* Increase the number of above ground SCT.
  - *Objective 1B,* Expand the distribution of the SCT.

- **Goal 2:** Reintroduce grazing to restore a disturbance regime that maintains a functioning coastal prairie.
  - *Objective 2A,* Implement the grazing program.

        - Objective 2A.1, Locate grazing support features (e.g. portable water troughs, salt lick fence posts) outside of occupied SCT habitat or seasonal wetlands where possible.
        - Objective 2a.2, Implement Best Management Practices to minimize erosion, avoid impacts to the seasonal wetland, and to avoid impacts to water quality from cattle waste. The National Range and Pasture Handbook (NRCS 2003) describes current grazing practices.
    - *Objective 2B,* Maintain Residual Dry Matter within a range that allows SCT to complete its lifecycle and protects the coastal prairie grasslands from erosion (between 700 -1,500lbs per acre).

- **Goal 3:** Minimize the detrimental effects of high non-native plant cover and restore coastal prairie species diversity and habitat function.
    - *Objective 3A,* Reduce canopy height to a level that enables the completion of the SCT lifecycle).
    - *Objective 3B-E,* Decrease the cover of non-native species and increase the cover of native species and bare ground.

- **Goal 4:** Maintain a genetically and demographically viable soil seedbank in perpetuity.

Most importantly, the adaptive management approach to achieving these grazing goals and objectives will require making adjustments to this Stocking and Work Program as conditions change or new information becomes available.

Until further modified, the initial grazing requirements include:

1) **Grazing Capacity:** Approximately 2 to 6 cow/calf pairs or an equivalent mix of "stocker" steers and heifers will be grazed to achieve the goals of the Stocking and Work Program. Before the initial grazing period begins, the City and biologist/range manager will discuss with the grazer the total number of cattle to be grazed based on the anticipated forage production and management priorities.

2) **Grazing Season:** The grazing period is dependent on the SCT flowering period. The anticipated grazing period is from late-October to mid-June. The City or City's Biologist/Range Manager will give the grazer two weeks' notice to begin and one week's notice to end each season's grazing period. Special attention shall be given to the tradeoffs between grazing time, flowing

time, and growing season of certain non-natives to achieve the appropriate conditions for the following year.

3) **Delineated Area Where Grazing Can Occur:** The grazing area is approximately 18 acres and features three grazing areas to encompass SCT areas A, C, and D as depicted in Exhibit A of the Arana Gulch Cattle Grazing Contract.

4) **Distribution and Rotation of Livestock:** The City and/or City's Biologist/Range Manager will discuss the appropriate distribution and rotation of livestock. At this initial stage, it is likely that one or two cow/calf pairs will be located in each grazing area. The City or City's Biologist/Range Manager may require cattle to be moved between grazing areas to conduct more controlled or focused grazing or protect early blooms of the SCT from being crushed. Additionally, watering trough or mineral block locations may be changed to assist with more focused grazing.

5) **Hay, Feed or Salt and Mineral Blocks:** The use of hay, feed, or salt and mineral blocks must first be approved by the City after consultation with the Adaptive Management Working Group and Project Biologist.

6) **Location of Watering Troughs:** City and/or City's Biologist/Range Manager will provide direction on the location of watering troughs as needs arise or changes are necessary. Placement will consider proximity to seasonal wetlands and other sensitive areas.

7) **Cattle Transport:** The cattle shall be transported to the Agnes Street entrance, then offloaded from the cattle truck and released into a corral located near the park entrance. The exact timing of the delivery will depend on climatic conditions and resulting soil saturation. The cattle shall not be delivered during periods of heavy rainfall.

8) **Fence Line Inspection and Repair:** Regular visual inspections of fence lines shall be conducted and fence repair shall occur immediately to ensure cattle remain within the designated grazing area. Any soil removed shall be spread evenly across the ground in the surrounding area.

9) **Cattle Herding:** The cattle may be herded among grazing areas with horses, ATVs, or pick-up trucks depending on the season. Motorized vehicle use shall be avoided during the rainy season to the maximum extent as possible.

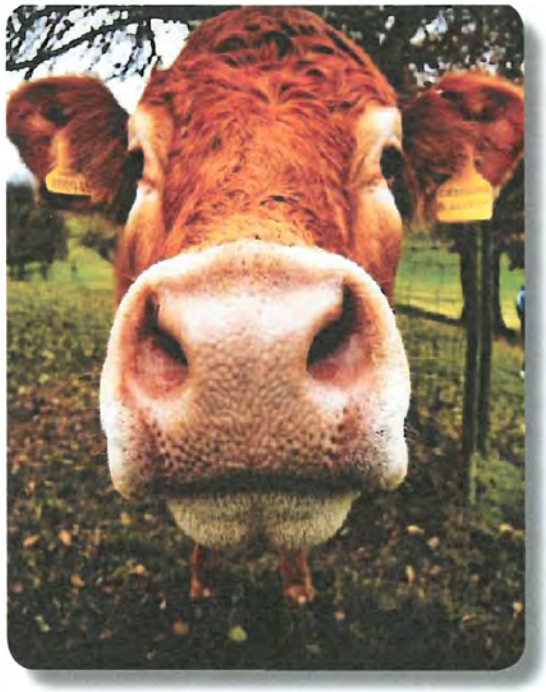
10) **Rainfall Events:** Visual inspections shall be conducted by foot to ensure no rilling within and from the grazing area. Appropriate erosion control measures, such as straw wattles, may be installed, if necessary, to prevent any accelerated or channelized runoff toward steep slopes. During the months of highest rainfall and storm events, the minimum number of cow/calf pairs will remain onsite to avoid erosion and minimize volume of cattle waste.

CITY OF SANTA CRUZ

Parks Make Life Better!

City of Santa Cruz
Parks and Recreation Department
323 Church Street,
Santa Cruz, CA 95060

831-420-5270



CATTLE GRAZING AT ARANA GULCH

CATTLE GRAZING

Cattle grazing is an important resource management practice at Arana Gulch to help restore the coastal prairie habitat of the Santa Cruz tarplant (*Holocarpha macradenia*), which is vulnerable to extinction. Visitors may see cattle grazing in the fenced areas at Arana Gulch from October to June each year.

SANTA CRUZ TARPLANT

Historically, Santa Cruz tarplant was found in coastal prairies between Marin and Monterey Counties. As a result of development and habitat destruction, Santa Cruz tarplant is now found at fewer than 20 locations. Arana Gulch is one of the largest of these remnant populations. In the late 1980s there were more than 100,000 plants here. Since grazing was removed from Arana Gulch in 1988, the Santa Cruz tarplant population has declined sharply and recently there have been fewer than 100 plants. The City of Santa Cruz has been actively trying to restore the Santa Cruz tarplant since it purchased the property in 1994.

Healthy California coastal prairies are considered the most species-rich grasslands on the continent. Before European settlement more than 200 years ago, native wildflowers, such as tarplants, were maintained by disturbance processes such as fire and grazing. The new use of the land introduced non-native plant species and displaced many native plants over time. Experience gained from other tarplant areas suggests that cattle grazing may improve the coastal prairie and return many native wildflowers.

Santa Cruz tarplant is a member of the sunflower family and has yellow flowers with sticky, strong smelling leaves.

A patch of Santa Cruz tarplant surrounded by non-native grasses. 1996.

GRAZING AND HABITAT MANAGEMENT

Properly managed cattle grazing has improved coastal prairies in central California. In the City of Santa Cruz, grazing at the Moore Creek Open Space Preserve has improved and continues to maintain habitat for the federally endangered Ohlone tiger beetle. Livestock grazing is used by the East Bay and South Bay park districts, water districts, and landowners to reduce wildfire threat and maintain habitat for many of California's threatened or endangered plants and animals. The grazing operation at Arana Gulch is strictly monitored and based upon accepted principles of range management. For more information about habitat management at Arana Gulch, please visit www.cityofsantacruz.com/habitatmanagementataranagulch

PUBLIC SAFETY

The cattle grazing at Arana Gulch have been selected based on their gentle temperament. However, cattle may act aggressively if they perceive a threat and can harm themselves and others. Please keep the following safety tips in mind:

- Keep dogs on leash and under control. Cattle perceive dogs as predators.
- Do not allow your dog to chase or harass the cattle. They can hurt or kill dogs, charge through a fence, or injure themselves or you.
- Never enter the fenced grazing area.
- Mother cows may be extra protective of their calves. Do not get between a mother and her calf.
- Do not feed, pet, or startle the cattle.
- If you see cattle outside of the fences, keep your distance and call 911. The rancher will be contacted immediately.
- Report any incidents or aggressive, injured, or sick cattle to the Parks and Recreation Department at 831-420-5270.

