

**San Diego Association of Governments
San Diego National Wildlife Refuge - Mother Miguel Mountain
Final Report**

Project Period: 12/01/2015 – 6/01/2019

SANDAG Contract Number: 5004736

Executive Summary

The San Diego National Wildlife Refuge (SDNWR or Refuge) Mother Miguel Mountain project was proposed and implemented for the purpose of protecting sensitive habitats and species on a portion of the SDNWR. The goal of the project was to reduce impacts to sensitive habitat and species related to unauthorized off trail activities on this portion of the Refuge. To achieve this goal, it was necessary to design and construct a sustainable trail up the mountain and then close and rehabilitate the existing non-sustainable user created trails, including an ever-widening fall line trail, on the mountain. The project also included the development of interpretive measuring, design and fabrication of interpretive signage, and a public outreach effort intended to inform users of the importance of the area to species conservation and the success of the San Diego Multiple Species Conservation Program.

Upon completion of the trail, which includes direction signage, interpretive signage, fencing, and regulatory signage, the majority of trail users are staying on the new sustainable trail. Native and nonnative vegetation is already present within the tread of some segments of closed trail. There remains a small percentage of users who chose to ignore signage and fencing and continue to use the fall line trail. Additional management actions, monitoring, and an on-site presence are all needed to increase compliance. Responsible trail users are also assisting us in getting the message out that all users must stay on the designated trails. We will continue our outreach efforts, along with guided hikes intended to continually inform visitors of the importance of the conserved lands on the Refuge and throughout San Diego County. Other actions will include the installation of additional fencing and signage as needed, continued active restoration, and outreach via social media.

As part of our long term rehabilitate efforts here and elsewhere on the Refuge, we will continue to solicit assistance from the surrounding communities in an effort to create a sense of ownership. Regular trail users and past volunteers have already demonstrated their skills as stewards of the area, and as more visitors become aware of the need to stay on the designated trails, the impacts of public use on these conserved lands will continue to decrease.

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Project Background

Conservation Overview. The San Diego National Wildlife Refuge (SDNWR or Refuge), which is part of the National Wildlife Refuge System managed by the U.S. Fish and Wildlife Service (FWS), is located within Management Unit (MU) 3 of the Management Strategic Plan (MSP) for Conserved Lands in Western San Diego County (San Diego Management and Monitoring Program 2013). This Refuge was established to conserve sensitive habitats and species and represents a significant portion of the federal government's contribution to the San Diego Multiple Species Conservation Program (SDMSCP).

Mother Miguel Mountain, which burned in the 2007 Harris Fire supports recovering coastal sage scrub habitat, along with patches of southern mixed chaparral. Open areas along the ridgeline suggest the presence of clay lens. This area of the SDNWR is included within the boundaries of critical habitat for both San Diego tarplant (*Deinandra conjugens*) and the coastal California gnatcatcher (*Polioptila californica*). The project site is also located within the Southwest San Diego Recovery Unit for the Quino checkerspot butterfly (*Euphydryas editha quino*). The mid to upper elevations of the mountain support nectar and larval host plants for the Quino checkerspot butterfly, and presence/absence surveys are periodically conducted in the general area.

Like most of the other conserved lands in San Diego County, the SDNWR abuts extensive areas of development with residents seeking out locations where they can recreate. The MSP identifies human use of preserves as a major threat within MU-3; with illegal/unauthorized trails a serious contributing factor. Even where authorized trails have been established, off-trail activity contributes to habitat and species loss. Users who are unaware of why or how open space areas have been acquired, can and often do represent a threat to the species and habitats that were intended to be protected within our conserved lands. The Mother Miguel Mountain project focuses on an area of the SDNWR that has experienced a significant increase in use since the Refuge was established.

Pre-project Site Conditions. The Mother Miguel area of the Refuge was acquired in 1997 at a time when development was occurring far to the west and limited access by the public was occurring on the property. Today, this area is located immediately adjacent to suburban development, about 1,000 feet northeast of Mount San Miguel Community Park, off Paseo Veracruz in the City of Chula Vista (Figure 1). Walking and biking to the top of Mother Miguel Mountain has become a favorite past time for residents living in the South Bay, including many of the 17,449 residents (SANDAG Data Warehouse) who have moved into the area located between the Refuge and Proctor Valley Road since 2010. In addition to local residents, large numbers of users, who learn about the area from social media, drive to the site from throughout the region to climb the mountain and experience the views from the top.

Aerial photographs indicate that sometime prior to 2007 a user-created switchback trail was developed that extends up the mountain to the peak. After the Harris Fire of 2007, this little-known unauthorized trail was exposed and use of the trail began to increase. By 2012, use of the user-created trail had increased and aerial photographs indicate cutting of the trail's switchbacks. The quality of the user-created trail began to deteriorate and by 2013 with no official trails in the area and no signage to guide users up the mountain, users created a new route that ascended directly up the fall line of the mountain's steep slope (with an average grade of 29%). In the following years, continued use was resulting in an ever-widening pathway. The affected area experienced substantial loss of vegetation and soil disturbance. The majority of the impacts occurred along the steepest portion of the mountain (about the first 6,255 linear feet). By 2015, the scar from this trail was 25 to 30 feet wide in some locations (Figures 2 and 3).

