East More Mesa
RESTORATION MASTER PLAN
2024

Izzy Chang, Tegan Preston, Sophia Delap, Kayli Fennell-Lyman
University of California, Santa Barbara

PROJECT OVERVIEW

PURPOSE

The overall goal for this project is to eradicate non-native species in the East More Mesa open space by restoring them with California native species to boost ecosystem function and support ecosystem services.

Goals: By the end of 1 year with a $500,000 budget, we will meet the following objectives:

1. Limit human damage to restored areas of East More Mesa open space by adding fencing around the perimeter of the 4-acre site, with a small "Restoration in progress. Do not enter" sign on all 4 sides of the site. Add 1 informational plaque on the main trail adjacent to the site.
2. Increase native species cover to 75% (¾ acres) of our designated 4-acre site of East More Mesa and reduce non-native species cover to <10%.
3. Decrease non-native seed banks to 5% by conducting a controlled burn across the 4-acre site.
4. Reduce non-native re-colonization in the 4-acre site to 10% by transplanting native plants within at least 2 feet of the site's perimeters to ensure fair competition.

USE POLICY

This project occurs in East More Mesa, which is privately owned. The More Mesa Shores Homeowners Association strives to limit the use of the area through Declarations, Bylaws, and regulations (15). Signage indicating the private property and roads already are in place to restrict access directly into East More Mesa. The private community uses the restoration area for recreation, with trails for humans, dogs, and horses. More signage will be placed to restrict access to horses in order to reduce soil compaction and trampling of native plants. A proposal for a public entrance on the east side of More Mesa will be brought to the More Mesa Shores Homeowners Association. We hope the entrance will limit the number of people accessing the area off-trail and therefore protect the restoration site by keeping people on trails.

PERMITTING

USFS will complete an environmental review before starting the project, as the National Environmental Policy Act requires. A collection permit will be acquired by USFS in order to collect native seed from the site. A California Department of Forestry and Fire Protection (Cal Fire) burn permit will be acquired in order to perform prescribed burns at the site. A California

Coastal Commission permit will also be acquired for the development activity occurring, like clearing vegetation and impeding access to the trails during restoration.

SITE INVENTORY AND ANALYSIS

Regional Context

Location Description

More Mesa is a 300-acre open space on the coast located in Goleta Valley, just west of the Hope Ranch neighborhood. More Mesa can be defined as a bluff mesa (9), with a sprawling white sand beach below. The open space includes oak woodland and a native riparian habitat, and contains popular trails for local birdwatchers, bikers and horseback riders (8). There is also a creek that runs through the site. This creek, called Atascadero Creek, is at the base of the site and runs into the ocean at Goleta Beach, connecting the water sources.

Land Use History

Historically, More Mesa supported large Native American populations, primarily used for fishing and gathering (10). However, once the land was colonized by Spanish missionaries, the space was used for grazing. The land, specifically East More Mesa, was used for grazing and agriculture for years after this until the 1960s. The More Mesa was recognized as a site of significant planning and environmental concern by the county and state in the Local Coastal Plan in 1982. A majority of the open space is an environmentally sensitive habitat. Currently, the 330-acres of open space is under four different ownerships. Over 80% of the site belongs to three individual private landowners, with the remainder belonging to Santa Barbara County. Sun Mesa Inc. owns 264.5 acres of land, holding the largest amount of land.

Climate

This area has an average annual temperature of 69.9ºF and an average precipitation of 19.43in (1), making it a Mediterranean climate. The winters are wet and cool with an average temperature of 56.0ºF and average precipitation levels of 11.95in, whereas the summers are warm and dry with an average temperature of 66.7ºF and average precipitation of 0.16in. Located directly on the bluff, the coastal marine layer greatly affects the climate here. East More Mesa sits at about 39-112ft of elevation (2).

Geology

The majority of East More Mesa is composed of the soil series Concepcion, but there is one area in the southeast that has 85% Diablo (3). The Concepcion series is deep, fine sandy loam that is moderately well drained, whereas the Diablo series is a fine, silty clay that is well drained (4, 7). The east side of the More Mesa cliff is composed of Monterey Shale, a clay that formed 6-18 million years ago and is eroding away slowly (6). The geology consists of marine-terrace deposits from the upper Pleistocene, including fossiliferous gravel, sand, silt, and estuarine deposits (5).