In an emergency, call 911.

Appendix C Arana Gulch Creek Riparian Woodland and Wetland Management Area and Hagemann Gulch Riparian Woodland Management Area

Appendix C-1: Riparian Revegetation Plan at Arana Creek and Hagemann Gulch

ARANA GULCH MULTI-USE TRAIL RIPARIAN REVEGETATION PLAN

(Per the Streambed Alteration Agreement with the California Department of Fish and Wildlife, Notification No. 1600-2013-0051-R3)

The Arana Gulch Multi-Use Trail Riparian Revegetation Plan (Plan) is intended to implement short-term enhancement strategies to riparian areas directly affected by the trail project. The Plan is pursuant to the requirements of the project's Streambed Alteration Agreement with the California Department of Fish and Wildlife (#1600-2013-0051-R3). In addition to the Plan, the City will be implementing riparian enhancement and management activities for Hagemann Gulch and Arana Gulch found in the Arana Gulch Habitat Management Plan (AGHMP). The AGHMP was conditioned as part of the permit process and provides for restoration, enhancement, and long-term management of the habitat areas in more comprehensive terms.

The City will be responsible for all maintenance and monitoring of the revegetation area in the Plan for a minimum period of five (5) years after installation, or longer if necessary to meet the stated success criteria. The Plan will be considered complete when all conditions in the Streambed Alteration Agreement regarding the Plan have been fulfilled. Thereafter, future maintenance and monitoring activities of the areas covered by the Plan will be conducted as part of the AGHMP management effort.

1) GENERAL PLANTING OPERATIONS

a) The Project Biologist or City Arborist shall review and approve all plant materials, prior to their installation. The City, or its designated landscape contractor, shall be responsible for any replacement of plant material if said material is in poor condition and rejected by the Project Biologist or City Arborist.

b) All plants shall be the genus, species, and sizes outlined in the Plan. Under no condition, will there be any substitution of plants, except with the consent of the Project Biologist or City Arborist. If the specified plant material is not available, the City must receive a written approval from the California Department of Fish and Wildlife for a suitable substitution.

c) Existing vegetation that is not within the limits of the project area shall not be cut, removed or otherwise disturbed, except for occurrences of invasive, non-native plant species or to obtain plant cuttings or seeds for plant propagation.

2) PLANTING REQUIREMENTS AND LOCATION:

The plantings will occur in the locations and amounts shown on Exhibit A and as described herein:

a) **Hydroseeding:** The seed mix shall be comprised of sterile seed intended to provide quick ground cover. Application will be "Regreen", a sterile wheat –wheatgrass hybrid (*Triticum x Elymus)*, 95 percent minimum purity and minimum germination of 85 percent. Application rate shall be 50 lbs. /acre. The seed mix will be spread in the designated Arana Gulch Creek and Hagemann Gulch Creek riparian areas after pre-irrigation. Hydroseeding will occur prior to October 15th.

b) **Willow Cuttings:** Willow cuttings shall be taken from surrounding willows when they are fully dormant (typically between December 15 and January 15) and the soil is moist. The cuttings will be planted along the bank of Arana Gulch Creek. The live cuttings shall

be installed into the creek edge planting area the same day they are obtained. Willows will also be densely staked to armor the outfall associated with the abutment.

c) **Plants:** *Artemisia douglasiana*, *Rosa californica*, and *Elymus triticoides* will be purchased from a local nursery. The plants shall have been grown from seeds or cuttings found in local, coastal riparian areas, such as Soquel Creek or Aptos Creek. The plants will be installed at the designated planting sites, irrigated, and mulched.

d) **Coast Live Oak Trees:** In fall, three container stock coast live oak trees at a minimum 15 gallon size will be planted in the Arana Gulch Creek riparian area. A 3-foot diameter hand-packed soil berm shall be constructed around each oak tree to create a watering basin. The berm shall be 3 inches high. If soil is not moist to 14 inches from natural rainfall, then all plantings will be hand watered immediately following installation. A 3-inch thick layer of redwood mulch shall be spread in each planting basin to reduce weed growth and to retain soil moisture.

3) MAINTENANCE REQUIREMENTS

a) Supplemental irrigation using a drip or hand-watering program will be used as needed to ensure the plants successfully establish before the first rainy season and survive during the dry seasons (April-October) during years 1-3. If drought stress is noted on any of the plantings, the quantity and interval of watering should be increased.

b) Maintenance of the re-vegetation area will occur for a minimum of five years following the final inspection and acceptance of all plantings and until the success criteria are met.

c) Maintenance work shall include the removal of weeds from planting basins, control/removal of invasive non-native plant species, supplemental irrigation, and installation of replacement plantings within the revegetation areas to keep the installed plants in a healthy, growing condition throughout the 5 year establishment and maintenance period.

d) In each spring during Years 1-5, the City, or its designated landscape contractor, shall remove infestations of invasive non-native plant species referenced on the CalIPC Invasive Plant Inventory if they establish within the designated revegetation areas. Species that may be of management concern include English ivy (*Hedera helix)*, thistles (*Carduus sp. and Cirsium sp.)*, Himalaya berry (*Rubus armeniacus)*, cotoneaster (*Cotoneaster sp.)*, periwinkle (*Vinca major)*, French broom (*Genista monspessulanus)*, wild radish (*Raphanus sp.)*, Monterey cypress (*Hesperocyparis macrocarpa)* and acacia (*Acacia spp.)*. All invasive herbaceous plants and shrubs/tree re-sprouts shall be removed, with the root severed approximately 4 inches below the ground surface (at at the trees trunk (i.e., acacia re-sprouts). Site maintenance visits shall be conducted in March, April, May and June wherein non-native plant species shall be controlled and removed. The goal of the maintenance actions will be to substantially reduce the amount of invasive plant species from the revegetation area prior to developing flowering heads and/or a significant infestation within the revegetation area and adjacent riparian areas.

