



County of San Diego

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February 21, 2019

Sarah Pierce
San Diego Association of Governments
401 B Street, Suite 800
San Diego, CA 92101

**Re: Final Report for the Quino Habitat Restoration Project – Grant Agreement
#5004942**

Dear Ms. Pierce:

The purpose of this Final Report is to document the Quino checkerspot butterfly habitat restoration activities that occurred throughout the duration of the project. The attached report includes a discussion of all work performed and the project's results. Invoices and invoice back up for year 2, quarter 4 are attached.

If you have any questions, or require additional information, please contact me at (858) 966-1377 or via email at Melanie.Tylke@sdcounty.ca.gov.

Sincerely,

Melanie Tylke, Land Use/Environmental Planner III
Resource Management Division

Attachments: Final Report
Invoices
Invoice Back-up



San Diego Association of Governments
Quino Habitat Restoration – Otay Reservoir Population
Final Report
Project Period: January 27, 2017 – January 27, 2019
SANDAG Contract Number: 5004942

Executive Summary

In 2017 the County of San Diego Department of Parks and Recreation (DPR) began a habitat restoration project to protect and enhance the viability of occupied Quino checkerspot butterfly (*Euphydryas editha quino*; Quino) habitat at the Otay Lakes Park off-site property. The project site is specifically located adjacent to an existing Otay Water District (OWD) Reservoir and was designed to reduce threats to Quino by increasing and improving habitat on the DPR-owned site that had previously supported a hundred or more Quino. Quino is threatened by development pressure, invasion by non-native grasslands (NNG) and forbs, and, likely, changes to climate and long-term drought and is considered an MSP Category SL (species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities). DPR enhanced Quino habitat conditions and connectivity by: 1) identifying and closing roads/portions of road on the site to vehicular activity; 2) preventing off-road vehicle activity that may be bifurcating and destroying Quino habitat; 3) fencing and signing these areas to be restored; 4) controlling and removing invasive NNG that compete with *Plantago erecta* (dwarf plantain); 5) seeding closed roads with dwarf plantain to increase the size of Quino larval patches; and 6) document site condition improvements as well as any beneficial effect for Quino.

Monitoring of the project site occurred multiple times throughout the project period. Quino surveys occurred between January and April in 2017 and 2018, and during January 2019, and documented the occurrence of both Quino larvae and adults. However, Quino observations in 2018 ceased several weeks earlier as compared to 2017. This is likely due to below average rainfall in 2017/2018 resulting in less than optimal levels of *Plantago erecta* seed germination.

Due to the less than optimal rainfall in 2017/2018, a six-month project extension was requested and granted to DPR to continue the restoration and monitoring efforts. The project extension allowed for the site to receive an additional application of *Plantago erecta* seed in the restoration areas on November 27, 2018. Seeding was timed to take advantage of the winter rains. Additional site visits and larval monitoring surveys were conducted on December 26, 2018, January 10, 2019 and January 24, 2019. These site visits concluded plantago seeding was successful and host plant conditions are better than the previous year. In addition, one Quino larva was observed on January 10, 2019 in the adjacent habitat next to the active restoration areas.

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Project Background

The County of San Diego Department of Parks and Recreation (DPR) proposes to reduce a threat to the Quino checkerspot butterfly (*Euphydryas editha quino*; Quino) by increasing and improving habitat on a DPR-owned site that had previously supported a hundred or more Quino. Quino is threatened by development pressure, invasion by non-native grasslands (NNG) and forbs, and, likely, changes to climate and long-term drought. Quino is considered an MSP Category SL (species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities). DPR enhanced Quino habitat conditions and connectivity by: 1) identifying and closing roads/portions of road on the site to vehicular activity; 2) preventing off-road vehicle activity that may be bifurcating and destroying Quino habitat; 3) fencing and signing these areas to be restored; 4) controlling and removing invasive plants and non-native grasses (NNG) that compete with *plantago erecta* (dwarf plantain), the primary Quino habitat; 5) seeding closed roads (0.4-acre) with dwarf plantain to increase the size of Quino larval patches; and 6) document site condition improvements as well as any beneficial effect for Quino.