Vegetation

More Mesa is composed of natural wetlands, oak woodlands, creeks, coastal bluffs, and grassland habitats. This habitat diversity supports a wide range of plant/vegetation species which are important for supporting local wildlife (10). The area is primarily composed of grassland (64%), supporting native grasses, herbs and shrubs (11). These include the california poppy, coyote brush, lupine, owl's clover, and blue eyed grass. CNPS lists the california poppy (*Eschscholzia californica)* in the California annual herb/grass group which is sensitive to fire, although seeds in the soil are generally unaffected and can still germinate proceeding a fire (14). Non-native species to note are wild oat, ripgut grass, Italian ryegrass, Harding grass, sweet fennel, and wild radish. Riparian and Eucalyptus Woodlands (14.5%) support the arroyo willow, black cottonwood, box elder, and eucalyptus. Invasive species here are the periwinkle and German ivy. The wetlands (7.8%) support meadows and vernal pools, with plant species such as Western goldenrod and coyote thistle. The invasive species in this area is Harding grass. Coastal bluffs (4.5%) support coastal sage scrub among other coastal bluff and dune scrub vegetation that can withstand frequent wind and high salt/moisture content. These include deerweed, coyote brush, and beach primrose, and the invasive species to note is ice plant. Oak woodlands (3%) support more dense forests with vegetation such as coast live oak, california walnut, elderberry. CNPS states coast live oak (*Quercus agrifolia)* is an evergreen tree that is largely fire resistant and recovers well from fire due to its thick bark (12). Invasive species/plants causing issues include nasturtium, eucalyptus, and fennel. Management considerations include controlling invasive species listed through hand removal, herbicides, controlled burns (coordinated with the County Fire Department), solarization (covering vegetation with a sheet of black plastic). Efforts are also being made to plant native oak woodland vegetation above Atascadero Creek.

Disturbance

More Mesa has faced many development threats from previous owners of the 265 acres of the landscape, some of which include ideas to establish a mall, golf course, horse boarding facility, and hotel over the environmentally sensitive habitat (6). Although these development projects have never come to fruition, the main Mesa's northeast 40 acres have been legally restricted to the development of 70 homes ever since County Plans adopted this land allocation in 1993. Such development could have implications for increased human activity around East More Mesa, causing adverse effects on species such as white-tailed kites which are raptors that require sparsely wooded areas of the More Mesa to roost and nest. Kites have been found to avoid nesting within 150 feet of homes, and they are likely to abandon their nest in the presence of nearby pedestrians (10).

With Goleta's deep history of colonial development, a coastal railroad was built along the contour of the More Mesa, with efforts to connect the small agricultural village of Goleta to the larger cities of San Francisco and Los Angeles in the late 1800s and into the early 1900s (13). Over a century later, the More Mesa faces erosion disturbance due to the presence of trails along

steep slopes and from the construction of the original railroad line (10). The grassland and wetland portions of the More Mesa have particularly faced disturbance from agricultural cultivation, off road vehicle activity, and current recreational use. On the East More Mesa, the main trail is three times as wide as it used to be, with increased foot and vehicle traffic preventing native vegetation to recover.

Invasive vegetation is present at the project site—mainly ice plant and pampas grass. These species disturb slope stability, lack adequate cover for wildlife, and colonize areas where native species (i.e., deerweed, coyote brush, beach primrose, etc.) once thrived (10).

With ongoing intensive storms occurring along the southern coast of California, East More Mesa faces threats of habitat disturbance from coastal erosion, threatening the security of the land and its vulnerable inhabitants. In fact, a large sinkhole formed on the cliff edge along the coastal trail of the More Mesa in 2017, and it continues to be a precarious threat to human safety. Additionally, a couple of the main trails were corroded during recent storms when the fire department was called in to rescue a dog that had jumped down the cliff edge. Due to the rain that day, the emergency vehicles were trapped in the mud and required lots of physical disturbance to retrieve them out of the More Mesa.

Figure 1. General site features of East More Mesa including trails and 3 separate areas for conducting surveys.

Site Visit

Inventory Methods

We conducted a site visit on April 29th, 2024. Our access to the research site was impeded by its location behind a residential neighborhood with restricted street parking. Upon entering the site, we used our phone GPS to find the key locations previously determined, distinguished by different plant communities. We took photos at each location and documented all plant and animal species observed. We also used a 20-meter transect tape to take vegetation surveys at each key location (Figure 4). At each meter starting at 1m, we recorded each plant species that intersected above and below the transect tape, using the plant-identifying app called *Seek*. We used water and our hands to determine the soil texture.