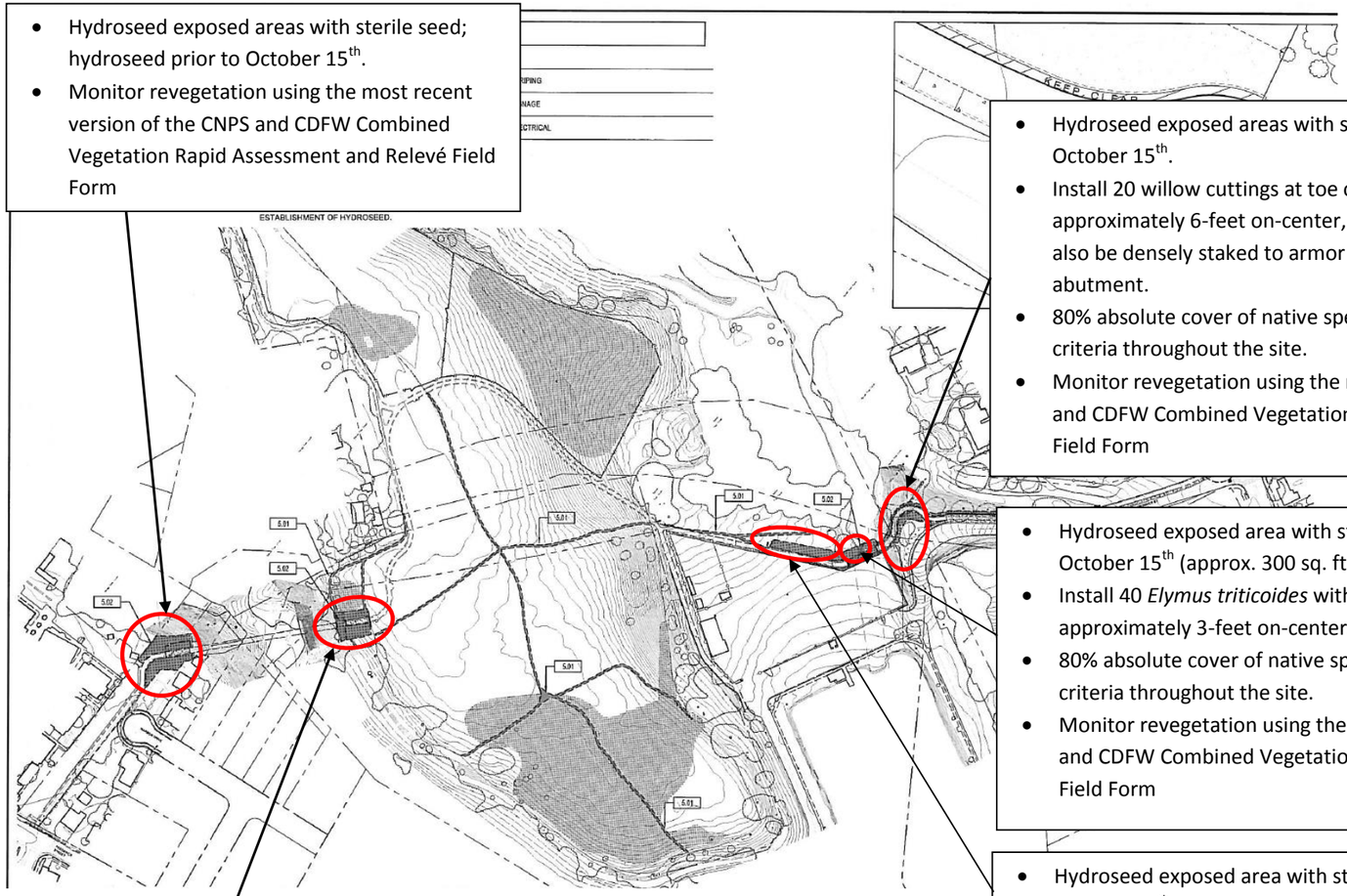
4) MONITORING REQUIREMENTS

a) Erosion on steep slopes will be monitored. In instances when erosion occurs, sterile seeds shall be hand broadcast to the bare soil such that 100 percent ground cover is maintained.

b) Drainage outfalls from project hardscape may need to be mapped and additional monitoring and revegetation strategies may need to be implemented.

c) City, or its designated contractor, shall conduct monitoring of the revegetation areas for a period of 5 years after planting. Monitoring of site conditions shall be conducted each year following plant installation. Between April and October of each monitoring year, all plantings shall be counted and monitored for survival. Other site maintenance and performance conditions shall also be documented, such as debris, trash, or vandalism.
d) During each monitoring year, the City, or its designated contractor, shall photograph the progress of the revegetation using fixed photo-stations and random photos. Plant cover will be sampled using the stand-based rapid assessment technique. Each revegetation area will be considered a stand under this methodology. The most recent version of the *CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form* will be used to record stand attributes, vegetative cover (by stratum), and cover by each species.
e) The project shall be deemed successful if revegetation areas within the riparian corridors, as shown on Exhibit A, achieve:
    i) 80% absolute cover of native species, which includes both planted and naturally regenerating species in the herb and shrub layers (excluding tree cover); and
    ii) Less than 5 percent absolute ground cover consists of Himalayan blackberry, French broom, or other invasive plant species so designated in the most current Cal-IPC database.
f) If the success criteria are not reached in the 5 year timeframe, the City shall continue to maintain and monitor the site until the criteria are met and the California Department of Fish and Wildlife confirms their permit condition has been satisfied.
g) The Project Biologist shall compile all data from site monitoring and incorporate this information into a yearly Monitoring Report. The City shall submit the report to the California Department of Fish and Wildlife by December 31 of each monitoring year. The report shall state whether the project revegetation has been successful in meeting the performance standards and if any remedial measures are required. All documentation for the report shall be submitted in one document.

- Hydroseed exposed areas with sterile seed; hydroseed prior to October 15th.
- Monitor revegetation using the most recent version of the CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form



- Hydroseed exposed areas with sterile seed; hydroseed prior to October 15th.
- Install 20 willow cuttings at toe of slope, staggered design, approximately 6-feet on-center, over 60 linear feet. Willows will also be densely staked to armor the outfall associated with the abutment.
- 80% absolute cover of native species is the central success criteria throughout the site.
- Monitor revegetation using the most recent version of the CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form

- Hydroseed exposed area with sterile seed; hydroseed prior to October 15th (approx. 300 sq. ft.).
- Install 40 *Elymus triticoides* within seeded area; install approximately 3-feet on-center.
- 80% absolute cover of native species is the central success criteria throughout the site.
- Monitor revegetation using the most recent version of the CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form

- Hydroseed exposed areas with sterile seed; hydroseed prior to October 15th (approx. 4,000 sq. ft.).
- Install 6 *Rosa californica* on south side of bridge abutment.
- Monitor revegetation using the most recent version of the CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form

- Hydroseed exposed area with sterile seed; hydroseed prior to October 15th (approx. 1,600 sq. ft.).
- Install three coast live oak trees. Distance from trail will consider mature root growth.
- Install *Elymus triticoides, Artemisia douglasii,* and *Rosa californica* within seeded area; install each species in clumps to form thickets, each clump approximately 20 feet apart and comprised of 3-4 plants (approx.24-32 plants).
- Install *Elymus triticoides* in remaining open area between each clump (approx. 40 plants)
- 80% absolute cover of native species is the central success criteria throughout the site.
- Monitor revegetation using the most recent version of the CNPS and CDFW Combined Vegetation Rapid Assessment and Relevé Field Form

EXHIBIT A. ARANA GULCH MULTI-USE TRAIL RIPARIAN REVEGETATION PLAN

Updated September 30, 2014

Appendix D AMWG Meeting Minutes

Appendix D-1: AMWG Meeting Minutes for:
April 23, 2013
July 16, 2013
March 26, 2014
July 16, 2014
November 4, 2014

Meeting Minutes
Arana Gulch Adaptive Management Working Group
ABC/Tony Hill Room; Santa Cruz Civic Auditorium 307 Church Street Santa Cruz, CA
9-1pm March 26, 2014

Participants:
Susan Bainbridge, Researcher, UC Jepson Herbarium
Mike Ferry, Planner, City of Santa Cruz Dept of Planning and Community Development
Mauro Garcia, Parks Superintendent, City of Santa Cruz
Grey Hayes, Consulting Botanist, CNPS
Kate Huckelbridge, Ecologist, CA Coastal Commission
Tim Hyland, Ecologist, CA State Parks
Suzanne Schettler (CNPS alternate)
Alison Stanton, Research Botanist, Consultant (facilitator)
ON PHONE:
Lena Chang, Biologist, USFWS

ABSENT:
Melissa Farinha, Biologist, CDFW
Kathy Lyons, Biologist, Biotic Resources Group

OBSERVERS:
Jean Brocklebank, FOAG
Debbie Bulger, CNPS
Noah Downing, Planner, City of Santa Cruz Dept of Parks and Recreation
Michael Lewis, FOAG
Richard Stover , FOAG

SUMMARY OF RECOMMENDATIONS AND ACTION ITEMS

The following management recommendations were developed with support from all voting members present:

- **Re-habilitation of the construction road and the volunteer paths**: areas should be allowed to come back passively without any hydro-seeding or scarification. Other rehabilitation measures should address erosion and runoff on steep areas only, or where otherwise minimally necessary. Use weed-free hay bale wattles.

  Action: Mike and Kate will check with Susan Craig to find if this recommendation can be included in the construction plans as a plan revision.

