Habitat Restoration for Grassland-Dependent Birds in the San Marcos Foothills Preserve *(amended)*

Recipient: The Bay Foundation
Project Period: 01/28/2019 – 04/30/2022
Award Amount: $64,539.73
Matching Contributions: $53,866.29
Project Number: #8006.19.063566

Summary of Accomplishments

This report is to describe the overall results of three years of funding granted to us by the National Fish and Wildlife Foundation (NFWF) given to restore native vegetation for grassland-dependent birds, in the San Marcos Foothills Preserve (SMFP or Preserve), by supporting growth and regeneration of the native grasses, soil, and water cycle. Forty-five acres was proposed for restoration of native perennial grassland that supports insects, small, medium, and large mammals, reptiles, birds of prey and songbirds. Specifically, the objectives are to increase the presence of grasshopper sparrow, lark sparrow, western meadowlark, burrowing owl, white-tailed kite and loggerhead shrike and other grassland dependent species.

To have a high and more ecologically based impact on the non-native grasses, we implemented a sheep grazing program with Cuyama Lamb, sheep grazers based in Maricopa Ventura County. Sheep, compared to goats, are relatively lightweight and do not eat the roots of the plants. In comparison, cows are heavy and consequently, compact the ground which damages plants and contributes to soil degradation. The grazing and trampling as the sheep moved through the pastures, proved to show success and we are encouraged to continue the use of this method in the grassland restoration in the foothills. In 2019, Channel Islands Restoration (CIR) published a Grassland Restoration Plan (Gevirtz 2019). The goals of the plan include increased cover of native grasses and native wildflowers, and increased use of the grasslands by birds that are dependent upon them. During the grant term, three annual bird surveys were carried out in 2019, 2020, 2021 (Gevirtz and Mulroy). The primary goal of this project is to restore the grassland habitat, and in the process, restore populations of grassland-dependent birds to the greatest extent possible. The map in Figure 1 shows the vegetation community of the Preserve (not including the West Mesa, which is now protected for restoration).

Concurrent to this NFWF funding was also a matching partner grant, between CIR, United States Fish and Wildlife Service (FWS), and the County of Santa Barbara. With these two funding sources, CIR was able to implement its grassland restoration plan. The support from NFWF has run for three years, beginning in 2019

and continuing to 2021. As will be described in more detail, this method for restoration, by sheep grazing and trampling, did show, by the end of the three-year term, that our hope and hypotheses had been worth following. The grazing was used to reduce the growth and seed drop of nonnative invasive plant species, and we were glad that these results did occur. Furthermore, knowing that the perennial grasses would recover more easily than the annual grasses, the trampling would help break down the thatch that restricts light to native grass seedlings. Based on this we hoped to see a recovery of the annual native grass, *Stipa pulchra* (purple needlegrass) which did prove to be the case as well as an increase in native annual forbs such as *Dichelostemma capitatum ssp. capitatum* (blue dicks) and *Calandrinia menziesii* (red maids). In order to track the efficacy and either beneficial or nonbeneficial results of the grazing, monitoring plots had been established in 2018. Monitoring data included: plot number; coordinates; percent vegetative cover; percent bare ground; percent relative cover of each species present; depth of thatch; soil moisture; and number of mammal burrows. These were then consolidated into annual tables for review.

Even in 2019, the first year of the grant term, we knew that increased weather unpredictability could play a part in the findings and we did find that there is reason to mention some impact from climate conditions such as drought. For example, 2021 was one of the driest years in Santa Barbara in a century. Nevertheless, there was enough green grass to bring the sheep on to the Preserve, for a shorter amount of time than in the years previously, but still possible for one session. That year we grazed 145 ewe-lamb pairs between March 7 and an additional 150 dry ewes/yearlings until April 7. This was over 57 acres of grassland on the Preserve. We observed less thatch, which can be beneficial to soil moisture and temperature, in the grazed area which may be due in part to the grazing, and in part to the extended drought. Nevertheless, less thatch can act as one of the desired results as this is expected, due to greater sunlight, to make more space for establishment of native grasses and wildflowers. By February 2022, which is post the grant period, but should be mentioned, as it was in great part because of this grant, observations were made of a healthy and diverse mix of native annual and perennial forbs and herbaceous native plants listed in this report.

In 2018, pastures and monitoring were set up as the restoration plan was being written. Those pastures are shown in Figures 2, 3, 4, and represent the grazing patterns of each year and the data attached. Table A below shows the planned grazing seasons as written into the restoration plan, and compiled data summary of actual grazing during the grant term is shown in Table B. This comparison shows that we met and exceeded our goal of 45-acres by over 10-acres.

Project Activities & Outcomes

Grazing Final Report

The tables below show that by, 2021, we did reach our acreage goal of grazed grassland. During the grant term, changes of maturity in the sheep put into the pastures were based upon advice from Cuyama Lamb. This summary from the 2019 annual report describes findings that support what we have been finding at the end of 2021 and the beginning of 2022; that there is a good recovery and natural spread of *S. pulchra* because of grazing. Also, the grazing seems to have had at least two positive effects including 1) a reduction in the depth of thatch in some pastures cells and 2) increased growth and seed production of *S. pulchra*. The evidence of increased growth and seed production is that in summer 2019, we observed individual *S. pulchra* plants that had been grazed, were green and produced a second set of seeds. These contrasted with adjacent *S. pulchra*

plants that had not been grazed (because they were excluded from grazing by temporary fencing), and they were brown and not did not have a second set of seeds. The substantial amount of rain in 2019 may have contributed to the growth and seed production, but we think that the grazing was a significant contributing factor.

Table 1. Planned Annual Grazing Schedule of the CDFW-OSPR-NFWF Grant (2019-2021).

Grazing Period	Timing	Ewes	Ewe/Lamb Pairs	Acres	Acres/Day	Days
Winter 2019	January 15-30 (unlikely due to timing constraints)	350	0	45	3	15
Spring 2019	March 1-30	0	350	45	4	12
Winter 2020	December 2020/Jan 2021	350	0	45	3	15
Spring 2020	March 1-30	0	350	45	4	12
Winter 2020/2021	December 1, 2020-Jan 30, 2021	350	0	45	3	15

Table 2. Actual Grazing Data Over the Grant Term.

Grazing Period	Total Grazing Days	Ewes	Ewe Lamb Pairs	Ewes & Yearlings	# of Pastures Grazed	Avg. Acres/ Pasture	Avg. Days/ Pasture	Avg. Acres/Day	Total Acres
2019	29	145	-	150	20	1.4	1.5	1	27
2020	63	-	200	-	14	3.5	1.2	3.4	53.1
2021	61	-	145	150	35	1.9	2.1	0.9	57.6

Grazing Future Plans

We have one more year of funding under the FWS Partner Grant with which we hope to do more grazing this fall. This is based upon our question on whether fall grazing will reduce thatch, protect native wildflowers, and produce conditions that are more favorable to colonization by native grassland plants. Concurrently, we will actively seek more funding to continue the work, including from grant programs such as for fire resiliency. Combat of the Cave Fire in 2020 which burned over 4300 Acres in the foothills was supported by the reduction of vegetative fuel from the dry nonnative oats and brome. Monitoring of grazing will also continue to be adjusted to adapt to ecological changes observed in ground and in the air. To support the grazing in our Integrated Pest Management (IPM), we will continue to use herbicide and hand removal where needed or necessary, but only in seasons out with or removed from grazing and extremely targeted.

Seed Collection and Planting – Final Report

In 2019, we collected seeds of *S. pulchra* on the Preserve, processed them, and stored them at our native plant nursery. In 2020, we brought the seeds back to the Preserve and scattered them in 30 experimental plots that we had first cleared of vegetation, exposing bare soil. Each plot is approximately 100 square feet (10

feet x 10 feet). These plots are due north of the northerly terminus of Cocopah Drive, near the intersection of the main north-south road and the trail that comes from the east, originating at Antone Road. After scattering the seeds in each plot, CIR staff and volunteers stomped them into the ground. The Cave Fire went through the Preserve a few days later. These seeded plots did not burn. It rained shortly after the fire burned through the Preserve. In early 2022, we have been seeing increased presence of *S. pulchra* in that area and it is reasonable to assume that this is a result of the seeding and removal of thatch and overstory from the nonnative grasses. A photo of CIR staff finding *S. pulchra* in the nonnative grasses, being cleared for planting is shown in Figure 12.