Topography

The topography of the site was mainly flat, with a few slopes dispersed throughout (Figures 2 and 3). The topography supports the grasslands that were covering a majority of our site, with shrubbery and trees in sporadic places. Since the site is on a cliff, it is not quite at sea level, but quite close to the sea level line. The topography is important to consider in our project because we will have to be strategic about where we want to plant native species in regard to the hills and ensure that the species we do implant are comfortable being close to the coast. In the topographic map, from a zoomed out view we can see that East More Mesa displays as pretty flat on the scale, and upon closer inspection and zooming in, we can see that it is closer to the middle of the spectrum due to the variance in small hills in the site.

Microclimate

Due to the site's proximity to the ocean, the microclimate is fairly temperate and stable with little variation. There is a small area near the trail entrance that is shaded by *Quercus spp*, where a small creek also runs through. *Eucalyptus globulus* trees shade portions of the cliff running along the oceanside, as well as a few locations interspersed throughout the site. The majority of the site faces south/southwest, receiving full direct sunlight without much shading. It is important to consider that seeds or plants planted for restoration purposes should be species that will thrive in direct south-facing sun.

Soils

Soils ranged from sand (Figure 8) to silty clay loam in compacted areas (Figure 9). Evidently, soils were most compacted on and adjacent to public trails, while sand became more prevalent closer to the ocean and especially along the coastal bluffs. Figure 7 displays the result of our soil test—where the soil created a smooth, medium ribbon when soaked with water and pinched between the fingers. This soil, which was found along our transects, was identified as silty clay loam. Whereas the soil around transects 1 and 2 were either bare or covered in invasive grasses,

organic matter was most prevalent along transect 3 where sticks and dead eucalyptus leaves blanketed the topsoil (Figure 6).

Hydrology

We did not encounter any hydrology during our site visit. However, there must have been some hydrology around the site due to the grassland we encountered and the possible water systems running through due to past rain. The topography would allow for water to travel down the slopes and Atascadero Creek at the bottom of the site. We were certain that we were going to see a fresh water system due to the satellite images of the site, however, in our three key site visits, there were no creeks, streams, rivers, or other freshwater systems present. Our site was next to the ocean, so we were able to view the ocean from the cliffs of our site.

Fauna

During the site visit animals observed included: lizards, rabbit, pelican, seagull, beetle, gnat, mosquito. We also observed many spider webs and heard birds at each key location. No species names were identified. These animals contribute to the biodiversity of the restoration area and must be considered because a diverse range of species helps maintain ecosystem balance. Animals also interact with each other and plants, maintaining the health of ecosystems.

Flora

The most abundant vegetation of the site are non-native invasive grasses which commonly dominate the coastal prairie of Southern California. These include common grasses, *Bromus hordeaceus*, *Hordium murinum,* as well as a species of native grass. Native plants are scattered throughout the site, including *Quercus agrifolia and Toxicodendron diversilobum.* Other non-native plants are also present throughout the site such as *Eucalyptus globulus,* which exhibits allelopathy and prevents other vegetation from growing near it. *Medicago polymorpha, Plantago lanceloata, and Vicia villosa* are some other non-native species that grow at the site.

Cultural Resources and Human Use

The research site is located behind a residential area with a horse farm, so it is most likely often used for recreational activities. Horseshoe prints and scat were seen on the trail, along with dog scat. There are paths and trails throughout the site. There were logs and stumps at our first key location arranged in a way that leads us to believe that it is used recreationally. Our second transect crossed a footpath that was crossed by many walkers and runners. Our third key location had a makeshift tree swing and a lot of graffiti on fallen trees, showing us that the area is frequented (Figure 5). There was litter (e.g. bottles, cans, orange peels, wrappers, socks, bikes) at the first and third locations. This area is used often by people, which must be taken into consideration when restoring. Methods of restoration that prevent the use of the area should not be used, as well as keeping the footpaths intact afterwards.