Quino and its primary host plant dwarf plantain will benefit from the threat reduction stewardship measures. Quino is federally listed as an endangered species, and is a listed MSP sensitive species (Category SL). Specific objectives and actions implemented during the project period were stressor management (removal of invasive plants and eliminating human activities in the area), alteration of the vegetation community (removal of non-native invasive plants and replanting and seeding of native plants) and specific species management (support the habitat, monitor numbers and potentially reintroduce Quino into the project area). As stated in the MSP, (MSP Vol. 2, Page 2-88; Goal) “MU [Management Unit] 3 Management Goals for Quino Checkerspot: Within the identified USFWS Recovery Unit (USFWS 2003) or “Possible Future” Recovery Units in the MSPA, protect, restore and enhance Quino checkerspot habitat within currently occupied and historically occupied sites and the landscape connections between them to create resilient occurrences and to allow for potential reintroduction to ensure persistence over the long-term (>100 years).” In addition, as stated in MSP Vol. 2, Page 2-89 “Beginning in 2015, implement high priority actions in the implementation plan to manage habitat within the SW San Diego Recovery Unit to maintain landscape connectivity between the Otay Lakes/Rancho Jamul occurrence complex and occurrence complexes [...] west (Otay Valley, W. Otay Mesa) using methods identified in the USFWS 2003 Recovery Plan” is outlined as a key objective. Associated actions completed by this project in concert with this objective included managing identified connecting habitat to increase the likelihood of Quino use by reducing non-native invasive plants, adding native seeds, and reducing surface disturbance by adding fences and signage to deter off-road vehicle use from the occupied Quino habitat area.

Given the reduced population numbers found since a peak year in 2013, the need to improve the project site is urgent as management of Quino in MU3 is critical to the long-term persistence of the species in the MSPA, and the proposed improvements are not within County maintenance/management budgets. Quino is a federally listed endangered species and is a listed MSP sensitive species (Category SL). Immediate threats to Quino in this area include: lack of specific management and habitat protection; non-native invasive grasses; and human/ vehicle off- and on-road traffic. Specifically, this site is in close proximity to a heavily used maintenance road. The road is used by personnel from San Diego Gas & Electric (SDG&E), Otay Water District (OWD), and the U.S. Border Patrol.

The project site is known to support both Quino adult and larvae. Non-native invasive grasses occur in the southern portion of the parcel. Control of these grasses would expand the potential habitat for Quino onsite. Human/vehicle off- and on-road traffic is another stressor/threat to Quino and its habitat.

Pedestrian and vehicle traffic near and within the project areas are identified threats that include direct mortality caused by trampling of larvae and host plants and compaction of soil, as outlined in the MSP (Vol. 2, Page 2-81). Off-road activity may also negatively affect host plant growth and directly impact Quino larvae. An existing dirt road splits the known larval cluster. As part of this project this dirt road would be closed and fenced to prevent access and restored to support dwarf plantain (Quino's primary host plant), providing connectivity of this habitat area. Fencing along the southern perimeter of the habitat would also ensure that unauthorized vehicles do not further impact the extant Quino population onsite. In addition to the fencing and road closure, proposed management activities include controlling and removing non-native invasive grass and other plants that have taken over the butterfly's habitat and food source, seeding areas with native plants, and monitoring and documenting improvement of the conditions and result for the butterfly within the project area throughout the project period. These activities directly eliminate and manage identified threats to the butterfly by restoring and enhancing Quino habitat.

Project Goals

The overarching project goal is to enhance Quino habitat conditions and connectivity by: 1) identifying and closing roads/portions of road on the site to vehicular activity; 2) preventing off-road vehicle activity that may be bifurcating and destroying Quino habitat; 3) fencing and signing these areas to be restored; 4) controlling and removing invasive NNG that compete with *plantago erecta* (dwarf plantain), the primary Quino habitat and food source seeding areas with primarily native plant species required for Quino survival; and 5) documenting site condition improvements as well as any beneficial effect for Quino.