S. pulchra seeds were collected every year and spread in the one following. In 2021 a plant palette was designed for the County Restoration Area on the East Mesa of the Preserve. It was chosen and based upon findings of what plants we found the sheep had left whilst grazing and the work to grow the density of *S. pulchra.* Up until the start of 2022, work had been slowed by Covid 19 related circumstance but has now resumed in full and making progress. A total of 550 plants have been installed over the month of February 2022 by CIR crew members and volunteers as shown in photographs in Figure 11.

- 500 *Stipa pulchra* (purple needlegrass) (500) 2" plugs tip
- 25 *Asclepias fascicularis* (narrowleaf milkweed), (25) one-gallon pots
- 15 *Calystegia macrostegia* (coastal morning glory) (15) one-gallon pots
- 10 *Pseudognaphalium californicum*, (California cudweed) (10) one-gallon pots

The overall planting area north of the Cocopah Gate, descends from a mature oak grove, south down a sloping meadow and ends above an arroyo on the south boundary. To the west the meadow drops off into another steep drainage, To the east a public trail makes a natural boundary. The map in Figure 5 shows this planting area (marked in green) and its location to the 'guzzler' (marked as a blue point) which provided irrigation and is described below. Also on this map is an area of densely planted *A. fascicularis.* There is a noticeable difference in vegetation in the east and west portions of this meadow like an axis. The east side of this axis is covered in nonnative dicots and grasses. Few native species can be found as they are being out competed by these faster growing annual invasive plants. The west side of the meadow axis is much different. This whole area was grazed in the single season during 2021. An area of approximately 70 ft x 120 ft. was drawn out for planting. Flagged within that perimeter, were self-seeded natives such as *Artemisia californica (coastal sage)* and *Hazardia squarosa* (sawtooth goldenbush). These were protected to continue natural native revegetation. From February 9th- 11th, three volunteer days were organized for planting the 550 native species in the plant palette. Over three days, CIR crew members supported 15 volunteers ensuring Best Management Practices (BMPs) on planting and sharing education of how we monitor the grazing program for evidence of the success and what is needed from here to continue the successful rehabilitation of the native grasslands.

Seed Collection and Planting – Future Plans

Seed collected in 2021, though limited, has been preserved and been spread in March 2022. At this time, no planting is planned until at least the late Fall of 2022, dependent on rain. However, we are focusing on the self-propagation of the *S. pulchra* which seems to have been strengthened significantly from the three years of grazing. Photos below show CIR staff identifying *S.pulchra* in the nonnative grasses at such a frequency that

the new monitoring plan was deemed important to implement immediately. The other indicator plant species used in this survey is *Dipterostemon capitatus* ssp. *capitatus* (blue dicks) which we also found to be plentiful in comparison to recent years. At this time this survey is concentrated on the west mesa and described in more detail further on in this report.

Irrigation for Planting – Final Report

In August 2021, we found a solution that meant we were able to buy a 500-gallon Wildlife Watering System (guzzler), placed on the East Mesa, above the planting area which would serve ongoing as a water source for wildlife and in the short term, also for irrigation to the new area of plantings, grown from local seed stock to support the natural native revegetation observed in the grazed areas. This was made possible by using a CIR water truck to replenish the guzzler during time of initial irrigation needed for establishment as well as providing drinking water for wildlife.

Work to put the guzzler in place was left until later into winter 2021 when the ground was softer to dig. Heavier rains than usual in December and January postponed that work until late January 2022. The guzzler placement hole was dug 1000 feet from the planting site at a 100ft vertical foot grade and irrigation pipe in place for gravity fed watering of the planting install. It is in shade under mature *Quercus agrifolia* (live oaks). CIR will maintain the 7200 square foot area by weeding and irrigating as needed over a two-year period. Maintenance will also include trucking in water and filling up the wildlife guzzler and maintaining the camera. We anticipate, potentially, weekly filling of the guzzle and thereby provide weekly watering to the planting area. At this point we are watering via the truck over an hour but will be able to water more gradually over a longer period once the guzzler is installed. This should reduce point source evaporation in the planting area considerably. Weekly Monitoring will help us decide when to begin to wean the plant establishment from irrigation by decreasing the frequency of the watering. We expect the plants to need only monthly watering when seasonal rains begin.

Weeding during the plant establishment period will be by hand around the plantings and by weed whacker in the margins. With competition decreased and water, we hope that the natives will continue respond as vigorously. Breaking the reproduction cycle of the weeds in the planting area should allow the natives to naturally reproduce and further capitalize on the reduced competition.

Irrigation for Planting – Future Plans

At this time there are no plans for more irrigation supply than we have installed with the guzzler as we do not have the need. However, we will be monitoring the guzzler for animal safety, water quality, and observations on how much natural capture is gained and in which seasons. This will be done by an installation of a game camera and field monitors.

Vegetation Monitoring – Final Report

In 2018, prior to this funding form NFWF, twenty-nine permanent vegetation monitoring plots were established by CIR, to establish a baseline of vegetative conditions in the grasslands. The plots were used to

measure changes following restoration actions, progress toward achievement of restoration goals, and measuring progress toward satisfaction of performance criteria.

The criteria that were used to determine the locations of the monitoring plots were based on a goal of having four grassland plots: three nonnative, one native. This was reflective of overall native versus nonnative grass density and species dominance; 1. *Stipa pulchra (purple needlegrass)*, 2. *Bromus diandrus* (ripgut brome), 3. *Avena barbata* (slender oat), 4. *Avena fatua* (common wild oat) and within both open sun and shaded oak areas. The center point of each plot is a t-post that remains in the ground. A 15-foot radius around each post encompasses the area of each 706 square foot plot. Vegetation and abiotic baseline data were recorded, and photographs were taken at each plot. Monitoring of these plots continued through 2022, and more funding to continue grazing and monitoring will be sought immediately to continue this into the future years.

At this time, we have reason to ask if the sheep grazing should be conducted in the fall/winter, as opposed to early spring when the wildflowers are trying to make their debut. A second wave of grazing post-wildflower flush could be an additional option, to try to control the non-native invasive species as we must consider the effectiveness of grazing upon preventing nonnatives dropping seed. We will be continuing more research on which season is most effective to graze or if there should be alternating sessions. By January 2022, we observed natural revegetation of native wildflowers and shrubs including *C.menziesii; Erigeron canadensis* (horseweed)*; Ambrosia psilostachya* (western ragweed)*; Oxalis Pilosa* (hairy wood sorrel)*; Lupinus sparsiflorus* (Coulters lupine)*; Lupinus succulentus* (arroyo lupine); *Lepidium nitidium* (shining pepperweed)*; Solanum xanti* (purple nightshade)*; P.californicum; A.californica; Baccharis pilularis* (coyote bush) and *S. pulchra* showing a successful equation of grazing with restoration of native plant species, despite having been grazed along with the nonnatives. Some photos of the native forbs taken in early 2022 are included in Figure 8.

Vegetation Monitoring Future Plans

We will continue to use the established vegetation plots to monitor successful germination as we establish the more complex Quadrat map designed. Monitoring in 2022 has begun on the newly acquired West Mesa for observations and coverage tracking of native wildflower cover and species. Map in Figure 6 shows clearly how much research data has already begun on the West Mesa. The map shows a layer of 50 x 50-meter quadrants that cover the entire SMFP, including the new 150-Acres of the West Mesa. Field Crew and volunteers input data via the ArcGIS Collector which serves as both data collection and navigation around the site and work. An example of the data gathered using quadrants A1 – C7, as an example in Figure 7, shows the beginning of data being gathered from the quadrats shown on the Map.

