Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program

Quino Checkerspot Butterfly (*Euphydryas editha quino*)
Survey Report 2007

7 March 2008

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NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies (i.e., the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

The primary preparer of this report was the 2007 Lead Biologist, Adam Malisch. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the Western Riverside County Regional Conservation Authority (RCA). For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

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INTRODUCTION

The Quino checkerspot butterfly (*Euphydryas editha quino*; "QCB") is federally listed as endangered and is narrowly distributed at relatively few locations within the MSHCP Plan Area. Seven Core Areas for QCB are identified in the MSHCP, and Species Objective 4 for QCB states that "within the MSHCP Conservation Area, Reserve Managers will document the distribution of Quino checkerspot on an annual basis" (Dudek & Associates 2003).

The Monitoring Program began developing a protocol in 2005 to determine the distribution of QCB across the Conservation Area. The protocol was refined and expanded in 2006 and again for the 2007 survey season based on previous results. Several survey goals in addition to those specified in the species objectives have been included in the study. The goals of the 2007 QCB survey effort were as follows:

Survey Goals:

A) Document QCB distribution across the Conservation Area.

B) Refine the 2005 protocol for sampling the distribution of adult QCB within the Conservation Area and test additional methods for finding QCB (larvae surveys, adult surveys specifically targeting high-quality habitat).

C) Calculate the detectability of adult QCB during flight season and estimate the percentage of surveyed sites that are occupied using repeat visits to plots and analyzing the Proportion of Area Occupied (MacKenzie et al. 2002).

D) Provide data regarding QCB resource selection, important distribution covariates, and important observation covariates.

METHODS

Protocol Development

In order to expand the Monitoring Program's QCB survey effort in 2007, we planned to continue adult QCB surveys according to the protocol developed in 2005 and refined in 2006 (see *Quino Checkerspot Butterfly Survey Report 2006*) and to add larvae surveys and surveys specifically targeting presumed high-quality habitat. We hoped the expanded study would help locate additional populations of QCB, beyond those seen in recent years.

Personnel and Training

All field observers studied pinned specimens, videotape of live QCB and co-occurring butterfly species, and relevant butterfly field guides before conducting surveys. Observers were also trained to identify QCB and important QCB habitat characteristics including host plants in the field by Dr. Gordon Pratt and Mike Klein, independent consultants and Quino specialists, Dr. Alison Anderson of the U.S. Fish and Wildlife Service (USFWS), and Monitoring Program staff Adam Malisch, Angela Hyder, and Karin Cleary-Rose. All field surveyors passed the USFWS Quino Checkerspot Butterfly practical exam before participating in field surveys. Surveyors in 2007 included:

- Angela Hyder, Project Lead (Regional Conservation Authority)
- Ryann Loomis (Regional Conservation Authority)
- Rosina Gallego (Regional Conservation Authority)
- Joe Veverka (Regional Conservation Authority)
- Lynn Miller (Regional Conservation Authority)
- Angie Coates (Regional Conservation Authority)
- Ricardo Escobar III (California Department of Fish and Game)

Survey Methods

To optimize the timing of surveys in 2007, we monitored previously established "sentinel sites" at 4 locations across the Conservation Area known to support populations of QCB. We believe these sites are representative of the currently known distribution of QCB. Sentinel sites were located at the Southwestern Riverside County Multi-Species Reserve ("Multi-Species Reserve"), Oak Mountain, Wilson Valley, and Silverado Ranch (Figure 1). These sentinel sites locations fall in the following Core Areas: Johnson Ranch/Lake Skinner, Oak Mountain, Wilson Valley, and Silverado/Tule Peak.

When spring conditions developed, a Monitoring Program biologist visited each sentinel site approximately once per week to monitor the status of QCB at that site. To minimize observer impacts and reduce redundancy, Monitoring Program biologists did not revisit sites when it was known that observers from partnering agencies (e.g. USFWS) had already visited a sentinel site in a given week.

Observers recorded QCB host plant status on-site, available nectar resources, number of QCB adults and larvae seen, co-occurring butterflies, start and end time, and weather during each sentinel site visit (Appendix A). We visited sentinel sites until the approximate date of the end of the flight season from the previous year (2006).

Data Analysis

Only sentinel site visits were conducted during 2007. Because these data are collected simply to identify the status of known QCB populations, no data analysis was conducted.

RESULTS

Monitoring Program biologists did not observe any QCB in western Riverside County in 2007 from sentinel site monitoring, nor were any incidental observations of QCB made during survey activities for other species. We conducted 28 sentinel site surveys at four sites between 4 March and 10 May 2007 (Table 1). Sentinel sites were surveyed approximately weekly to detect the start of the QCB flight season.

Other butterfly species remained relatively abundant, and at least 1 species of host plant was observed at each sentinel site, but no QCB adults or larvae were seen. To the best of our knowledge, no QCB were seen in Riverside County by any person in 2007 (USFWS, 9 January 2008).

The QCB host plant *Plantago erecta* was observed at the Multi-Species Reserve, Oak Mountain, and Wilson Valley; however plants remained scarce and small. Other host plants including *Plantago patagonica*, *Collinsia concolor*, and *Antirrhinum coulterianum* were

observed at the Silverado Ranch sentinel site, but they also remained scarce throughout the season.