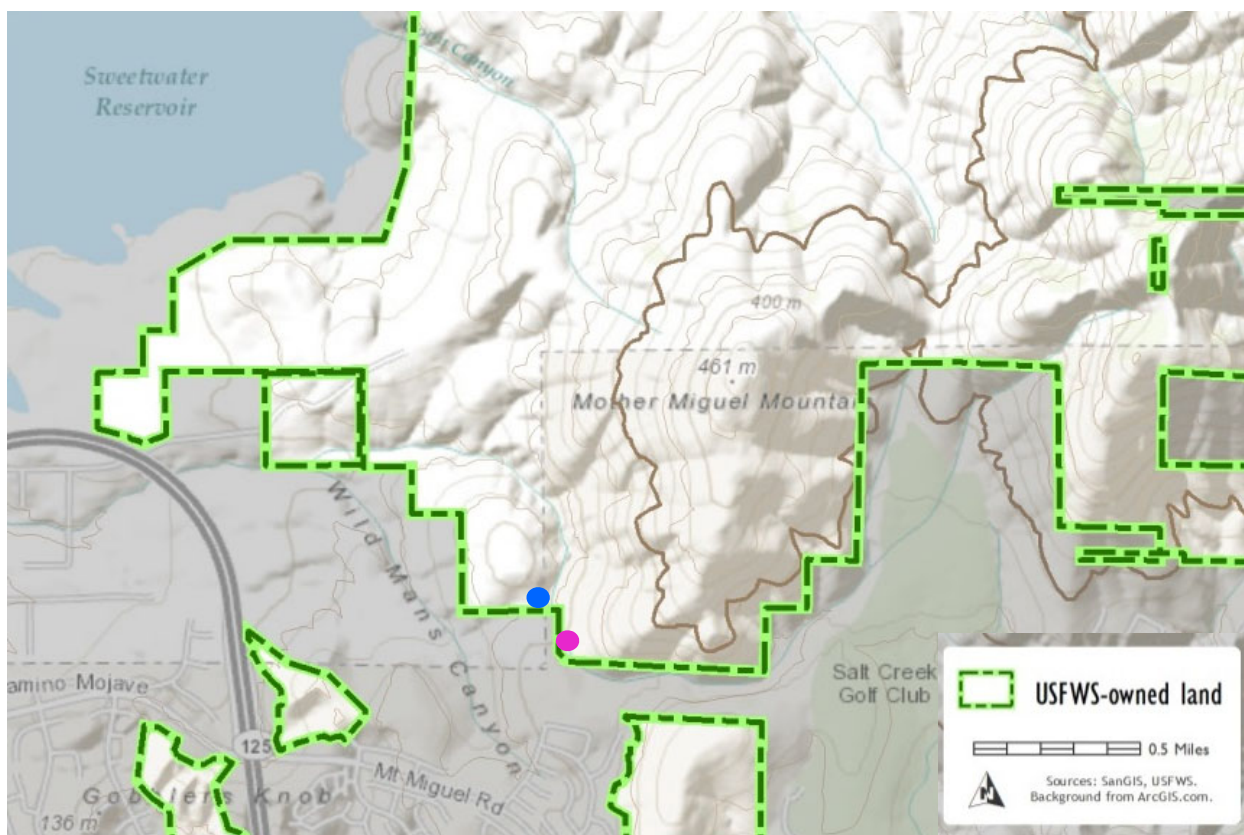


Figure 1. Project Location

The fall line trail starts near the pink dot on Figure 1 and extends straight up the mountain, as indicated in yellow in Figure 2. Figure 3 illustrates the impacts to the habitat of this user-created trail. The blue dot on Figure 1 indicates where the original user-created switchback trail enters the Refuge. The trail extends for approximately 6,240 feet from the Refuge boundary up to elevation 1,136 feet above MSL; at that point, the original user-created trail and the fall line trail merge and continue to the top of the mountain.