The monitoring is carried out in part by CIR crew and where appropriate in a weekly volunteer program. We plan to extend this into the County Restoration Area (East Mesa) and currently seeking funding for this and the research on the West Mesa.

Bird Monitoring Final Report

The overall purpose of this grant was to restore native vegetation for grassland-dependent birds, in the San Marcos Foothills Preserve. The complete bird monitoring tables, from 2019 to 2021, are included in Tables 4-7. Since 2021 was the last year in the term, an excerpt from the 2021 Annual Report is included here as the final report narrative.

“Over the course of the four surveys conducted in 2021, a total of 61 bird species were recorded in the Preserve. Fifteen species observed in the 2020 survey effort were not observed during 2021 surveys: Allen’s hummingbird, warbling vireo, common raven, tree swallow, violet-green swallow, barn swallow, ruby-crowned kinglet, house wren, dark-eyed junco, Nashville warbler, black-throated gray warbler, Townsend’s warbler, hermit warbler, Wilson’s warbler, and lazuli bunting. Of these, only house wren and dark-eyed junco, were classified as probable breeders during 2020, with the rest having an unknown status or thought to be migrants and/or wintering birds.

Seven additional species were observed during 2021 surveys that were not observed in 2020: Loggerhead shrike, western bluebird, European starling, cedar waxwing, scaly-breasted munia, Lawrence’s goldfinch, and lark sparrow. Of these, only Lawrence’s goldfinch was not observed during 2019 surveys. None of these 7 species was assessed as a probable breeder in the Preserve in 2021.

Of the 61 species observed during the 2021 survey, 22 were observed utilizing grassland habitats within the Preserve for foraging or nesting. Of these, we documented direct evidence of breeding or attempted breeding for three species: American kestrel, ash-throated flycatcher, and phainopepla. White-tailed kites were observed during surveys and were presumed to have nested in their normal nest site near Cieneguitas Creek, though the area was not surveyed, and we did not document juvenile white-tailed kites during our surveys. Similarly, red-tailed hawks have multiple nest sites in and around the Preserve, and juveniles were observed during surveys. Red-tailed hawks forage in grassland areas within the Preserve. Many additional species were considered probable breeders in or adjacent to grassland areas of the Preserve, including mourning dove, greater roadrunner, wrentit, blue-gray gnatcatcher, northern mockingbird, house finch, lesser goldfinch, song sparrow, rufous-crowned sparrow, and common yellowthroat. For two species, western bluebird, and red-winged blackbird, it seems possible that breeding occurred on the Preserve. Both were observed in the April and May surveys but not in subsequent surveys. Nonbreeding grassland/open habitat dependent birds observed during surveys included northern harrier [California Species of Special Concern (CSSC)– breeding], savannah sparrow, lark sparrow, and loggerhead shrike, all wintering and/or transient birds.

Grasshopper sparrows (CSSC - breeding) and western burrowing owls (CSSC) have been recorded on the Preserve within the past 20 years but were not recorded during 2019, 2020, or 2021 breeding season surveys. It remains possible that one or both species could be present as a wintering species on the Preserve. Night-time surveys were not conducted; however, it is probable that barn owl, great-horned owl, and screech owl also hunt for prey in the grasslands on the Preserve. eBird.org has credible observations of each species in SMFP during 2020.

In addition to grasslands, the Preserve contains oak woodland, woodland-riparian, coastal sage scrub, and chaparral habitats that support a variety of additional bird species. The data can be viewed as individual checklists on the eBird website. All verified bird breeding observations were submitted to the Santa Barbara County Breeding Bird Study, and can be viewed online (Gevirtz 2021).

In late February 2022, two western meadowlarks were, potentially, seen at ground level, flushed and flew on to ground approximately 50 feet further away. This is an exciting prospect and makes continued financial

backing even more vital to be able to fund continued monitoring and restoration of the grasslands.

Table 4. Bird Surveys Conducted in 2019-2021. Frequency less in 2020 & 2021 due to Covid 19 conditions.

Survey Date	Surveyors	Duration	Conditions
4/19/2019	M. Mulroy, E. Gevirtz	3 hr 20 min	Foggy becoming overcast, 58 F, little to no wind
4/28/2019	M. Mulroy	3 hr 30 min	Overcast/foggy with light drizzle/mist for entire survey, 55-60 F, calm
5/6/2019	M. Mulroy	2 hr 22 min	Overcast with some light rain, 55-60 F, calm, rain cut survey short
5/13/2019	M. Mulroy	4 hr 1 min	Overcast, ~60 F, calm
5/21/2019	M. Mulroy	4 hr 46 min	Cloudy, becoming sunny and windy by midday, mid 50s to mid 60s
5/27/2019	M. Mulroy	3 hr 19 min	Sunny, 60 F, light to moderate breeze
6/3/2019	M. Mulroy	3 hr 34 min	Overcast, ~60 F
6/30/2019	M. Mulroy	2 hr 59 min	Sunny, warm (70s), calm to mildly breezy
7/10/2019	M. Mulroy	3 hr 16 min	Calm, sunny
7/16/2019	M. Mulroy, H. Roodjenris	3 hr 18 min	Sunny, warm, high 60s-70s, low wind
7/23/2019	M. Mulroy, E. Gevirtz	2 hr 38 min	Mostly sunny, warm, mid 60s to 70F
3/27/2020	M. Mulroy, E. Gevirtz	3 hr 43 min	Sunny, calm, becoming breezy toward midday, 55-65 F
4/20/2020	M. Mulroy	4 hr 7 min	Partly overcast becoming mostly sunny, 60s to low 70s, mostly calm
5/25/2020	M. Mulroy, E. Gevirtz	4 hr 23 min	Mostly sunny, cool becoming warm (up to high 70s), calm
6/30/2020	M. Mulroy	3 hr 39 min	Sunny, calm, warm (up to mid 70s)
4/11/2021	M. Mulroy, E. Gevirtz	3 hr 55 min	Foggy becoming partly cloudy, high 50s to low 60s, calm
5/9/2021	M. Mulroy, E. Gevirtz	2 hr 59 min	Sunny, 60s to low 70s
6/10/2021	M. Mulroy	4 hr 10 min	Sunny, low 60s to low 70s
7/13/2021	M. Mulroy, E. Gevirtz	2 hr 51 min	Sunny, calm to slightly breezy, 60s to 70s

Table 5. Bird Monitoring Data from April-July 2019.

Species Observed	2019 Breeding Status	Comments
California Quail	Confirmed breeding	nest with 9 eggs found 5/13/19. Quails with chicks observed on subsequent surveys
Band-tailed Pigeon	unknown	None
Eurasian Collared-Dove	unknown	None
Mourning Dove	breeder	common throughout Preserve, often seen in pairs. A nest with eggs was observed on the ground in spring 2018.
Greater Roadrunner	unknown	probable resident
White-throated Swift	unknown	no known suitable nesting habitat on Preserve. Occasionally observed foraging.