- **Need for hydrological monitoring:** Developing a recommendation to assess potential impacts from the paved trail is within the purview of the AMWG and should be addressed.

- **Livestock water troughs:** add two connector points at one third and two thirds the total distance of the municipal water line extending from Agnes in enclosure C. Add two additional connectors in enclosure A. These points were marked on a map.

  Action: Mauro will coordinate with Chris to get the connectors into the plans

- **2014 mowing:** Two test areas of 100 x 100 feet were identified on a site map to test the timing of mowing. The test areas will be located on the central terrace, south of the east-west trail that is under construction. The first flail mowing of the entire site will occur in late April. One of the test areas will be left un-mowed. A second mowing will occur of the entire site about one month later. The remaining un-mowed test area will be mowed at that time. Volunteers will hand rake and remove biomass in July at four points that have infestations of velvet grass or other invasive species.

  Action: CNPS will coordinate volunteers to remove thatch after the second mowing.

ADDITIONAL ACTION ITEMS

Action: Mauro will check on the status of the website and get a page running within two weeks

Agenda item 7: Alison will send out a doodle poll for availability for a next AMWG meeting in July or August. Primary topics will be the grazing program and woody plant invasion into the grassland.
Action: Re-sampling of the 2013 baseline assessment vegetation transects and installation of photo monitoring was not discussed. Address by email.

Action: Develop recommendation to address herbaceous weed infestations in the grassland by email.

All AMWG process-oriented decisions are addressed within the agenda items below.

AGENDA ITEMS

1. View progress on construction and assess site conditions to inform management recommendations for 2014

The meeting convened at 9am at the Agnes Street entrance to Arana Gulch. It rained the whole time! The group learned about elements of the construction infrastructure including the ribbon stress bridge and how the construction access road was built. The main points of discussion relating to prairie management will be addressed in sections below:

- Re-vegetation of the construction access road and user trails
- Changes in hydrology from the paths and the need for hydrological monitoring
- Water trough placement
- Mowing locations and need to remove thatch
- Herbaceous weed infestations in the grassland
- Woody plant invasion into the grassland

10:30 Meeting re-convened at the Santa Cruz Civic Auditorium

2. Re-cap of July 16 2013 meeting and subsequent actions

The seed bank density assessment proposal was accepted by AMWG (Sue abstained) and funding was approved by City. The 2081 Collecting permit was issued in November 2013 and work completed in December. Analysis will occur sometime this spring. The HMP was approved in September 2013. CDFW determined that a 2081(a) CA Endangered Species Act (CESA) Scientific, Educational, or Management Permit was required. The MOU was issued in January with an effective date through 2023.

Q: Was there hydro monitoring as part of the permit?

No one at the table was familiar enough with the MOU to say definitively. During the field visit there was discussion about the groups concerns over changes in hydrology associated with the paths. The group agreed that the slope near area B around Hagemann Bridge would likely get drier. Most of the rest of the area contained within the main paths on the top of the terrace is flat and likely to experience less change. Note* Hydrological monitoring is NOT mentioned in the permit- Hydro monitoring was not a mitigation measure in the EIR; I checked after the meeting. Potential Hydro impacts were to be addresses in the path design which was completed. In addition, we changed from asphalt paving to permeable concrete during the coastal permit process. – Mike Ferry

Decision: developing a recommendation for **hydrological monitoring** is within the purview of the AMWG and should be addressed.

3. Clarify AMWG decision making process

Decision making process

- There are 7 voting members: CCC, CDFW, USFWS, four technical advisors
- There are three non-voting members: Two from the City of Santa Cruz (Mauro, Mike) and the Facilitator (Alison)
- A meeting quorum includes: two regulatory agencies, two technical advisors, City of Santa Cruz (one), Facilitator

Agency participation

Kate made it clear she will vote in almost all cases. Lena said she can vote but may abstain over any management that could potentially take SCT. Prior to the meeting Melissa told Alison that she was unfamiliar with the MOU and therefore unprepared to discuss how it may or may not affect her ability to vote.

Decision: The group will operate as if there are 6 voting members until we hear from CDFW.
Action: Alison will follow up with Melissa and assess her willingness to participate and vote.

The feeling in the room was that with 6 or 7 voting members we think it is perfectly reasonable to work together on recommendations to obtain unanimous support from those who do not abstain from the decision. We will utilize the gradients of agreement approach to measuring support. However, we are willing to go with a simple majority.

Decision: recommendations can be moved forward to the City with support from four voting members

Out-of-meeting recommendations

Decision: Recommendations can be developed via email. Alison will facilitate. All email discussion of recommendations shall be shared among the entire group. Whole group may decide to delegate recommendation to a subcommittee. Email recommendations must be responded two within two weeks. Lack of response will equal support.

Meeting Minutes

Decision: Alison will distribute minutes and AMWG will have two weeks to comment. All comments received will be incorporated and the minutes will be considered final. Minutes will be posted to the Arana Gulch website.
Action: Mauro will check on the status of the website and get a page running within two weeks

4. Conflict of interest

Mauro handed out guidelines on conflict of interest that he obtained from the City Attorney. There was discussion that the AMWG had already successfully resolved a potential conflict of interest issue over the seed bank density assessment when Sue abstained from the vote.

Decision: Utilize a case by case approach to address conflict of interest. If a member votes to move forward a management recommendation and that vote results in a request to perform work at a later time, the member is not barred from bidding on the work. If the member believes they might be interested in work that might arise as a direct result of the vote they should abstain.

6. Implementation of Grazing Program (agenda item 5 moved to lunch discussion)

Livestock water trough placement

Mauro produced a construction map and explained that the water troughs will be supplied with municipal water lines extending from Agnes Street. The plans showed only one coupling unit near the central connector trail for extending lines into the other grazing enclosures. The AMWG discussed how impacts from cows congregating around troughs can be significant and difficult to reverse. It is much better to have flexibility on where troughs are placed so they may be moved as conditions change.

Recommendation: add two connectors at one third and two thirds the total distance of the line extending from Agnes in enclosure C. Add two additional connectors in enclosure A. These points were marked on a map.

7. Schedule next AMWG meeting in July-August to focus on the Grazing Program

Action: Alison will send out a doodle poll for availability. At that meeting we will meet the selected grazing contractor and here about his operation. We will also discuss woody plant invasion and wed control.

12:00 Break (15 minutes) and lunch delivered

5. 2014 Management recommendations: mowing, baseline assessment, photo monitoring

Re-vegetation of the construction access road and user trails

The construction road and volunteer path rehabilitation measures included on the construction plans are as follows:

> *Sheet PL-1.01 "Planting Plan" (sheet 31 of 32): All areas to be hydro-seeded shall have the top 12" of grade scarified and grades smoothed out in order to assist in establishment of hydro-seed.*

The AMWG discussed this treatment and agreed that this approach would lead to the recruitment of weeds and very few native species. These areas should be allowed to re-establish naturally and this would result in greater productivity and include more native species.

Recommendation: the re-habilitation of the construction road and the volunteer paths should be allowed to come back passively without any hydro-seeding or scarification. Other measures should address erosion and runoff on steep areas only, or where otherwise minimally necessary. Weed-free hay bale wattles should be used for erosion.

Action: Mike and Kate will check with Susan Craig to find if this recommendation can be included in the construction plans as a plan revision.

2014 Mowing

The AMWG discussed that mowing at the site before the start of grazing could take advantage of the drought conditions to reduce the canopy height and biomass and potentially help increase the efficacy of grazing in the near term. Flail mowing chops the pieces small and the smaller pieces can have a fertilizing effect. Smaller pieces can be achieved with multiple passes of the mower.

Mauro said a mowing could begin as soon as it was dry enough. While at the site, the group observed that the ground was not even close to saturated and would dry very quickly from the storm. The City allocated funds to mow the entire site, but not to remove thatch or rake. The AMWG wants to test timing of mowing to help inform the management of the fire break mowing that will continue to occur outside of the fences. Volunteers could be utilized to conduct raking and hand removal of thatch.