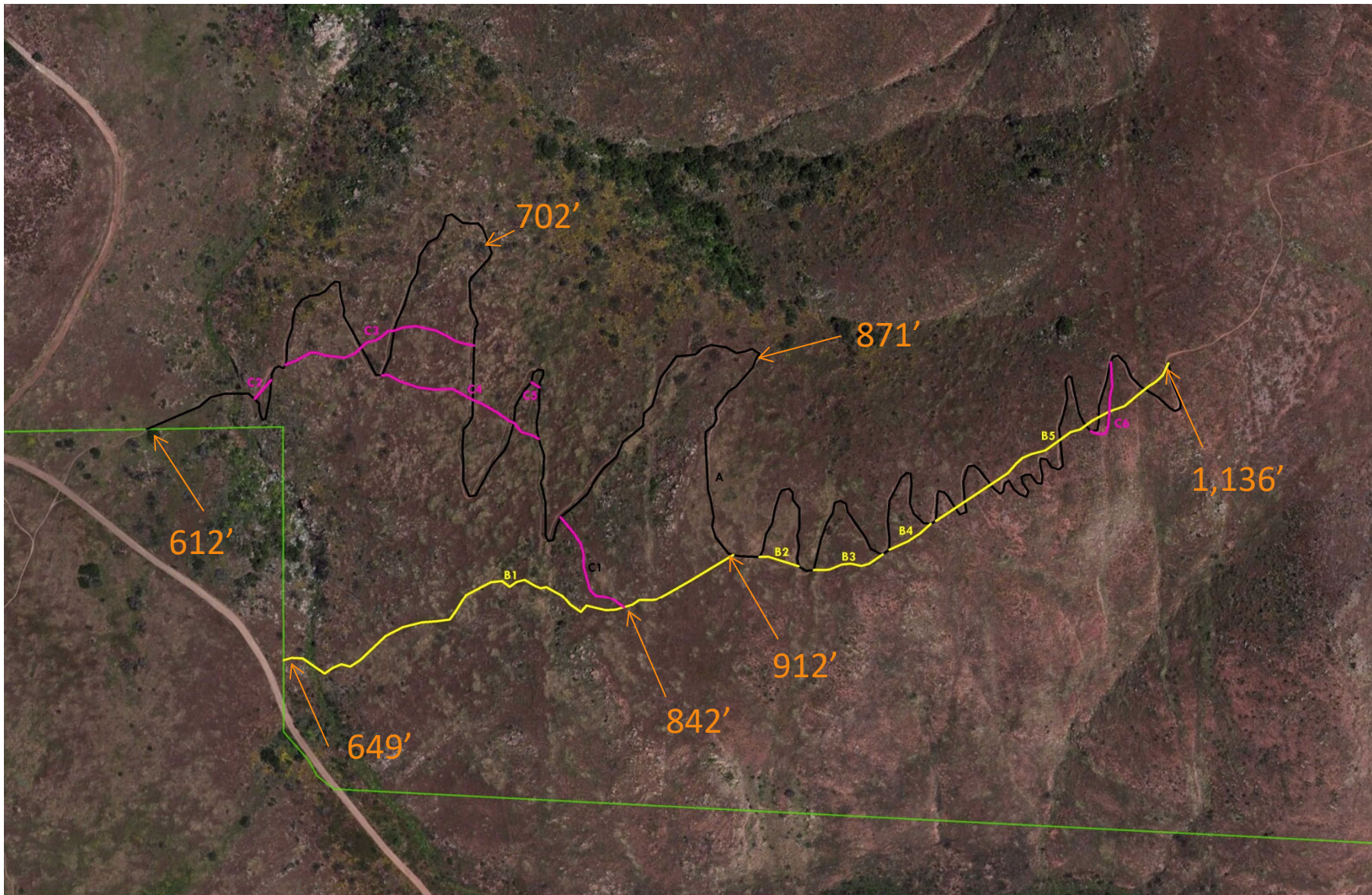


Figure 2 - Original and Current Trail Patterns (The black line depicts the original switchback trail; pink segments are where the switchbacks have been cut; and the yellow line is the user created fall line trail).



Figure 3 - User-created Fall Line Trail and Evidence of Continued Trail Braiding

The primary focus of this project was the area between the trailhead and elevation 1,136 feet. There are approximately 2,436 linear feet of user-created trail cuts along the switchback trail (shown in pink [“C” segments] on Figure 2). The fall line trail (shown in yellow on Figure 2) includes 1,533 feet of user-created trail.

As the width of the “scar” expanded, impacts to habitat quality and individual plants increased. Plants, such as San Diego barrel cactus (*Ferocactus viridescens*) were uprooted and shrubs attempting to recover from the Harris Fire were trampled. Erosion became a significant concern. In addition, areas where Mexican flannelbush (*Fremontodendron mexicanum*) had been reintroduced were impacted and plants were trampled by foot traffic and/or lost to erosional forces.

Project Proposal. The Mother Miguel Mountain project proposed to:

- 1) establish a sustainable trail route that the public can use to access the top of the mountain;
- 2) manage public use along the entire length of the trail via interpretive and directional signage, fencing, and public education; and
- 3) close and rehabilitate the existing fall line trail to eliminate damage caused by inappropriate use and erosion.

In addition to addressing the immediate on the ground issues, this project also proposed to develop and implement various actions intended to change users' attitudes and behaviors - to encourage use compatible with the Refuge's purpose of habitat and species conservation. This required developing partnerships with user groups and creating an effective message that would not only inform users about the need to protect the natural resources within our conserved lands, but also encourages them to become involved in the conservation of these important areas. The interpretive materials would address the resources on the Refuge, but also include a conservation message about the need for responsible use within all of the region's conserved lands. As stated in the MSP, "Regional threat management would benefit a suite of species" (Vol. 1, p. 2-18).