Species Observed	2019 Breeding Status	Comments
Anna's Hummingbird	Probable breeder	territorial females observed
Allen's Hummingbird	probable breeder	None
Costa's Hummingbird	unknown	None
Western Gull	incidental	flyover
Turkey Vulture	unknown	None
White-tailed Kite	Confirmed breeding	at least 2 juveniles fledged from known nest location
Northern Harrier	wintering/migration	
American Kestrel	Confirmed breeding	fledglings observed 6/3/19 and on subsequent surveys
Great Blue Heron	incidental	flyover
Cooper's Hawk	unknown	commonly observed. Observed adult with likely juvenile in Preserve but unable to confirm
Red-tailed Hawk	Confirmed breeding	nest with nestlings observed April 29 and on subsequent visits
Red-shouldered Hawk	unknown	observed occasionally during surveys
Lewis's Woodpecker	wintering	None
Acorn Woodpecker	Probable breeder	resident
Nuttall's Woodpecker	Confirmed breeding	nest with nestlings observed 5/13/19
Northern Flicker	Probable breeder	consistently observed during surveys
Hairy Woodpecker	unknown	consistently observed foraging
Black Phoebe	unknown	None
Say's Phoebe	unknown	consistently observed foraging
Cassin's Kingbird	unknown	consistently observed
Pacific-slope Flycatcher	Probable breeder	summer resident in wooded areas of Preserve
Ash-throated Flycatcher	Probable breeder	commonly observed summer resident
Western Kingbird	migrant	None
Western Wood-Pewee	unknown	None
Willow Flycatcher	migrant	single migrants observed 5/21 and 5/27/19
Loggerhead Shrike	migrant	migrants observed beginning 6/30/19

Species Observed	2019 Breeding Status	Comments
Hutton's Vireo	probable breeder	observed in suitable woodland breeding habitat
Warbling Vireo	unknown	possible migrant observed 5/21/19
California Scrub-Jay	Probable breeder	common resident
American Crow	unknown	None
Common Raven	unknown	family group of 5 observed on Preserve, but nest location unknown
Barn Swallow	unknown	None
Cliff Swallow	unknown	no known suitable nesting habitat on Preserve. Commonly observed foraging.
Oak Titmouse	Probable breeder	common resident
Bushtit	Probable breeder	common resident
White-breasted Nuthatch	Probable breeder	consistently observed during surveys
House Wren	Confirmed breeding	nest with nestlings observed 5/13/19
Bewick's Wren	Probable breeder	consistently observed during surveys
Blue-gray Gnatcatcher	Confirmed breeding	observed nest-building 5/27/19
Wrentit	Probable breeder	common resident
Western Bluebird	Probable breeder	pair consistently observed in suitable habitat
California Thrasher	Probable breeder	common resident, singing males observed during surveys
Northern Mockingbird	Probable breeder	common resident with established territories throughout Preserve
European Starling	unknown	None
Phainopepla	Confirmed breeding	adult feeding fledgling 5/6/19
House Finch	Probable breeder	consistently observed during surveys
Lesser Goldfinch	Confirmed breeding	food delivery to nestlings 5/6/19
Lark Sparrow	probable migrant	observed once during 4/19/19 survey
Song Sparrow	Confirmed breeding	observed nest-building 5/21/19
California Towhee	Probable breeder	common resident
Rufous-crowned Sparrow	Confirmed breeding	common resident. Observed 3 juveniles with 2 adults 6/3/19
Spotted Towhee	Probable breeder	common resident. Independent juveniles observed in Preserve.
Dark-eyed Junco	Probable breeder	resident in wooded areas of Preserve

Species Observed	2019 Breeding Status	Comments
Hooded Oriole	unknown	None
Brown-headed Cowbird	unknown	None
Orange-crowned Warbler	Probable breeder	Singing males observed during surveys
Common Yellowthroat	Probable breeder	common resident
Wilson's Warbler	migrant	likely migrant observed 5/21/19
Western Tanager	migrant	likely migrant observed 5/21/19
Black-headed Grosbeak	unknown	flyover
Scaly-breasted Munia	unknown	Groups observed foraging

Table 6. Bird Monitoring Data from March-June 2020.

Species Observed	2020 Breeding Status	Comments
California quail	Probable breeder	Observed on all surveys, M/F pairs observed 3/27/20
Band-tailed pigeon	Unknown	Observed on all surveys
Mourning dove	Probable breeder	Abundant, observed on all surveys, pairs frequently observed
Eurasian collared-dove	unknown	Observed from Cieneguitas Creek drainage on two surveys
Anna's hummingbird	Probable breeder	Common in Preserve, females and males observed on all surveys
Rufous/Allen's hummingbird	Unknown	Presumably Allen’s hummingbirds, observed along Cieneguitas Creek
Greater roadrunner	Probable breeder	Territorial coo-ing calls heard from Atascadero and Cieneguitas Creek drainages
white-throated swift	Unknown	Observed foraging on west side of Preserve on 3 of 4 surveys
Vaux's swift	Migrant	20 + observed 4/20/20
White-tailed kite	Confirmed breeding	Pair observed consistently at Cieneguitas Creek nesting area
Northern harrier	Wintering/migrant	None
Cooper's hawk	Probable breeder	Juvenile observed 6/30/20. Breeding locally, possibly within Preserve boundaries
Red-tailed hawk	unknown	No confirmed nest locations within Preserve

		boundaries. 2 juveniles observed 6/30/20.
Red-shouldered hawk	Unknown	None
Turkey vulture	Unknown	None
Acorn woodpecker	Confirmed breeding	Confirmed breeding location along Atascadero Creek drainage. Occupied nest cavity with young.
Nuttall's woodpecker	Probable breeder	Commonly observed year-round resident.
Hairy woodpecker	Unknown	None
Northern flicker	Confirmed breeding	Confirmed breeding location along Atascadero Creek drainage. Occupied nest cavity with young.
American kestrel	Probable breeder	Likely family group observed in oak savannah habitat 6/30/20.
Pacific-slope flycatcher	Probable breeder	Likely breeder in riparian/woodland corridors
Black phoebe	unknown	None
Say's phoebe	Probable breeder	Adult with 2 juveniles observed 5/20/20, singing bird observed 4/20/20.
Ash-throated flycatcher	Probable breeder	Commonly observed summer resident
Cassin's kingbird	Unknown	None
Western kingbird	Migrant	None
Hutton's vireo	Probable breeder	None
Warbling vireo	Migrant	Silent birds observed 4/20/20
California scrub-jay	Probable breeder	Commonly observed year-round resident
American crow	Unknown	Commonly observed, particularly abundant at east end of preserve
Common raven	Unknown	2 observed 6/30/20
Oak titmouse	Probable breeder	Commonly observed year-round resident
Tree swallow	Migrant	Observed ~10 on 3/27/20
Violet-green swallow	Unknown	None
Barn swallow	Unknown	None
Cliff swallow	Unknown	None
Bushtit	Probable breeder	Abundant, observed on all surveys
Wrentit	Probable breeder	Common resident throughout Preserve
Ruby-crowned kinglet	Wintering/migration	None

White-breasted nuthatch	Probable breeder	Commonly observed year-round resident
Blue-gray gnatcatcher	Probable breeder	Observed on all surveys
House wren	Probable breeder	None
Bewick's wren	Probable breeder	Commonly observed year-round resident.
California thrasher	Probable breeder	None
Northern mockingbird	Probable breeder	None
Phainopepla	Probable breeder	Summer resident, probably bred in or near Preserve
House finch	Probable breeder	Common, observed on 3 of 4 surveys
Lesser goldfinch	Probable breeder	Abundant, observed during all surveys
Dark-eyed junco	Probable breeder	Heard singing 6/30/20 in oak woodland near Antone Rd. entrance
White-crowned sparrow	Wintering/migration	None
Golden-crowned Sparrow	Wintering/migration	None
Savannah sparrow	Wintering/migration	None
Song Sparrow	Probable breeder	Common along Cieneguitas and Atascadero Creek
Lincoln's sparrow	Wintering/migration	None
California Towhee	Probable breeder	None
Rufous-crowned Sparrow	Confirmed breeder	Lone juvenile observed 6/30/20, presumed to have fledged from nest within Preserve.
Spotted Towhee	Probable breeder	Common throughout Preserve
Hooded oriole	Unknown	None
Red-winged Blackbird	Probable breeder	10+ singing males along with females observed.
Orange-crowned Warbler	Probable breeder	Singing birds heard during first 3 surveys in riparian woodland areas.
Nashville warbler	Migrant	Observed 4/20/20
Common Yellowthroat	Probable breeder	Abundant along Cieneguitas and Atascadero Creek drainages.
Black-throated gray warbler	Migrant	Observed 4/20/20
Townsend's warbler	Wintering/migration	None
Hermit warbler	Migrant	Observed 4/20/20
Wilson's Warbler	Unknown	Singing bird heard along Atascadero Creek