The timing of a first mowing should be soon in order to cut off the developing inflorescences of rip gut brome and other dominant non natives. Tim will observe phenology at the site and inform the AMWG about timing. A second mowing could further reduce seed output for the season of some species. To test timing, several patches could be left un-mowed the first time. The size of the test areas needs to be sufficient to accommodate some of the processes on the prairie such as the movement of voles. Voles move seed caches around up to 25 m from their home burrow. Therefore a 100 x 100 ft test area would be appropriate to test mowing timing.

Recommendation: Two test areas of 100 x 100 feet were identified on a site map to test the timing of mowing. The test areas will be located on the central terrace, south of the east-west trail that is under construction. The first flail mowing of the entire site will occur in late April. One of the test areas will be left un-mowed. A second mowing of the entire site will occur about one month later. The remaining un-mowed test area will be mowed at that time. Volunteers will hand rake and remove biomass in July at four points that have infestations of velvet grass or other invasive species. These areas were recorded as dots and were scattered around the meadows in the vicinity of recently documented SCT and on the outskirts of velvet grass, so as to catch the velvet grass invasion front while removing thatch in areas where we might expect to see tarplant germinate. The dots were mapped where the biomass removal would begin; biomass removal should be concentric to those dots and progress as far out from those dots as possible, depending on the available labor.

Action: Coordinate volunteers to remove thatch after the second mowing.

Action: Re-sampling of the 2013 baseline assessment vegetation transects and installation of photo monitoring was not discussed. Address by email.

Action: Address woody plant invasion at next meeting and herbaceous weed control in the grassland.

9. Public comment period

Jean: is concerned about the impacts of the water troughs and the disturbance created by trenching for the water for the live stock troughs. She also is concerned about trampling of the SCT area right now and thinks the area should be fenced off.

1:30 Adjourn meeting

Meeting Minutes
Arana Gulch Adaptive Management Working Group
Planning Conference room 809 Center Street, Room 107 Santa Cruz, CA
9-4 pm July 16, 2014

Participants:
Susan Bainbridge, Researcher, UC Jepson Herbarium
Noah Downing, Planner, City of Santa Cruz Dept of Parks and Recreation
Mike Ferry, Planner, City of Santa Cruz Dept of Planning and Community Development
Mauro Garcia, Parks Superintendent, City of Santa Cruz
Grey Hayes, Consulting Botanist, CNPS
Kate Huckelbridge, Ecologist, CA Coastal Commission
Tim Hyland, Ecologist, CA State Parks
Suzanne Schettler (CNPS alternate)
Alison Stanton, Research Botanist, Consultant (facilitator)
Melissa Farinha, Biologist, CDFW (9-11:30)

OBSERVERS:
Jean Brocklebank, FOAG
Debbie Bulger, CNPS
Michael Lewis, FOAG
Richard Stover , FOAG

SUMMARY OF ACTION ITEMS

Riparian Re-vegetation Plan: ~~The City~~Noah Downing will work with Kathy Lyons to incorporate the recommendations into a modified plan and to submit the plan to Melissa Farinha for written approval. The AMWG will have an opportunity to review the plan pending final approval.

Area C soil salvage: The City will incorporate recommendation in construction plans to thinly spread the top 6" of soil within 20 feet of the mapped boundary of Area C (approximately 3 yards of soil) very thinly throughout the coastal prairie from the northern part of Areas C and D moving southwest across the terrace. The City will also consult with the contractor to spread at least the top 3" of soil N of Area C as thinly as possible in the adjoining grassland to conserve native seedbank from those soils. The results of that consultation will be communicated as soon as possible to the AMWG.

SCT census: Kathy Lyons has counted 3 SCT plants ~~have been counted~~ in the usual spot ~~but the~~and will check shoulder of E-W trail ~~should be closely checked~~ for SCT during the census.

Weed and Woody Plant Removal Recommendations:

- Map Bay Area Early Detection Network and CalIPC priority weeds in all 3 management areas to a level of detail that will inform management.
- ~~Map~~ Delineate the area that will be maintained as grassland
- 1 voting AMWG member will inspect the grassland delineation in the field with the City before finalizing the delineation

~~In addition,~~After the grassland delineation is complete, the AMWG would like cost estimates for the following activities:

- ~~Immediate~~ T~~t~~reatment of perennial pepperweed near the harbor and otherwise in the riparian area and medusahead (if found)
- Woody species removal in mapped grasslands
- Scraping and subsequent herbicide treatment of re-sprouting Himalayan ~~of~~ blackberry ~~on north end of~~within coastal prairie
- Scraping 3 100x 100 ft plots down to bare ground. The AMWG mapped these locations ~~have already been mapped~~ in NE grassland outside of fencing
- Continued spring time flail mowing in ~~unfenced~~ ungrazed areas, including the NE corner and fire breaks

Grazing Program: The City will incorporate recommendations into the Stocking and Work Program Exhibit A that will be part of the professional services contract.

Seed Collection: The City will seek CDFW approval to collect up to 5% of the SCT seeds and work with qualified/approved facility to store these seeds so that they may be used to help recover the population at a later date.

Mowing: The City will provide the AMWG an estimate for fire break mowing and mowing of the coastal prairie areas, including the NE corner, as that cost will be covered by the 20K budgeted for the current fiscal year.

Location of N-S trail: The AMWG reiterated the value of placing the N-S trail as close as possible to the western property boundary to conserve more of the coastal prairie

New AMWG Members: The City and the Coastal Commission will decide on additional AMWG members that may have wildlife and/or rangeland management expertise and advise the group on their selection(s)

Annual Reporting: The City and the Coastal Commission will let the AMWG know about their decision on an annual reporting cycle. The City will send the current year report to the AMWG with sufficient time for their review.

AGENDA ITEMS

1. Propose modifications to the Arana Gulch Multi-Use Trail Riparian Re-vegetation Plan

The meeting convened at 9am at the Harbor entrance to Arana Gulch. The group walked along the fence line of the causeway construction toward Arana Creek to view the hillslope slated for re-vegetation as mapped and described in Exhibit A of the Riparian Re-vegetation Plan. The group discussed modifications to the plan that would improve success criteria and simplify the methods.

10:30 Meeting re-convened at the City Planning Department Conference Room

2. Modifications to the Arana Gulch Multi-Use Trail Riparian Re-vegetation Plan

Recommendations were provided for the following sections of the Plan Notes:

A. General Information

- Include adaptive management as part of the plan

B. Planting Operations

The hillslope slated for re-vegetation at Arana Creek identified in Exhibit A is an erosion concern and the project area is not clearly identified within the orange polygon on the map provided to the AMWG. The planting operations could be simplified as follows with less cost to the City and an increased chance of success:

- pre-irrigate if possible prior to hydro-seeding
- irrigate, if necessary, after planting so that vegetation is well established before onslaught of rains
- utilize a sterile hydroseed mix, rather than the specified native grass and shrub mix to provide quick ground cover
- correct Himalayan blackberry scientific name to *Rubus ~~procerus~~aremeniacus*

- install willow cuttings from local willows
- Maintenance of 80% cover of both planted and naturally regenerating species in the herb and shrub layers (excluding tree cover) is an appropriate success metric. No container stock/division survival criteria is needed
- Map drainage outfalls from project hardscape and create success criteria specific to those specific and especially vulnerable sites.