Work Performed by Task

Task 1- Pre-Project Monitoring

Budget: \$2,700

Spent: \$2,700

Quino checkerspot butterfly (Quino – *Euphydryas editha quino*) adult and larval surveys were conducted between January 31st and March 29th, 2017. Survey results included the identification of three Quino larvae (Photo 1) and six Quino adults (Photo 2). Adults were observed on three separate days (March 14th, March 21st, and March 29th) (See Figure 1). Additionally, Figure 1 depicts the 4.5-acre habitat enhancement area, the 0.4-acre *Plantago erecta* restoration patch, and the location of the new fence line.



Photo 1. Quino larvae (1/31/2017)



Photo 2. Adult Quino (3/14/2017)

Task 2-Site Preparation

Budget: \$6,000

Spent: \$6,000

Dirt roads bisecting occupied Quino habitat were closed in March 2017 and 5-foot tall 3-strand wire fencing (Photos 3 and 4) and six 24-inch “No Trespassing” signs were installed in April 2017. Fence and signage installation was completed on April 7, 2017.



Photo 3. Installation of perimeter fence near northeast corner (4/7/2017).



Photo 4. Fencing located along southern boundary of the site (4/7/2017).

Task 3-Habitat Restoration – Roadways

Budget: \$9,306

Spent: \$9,306

Roadways were closed and protected by site perimeter fencing in April 2017. Initial removal of invasive weeds from the roadway began in March 2017 and continued through June 2017. Weeding resumed in October 2017. Active restoration activities included hand broadcasting dwarf plantain (*Plantago erecta*) seeds throughout the closed road areas (0.4-acre active restoration area) (Figure 1). Prior to seed broadcasting, water was applied to the road surfaces. Once wet, the seed was broadcasted and raked into the soil (Photo 5). Following raking, the restoration areas received approximately 2,000 gallons of supplemental water.



Photo 5. Eastern roadway with seed raked into road surface (12/2017)



Photo 6. Watering Seed into Road Surface Following Seeding (12/2017)

Supplemental water was applied to the site three times (12/1/2017, 12/14/2017, and 01/02/2018). Supplemental water was required due to the lack of natural rainfall during the fall and winter months of 2017. Approximately 8,000 gallons of water were applied to the site during three site visits. The application of the water was done by hand utilizing a water pump, hoses and water tanks (Photo 6). The water tanks and pump were located on maintenance vehicles that were parked along the southern boundary of the project site.

In addition to the broadcasting of *Plantago erecta* seeds throughout the closed roads, six 15-foot by 30-foot patches located in the two old access roads (Figure 2) were reseeded with three pounds of *Plantago erecta* then cultivated and watered on January 22, 2018 (Photo 7). Site watering by hose and water truck continued through the months of January, and into mid-February (2018). Unfortunately, below average rainfall in February and March 2018 reduced the effectiveness of the 2018 seeding efforts.



Photo 7. Cultivation of newly seeded *Plantago erecta* (1/22/18).

Due to less than optimal project results and since budget was still remaining, a six-month project extension was granted to the County to continue the restoration efforts. The project extension allowed for crews to apply an additional application (till, cultivate, and water) of *Plantago erecta* seed in ten 10-ft x 10-ft plots in the old access road (Photo 8) on November 27, 2018. Seeding was timed to take advantage of the winter rains.



Photo 8. Active *Plantago erecta* seeding (11/27/2018)

Task 4 – Site Enhancement – Other Areas

Budget: \$12,704

Spent: \$12,652

General site maintenance of invasive plants located outside of the occupied Quino larval and adult habitat began in March of 2017 and continued through the 2018 plant growing season. Removal techniques included hand pulling and spraying of non-native grasses, *M. nodiflorum*, and *Salsola tragus* (Photos 9 and 10).