The project proposed a partnership between the Service and the San Diego Mountain Biking Association (SDMBA), with the intent of establishing a relationship with the local and regional mountain biking community. Other user groups would be encouraged to participate, including local equestrian groups, hikers, and members of the surrounding community. The establishment of these relationships would assist in "getting the word out" about the need to protect the resources on the Refuge by using only authorized trails.

Relationship of the Proposed Activities to the MSP. The overall intent of this project was to minimize impacts to sensitive species and vegetative communities. As identified in the MSP (Vol. 2, p. 4-32), activities occurring on properly designed and managed trails can be accommodated on many preserves while minimizing adverse impacts to MSP species. However, when access into conserved areas is the result of unauthorized trail construction, use of these trails and the adjacent areas can severely impact vegetation communities and affect species distribution, abundance, and the long-term survival of some species populations within the SDMSCP.

It was apparent that without proper informational, interpretive, and directional signage, trail users on Mother Miguel Mountain would continue to be unaware of the damage they were causing. With the establishment of a sustainable trail, old trails could be closed and rehabilitated. Appropriate signage would improve our ability to manage trail use in the area, as well as manage and protect sensitive habitat areas.

The MSP 2014-2016 species and their associated habitats that benefit from this proposal include the Quino checkerspot butterfly and Mexican flannelbush. Disturbance associated with unauthorized trail activity was directly affecting areas of the Refuge that supported Mexican flannelbush and threatened areas with conditions favorable to supporting nectar and/or larval host plants of the Quino checkerspot butterfly.

Project Goals

The objectives of project implementation included:

- Redirect existing public access to avoid the population of Mexican flannelbush in Wild Man Canyon.
- Create a sustainable trail alignment that addresses the public's desire to reach the top of the mountain, while minimizing impacts to surrounding habitat and species.
- Complete closure and rehabilitate of the fall line path.
- Expand public awareness for and stewardship of the resources protected on the Refuge.

Our goals at project completion included:

- More than 90 percent of trail users would remain on the designated trail.
- Access near Mexican flannelbush in Wild Man Canyon would be eliminated.
- A minimum of 0.55 acre of disturbed habitat within the footprint of the current fall line trail will be rehabilitated and restored to native coastal sage scrub habitat.
- Areas supporting cryptogamic crust in the vicinity of the trail will be protected using fencing and/or signage.
- Public awareness of the importance of protecting the resources within the Refuge and the need to stay on designated trails will increase, with a minimum of 80 percent of the repeat users aware that they are on a National Wildlife Refuge.

Work Performed by Task

Task 1 - Corrective and Protective Measure Identification

Budget: \$970.00, revised and reallocated in February 2019 to \$0

Spent: \$0

Match for Task: Expected \$4,935.00 Actual \$10,140.90

In January 2016, we began the process of evaluating and documenting current site and trail conditions, identifying existing issues, examining possible solutions, and basically struggling with the complexity of the topography on Mother Miguel Mountain. Refuge staff and representatives from the SDMBA conducted a number of site visits to evaluate current conditions and determine the best approach for protecting habitat and continuing to accommodate the high volume of trail use that occurs in the area. The results of this initial work are included in a trail log provided as Appendix 1.

The original intent of this trail log was to identify areas along the existing Mother Miguel Trail where trail maintenance and trail rerouting was necessary to address erosion, switchback cuts, and impacts to native habitat. We conducted several site visits to identify problem areas and establish general use patterns. Based on existing site conditions and the large number of

individuals recreating in the area, we concluded that to minimize impacts to the habitat and substantially reduce off-trail activity, the existing trail had to be closed and replaced with a new sustainable trail route.

We began working with members of the SDMBA to establish a new trail route that would significantly reduce the number of switchbacks and in turn reduce the potential for the creation of short cut trails. Cutting the switchbacks creates short trails that typically follow the fall line of the slope and result in initial and long-term damage to habitat due to vegetation removal and erosion. Upon completion of a new sustainable trail, old trail segments, as well as the numerous unauthorized fall line trails, would be closed and rehabilitated. The focus of initial rehabilitation efforts would be on wide, steep, eroded segments of unvegetated fall line trail where erosion control measures are critical to the successful reestablishment of native vegetation.

When the project started, the primary trail use on Mother Miguel Mountain was hiking/walking for the primary purpose of getting to the peak of the mountain. Mountain bikers and occasionally equestrians tended to use the existing somewhat degraded switchback trail to reach the top of the mountain, while the majority of the pedestrians were traveling straight up the fall line of the mountain's western slope. Due in large part to the poor conditions on the existing user-created trails, trail cutting was ongoing and the existing scar trail was continuing to widen as users attempted to avoid exposed rock and erosion gullies. The construction of a sustainable trail with minimal switchbacks and gentler grades was determined to be the only permanent solution for this area.