Sensitive Resources

The East More Mesa is overrun by non-native herbs and annual grasses that dominate the landscape. Because of this, the presence of *Stipa pulchra*—a native state grass of California—struggles to reclaim the landscape from its invasive competitors (e.g., *Bromus hordeaceus*, *Plantago lanceolata*, etc.). Upon measuring Transect 1, we came across litter and evidence of human residency in the riparian woodland habitat, posing a risk to the plant community's resilience. Additionally, there may be a seasonal creek running through the site and could potentially be sensitive. Due to increased pollutants in our site from human usage, the freshwater may also be polluted. The impact of pollutants in the freshwater can not only devastate our coastal ecosystem, but flow into the Atascadero Creek at the base of our site and into the ocean. This would then be damaging to ocean ecosystems.

Table 1. All species observed during the site visit categorized by origin, native or non-native.

Native Species	Non-Native Species
Quercus spp.	*Bromus hordeaceus*
Toxicodendron diversilobum	Common grasses (spp. unknown)
Native grass (spp. unknown)	*Eucalyptus globulus*
Baccharis pilularis (dead)	*Hordeum murinum*
	Medicago polymorpha
	Plantago lanceolata
	Vicia sativa

Table 2. Plant species from site inventory from transects.

Transect	Meter Mark	Species	Substrate
1	1m	*Toxicodendron diversilobum*	Dense, compact, organic matter
1	2m	Native grass, *Quercus agrifolia*	Dense, compact, organic matter
1	3m	Native grass, *Quercus agrifolia*	Dense, compact, organic matter
1	4m	*Quercus agrifolia*	Dense, compact, organic matter
1	5m	Native grass, *Quercus agrifolia*	Dense, compact, organic matter
1	6m	Native grass, *Quercus agrifolia*	Dense, compact, organic matter
1	7m	Native grass, *Quercus agrifolia*, woody reed	Dense, compact, organic matter
1	8m	Native grass, *Quercus agrifolia*, woody reed	Dense, compact, organic matter
1	9m	Common grass	Dense, compact, organic matter
1	10m	Native grass, woody reed	Dense, compact, organic matter
1	11m	Native grass, woody reed	Dense, compact, organic matter

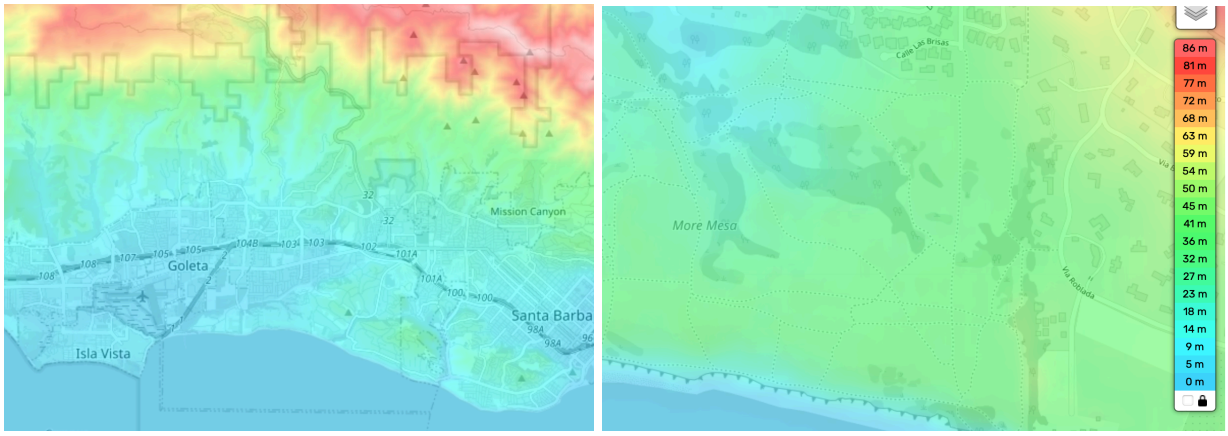
1	12m	Native grass, woody reed, dead *Baccharis pilularis*	Dense, compact, organic matter
1	13m	Native grass, woody reed	Dense, compact, organic matter
1	14m	Native grass, woody reed	Dense, compact, organic matter
1	15m	Native grass, *Bromus hordeaceus*	Dense, compact, organic matter
1	16m	Native grass, woody reed	Dense, compact, organic matter
1	17m	Native grass, woody reed, *Bromus hordeaceus*	Dense, compact, organic matter
1	18m	*Bromus hordeaceus*, common grass	Dense, compact, organic matter
1	19m	Native grass, woody reed, *Bromus horeaceus*	Dense, compact, organic matter
1	20m	Native grass, woody reed, *Bromus horeaceus*	Dense, compact, organic matter