Photo 9. Site spraying of *Salsola tragus* (6/27/2017)



Photo 10. Site spraying of *Salsola tragus* (5/17/2017)

In 2018 general site maintenance occurred on May 30, 2018 and November 27, 2018 and included weed removal from the habitat outside the active restoration areas, litter removal, and fencing and signs inspections. Limited site maintenance was primarily because the drought conditions onsite didn't warrant active weeding of invasive plants and of the desire to redirect maintenance funds from weeding to reseeding of the closed roadways.

Additionally, on January 22, 2018, a 60-foot section of new fence, consisting of nine T-posts and wire fencing and one large sign, was added in the northwest corner of the site to further exclude vehicular access and protect the enhancement areas (Photo 11).



Photo 11: New 60-foot section of perimeter fence and sign (1/22/18).

Task 5 – Monitoring

Budget: \$9,090

Spent: \$9,090

Biological monitoring occurred throughout 2017 and 2018 and ended on January 19th, 2019. The biological monitor was onsite during site maintenance activities performed by the habitat restoration contractor to ensure no impacts to larval or adult Quino occurred.

Numerous site visits to the restoration site occurred during the 2018 reporting period. In 2018 focused Quino surveys occurred between January 2018 and April 2018. Quino monitoring documented the occurrence of both Quino larvae and adults. Two Quino larvae were observed on January 31, 2018 (Photo 12) and three adult Quino were observed on March 6, 2018. Quino observation ceased several weeks earlier than in 2017. During the beginning of the year, host plant conditions within the occupied habitat was average, however, live *Plantago erecta* plants quickly went to seed by the end of April 2018. This is likely due to the less than optimal rainfall that occurred in 2018.



Photo 12. Quino larvae (1/31/18).

After the summer months, one site visit was conducted on October 11, 2018 to evaluate site conditions going into the fall and winter growing season. After the site was seeded on November 27, 2018, additional site visits and larval monitoring surveys were conducted on December 26, 2018, January 10, 2019 and January 24, 2019. These site visits concluded plantago seeding was successful and host plant conditions are better in 2019 than the previous years (Photos 13 and 14). Of the 0.40-acre closed for active restoration approximately 0.33-acre contain low to medium dense plantago patches (Figure 2). It is anticipated that the plantago density and coverage within the roadways will continue to improve throughout the 2019 plant growing season. It should also be noted that on January 10th, 2019 one Quino larvae was observed in the habitat adjacent to the closed roadways.



Photo 13. Reseeded Roadway December 2018



Photo 14. *Plantago erecta* plants December 2018

Task 6 – Administrative

Budget: \$4,200

Spent: \$4,200

Management and administrative activities included project management, scheduling, and coordination with field crews and DPR staff as well as the preparation of six quarterly reports, two annual reports, and this final report.

Conclusions

At project close out DPR has achieved project goals. This includes enhancing Quino habitat conditions and connectivity by closing and protecting 0.40 acre of road area. Fencing and signage was installed, and the closed road sections are no longer impacted by any off-road vehicle activity. Restoration of the roadways was also successful as 0.33 acre of the roadways support plantago erecta patches at project completion. This acreage number is likely to improve as the 2019 plant growing season continues. Lastly, general site maintenance activities were able to control and suppress invasive non-native plants throughout the restored and adjacent habitat areas. Monitoring efforts in 2017, 2018 and 2019 further supported project success as Quino were observed during each year. This included both observations of larva and adults in 2017 and 2018. In 2019 only larvae were observed as the project monitoring ended prior to the 2019 adult flight season. However, it is anticipated that the 2019 adult flight season will be at least an average to above average year as conditions onsite and throughout Quino's range appear to be excellent.

As additional monitoring and management funds become available it is recommended that the Otay Reservoir site be monitored for threats and Quino presence/absence. This site has the potential to support high densities of both Quino larvae and adults and its connectivity to other occupied Quino habitat (west, east and south) of the site further increases the regional importance of the occupied habitat onsite. The Otay Reservoir site would be an excellent candidate for regional Quino monitoring efforts.