With the description of the proposed action more clearly defined, we initiated the work necessary to comply with the National Environmental Policy Act (NEPA), Section 7 of the Endangered Species Act (ESA), and Section 106 of the National Historic Preservation Act (NHPA). This included site evaluations of existing sensitive biological and cultural resources in the area, as described below.

- In early 2016, a FWS cultural resource specialist walked the site with Refuge staff to ensure that proposals for the new trail realignment and existing trail closures would not impact known cultural resources. No potential effects were identified along the proposed trail alignment; however, resources were identified in an area where we proposed to close an existing trail segment. Options for closing this trail segment and rehabilitating the habitat without impacting cultural resources were addressed.
- In mid-2016, FWS biologists conducted a reconnaissance of the proposed trail re-route. Species encountered during the reconnaissance included California gnatcatcher and San Diego barrel cactus. Also encountered were several dead Mexican flannelbush that were part of a transplantation project. The proposed trail realignment would avoid the live flannelbush that remain in the area and the user created trail in this area would be closed. Small patches of suitable habitat for Quino checkerspot butterfly and variegated dudleya (*Dudleya variegata*) were also identified.

Working with various trail experts, we developed more defined actions for tackling the existing erosion problems on the user-created fall line trail. These include filling in erosion ruts with rock to slow water flow, providing multiple drainage cuts (nicks) along the disturbed route to get water off the existing scar and thus reducing the volume of water flowing down the slope, and installing fiber matting to stabilize the soils and support revegetation efforts.

We evaluated how best to ensure that users will confine their activities to the designated trail once completed, including considering the locations for and types of fencing that would be needed. Measures for minimizing erosion along the realigned trail were also evaluated including trail outsliping, appropriate benching, minimizing the number of trail segments that approach the maximum acceptable grade, incorporating grade reversals, using trail tread protection (installing flat rocks) on switchback turns, and adding nicks along the trail to help water flow off the trail.

The process of laying out and flagging the final trail alignment required substantial time and expertise due to the extreme topographic conditions and biological constraints on the site. The final trail alignment needed to consider how water would flow across the new trail from the existing fall line trail. Addressing this issue is essential to the long-term sustainability of the new trail route. Minimizing the potential for trail cutting was also a major concern.

Trail designers from SD MBA provided invaluable assistance in trail layout. We also sought outside input from California State Parks and San Dieguito River Park Joint Powers Authority trail designers. Potential alignments were documented using GPS coordinates, mapped, and then further refined in the field. Once the final alignment was determined, it was flagged, GPS coordinates were recorded, and the final alignment was mapped. The next step was deciding how and when to address closure of the existing user created trails. There was significant concern in the community that the area would be closed. We ultimately decided to keep the existing trails open while we constructed the new trail. This worked to our advantage because we were able to talk with users while constructing the new trail. This increased their understanding of what changes were being made and why they were necessary.

With a Refuge team of two, reliance on trail construction volunteers was essential. The majority of the trail work was conducted on the weekends. Workdays when initial trail was being cut, we had as many as 30 volunteers. More detailed trail work (e.g., rockwork, construction of a turn) required fewer but more experienced volunteers. Volunteers also installed fencing, signposts, and installed regulatory signs. Members of the Bonita Bikers constructed a puncheon to accommodate a stream crossing and provided their expertise on all aspects of trail construction.

With the new trail in place, work to refine the trail tread and close old trail segments began. Actions were taken to redirect runoff away from the fall line of steep user created trail segments. Fiber matting was installed on portions of the scar trail to facilitate revegetation and discourage continued access. When the new trail entrance was completed, the entrance to the scar trail was closed and fenced. Corrective and protective measures will continue to be implemented over the next few years as we monitor user activity and areas of potential vulnerability.

Task 2 - Interpretive Panels Design and Fabrication

Budget: \$15,000.00, revised and reallocated in February 2019 to \$14,660.00

Spent: \$13,830.00

Match for Task: Expected \$7,540.00 Actual \$7,236.59

An important component of this project was public outreach. In 2015, the public was completely unaware of who owned the land they were using and gave no thought to why it had not been developed. Appropriate signage is critical for getting out our message because we cannot always be present on the site. Of the three types of signage installed (regulatory, directional, and interpretative), interpretative signs provide us with the ability to connect users with the land. This grant provided funding for the design and fabrication of interpretive signs, as well as the development of several interpretive messages that will be used to inform the public about the importance of lands conserved to protect habitat and sensitive species. The contract for an interpretive designer went through a competitive bid process. A scope of work was developed and our FWS Regional Contracting staff issued the Request for Bids.