Transect	**Meter Mark**	**Species**	**Substrate**
2	1m	*Hordeum murinum*, invasive grass	Compact, dry, lots of aggregate clumps
2	2m	3 species of grass	Compact, dry, lots of aggregate clumps
2	3m	2 species of grass	Compact, dry, lots of aggregate clumps
2	4m	2 species of grass	Compact, dry, lots of aggregate clumps
2	5m	1 species of grass	Compact, dry, lots of aggregate clumps
2	6m	2 species of grass	Compact, dry, lots of aggregate clumps

2	7m	1 species of grass	Compact, dry, lots of aggregate clumps
2	8m	2 specie of grass	Compact, dry, lots of aggregate clumps
2	9m	*Vicia sativa*, 1 species of grass	Compact, dry, lots of aggregate clumps
2	10m	*Vicia sativa*, 3 species of grass	Compact, dry, lots of aggregate clumps
2	11m	*Medicago polymorpha*, 1 species of grass	Compact, dry, lots of aggregate clumps
2	12m	N/A	Compact, dry, lots of aggregate clumps
2	13m	N/A	Compact, dry, lots of aggregate clumps
2	14m	2 species of grass	Compact, dry, lots of aggregate clumps
2	15m	2 species of grass	Compact, dry, lots of aggregate clumps
2	16m	2 species of grass	Compact, dry, lots of aggregate clumps
2	17m	2 species of grass	Compact, dry, lots of aggregate clumps
2	18m	2 species of grass	Compact, dry, lots of aggregate clumps
2	19m	2 species of grass, *Plantago lanceolata*	Compact, dry, lots of aggregate clumps
2	20m	2 species of grass, *Plantago lanceolata*	Compact, dry, lots of aggregate clumps

Transect	**Meter Mark**	**Species**	**Substrate**
3	1m	N/A	Bare ground
3	2m	N/A	Bare ground

3	3m	N/A	Bare ground
3	4m	N/A	Bare ground
3	5m	*Eucalyptus globulus*	Dead leaves/organic matter
3	6m	*Eucalyptus globulus,* Common grass	Dead leaves/organic matter
3	7m	*Eucalyptus globulus,* Common grass	Bare ground
3	8m	*Eucalyptus globulus*	Bare ground
3	9m	*Eucalyptus globulus*	Bare ground
3	10m	*Eucalyptus globulus,* Common grass	Bare ground
3	11m	*Eucalyptus globulus,* Common grass	Bare ground
3	12m	*Eucalyptus globulus,* Common grass	Bare ground
3	13m	*Eucalyptus globulus,* Common grass	Bare ground
3	14m	*Eucalyptus globulus,* Common grass	Bare ground
3	15m	*Eucalyptus globulus,* Common grass	Bare ground
3	16m	*Eucalyptus globulus,* Common grass	Bare ground
3	17m	*Eucalyptus globulus,* Common grass	Bare ground
3	18m	*Eucalyptus globulus,* Common grass	Bare ground
3	19m	*Eucalyptus globulus,* Common grass	Bare ground
3	20m	*Eucalyptus globulus,* Common grass	Bare ground



Figures 2 and 3. Topography heat map of the restoration site.

Figure 4. Location of transects used to assess plant cover.

Figure 5. Graffiti on a fallen tree at our third key location.

Figure 6. *Eucalyptus globulus* shading land along the ocean.

Figure 7. Conducting a soil texture survey among invasive grasses.

Figure 8. Sandy soil near Transect 3, located along the coastal bluffs.

Figure 9. Compacted, dry soil displays footprints of dog, horse, and human traffic along the trail.

Figure 10. Group photo at the restoration site.

JUSTIFICATION AND SOLUTIONS
CHALLENGES AND OPPORTUNITIES FOR RESTORATION

Challenges

I. The location of this site could be a major issue for restoration. The site is situated behind a populated neighborhood with a need for entrance points for others to use. The streets are lined with signs to prevent any parking or unwanted visitors (Figure 11). The inhabitants of this neighborhood may not appreciate key restoration tools, like pesticides or loud machines in their area. They may also have issues with many people parking and going in and out of the restoration site, disrupting the neighborhood. There were also many walkers and runners during our site visit, so there would be upset if people were inhibited from using the trails that run through the site during restoration. Many dogs and horses use the trail as well, so pesticides could be dangerous for them.