Figures

Figure 1

Figure 2

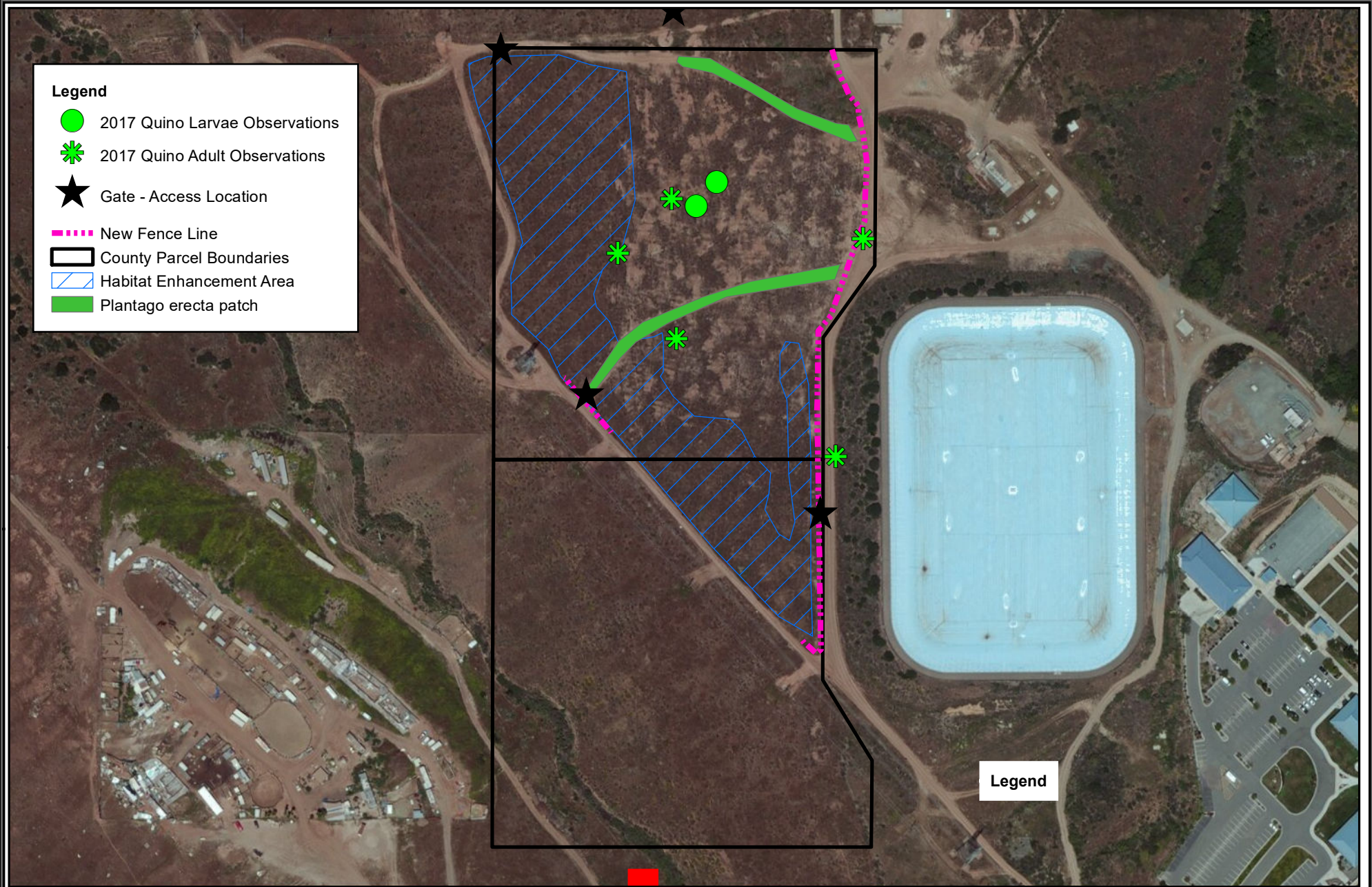


Figure 1
Quino Habitat Restoration