In September 2016, Artefact Design was awarded a contract for the design and fabrication of two interpretive signs, kiosk displays, and the development of interpretive messaging. Artefact Design was provided background information about the project, a kick-off meeting was held involving Refuge staff, Artefact Design, and a representative from Earth Discovery Institute (EDI) to discuss interpretive messaging goals, and a site visit was conducted to familiarize the Artefact Design team with site conditions and site resources. Refuge staff and representatives from EDI reviewed 30%, 60%, and 90%, and 100% designs prior to fabrication. At 60% design, the interpretive materials were reviewed and approved by SANDAG staff to ensure appropriate use of the SANDAG and Transnet logos. Both panels focus on the importance of the Mother Miguel Mountain area to the conservation of native habitat and species conservation (Appendix 2). One panel includes a trail map and addresses sustainable trail use, while the other focuses on protection of the Quino checkerspot butterfly and why staying the designated trail is essential to this species survival. These panels were installed in 2019 near the entrance to the new trail. The public's approval of these signs was evident on social media.

Upon completion of the contract, there were still unallocated funds available for interpretive signage. After receiving approval from SANDAG, Artefact Design was requested to submit a proposal for an additional panoramic interpretive panel that would be located at an overlook along the new trail. The completed panel is approximately 48 inches wide by 18 inches high and includes a panoramic high quality photograph with a 180° view of the area generally to the west, northwest, and southwest of Mother Miguel Mountain, as seen from a viewpoint along the new trail route. The text on the panel addresses the region's habitat conservation efforts.



Task 3 - Public Outreach and Education

Budget: \$0

Spent: \$0

Match for Task: Expected \$3,960.00 Actual \$6,058.25

Public outreach and education is an ongoing task. Trail users are contacted while out in the field. They learn about why the land is being protected and are encouraged to stay on the authorized switchback trail. With assistance from the Bonita Bikers and permission from the City of Chula Vista, a small kiosk was installed at the end of Paseo Veracruz, the primary access point to the Mother Miguel Mountain Trail. Here we can post information about events, status of the trail project, and sustainable trail use, such as avoiding the fall line trail and staying on the authorized switchback trail. Another kiosk, to be installed at the first turn of the new trail, will include the trail posters, as well as rotating educational materials.

A number of outreach events were held during the course of the project. On February 24, 2016, San Diego NWR and EDI partnered with SDMBA and Bonita Bikers to greet trail users at the Mother Miguel Mountain trailhead. The event reached about 20 hikers, 5 dog walkers, and 25 mountain bikers in just two hours, and provided information about sensitive species in the area and upcoming trail reroutes intended to improve user safety and increase habitat protection. Prior to beginning their training ride, Refuge Manager Jill Terp met with the Eastlake High School Mountain Biking Team of about 20 members and leaders to introduce them to the area and describe the importance of the habitat to regional conservation efforts.

Another outreach event was held on May 19, 2016. The Refuge Manager and partners from EDI, SDMBA, and Bonita Bikers talked with 55 people during the 3-hour event, that was intended to target "after work" trail users. Hikers, runners, mountain bikers, and dog walkers learned about upcoming trail work and why the fall line trail needed to be closed and rehabilitated. Specimens of native animals from the area (bobcat, red-tailed hawk, red-diamond rattlesnake) were provided and reasons for why rocks and other parts of nature should be left undisturbed were discussed. Many visitors asked to be added to the EDI email notification list for future volunteer opportunities. On December 3, 2016, the Refuge, in partnership with EDI, Bonita Bikers, SDBMA, and Bonita Valley Horsemen, held a similar event to inform the public of upcoming changes to the Mother Miguel Trail.

Updates on the trail project were communicated to trail users through contacts made along the trail and information sheets posted on a kiosk at the end of Paseo Veracruz. Because trail construction was occurring while users were on the mountain, there were many opportunities to talk one on one with trail users about the project and the need to stay on the designated trail. Initial responses were mixed with most users excited about a better-aligned, safer trail and others concerned that the fall line trail would be closed. Refuge staff also worked with the County of San Diego and City of Chula Vista to help to get the word out about staying on the switchback trails, and used the San Diego NWR website to provide up-to-date information on the progress of new trail construction.

Similar activities continued through 2019. EDI members joined us out at the site in March 2019 to talk with people about the new trail and the resources important to the area, while volunteers installed signage and fencing along the new trail. Again in May 2019, EDI set up an information table at the trailhead where they talked with the public about the new trail and provided interested individuals with information on how they can help protect the trail and the resources on the mountain. As trail work continued, most users readily expressed their approval of the new trail, thanked the volunteers and Refuge staff for their efforts, and supported all the efforts being made to keep users on the designated trail.

In late spring 2019, Lisa Cox, our Public Information Officer, interviewed three prominent volunteers who assisted in trail layout and trail construction. That information will be used to support a Region 8 Fish and Wildlife article about the project. Lisa has also shared information about the project and all of our project partners on social media, including Facebook and Instagram.

In April 2019, a session about this project was presented at the California Trails and Greenways Conference (Enjoy the Journey! Interpreting Conservation with Trail Use) as an example of how interpretation can be used to influence user behavior on trails and increase their awareness of the importance of conserved lands. The session was very well attended.

Public outreach will continue through the use of changeable materials in the kiosk, organized events, and social media. An official grand opening for the trail will take place in fall 2019 and will involve all of the trail partners including SANDAG, SDMB, Bonita Bikers, EDI, other volunteers, and the surrounding community.