II. There is a high density of non-native grasses throughout the entire site. This is a major issue for restoration because these species are competitive and can limit native plant success. The timing of eradicating these non-native grasses and allowing native plants to flourish will be difficult. There is a layer of thatch, which may prevent native plant dispersal and growth.

III. There seems to be three different ecosystem types in our restoration site, which will prove difficult to keep connected. The grasslands transitions to a coastal beach area, with an area in the grasslands with many trees. While restoring the site, we must keep all three ecosystems in mind and ensure that they can thrive together still. The entire area used to be an oak savannah, pre-colonialism. This must be kept in mind because human management has already impacted the area once. This may come into play, as seen in legacy effects.

Figure 11. Private road signs next to the site entrance.

Opportunities

The topography is very flat, making it easy to burn and solarize large areas. We also observed a native grass in our transects, which means there is a foundation of native plants to build off of. We know that it is possible for them to grow and aim to get seeds from our reference ecosystem sites. If we raise public opinions about this restoration project, we could get funding and volunteer help from the neighborhood locals, as well.

Addressing Site Challenges

I. It will not be possible to fully get around the issue of location because the neighborhood can not be moved, but we can take actions to lessen the disruption to the inhabitants' daily lives. Manual removal of non-native species would be loud and take a long time. We assume the inhabitants of the neighborhood would not support the use of herbicides because of the frequent use of the trails by humans and pets. In order to gain support for

this restoration project by the public, we propose a neighborhood meeting or an email to their listserv that shows the potential of the restored area. We believe that the beauty and aesthetics that come along with restoration will be convincing to the local community.

II. There is significant cover of non-native grasses and without the possibility of herbicide and manual removal, we propose a controlled burn of the area, followed by solarization. This is a cost-effective strategy that will ensure effective eradication of the unwanted grasses. We will conduct the controlled burn and then solarize in sections. Immediately after solarization we will plant native seeds and let them germinate as we go, ensuring that the non-native grasses will not regrow.

III. It is not possible to get rid of the three separate ecosystems, but it is possible to ensure that they are connected and benefiting each other. By ensuring there are habitat linkages and natural features to enhance connectivity, we prioritize the maintenance of all three different biomes. We will focus our efforts on the transition zones so that there are areas for species to coexist.

PROPOSED RESTORATION ACTIONS

Reference Ecosystem

The general reference ecosystem for our restoration site is California coastal sage scrub. This ecosystem succeeds in a Mediterranean climate, with hot dry summers and mild wet winters, which aligns with the climate at the location of our site in Santa Barbara. The main plant communities of the California coastal sage scrub ecosystem are coastal sage scrub, oak woodland, riparian woodland, and salt marshes. Our specific reference ecosystem is the UCSB Lagoon Trail near the cliffs, specifically the restored coastal sage scrub and oak woodland areas. This reference ecosystem has many similarities to East More Mesa. They share a sandy soil type, are both close to the coast, and would have shared similar native species in the past. The UCSB Lagoon Island restoration project was initiated in the early 2000s and now proves resilient as a result of the UCSB Cheadle Center's research and management strategies.

Treatments

We will conduct a controlled burn under high-intensity fire to eliminate the juvenile and adult growth of invasive grasses on the land, as well as eliminating thatch. We will then utilize black plastic tarps to solarize in 4-month increments over the previously burned areas in order to remove ice plant and destroy the non-native seed banks through intense heat. The burning of the area will leave bare, mostly flat ground which will allow us to easily lay tarps without large air gaps for this process. These processes combined will likely decrease the likelihood of non-native regrowth when native species are later transplanted. We do not intend to scarify or loosen the soil due to the natural cycle of the clay substrate loosening and constricting at our site.

Site Preparation

We will acquire a collection permit from the U.S. Forest Service for native grass and coastal scrub seed collection on-site and from our reference site, UCSB Lagoon Island. In addition to this, we will obtain a burn permit from the California Department of Forestry and Fire Protection prior to conducting a controlled burn with the Santa Barbara County Fire Department. The 4-acre site will need to be cleared of any human-made hazards, and its surrounding trails will need to be restricted to authorized personnel (i.e., SB Fire Department, restoration volunteers, and project leaders), thus requiring a California Coastal Commission permit to be issued. After receiving the necessary permits and choosing a time period where there is minimal wind in order to minimize risk, we will conduct controlled burns in a small area of the site. We suggest beginning with a 0.5-acre sample site to begin with. Pile burning will also help reduce the amount of nitrogen in the soils, which will prevent the non-native grasses from growing back as much. After the burn, we will evaluate the effectiveness and the impact on the non-native seed bank to assess if any changes may be made. After the burn, we must plant the native species so that they can be established in the ecosystem before the non-native grasses grow back.