For the flat areas identified within the green polygons:

- Re-vegetation with divisions of Artemesia douglasii, Rosa californica, and Elymus triticoides instead of container-grown stock of Quercus agriifolia and Ribes sanguineum
- Maintenance of 80% cover of both planted and naturally regenerating species in the herb and shrub layers (excluding tree cover) is an appropriate success metric. No container stock/division survival criteria is needed

C. Maintenance Requirements

- Clearly ~~map~~ delineate all project areas and transects for ease of 3rd party monitoring
- ~~Consider extending~~Extend maintenance period beyond 5 years if success criteria are not met
- Reference the CalIPC Invasive Plant Inventory for weed removal and modify list to correct name of Himalayan blackberry, add Lepidium latifolium, Carpobrotus edulis, and Eucalyptus globulus, and remove genus limitation on "thistles".
- Simplify watering regime requirements to be "as needed"

D. Monitoring Requirements

- Extend monitoring period beyond 5 years if success criteria are not met
- ~~Consider extending monitoring period beyond 5 years~~
- Use % cover as measured with a CNPS rapid assessment or releve method as the~~a~~ success ~~criteria~~ metric
- Monitor for erosion on steep slopes at specific points and require 100% ground cover at these points
- Specify what happens if success criteria are not met within time frame

The City wishes to work with Kathy Lyons to incorporate the above recommendations into a modified plan and to submit the plan to Melissa Farinha for written approval. The AMWG will review the plan prior to final approval.

3. Finalize recommendation for placement of salvaged topsoil from within 20 ft of Area C (discussed after seedbank assessment results)

The group estimated that approximately 3 yards of soil area Area C would qualify under the requirement of the USFWS Biological Opinion for salvage and re-location. The recommendation is:

"Thinly disperse the top 6 inches of soil from around Area C from the northern part of Areas C and D moving southwest across the terrace." One method of doing this is to fill a truck with the soil and use shovels to fling the soil around as the truck moved slowly.

Budget-

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For the fiscal year July 1, 2014 – June 30, 2015, the City has allocated $20,000 to activities specified by the Adaptive Management Working Group, including mowing for firebreak maintenance and experimental treatments. Labor provided by City retained biologist Kathy Lyons is covered under a separate funding source. The AMWG agreed that it needs to consider the range of priorities for that entire year to effectively budget this limited funding.

4. Seed bank assessment and soil study results/ potential for propagation

Sue showed several slides with the results from the seedbank assessment. The soil study results are not yet available. Sue will distribute the results to the group of both when available. Several key points include:

- There was a significant decrease in viable seeds since 2001, both in total number of seeds and seed density, although some viable seeds remain in Areas A and D. No viable seeds were found in areas B & C
- Successful management of the prairie for recruitment of SCT has only occurred a couple of times and in very small area since 1988 and so the SCT seedbank has been lying dormant and aging for 26 years
- Genetic diversity has likely declined.

The group further comments that the flush of ~~coast tarplant~~SCT along the E-W trail was promising and that the area should be closely checked for SCT during the census. The group also discussed the timeline for grazing. Fencing is scheduled to be completed in August/September. Grazing could occur in Nov. (possibly before the end of the construction contract in November). There was general agreement that there is some benefit to getting cows out on the prairie before it rains.

Sue is currently propagating 14 seedlings. The group recommended establishment of an ex situ seed bank from annual collection of 5% of seed, representing as many individuals as possible.

Seed from each individual should be kept separate and stored appropriately until placed in a long term storage facility. It would be good if Kathy Lyons started this year.

After meeting note* From the HMP MOU: "The details of seed collection and ex-situ propagation shall be approved by CDFW in advance in writing".

5. 2014 Baseline assessment results

Alison briefly showed a map of the transect locations that have been installed across the prairie. The mowing damaged most of the re-bar caps so re-location will happen with GPS.

6. Priority weed control recommendation: recommendation for herbaceous and woody plant species removal

The first priority is to map weeds in all 3 management areas to a level of detail that will inform management. ~~and develop a~~A comprehensive weed inventory is also needed but all species do not need to be mapped.. The City will ask Kathy Lyons to do that, and it will not fall under the 20k management budget for the upcoming year. Volunteers ~~from CNPS~~ could be available to help, but a single person produces more reliable results. A clear written record of~~Knowing~~ the survey methodology will be important, ~~especially~~ including the specific paths taken during the survey ~~extent of the survey area~~ and identification of any areas that were inaccessible. Make sure to keep an eye out for the species on the Bay Area Early Detection Network Priority Species List available at: http://www.cal-ipc.org/WMAs/BAEDN/BAEDN_EDRRSpecies2010.pdf

The second priority is to map the area that will be maintained as grassland. The group had lengthy discussion on how to do this that progressed section by section around the entire grassland perimeter. The City will ask Kathy Lyons to do the mapping. Key guidelines include:

- Map the grassland within a 20' buffer of the coastal prairie loop trail. The map will be a GPS route overlay on satellite imagery. There will be some subjectivity~~ely~~ here and the group would like to review the map by having one voting member inspect the areas delineated with the City before finalizing the map.~~.~~
- ~~Exclude~~ For now, do not include the NE section of the prairie that is outside of the fence and trail network as part of grassland area to maintain. To investigate the quality of this grassland and assess future habitat goals~~. -~~scrape 3 100 x 100 plots to bare soil before the first rains this fall. This can be accomplished with hand crews using McClouds to scrape away all biomass but not soil. Feather the removed biomass into adjacent grassland. Also maintain mowing in this area.
- Consider planting and otherwise maintaining the area E of coast loop trail near the intersection with the marsh vista trail as wetland.

- It is not necessary to maintain the area west of the N-S paved trail north of Area C as grassland.

To best allocate limited resources and the 20K budget for FY2015, the AMWG would like cost estimates for the following activities:

- T~~Immediate t~~reatment of perennial pepperweed in the riparian area near the harbor and otherwiseand medusahead (if found)
- Woody species removal in mapped grasslands
- Scraping and subsequent herbicide treatment of re-sprouting Himalayan ~~of~~ blackberry ~~on north end of~~ throughout prairie
- Scraping 3 100x 100 ft plots down to bare ground. The locations have already been mapped in NE grassland outside of fencing
- Continued mowing in unfenced areas

Recommendations were discussed for each of these activities:

Perennial pepperweed : Herbicide treatment of perennial pepper is necessary to prevent re-sprouting. Ideally, this needs to happen now while there is downward translocation going on.

Medusahead: handpull immediately if found.

Blackberry: removal should utilize mechanical equipment to scrape it away and then treat re-sprouts with herbicide. The timing is not crucial and can wait until people have harvested fruit this summer.

Woody plant removal:

Remove all non-native woody species within the mapped grassland.

Remove all coast live oak and coyote bush within the mapped grassland that are less than 8 inches diameter.

Cut ~~trees~~ woody plants and immediately treat stump with herbicide-it's a two person job. The best timing is late spring or early summer for translocation of herbicide through stump. If cutting happens this year, then cut high so the stump can be re-cut and re-treated next year. Blow the chips into the adjacent oak woodland. If the chipper will be impeded by the fence then do treatment this winter. Any chips landing on grassland shall be removed.

In January propane torch ~~cotoneaster~~ woody seedlings that emerge.

7. Implementation of Grazing Program

The group reviewed the handout with language from both the HMP Grazing Program in section 3.7and the Stocking and Work Program Exhibit A that will be part of the professional services contract. Recommendations are as follows:

- Describe the AMWG and the AM process so the Grazer understands he will be receiving recommendations from the group and may need to interact directly with the AMWG
- Include specific goals and objectives for SCT and the coastal prairie from the HMP
- Specify 1x per month communication between City and Grazer
- Specify an annual meeting in August to review the objectives and form a plan for the following year
- Refer to the National Range and Pasture Handbook (NRCS 2003) for guidelines on best management practices (BMPs)

A further discussion ensued about how grazing will be implemented and how it will be received by the public. Several issues were raised regarding difficult dog- cow interactions and that cows will eventually get loose. Several recommendations were made:

- Make sure there is signage on the site that lists the name and phone # of a person to contact
- Provide information on importance of leashing dogs to protect against injury from livestock
- Include information on the grazing plan and objectives on the website-get materials from Sheila Barry on grazing and public outreach- the AMWG would like to review the language
- Moving cows across the E-W trail poses a safety risk and impediment to cyclists and trail users. Consider installing gates that can block access when open.
- Consider periodic press releases from the City on the grazing program and other management activities
- Consider allowing human access in fenced areas when cows are gone- agenda item for next meeting.