Table 1. Quino Checkerspot Butterfly Sentinel Site Survey Results in 2007.

Sentinel Site Location	Date of First Visit	Date of Last Visit	Total Number of Visits	Total QCB Observed
Multi-Species Reserve	3/22/2007	5/8/2007	7	0
Oak Mountain	3/4/2007	5/8/2007	9	0
Wilson Valley	3/28/2007	5/10/2007	3	0
Silverado Ranch	3/15/2007	5/10/2007	8	0

DISCUSSION

It appears that environmental conditions (i.e., drought) precluded the progression of QCB development in 2007 such that no significant flight season occurred. 2007 was one of the driest years on record with only 2.07 inches of rain falling at the Riverside Municipal airport between 1 July 2006 and 30 June 2007 (National Weather Service, 29 November 2007). We believe that this lack of precipitation led to a lack of sufficient host plant germination and growth, which in turn caused larvae to remain in diapause or to reenter diapause after a brief emergence (Ehrlich and Hanski 2004, USFWS 2003). Other checkerspot species were observed during sentinel site visits, most likely because their host plants are perennial shrubs rather than small annual forbs.

The lack of QCB observations in 2007 is cause for concern, but larvae are thought to be capable of remaining in diapause for more than one year or retuning to diapause after emergence if conditions are unsuitable (USFWS 2003). It is expected that QCB will fly in the Conservation Area again when conditions are more favorable.

Having established sentinel sites to monitor was very useful in 2007 as time spent surveying randomly distributed plots would most likely have been of little use. With no adult QCB flying at known high quality sites it would be impossible to have any reasonable confidence that plots without observations were truly unoccupied and it is unlikely that we would have observed QCB within surveyed plots.

Once QCB adults were observed flying at a nearby sentinel site, we planned to begin time-constrained surveys within 4 ha plots following the protocol established in 2005, and refined in 2006. We planned to both place plots at random within areas either known to support or suspected to support QCB populations, and to specifically place survey plots within areas *a priori* assumed to be high-quality habitat. All randomly placed survey plots were to be surveyed 3 times to establish a plot-by-plot detection history, as required by the Proportion of Area Occupied (PAO) study design outlined in MacKenzie et al. 2002 and MacKenzie and Royle 2005. Non-randomly placed plots were to be surveyed until adult QCB were observed flying within the plot, or a maximum of 3 times. Observers were to walk 10 parallel transects during a 90-minute survey of each plot, collecting the following data: coordinates of all adult QCB and larvae observed during the survey, date, observer, time, general weather description, temperature

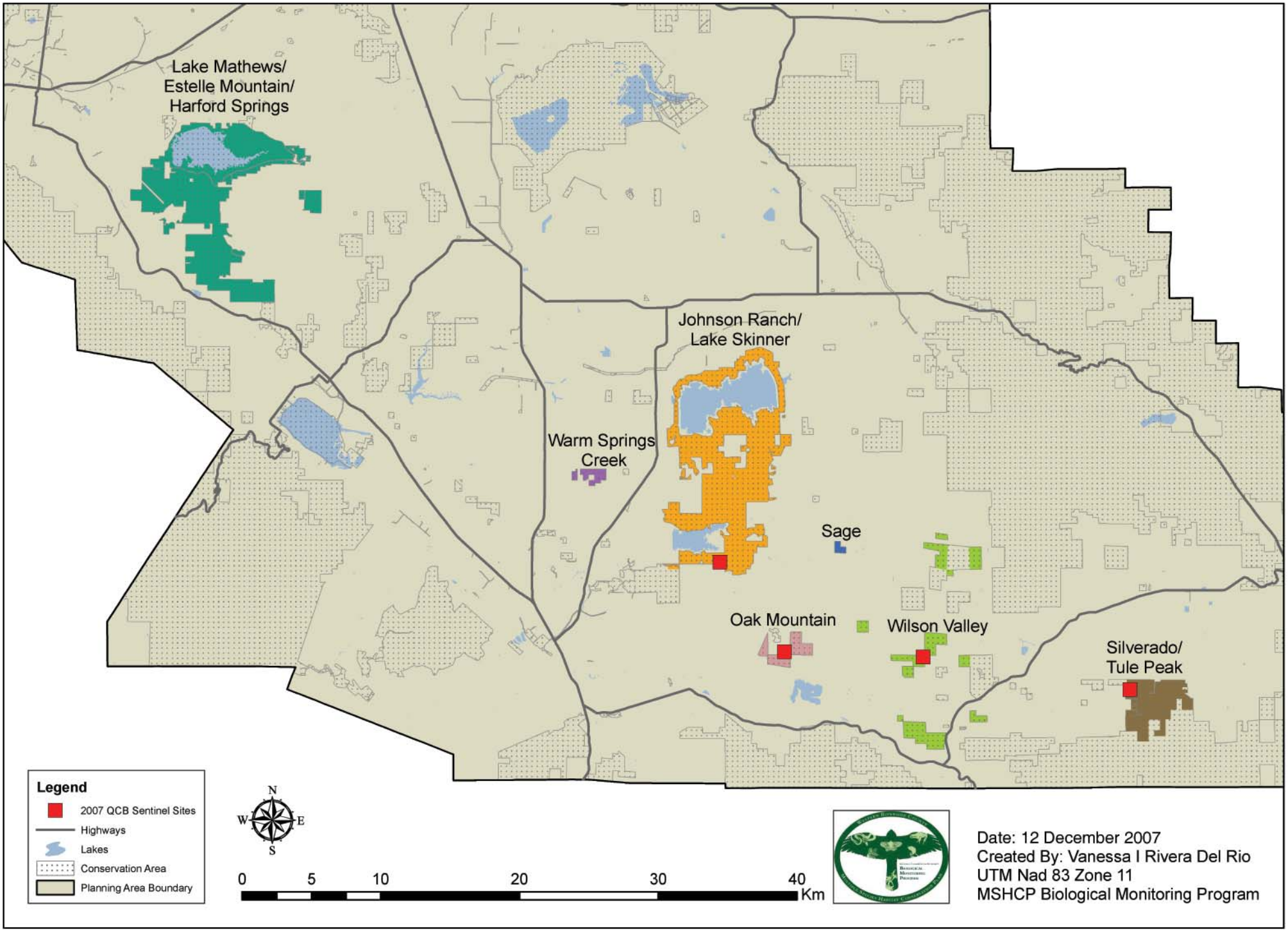
in shade at 1 m above ground, average wind speed, cloud cover, and co-occurring butterfly species. Observers were also to record abundance categories of individual host plants and nectar plants as a group within plots, along with the percent cover category of bare ground, forbs, shrubs, and non-native grasses within plots.