Native species will be seeded—such as California native grass (*Stipa pulchra)*, California poppies (*Eschscholzia californica*), and California sagebrush (*Artemisia californica*)—via hydroseeding. These species will have also been grown in the CCBER Nursery during the site preparation process so that they grow into seedlings by the time the site is ready for planting. Native seedlings will be planted along the perimeter of the site where the trail surrounds all sides. This restoration action ensures that seedlings that have gone past the germination process can fairly compete with non-native plants attempting to recolonize from across the trail.

Seed Installation

Our seed mixture will spread across the entirety of our 4-acre restoration site. Our seed mixture will consist of native Purple needlegrass (*Stipa pulchra)*, California poppies (*Eschscholzia californica*), California sagebrush (*Artemisia californica*), Coyote brush (*Baccharis pilularis)* and other native shrubs, forbes, and grasses that thrive in the coastal sage and chaparral ecosystem. We will plant these native species via hydroseeding. The coastal sage scrub species will have also been grown in the CCBER Nursery during the site preparation process so that they grow into seedlings by the time the site is ready for planting. Native seedlings will be planted along the perimeter of the site where the trail surrounds all sides. This restoration action ensures that seedlings that have gone past the germination process can fairly compete with non-native plants attempting to recolonize from across the trail. We also plan to transplant shrub species such as California sagebrush and Coyote brush in 6 clusters throughout the site in order to promote the establishment and competition of the native species. Increasing the diversity of species and reintroducing native plants to the site will replenish the ecosystem. We will plant this native seed mixture and let them germinate as we solarize by section, in order to ensure that the non-native grasses will not regrow. Once the non-native plants have been eliminated, we can

measure cover through tracking the amount of seeds planted and seed growth within 10 meter quadrat areas by doing counts every 5 days. In past research, we have found that we have achieved slightly over 3 species per quadrat, proving that native species growth is achievable. This will be a longer, yet realistic process based on previous restoration sites, where we will consistently measure native species growth during the 1-year span of our restoration project. We plan to hydroseed 60% of the site and transplant natives into 25% of the site, which means natives will be planted over 85% of the site. Leaving a 10% buffer for those plants that do not survive or establish themselves, we aim for native cover to reach 75% of the 4-acre site.

Figure 12. Treatment location for non-native species removal.

Figure 13. Post-treatment seeding and scattered transplanting of native species “islands” throughout the site to compete with non-natives located across the trails.

MEASURES FOR SENSITIVE RESOURCES

California native grass, *Stipa pulchra*

California native grass, *Stipa pulchra*, is dominated by non-native grasses throughout the entirety of our site and struggles to reclaim the landscape. The populations of California native found in our site will be marked with field flags and protected during the process of diminishing non-native species. We will make sure to have a 15-foot buffer surrounding the native grass regions in order to avoid any damage to the native grass through soil or ecosystem disturbance.

Native plant growth

Due to the excessive littering driven by human residency in an area of our site, there is a high risk to native plant growth on our site. We specifically noticed this in the riparian woodland habitat of Transect 1. We must block off regions of tree cover to prevent human usage in order to protect these sensitive native habitats. To block off this region, we will implement a fencing structure that will not damage the ecosystem and provide signage.

Freshwater

Freshwater and groundwater provide water to the ecosystems at our site. However, with increased pollutants in our site from human usage, the freshwater may also be polluted. The impact of pollutants in the freshwater can not only devastate coastal ecosystems, but flow into the Atascadero Creek at the base of our site and into the ocean. This would be damaging to ocean ecosystems. In order to protect these resources, we will install a filter system at the beginning of the water flow from our site into the Atascadero Creek in order to decrease the flow of pollutants from land to ocean.

ALTERNATE MANAGEMENT PLAN

If intense rainfall from winter storms returns to the site, site areas along the bluffs, trails, and hillsides may exhibit erosion or drown seeds. In light of this annual weather event, seed planting will need to be strategically implemented at least 4 months after the winter storm season. Timed hydroseeding is vital in this regard because it ensures that our time, money, and resources are not washed away in the event of a flash flood. We will implement a water truck in order to provide water for our seeds due to the lack of rain happening in the spring and summer months.