		4/20/20
Black-headed grosbeak	Migrant	silent
Lazuli bunting	Migrant	20+ observed 4/20/20, not observed on other surveys.
Yellow-rumped Warbler	Wintering/migration	None

Table 7. Bird Monitoring Data from April-July 2021. *Species in bold were observed breeding or foraging in grassland areas on at least one survey.*

Species Observed	**2021 Breeding Status**	**Comments**
California quail	Probable breeder	None
Band-tailed pigeon	Unknown	None
Mourning dove	Probable breeder	East mesa and oak grasslands. Observed 40+ in oak grassland 7/13/21
Eurasian collared-dove	unknown	None
Anna's hummingbird	Probable breeder	Common in Preserve, females and males observed on all surveys
Greater roadrunner	Probable breeder	Observed in oak grassland 6/10/21
White-throated swift	Unknown	Observed foraging on west side of Preserve on 3 of 4 surveys
Vaux's swift	Migrant	None
White-tailed kite	Known breeding	Primarily east mesa, foraging over Preserve grasslands and adjacent open areas
Northern harrier	Wintering/migrant	None
Cooper's hawk	Probable breeder	Juvenile observed 7/13/21 along Atascadero Creek
Red-tailed hawk	Known breeding	Observed around all grassland areas.
Red-shouldered hawk	Unknown	None
Turkey vulture	Unknown	None
Acorn woodpecker	Probable breeder	None
Nuttall's woodpecker	Probable breeder	Commonly observed year-round resident.
Hairy woodpecker	Unknown	None
Northern flicker	Probable breeder	None
American kestrel	Confirmed breeding	oak grassland and east mesa. Confirmed breeding location along Atascadero Creek

Species Observed	2021 Breeding Status	Comments
Pacific-slope flycatcher	Probable breeder	Likely breeder in riparian/woodland corridors
Black phoebe	unknown	None
Say's phoebe	Unknown	Seen/heard from east mesa, 4/11 and 5/9/21
Ash-throated flycatcher	Confirmed breeding	oak grassland, east mesa. Confirmed breeding location in oak grassland
Cassin's kingbird	Unknown	east mesa, observed calling/foraging during all surveys
Western kingbird	Migrant/Possible local breeder	Possible breeding pair seen 6/10/21 at east mesa. Migrants observed 4/11/21 and 5/9/21 east mesa.
Hutton's vireo	Confirmed breeding	Active nest observed on 6/10/21
Loggerhead shrike	Migrant	Single observation at east mesa 7/13/21
California scrub-jay	Probable breeder	Commonly observed year-round resident
American crow	Unknown	Commonly observed year-round resident
Oak titmouse	Probable breeder	Commonly observed year round resident
Cliff swallow	Unknown	Commonly observed foraging above grassland areas
Bushtit	Probable breeder	Abundant, observed on all surveys
Wrentit	Probable breeder	Common resident throughout Preserve, possible breeder in mustard patch, west mesa
White-breasted nuthatch	Probable breeder	Year-round resident, observed on all surveys
Blue-gray gnatcatcher	Probable breeder	Observed on all surveys; oak grassland
Bewick's wren	Probable breeder	Commonly observed year-round resident.
European starling	Unknown	None
California thrasher	Probable breeder	Year-round resident
Northern mockingbird	Probable breeder	Observed on all surveys in oak grassland
Western bluebird	Possible breeder	2+ observed in oak grassland 4/11 and 5/9/21
Cedar waxwing	Migrant	None
Phainopepla	Confirmed nest attempt	Observed on all surveys. Male observed nest building accompanied by female on 6/10/21. 8+ observed in oak grassland 5/9/21.
Scaly-breasted munia	unknown	None
House finch	Probable breeder	Abundant, observed during all surveys; oak grassland and east mesa

Species Observed	2021 Breeding Status	Comments
Lesser goldfinch	Probable breeder	Common, observed during all surveys; oak grassland
Lawrence's goldfinch	Unknown	Observed 4+ foraging on 4/11/21, oak grassland and east mesa
Lark sparrow	Migrant	Observed 3+ in oak grassland 4/11/21
White-crowned sparrow	Wintering/migration	None
Golden-crowned Sparrow	Wintering/migration	None
Savannah sparrow	Wintering/migration	East Mesa, 10 observed during 4/11/21 survey
Song Sparrow	Probable breeder	Observed on all surveys. Likely breeder in mustard on west mesa
Lincoln's sparrow	Wintering/migration	Observed 1 on 4/11/21, east mesa
California Towhee	Probable breeder	None
Rufous-crowned Sparrow	Probable breeder	Probable breeder in or adjacent to oak grassland and/or east mesa
Spotted Towhee	Probable breeder	None
Hooded oriole	Unknown	None
Red-winged Blackbird	Possible breeder	West mesa, 7 males observed 4/11/21, ~10 individuals total observed 5/9/21
Orange-crowned Warbler	Probable breeder	None
Common Yellowthroat	Probable breeder	Likely breeder in mustard patch at west mesa
Black-headed grosbeak	Possible breeder	Pair observed 6/10/21, male singing
Yellow-rumped Warbler	Wintering/migration	None

Bird Monitoring Future Plans

The extensive and thorough documentation of the birds using the SMFP from 2019 to 2021 contains a large amount to review, consider and base further research upon. Time is needed for this and will be given to the new Ecologist at CIR, who is graduating with a Masters degree in Ecological Restoration Management from the Bren School at the University of California Santa Barbara and a specialty in Ornithology. CIR Executive Director, Ken Owen, will also be guiding this and has already been implementing the new vegetation monitoring program as mentioned below in 'Outcomes'.

With remaining partner funds, and new funding currently being sought, we will continue to monitor annual bird breeding, migration and habitat surveys, focusing on the grassland areas within the Preserve and bird

populations' responses to grassland restoration activities in the Preserve. A survey effort for wintering grassland birds, as well as owl surveys, would be beneficial to document avian use of the Preserve more fully. In the same way that volunteers will be able to take part in plant surveys, we hope the same will be the case for birds, soil, and mammals.

As a result of observations and data collected that may indicate predation from barn or great horned owls, we have decided to postpone installing habitat boxes until we determine that it would still be safe to attract burrowing owls to the Preserve.

Outcomes Since the Grant Term Began

Channel Islands Restoration has been restoring native perineal grassland and conducting grassland restoration experiments on the SMFP since 2019. Although our restoration work during the grant term has centered on restoration on the Preserve, CIR is now part owner and manages the 101-acres parcel known as the "West Mesa" that is adjacent to the Preserve and that was saved from development in 2021 by a coalition of community groups that included CIR. These groups raised 18.6 million dollars in just over 90 days and purchased the property from the owners, just weeks before development of luxury houses would have begun on the property. The West Mesa will be conveyed to the County of Santa Barbara in 2022 for inclusion with the SMFP, making 301 acres of contiguous, protected nature preserve and open space. CIR plans to continue grassland restoration experiments on the SMFP, and now with the addition of the West Mesa, we will have 150 acres of grassland to restore for the benefit of wildlife. These 301 acres preserve will present us with a laboratory to conduct even more grassland restoration on an even larger scale, which will contribute to scientific knowledge of grassland restoration science in Southern California.

Conclusion

By the end of the grant period, overall, the native plant species seemed to have responded well to the guided sheep grazing. Nonnative weed species are still prevalent but the vegetative coverage monitoring shows that this has been reduced and there is an increase in *S. pulchra* and the other grassland plant species listed in this report. Use of the grassland as habitat for year-round and migratory birds is also continuing to show good results. We have to consider the now frequent weather uncertainties and out of season conditions. This is a time of adaptive management and, an advantage of the grazing method is its flexibility.

The funding we are now seeking is to, essentially, continue the work of the last three years and the years previous to that which led up to the structure of this program. It will continue to be based upon the initial 2019 Restoration Plan and the principles as well as updating from what has been learnt since it was written. The goals will be consistent, and among them, the purpose of this grant, habitat restoration for grassland-dependent birds, and the overall effort to restore the grasslands of California.