Project

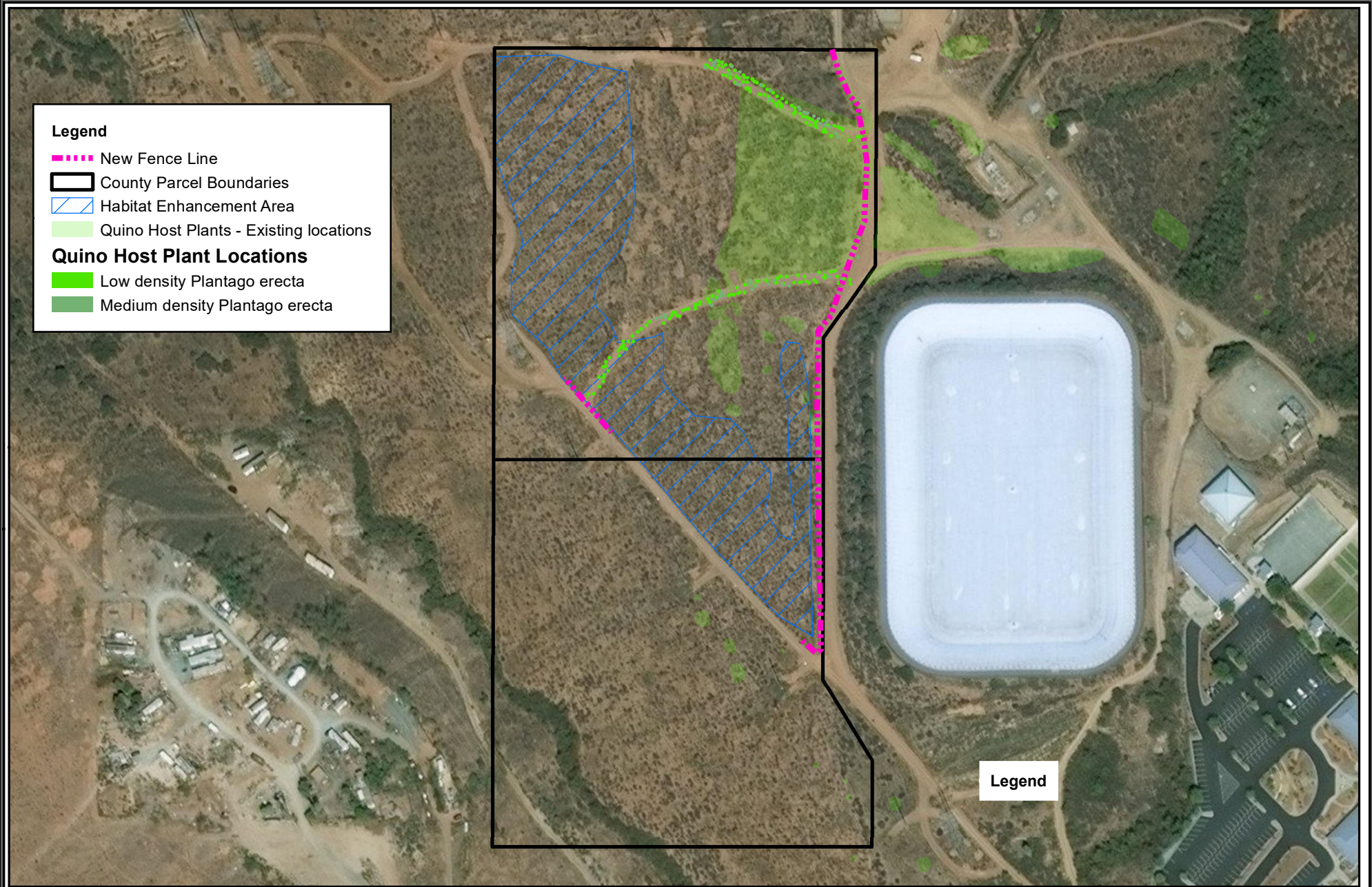


Figure 2
Quino Habitat Restoration
Project