8. Addition of new members to AMWG

Kate explained that she has been looking for an academic to add to the group. Everyone agreed that additional expertise in wildlife or riparian restoration would benefit the group. There is social science research that indicates that 10-15 members provide an optimal size for a decision-making group and therefore we may want to add several members.

UC CoopExt is hiring a new certified range manager (CRM) for the region. Having that person as a formal member of our group is free and could make a lot of resources available. In addition that person would presumably be involved with the management of other SCT populations and so could provide cross pollination of sorts with additional land managers. Sheila Barry has been in the position and will know who gets hired and when so we should stay in contact with her in order to issue an invitation before the workload gets huge.

9. Public comment period

The public was allowed to provide input throughout the meeting. During the reserved period, the main issue raised was that the website needs improvement and a clear and effective mechanism to receive public comment such as a form for interactive communication.

10. Debrief and objectives and outcomes and next AMWG meeting

Alison briefly re-capped the actions items listed above and then re-requested discussion of timing for the next AMWG meeting and agenda items.

AMWG meeting timing: Meeting 3x per year seems adequate. Next meeting should be in November to prioritize tasks for last 6 months of FY2015. A meeting in Jan-Feb will focus on management actions/budget needs for FY2016.

AMWG Agenda: Add standing agenda item for a "time of learning" to discuss how recommendations are being implemented, what worked well, what needs improvement, and how we can continue to adaptively manage most effectively.

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Reporting: The CDP require annual reporting of the HMP implementation. The AMWG needs to review this report and needs to identity a plan for review process. . The group discussed that the initial implementation date of the HMP should be the start of the reporting year, but it was unclear when that implementation date would be.

4:00 Adjourn meeting

DRAFT Meeting Minutes

Arana Gulch Adaptive Management Working Group

Louden Nelson Community Center, Room 4 301 Center Street Santa Cruz, CA

9-2 pm November 4, 2014

Participants:
Grey Hayes, Consulting Botanist, CNPS
Kate Huckelbridge, Ecologist, CA Coastal Commission
Tim Hyland, Ecologist, CA State Parks
Kathy Lyons, Biotic Resources Group
Suzanne Schettler (CNPS alternate)
Alison Stanton, Research Botanist, Facilitator
Noah Downing, Planner, City of Santa Cruz Dept of Parks and Recreation
Mike Ferry, Planner, City of Santa Cruz Dept of Planning and Community Development
Mauro Garcia, Parks Superintendent, City of Santa Cruz

ABSEBNT:
Melissa Farinha, Biologist, CDFW
Susan Bainbridge, Researcher, UC Jepson Herbarium
Lena Chang, USFWS

OBSERVERS: Jean Brocklebank and Michael Lewis, FOAG; Richard Stover, CNPS

SUMMARY OF ACTION ITEMS (*REQUIRES IMMEDIATE ACTION)

New AMWG Members: Sheila Barry, the UC Cooperative Extension Livestock and Natural Resource Advisor has agreed to serve on the AMWG. The AMWG now wishes to prioritize the addition of a member with wildlife expertise. The Coastal Commission will have responsibility for finding qualified candidates and making a final selection in consultation with the City.

CCC Reporting Cycle: The City is preparing a Draft compliance report for calendar year 2014 and will submit it to the AMWG in December for review. Alison will summarize HMP reporting requirements on one page. AMWG will have 2 weeks to submit comments to the CCC in track changes. Kate will compile the comments and send the City a single comment package. The target due date for final approval is late January, subject to change.

Current Budgeting: The City will update the "Expenditure Report for Fiscal Years 2013-2015" to make sure it is correct and complete.

SCT census: Kathy Lyons conducted repeated searches for SCT in previously occupied habitat on the following corrected dates: 7/11,7/23, 7/29, 9/2, 9/15, 9/20, 10/2. Only 4 SCT were observed

in Area A. No SCT were observed along the shoulder of the new graded E-W path. Kathy will modify the census procedure to record GPS tracks of her survey path and include search time for all dates. She will also GPS the extant of the coast tarplant (Deinandra corymbosa) on the E-W bike trail.

***Area C soil salvage:** Before the next rain, Kathy Lyons will map the boundaries of the two areas where the salvaged top soil was placed and measure soil depth at multiple locations using a transect approach. These areas will be included in the monitoring efforts in the upcoming year.

Scrape plots: The City will install 6ft T-posts in one corner of each of the 3 50 x 50 ft scrape plots in the NE corner of the prairie. These plots will be included in monitoring efforts in the upcoming year.

Grassland delineation: Tim will inspect the grassland delineation in the field with the City before any removal. Kathy Lyons will finalize the map after the fences are installed.

***Woody plant removal:** The project will be split into two. Removal of woody plants within the fenced areas will occur in November. Removal of all marked woody plants outside the fences will occur in spring (May) as a single mechanical removal and cut stump herbicide application.

***Arana Gulch webpage:** Alison incorporated recommended changes to the template and is providing it with these minutes. The City will notify the AMWG by email when the page is updated.

***Grazing contract:** Noah will strike the first sentence of item 5 in the Stocking and Work Program and modify Section 3 of the professional services contract to make payment and fees flexible. Noah will keep the AMWG updated on contract negotiations. An AMWG member or qualified City staff should inspect any hay purchase that will be used at the site.

***Grazing public outreach strategy:**

- Noah will put Grey in touch with Arron Becker to get the database of contact info for the neighbors surrounding Arana.
- Grey will organize a community meeting to have a meet and greet with the grazer and provide education on the grazing program. Flyers will be developed as part of this effort.
- Noah will develop a simplified interpretative sign on cattle/human/ dog interactions to be approved by the AMWG and then installed on fencing.
- The City will determine if the Park Ranger Office is available 24/7 and will update the website immediately with grazing information and accurate contact information.

Budget FY 2016: The AMWG will continue to develop the list of priority management actions for funding consideration and will make a recommendation to the City at the meeting in January.

***Next AMWG meeting:** Please respond to poll with availability in late January- the 27th or 28th look best so far. Noah will bring all necessary maps in large scale.

AGENDA ITEM DETAIL

1. **Addition of new members to AMWG**

Sheila Barry is the UC Cooperative Extension Livestock and Natural Resource Advisor for the SF Bay Area. Sheila is a Certified Rangeland Manager and has agreed to serve on the AMWG until Deevii Rao takes the same position to cover Santa Cruz, Monterey, and San Benito Counties. Kate or Alison will request that Sheila review the grazing outreach strategy very soon. The quorum will need to be modified for the January meeting and as new members join.

Grey mentioned that NRCS has provided pro bono grazing consultations in the other places. The AMWG would like to make adding a wildlife specialist the next membership priority.

2. **CCC reporting**

The City has asked Kathy Lyons to prepare a draft monitoring report to meet the requirements of the HMP. Alison will provide a one page summary of HMP requirements. Calendar year 2014 will be Year One. Draft report will be available in December. The AMWG will have a two week comment period. Comments will be submitted to Kate in track changes in Word and should exclude grammatical errors or re-arrangements. Suggestions for inserted text is best included in comment boxes. Kate will compile all comments from the AMWG and CCC staff into a single package for the City. The target for approval is Late January.

The CCC acknowledges that this first review cycle will need to be flexible and that the due date may change or be extended significantly. The report is approved by CCC staff only, not the Coastal Commission.

3. **Implementation of AMWG recommendations**

a. Budget allocation for FY2014-15

- The City will update the "Expenditure Report for Fiscal Years 2013-2015" to make sure it is correct and complete.

- Members thought that $4,500 for perimeter mowing seems exorbitant and would like more information on why it is so expensive.

The group would like to see a scope of work for the Social Trail Closure and provided several recommendations:

- use zigzag cables rather than split rail fencing for deterrence
- apply sterile hydroseed mix only on steep areas, such as near harbor
- do not disc compacted trails- this could eliminate the small number of native grasses that occur only on the trail margins
- the $10,000 price tag can be reduced with the above suggestions

b. Hear Kathy Lyons report on E-W bike road shoulder survey: see action item above

c. monitoring methodology for Area C topsoil salvage and 3 scraped areas

The salvaged topsoil from Area C was spread contrary to the AMWG recommendation because construction materials and heavy equipment were in the way. The top 6" of soil was removed with an excavator and a skiploader, shaken off the bucket, and hand-raked to a depth of 1" or 1 ½'. Kathy did not measure the depth. The AMWG requested that she map the boundaries of the two areas where the salvaged top soil was placed and measure soil depth at multiple locations using a transect approach. These areas will be included in the monitoring efforts in the upcoming year and the map and methods of the salvage will be in the monitoring report.