Project Photos

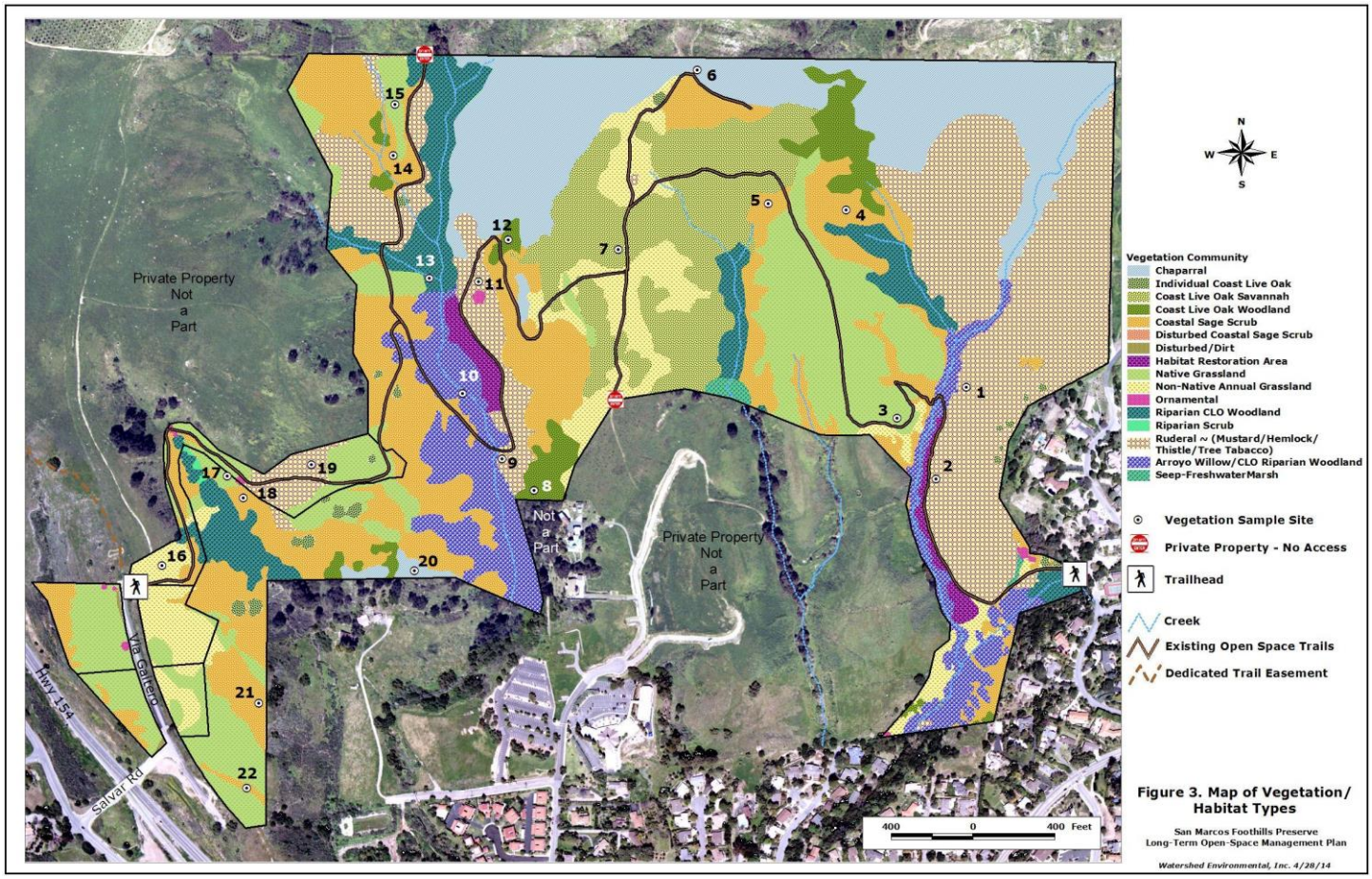


Figure 1. Map of Vegetation and Habitat types on Preserve.

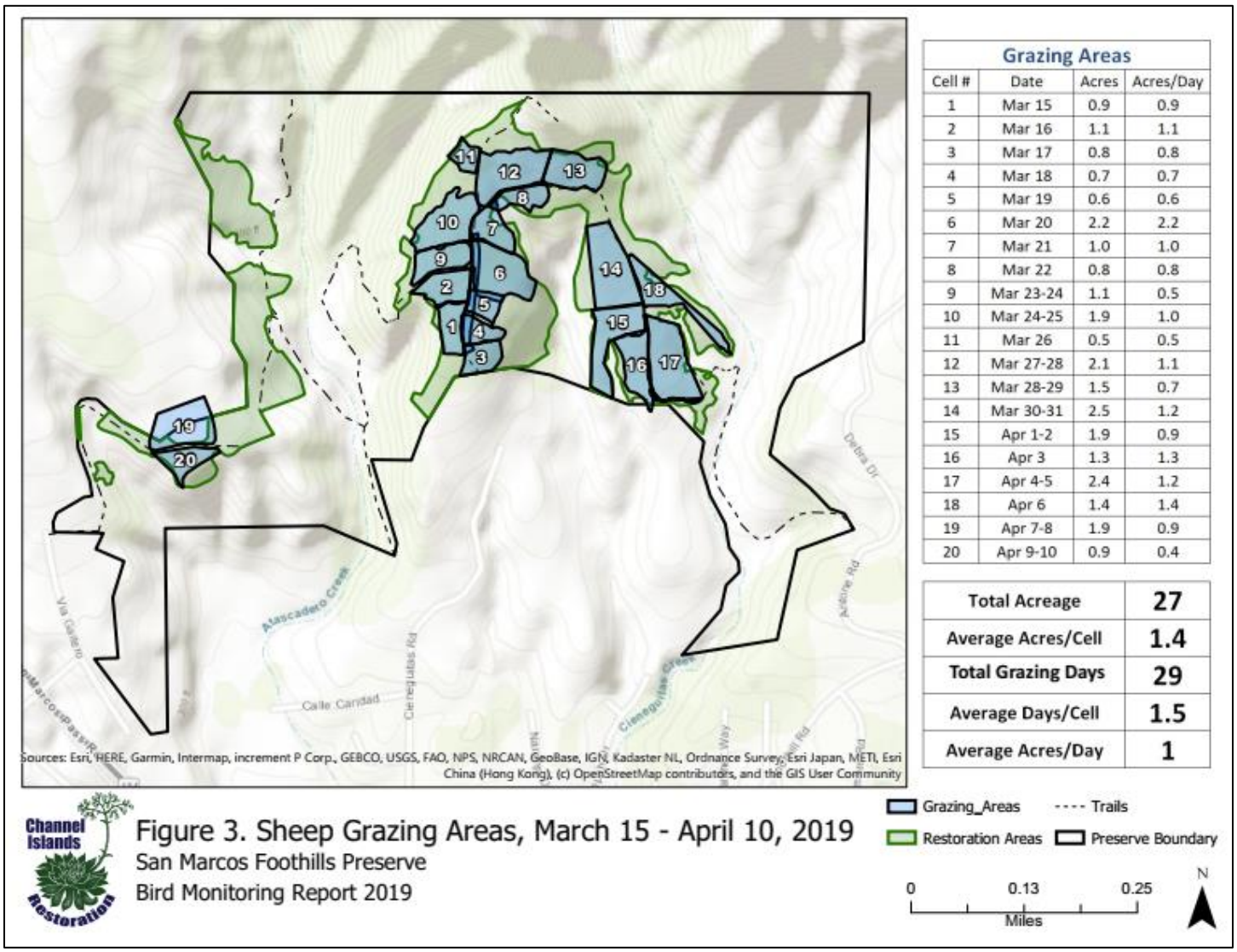
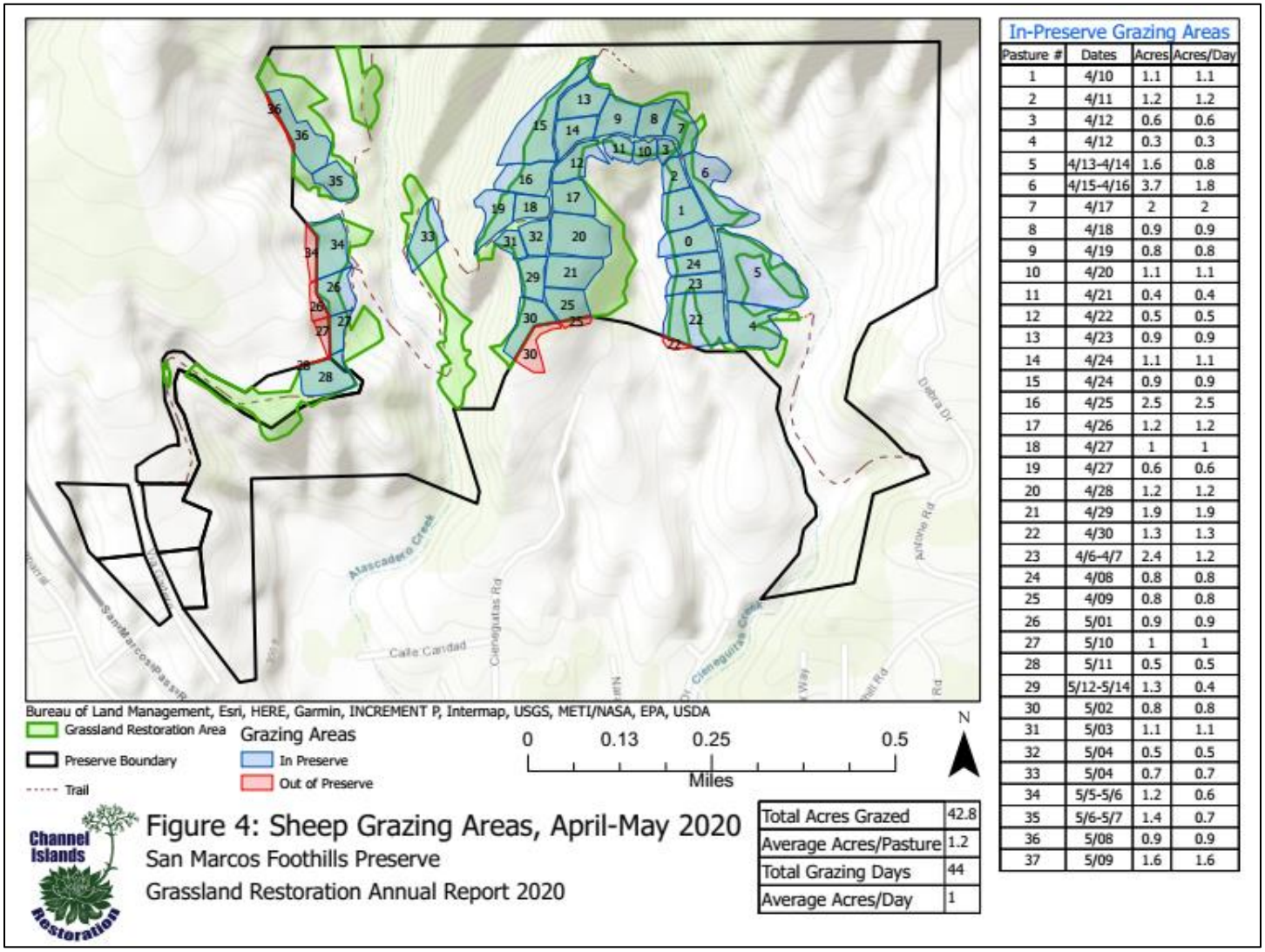