Task 4 - Trail Improvements and Realignment

Budget: \$0, revised and reallocated in February 2019 to \$2,145.00

Spent: \$2,139.00

Match for Task: Expected \$39,300.00 Actual \$47,719.40

In 2016, we began preliminary flagging of a new trail route. As discussed previously, the trail had to be aligned to reduce the potential for trail cutting and to avoid steep grades that can lead to erosion and impacts to the trail tread. GIS data was used to evaluate the best route for ascending the mountain. Proposed switchbacks had to be located and designed in a manner that would ensure maximum sustainability and minimum potential for users to cut the switchbacks. Staff evaluated the best construction methods for the area, including the use of both hand tools and small trail construction equipment.

It was also necessary to work with SDG&E and the County to identify an accessible access route from the northern terminus of Paseo Veracruz to the Refuge and the entrance to the new Mother Miguel Mountain Trail. We also worked with the adjacent homeowners association to acquire permission/access agreements to use existing easements for construction access to the trail site.

By 2017, with significant assistance from our SD MBA partners, we identified an appropriate alignment for the bottom section of the proposed trail. The steeper middle section of the mountain was much more challenging. Once we identified a route that met our grade requirements, it would have to be eliminated from consideration because of the presence of sensitive habitat. Trail specialists at California State Parks and the San Dieguito River Park provided important insight into how we could achieve a sustainable alignment through this area. With this input, additional expertise from the SD MBA team, and multiple site visits, the team finally identified a suitable alignment for the middle section of the trail. Another difficult section was located further up the mountain, where we concluded that we would have to rely on the existing switchback trail due to cultural resources and habitat constraints. After numerous attempts to identify alternative alignments, we determined that at least for the near future, this was the best alternative for the area. This upper section of the trail, within the current project boundaries, is considerably more stable than the lower portions of the fall line trail, so by adequately defining the trail route, the existing trail would be sustainable. A combination of fencing, signage, and rocks were used to delineate this portion of the trail.

All GPS data obtained during infield trail alignment studies was uploaded into our GIS files and maps were produced to facilitate our evaluation of the proposed reroutes. By 2018, the final trail alignment was established and construction of the new alignment began. Trail construction occurred primarily on the weekends with some work conducted in the later afternoons. We contracted with a Kumeyaay Cultural Monitoring firm to ensure that no impacts to cultural resources would occur as a result of trail construction. High temperatures and low soil moisture content during 2018 hampered our ability to conduct trail work. The dry, powdery soil could not be compacted and as result work had to wait for sufficient rainfall.

By late 2018, sufficient rainfall had occurred, allowing trail work to resume. Volunteers from the SD MBA and Bonita Bikers conducted several weekend work events to address needed trail benching and turn construction and to mitigate potential erosion issues along the new trail alignment. The rain continued into 2019 and provided good conditions for trail work. A number of very productive volunteer workdays result in completion of initial trail construction and implementation of final trail bench work. With funding from SANDAG, we were able to rent a bobcat tractor and with assistance from a trained SD MBA staff member, who operated the tractor, turn 1 and an associated flat area for the kiosk was constructed and rock needed to complete the new trail entrance was moved into place.

At the end of March 2019, we installed trail signage for the bottom section of the trail and with assistance from the Eastlake Youth Bicycle Team we delineated the upper portion of the trail, which was part of the original switchback trail, with rock in an effort to keep users on the trail (Appendix 3). The new trail entrance was completed at the end of March and the old scar trail entrance was blocked off with fencing on the same day. Once completed, the trail was mapped and a map of the 1.13-mile route was prepared (Figure 4).



U.S. Fish and Wildlife Service
San Diego National Wildlife Refuge



Figure 4. New Alignment for the Mother Miguel Mountain Trail (1.13 miles)

Task 5 - Rehabilitation

Budget: \$0

Spent: \$0

Match for Task: Expected \$13,920.00 Actual \$17,576.58

To assist in the rehabilitation of the user created trails present on the mountain, volunteers and staff installed both lodge pole fencing and barbless wire fencing in various locations throughout the site. Erosion control materials were installed on portions of the fall line trail and rocks were moved into erosion gulls on the scar to reduce runoff velocities during rain events.

Signage and rocks were placed along short cuts and brush cut to accommodate the new trail route was placed at the tops and bottoms of the short cuts to discourage continued use. Plants salvaged during trail construction will be replanted and revegetation efforts will continue over the next few years. Simply closing old trails has already resulted in the reestablishment of some vegetation within the old trail tread.

Task 6 - Purchase Kiosk/Install Kiosk and Interpretive Panels

Budget: \$3,300.00

Spent: \$3,299.72

Match for Task: Expected \$600.00 Actual \$1,260.40

Once trail construction was completed, the interpretive panels were installed. The two vertical interpretive signs were installed by Refuge staff near the new entrance to the trail and a contractor was hired to install the panoramic sign at a major viewpoint along the realigned trail.