If some non-native grasses and weeds return after solarization and controlled burning, our newly planted seeds may have difficulty competing with germinating invasives. If this may be the case, an alternative would be to grow select native species at the UCSB Biology Greenhouses during the non-native species removal process. When the site is prepared, seeds will have germinated and received a “head-start” on the growing process. These seedlings and the seeds themselves

would be interspersed throughout the prepared site to increase their resilience against competing non-natives.

THE HUMAN ELEMENT

Neighborhood residents frequently use the trails for hiking, running, walking dogs, biking, among other activities. While some areas of the trail are fairly clean, other areas collect pools of trash (e.g., plastic bags, cans, bottles, food containers). While the area is somewhat valued for recreational purposes by nearby residents, the area must be better maintained and cared for. Some of the secluded areas within oak and eucalyptus trees collect high amounts of trash, graffiti, broken bottles, and glass. These areas are generally dirty and unenjoyable areas to spend time at. In order to reduce human damage, we will increase signage and fencing for 80% of the region that we will be restoring. We can measure this by tracking the number of people who walk past the area and record the people who read signage or maintain avoidance of the restored regions. If people do enter the area, litter, or ignore signage, this will also be noted and potentially revisited if more signage or fencing is needed. Limiting human impact on restored areas is achievable because in other restored areas, such as the UCSB Lagoon restored regions and Coal Oil Point restored areas, have been protected by signage and human impact has reduced. Signage and fencing is realistic because it is not extremely expensive and is effective to enact over large areas. Enacting this goal immediately once seeds have been planted in our restored area will allow for no human interference in native plant growth and will further promote the goal of limited human impact in the restored area.

This restoration project aims to improve people's relationship with the land. Native species of wildflowers such as *Lupinus* species will enhance the aesthetics of the land. Removal of invasive weeds will also aid in the appeal of the space to nearby residents. A pressure blaster could be carefully used to remove existing graffiti on eucalyptus trees to make the area generally nicer. Near the creek site, we can clear away fallen branches and plant native riparian species, to make the area more lush and clean.

BUDGET AND WORK PLAN

Task	Sub Task	Target Completion Date
1. Controlled Burn	1.1 (Permitting)	Mid-Summer 2024
	1.2 (Preparing the site, clearing hazards)	Late-Summer 2024
	1.3 (Conducting the burn)	Fall 2024
2. Solarization	2.1 (Placement of plastic tarps)	Started directly after burn has been completed, completed 2-3 months later by mid-winter 2025
3. Planting natives	3.1 (Transplanting in clusters)	Begin transplanting directly after solarization, complete by end of Winter 2025 (Jan/Feb)
	3.2 (Hydroseeding)	Directly after transplanting, complete by end of Winter 2025 (Feb/Mar)
4. Continuous monitoring	4.1 (Watering, if needed)	End of winter/beginning of Spring 2025
	4.2 (Volunteer hand weeding, if needed)	End of winter/beginning of Spring 2025
	4.3 (Plant growth check-ins)	Monthly, leading up to Summer 2026
5. Grant Writing	5.1 (Grant Writing for informing more restoration at East More Mesa)	Simultaneous with monitoring, leading up to Summer 2026

Item	Justification	Total
Volunteer Labor	Using volunteers for mulching and transplanting.	$11,500.00
Hand Crew	Using hand crew for digging, building and installing signage, and placing solarization tarps.	$96,600.00
Heavy Equipment	Two trucks to bring supplies onto the site, one for mulch and one for water.	$36,800.00
Bulk Seed Purchase	Lupine, Coyote brush, California sagebrush, purple needlegrass, California poppy; 750	$270,000

	pounds of seed over a total of 2.4 acres since we plan on seeding 70% of the 4 acres.	
Plant Containers	10 plant containers for each species (5 species total).	$500.00
Watering	End of winter/beginning of Spring will begin watering after prescribed fire and solarization.	$27,600.00
Prescribed Fire	Burning will be conducted in the Fall prior to solarization.	$10,000.00
Soil Amendments	Mulch to retain moisture after hydroseeding.	$4,000.00
Hydroseeding	Seed installation using water truck in order to keep seeds in place.	$41,400.00
	Total Indirect Cost	$27,900.00
	Total Direct Cost	$470,500.00
	TOTAL COST	$498,400.00

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