We also planned to conduct a pilot study involving larvae surveys along transects within demarcated patches of QCB host plants. The short-term goal of this pilot was to determine if QCB larvae could be detected in host plant patches within the Conservation Area via visual encounter surveys. The long-term goal was to increase the encounter rate when surveyors are looking for QCB and thereby to improve our understanding of QCB distribution within the Conservation Area.

Recommendations for Future Surveys

As was planned for the 2007 season, it is recommended that additional surveys targeting high quality habitat be conducted in 2008 to supplement the typical plot surveys. These "targeted" surveys would primarily serve to increase the number of known locations in a survey season but would not provide the same detectability estimates and standardized search methods among observers that the typical plot surveys afford. Targeted surveys would focus efforts in historically occupied areas and areas with high quality QCB habitat. Appropriateness of habitat should be evaluated in the field using the best available knowledge, and surveyors should feel free to "high-grade" their efforts in order to attempt to visit the best habitat available. Larvae surveys should also be tested to determine if they might be useful additions to the typical adult surveys. The possibility of mapping patches of *Plantago sp.* or other host plants in and around occupied plots should also be considered.

Figure 1. Quino Checkerspot Butterfly Sentinel Sites in 2007.



REFERENCES

Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSHCP, Volumes I and II. Prepared for County of Riverside Transportation and Lands Management Agency. Prepared by Dudek & Associates, Inc. Approved June 17, 2003.

Ehrlich, P. R., and I. Hanski. 2004. On the Wings of Checkerspots: A Model System for Population Biology. Oxford University Press, Oxford.

MacKenzie, D.I. and J.A. Royle. 2005. Designing occupancy studies: general advice and allocating survey effort. Journal of Applied Ecology, 42:1105 – 1114.

MacKenzie, D.I., J. D. Nichols, B.L. Gideon, S. Droege, A. Royle, and C.A. Langtimm. 2002. Estimating site occupancy rates when detection probabilities are less than one. Ecology, 83: 2248 – 2255.

National Weather Service Forecast Office. National Weather Service. Accessed: November 29, 2007 <http://www.weather.gov/climate/index.php?wfo=sgx>.

U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Quino Checkerspot Butterfly (*Euphydryas editha quino*). Portland, Oregon. 179 pp.

U.S. Fish and Wildlife Service, Quino checkerspot butterfly – Protocol and Monitoring Information. U.S. Fish and Wildlife Service. Accessed: January 9, 2008. <http://www.fws.gov/carlsbad/Quino_Monitor.htm>.

Appendix A: Quino Checkerspot Butterfly Sentinel Site Survey

Date:_____ Site:_____ Monitor and Trainees:_____

Arrival
Time: _____ Temperature:_____ Average Wind Speed:_____
Weather (circle one): Clear, Partly Cloudy, Cloudy, Raining

Departure
Time: _____ Temperature:_____ Average Wind Speed:_____
Weather (circle one): Clear, Partly Cloudy, Cloudy, Raining

Adult Quino Seen (tally how many):_____
Quino Larvae Seen (tally how many):_____
Cryptogamic Crusts (circle one): Y N
Host Plants Seen (circle all that apply):
Plantago erecta, P. patagonica, Castilleja exserta, Antirrhinum coulterianum, Cordylanthus rigidus, Collinsia concolor

Butterflies Detected:	**Nectar Resources Seen Blooming:**
_____	_____
_____	_____
_____	_____
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Other Notes: _____
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