The AMWG learned that the contractor refused to allocate the time necessary to load the soil into a pickup and spread the soil across a broader area by hand with a shovel and viewed it as an extra outside of the contract. Therefore, the AMWG was really too late to make such a recommendation. In the future, the AMWG may want to see some scopes of work for recommended work before it is contracted, if this is possible.

The City will install 6ft T-posts in ~~one~~ the northern most corner of each of the 3 50 x 50 ft. scrape plots in the NE corner of the prairie. These plots should be included in monitoring efforts in the upcoming year with point transects. Some thought the plot size was too small, but not everyone agreed.

d. grassland delineation and plan for woody plant removal

Kathy will finalize the delineation after the fence install. Tim agreed to walk the site with Noah soon to look at the trees that were recently marked for removal as part of the delineation. The group decided that it was most efficient to split the project into two phases.

Phase 1: Jimmy Smith will remove woody plants, including cotoneaster, blackberry, coyote bush and live oak inside the fencing. The group learned that Jimmy Smith generally does not submit

written bids and that the scope of work is a verbal agreement. As such, the AMWG would like the City to provide the following guidance on Phase 1:

- All equipment needs to be free of mud to prevent spread of Sudden Oak Death.
- Apply treatment within fence and for an additional 3 feet out.
- Cut as close to ground as possible- there will be no cut stump follow up since cows will presumably keep them low
- All material is hauled off site.
- Minimize soil disturbance
- Limb large trees no higher than 7 ft.
- Cut beyond the branch collar when limbing oaks.

Phase 2: Woody Plant removal outside of the fencing will occur in spring, just as the soil is beginning to dry (often in May). The treatment will include mechanical and hand removal, followed immediately with a painted herbicide application on the cut stump. A new contractor will need to be hired because Jimmy Smith is not a licensed applicator.

Phase 1 will cost less, but Phase 2 could cost more and together they might exceed the $8,000 estimate.

e. Seedbank assessment and soil analysis- Sue was not able to attend, follow-up by email.

10:30 Break

4. **Arana Gulch Webpage**

Alison developed a template for the webpage for review at the meeting. The group made additional comments and rather than listing them here the revised template is included with this agenda. Better quality photos are needed. Alison can provide some but the City may solicit more from the AMWG.

The group spent time on learning some of the design and communication constraints imposed by the structure of the City of Santa Cruz website and recognized that the Arana page is but one of many. Mauro explained that public comment from the webpage must go to the general address parksandrec@cityofsantacruz.com and that is viewed by administration and then routed to the appropriate staff. This sentence of explanation will be added to the webpage.

One discussion centered on the ability of the City to post to the Parks and Rec Dept. Facebook page and Twitter account and to link announcements on the webpage page to both these social media. Mauro can send items to Scott Collins to post on the Dept. social media, but items sent for posting on the City of Santa Cruz social media accounts are competing with many things and might not get posted.

12:00- 12:30 lunch break (provided)

12:30-2:00

5. **Grazing program**

The City has given Tommy Williams the Stocking and Work Program and a contract but there is no deal yet and the negotiations have just started. Noah gave an overview of a recent site visit with Tommy where some potential deal breaking items emerged: use of hay to condition cows, use of dogs to herd, and use of a pick-up for fence inspection. The bottom line was that Tommy is expecting to expend a lot of effort for only a few cows, almost no profit and possibly a loss.

Everyone present agreed that starting grazing as soon as possible is imperative. There was strong agreement that Tommy Williams is the right person for the job and that the City cannot let a grazing contract fall through and should take necessary steps to make the job more profitable and alleviate his concerns as much as possible.

A discussion ensued about the use of hay, vehicles, and dogs. The group made a recommendation in July to not allow hay on site because of the risk of spreading weeds. Certified "weed free forage" is not readily available in this area and is only required to be free of particular noxious weed species (CDFA A and B list sp.), so it often contains many other invasive species. Alfalfa or wheat hay are better alternatives, but are often expensive. The City may want to offer to buy the hay. The AMWG would like any hay to be inspected by a member or by qualified City Staff before purchase to ensure it is free of weeds. This step will moderate the concern over weeds and all agreed that the group should reverse its recommendation and allow use of hay. This year quality hay cost $16/bale, and will likely be more in the future.

The AMWG made the following recommendations for the near term grazing effort:

- Noah will strike the first sentence of item 5 in the Stocking and Work Program and modify Section 3 of the professional services contract to make payment and fees flexible.
- Noah will keep the AMWG regularly updated on grazing contract negotiations.
- The grazer should document the location of water troughs, feed stations, and salt blocks on a map.
- A reasonable storage solution needs to be developed for the pieces of plywood that will be placed on the permeable bike paths sections before driving across or herding cows. One option is attaching them to the gates.
- If the City cannot find a reasonable storage solution for the plywood, then consider replacing the crossing sections with solid concrete.

Grazing outreach strategy

The objective of the group was to recommend to the City a strategy for reaching out to the immediate neighbors in advance of the start of grazing and dealing with public comments and reaction once it starts. Given that the group wants grazing to begin as soon as possible in December, **the following strategy needs to be implemented immediately.**

The first step is to obtain the database of contact information for the surrounding neighbors from Aaron Becker, the PR point for the Dept of Parks and Rec.

The AMWG recommends the following 7 point strategy:

- Develop a flyer to mail to the target group
- Modify the EBRP informational sign on cattle/dog/ human interaction and install on fences
- Schedule a neighborhood meeting to have a meet and greet with the selected grazer and introduce grazing operations (Grey volunteered to do this-thank you!)
- Make sure there is number for people to call to report livestock injury or escape or other issues that is available 24/7. This # is listed on the fence signs and webpage.
- Update the Arana Gulch webpage with information about upcoming grazing and include a form for reporting incidents and/or comments in a specific format.
- Emphasize dogs in all outreach. Specifically that "your dog may be harmed are even killed by livestock if not kept on leash."
- Emphasize success of City in improving SF popcorn flower and Ohlone Tiger beetle in Moore Creek with a similar grazing operation.

In addition to the broad target group, other entities require specialized outreach about what to do if and when a cow ends up on their property:

- The Harbor (an escaped cow if likely to head down and towards water).
- Neighbors with an adjacent fence
- The City Ranger's office- if it is available 24/7 and will be receiving calls about grazing

The AMWG viewed the EBRP informational sign and made several recommendations about content:

- Less words
- No technical words (6^{th} grade reading level)
- Bigger emphasis on dogs

- Mention benefit to SCT

The incident report form on the website should include specific fields to help people provide useful information.

- Location of incident
- Description of cow including coloring and ear tag # if possible
- Look for template

2:00 The group agreed to cancel the optional site visit due to low attendance and extend the meeting for an extra half hour to cover the remaining agenda items and make up for the late start.

2:00 -2:30

6. Identify management actions and prioritize budget needs for FY2016

The group agreed that there was insufficient time or information available to address this item fully. The main missing information is the complete list of budget items that the group will need to prioritize in January. Because the FY begins July 1, any spring work needs to be considered separately.

Spring work in FY 2015

- April baseline monitoring
- AMWG facilitation
- Continued weed mapping
- Priority weed control
- Woody plant removal and cut stump application
- Perimeter fuel break mowing ($4,500 is exorbitant)

There were questions about how things are funded:

- Special reporting required for USFWS?
- grazing outreach strategy
- weed management outside of fences

7. Debriefing of objectives and outcomes and timing for next AMWG meeting

The next meeting will happen in January. Please fill out the poll with availability.

8. Public comment period

2:30 Adjourn meeting