Figure 2. Map of sheep grazing areas during March – April 2019.



In-Preserve Grazing Areas

Pasture #	Dates	Acres	Acres/Day
1	4/10	1.1	1.1
2	4/11	1.2	1.2
3	4/12	0.6	0.6
4	4/12	0.3	0.3
5	4/13-4/14	1.6	0.8
6	4/15-4/16	3.7	1.8
7	4/17	2	2
8	4/18	0.9	0.9
9	4/19	0.8	0.8
10	4/20	1.1	1.1
11	4/21	0.4	0.4
12	4/22	0.5	0.5
13	4/23	0.9	0.9
14	4/24	1.1	1.1
15	4/24	0.9	0.9
16	4/25	2.5	2.5
17	4/26	1.2	1.2
18	4/27	1	1
19	4/27	0.6	0.6
20	4/28	1.2	1.2
21	4/29	1.9	1.9
22	4/30	1.3	1.3
23	4/6-4/7	2.4	1.2
24	4/08	0.8	0.8
25	4/09	0.8	0.8
26	5/01	0.9	0.9
27	5/10	1	1
28	5/11	0.5	0.5
29	5/12-5/14	1.3	0.4
30	5/02	0.8	0.8
31	5/03	1.1	1.1
32	5/04	0.5	0.5
33	5/04	0.7	0.7
34	5/5-5/6	1.2	0.6
35	5/6-5/7	1.4	0.7
36	5/08	0.9	0.9
37	5/09	1.6	1.6

Figure 3. Map of sheep grazing areas during April – May 2020.

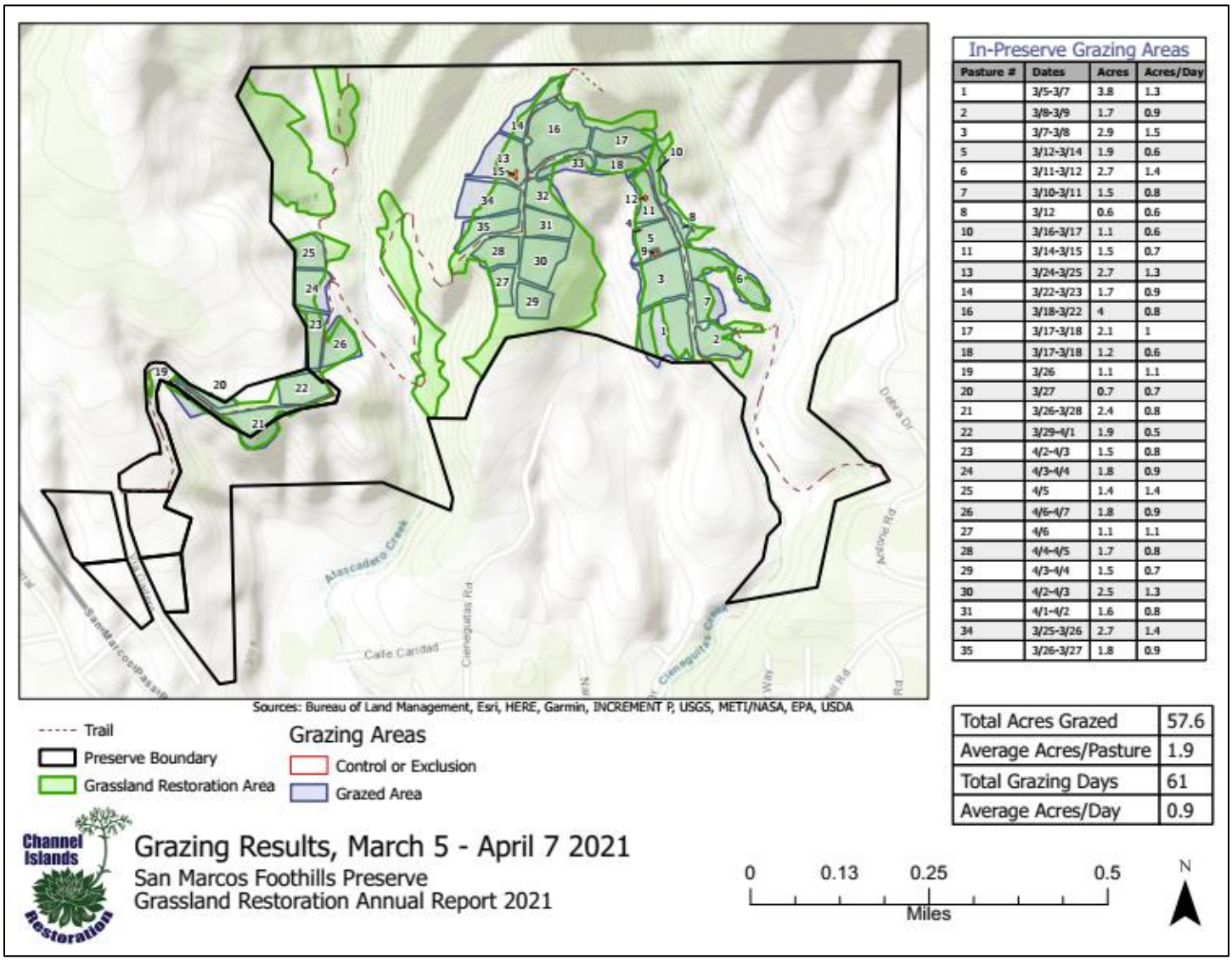


Figure 4. Map of sheep grazing areas during March – April 2021.