Materials were purchased for the kiosk, which will be constructed by the volunteers from the Bonita Bikers. An area was prepared for the kiosk to the right of the first major switchback (Turn 1). The kiosk will include the posters prepared by Artefact Design, as well as rotating information about habitats and species, safety tips for people and dogs, and other relevant information about the trail and the many important resources present on the mountain.

Task 7 - Site Monitoring

Budget: \$0

Spent: \$0

Match for Task: Expected \$2,670.00 Actual \$1,375.88

Periodic monitoring of trail activity to see where there may be trail cutting or new trail creation along the new trail alignment began immediately following the completion of trail construction and will continue. Monitoring efforts also include evaluating the effectiveness of fencing and signage in protecting habitat, as well as monitoring to determine if conditions on the new trail require maintenance. Frequent trail users also provide input to us regarding conditions and activity occurring on and adjacent to the trail.

Task 8 - Administrative

Budget: \$970.00, revised and reallocated in February 2019 to \$135.00

Spent: \$132.45

Match for Task: Expected \$7,260.00 Actual \$7,642.78

Administrative activities included preparing quarterly reports, managing the budget, tracking volunteer hours, assisting with contracts for interpretive signs and sign installation, interacting with budget and finance staff on monthly billings, keeping upper management informed of project progress, and interacting with SANDAG staff as needed.

Challenges

During the implementation of this project, we encountered a variety of challenges from difficult topographic and weather conditions to injury and a government shutdown. The steep terrain and presence of sensitive habitats required considerable field time to complete the design for the proposed reroute. We also experienced delays related to high temperatures and the lack of sufficient rainfall. Without any rain during the last quarter of 2017 through October 2018, we were not able to begin trail construction as planned, which also delayed our implementation of rehabilitation efforts. Trail work finally began in late 2018, when sufficient rainfall occurred.

The federal government shutdown, which resulted in the furloughing of Refuge employees, began on December 23, 2018 and extend until January 25, 2019. The shutdown affected our ability to work with volunteers on the project during the last quarter of 2018 and beginning of Jan – March 2019 quarter. To address these delays, we requested and SANDAG approved a grant extension to June 1, 2019.

Conclusions

The purpose of this project involved much more than just addressing the problems with an existing trail. Our purpose was to inform the public of the importance of the resources on the mountain, to create a respect for the land, and to provide users with sustainable, safe access into public lands set aside for habitat and species conservation. All land managers deal with the challenges of keeping visitors on the designated trail system, but for managers of conserved lands, such as the lands within the San Diego NWR, this is critical to our mission.

The Refuge, like other conserved lands in San Diego County, exists within the wildland/urban interface and is easily accessed from existing neighborhoods. Accessibility combined with the rising popularity of reaching the peaks of various mountains throughout the region and documenting the accomplishment with a photo has changed the traditional focus of trails from one of enjoying the journey to that of reaching the destination. The Mother Miguel Mountain

project provided us with an opportunity to inform users about the lands on which they are recreating and to expand their trail experience to include observing the plants, insects, and animals present along the trail while also achieving their goal of reaching the mountain peak.

The decision to construct the new sustainable trail while leaving the existing trail open provided us an opportunity to talk with users while we were working out on the site. This in addition to the presence of multiple volunteers working on the project helped raise awareness of the efforts necessary to address public use while also protecting resources. The message of why the fall line trail is bad for the environment and for public safety and why a new sustainable trail would improve their trail experience was more readily accepted when it came from fellow trail users.

Public outreach and on-site interpretive signage also helps get the message out about the importance of the resources in this area, as well as the importance of conserved lands throughout the region. Users need to understand that staying on the trail is important to protect wildlife they may not even know is present. For instance, one of our interpretive signs informs users that areas along the trail that look like just another weedy patch with little purpose, actually support small, short-lived seasonal plants that provide food for the very rare Quino checkerspot butterfly in its larvae stage. Traveling off trail into these areas threatens the continued existence of this butterfly species. Even the panoramic sign that points out various areas visible from the trail includes messaging about the lands conserved throughout the region to protect species and habitat.

Developing and nurturing partnerships with members of the SD MBA, Bonita Bikers, and Bonita Valley Horsemen, as well as trail users from the neighboring community was an essential component of the project. It is through these partnerships that we can most effectively engage the public and encourage them to respect the lands conserved for all of us. Our partners actively participate in peer-to-peer communication while out on the trail. The reward: users have expressed their appreciation for the work completed on the mountain, for the interpretive signage, and for the efforts of all involved.

All land managers will continue to be challenged by new users and changes in existing uses (e.g., electric bikes). As a result, efforts to achieve our project goals will be ongoing. Maintenance, monitoring, and corrective measures to address trail design, tread conditions, fencing, and rehabilitation will be required long into the future, as will our need to keep our public outreach efforts current and interesting.

Appendices:

Appendix 1 - Trail Log

Appendix 2 - Interpretive Signage

Appendix 3 - Project Overview in Photos

Appendix 4 - Other Project Photos