Figure 5. Map of grassland planting area within restoration area.

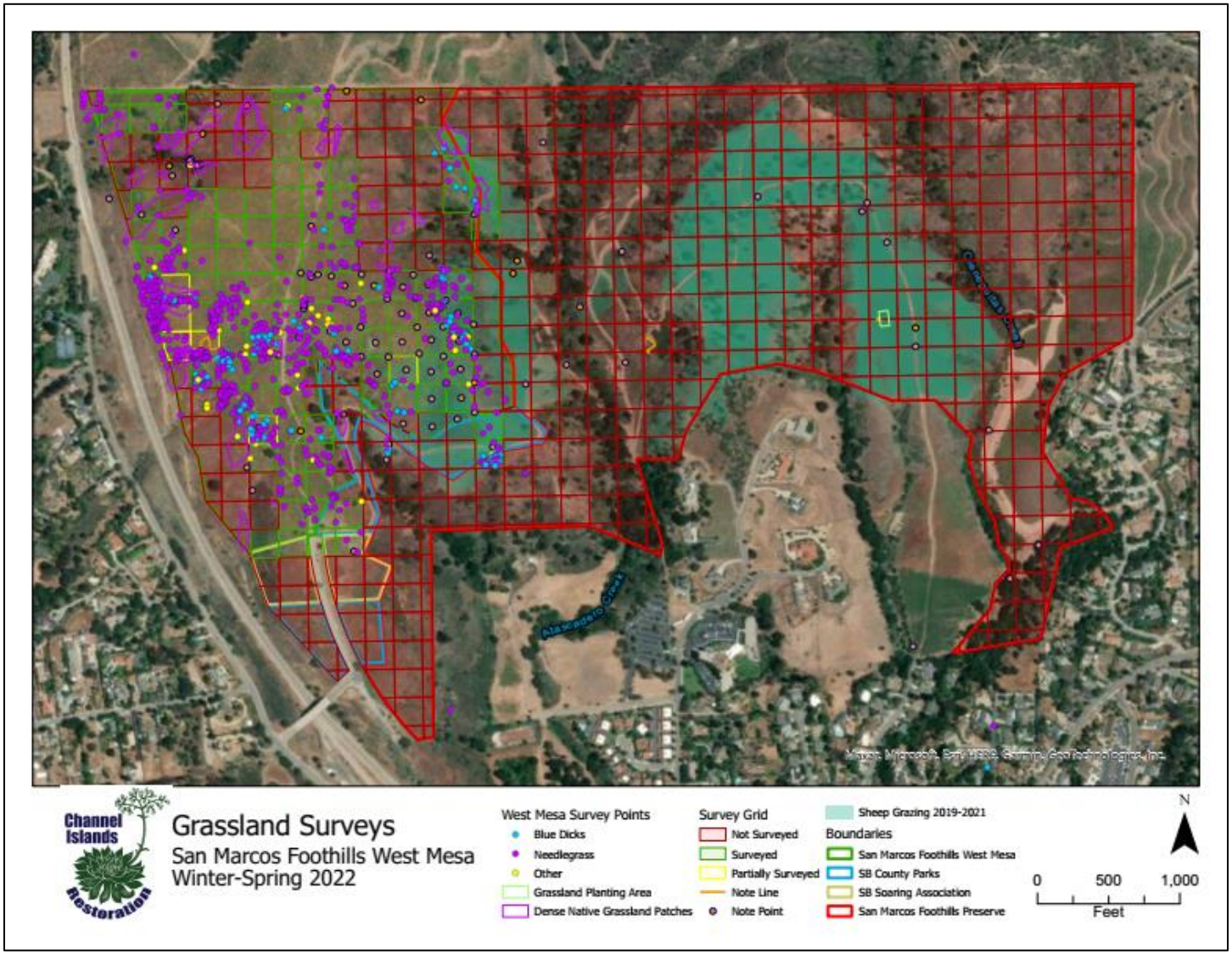


Figure 6. Map of vegetation survey locations at West Mesa

Quadrant	Accessibility	Contains High Density Stipa Patch (mapped and flagged)	Low Density Area Surveyed	Surveyed By	Notes	Complete?
A1		YES X2 (orange flags)	YES			Partially
A2		YES (orange flags)	YES			Partially
A3		YES X2 (orange flags)	YES			Partially
B1		NO	YES		No stipa observed	YES
B2		YES (orange flags)	YES			Partially
B3		YES X2	NO		Two high density polygons in plot, one marked in orange flags, the other is marked in green flags. They are very close to one another and the remaining area in plot is very difficult to access.	
B4		YES (orange flags)	NO			
B5		NO	NO			
B6		YES (orange flags)	NO			
C1		NO	YES		No stipa observed. Rattlesnake found in C1.	YES
C2		NO	YES			YES
C3	Inaccesable	NO	NO			
C4		YES (orange flags)	NO			
C5		YES	YES	Ryan Davis, Ian Docktor, and Erica Weed		Partially
C6		YES (orange flags)	YES	Ryan Davis, Ian Docktor, and Erica Weed		Partially
C7		NO	YES			YES

Figure 7. Image of an example of a Quadrant Vegetation Survey for quadrants A1-C7, which is the beginning of data being gathered from the 50 x 50-meter quadrants.

Figure 8. Entire flock of sheep grazing native grassland dominated by Stipa pulchra in April 2019. Stipa pulchra (purple needlegrass) is given opportunity to grow by the light that is brought in from removed taller nonnative grasses such as the dominant nonnative species Avena Fatua (slender wild oats) and Bromus diandrus (ripgut brome).

Figure 9. These photos were taken during February 2022 within the planting perimeter and surrounding up to 20 meters away from the planting perimeter. Top Left: Calandrinia menziesii (red maids), Top Right: Oxalis California (native oxalis), Middle Left: Lepidium nitidium (peppergrass), Middle Right: Hazardia squarrosa (sawtooth goldenbush), Bottom Left & Middle: Dipterostemon capitatus (blue dicks), Bottom Right: Psuedognaphlium californicum (California cudweed)


Figure 10. Left: Demonstration of Wildlife Watering System. Right: Hole dug for the water guzzler install.


Figure 11. Left: Looking downhill at planting area. Right: Looking downhill form oak and guzzler towards planting area 1000 ft below.

Figure 12. Planting area prepped for the gravity fed irrigation from guzzler (left). Planting buffers weeded by hand (right).

Figure 13. Volunteer day introduction to the project by CIR crew leads (left). Volunteers weeding non-native grass around self-propagated native plantings near planting area. Photographs by Z. Kinman, February 2022.

Figure 14. CIR staff observing S. pulchra appearing in the grazed area (left). CIR staff protecting native plants appearing in grazed areas. Photographs by H. Wright, February 2022.

Figure 15. Loggerhead Shrike, California quail eggs, and American Kestrel. Photographs by M. Mulroy, Spring 2019.