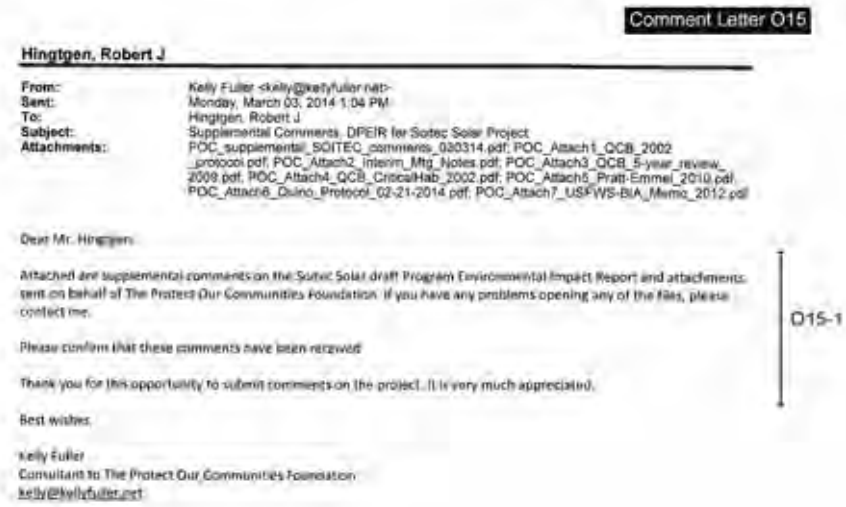


Comment Letter O15

Hingtgen, Robert J

From: Kelly Fuller <kelly@kellyfuller.net>
Sent: Monday, March 03, 2014 1:04 PM
To: Hingtgen, Robert J
Subject: Supplemental Comments, DPEIR for Sotec Solar Project
Attachments: POC_supplemental_SOITEC_comments_030314.pdf; POC_Attach1_QCB_2002_protocol.pdf; POC_Attach2_Interim_Mtg_Notes.pdf; POC_Attach3_QCB_5-year_review_2009.pdf; POC_Attach4_QCB_CriticalHab_2002.pdf; POC_Attach5_Pratt-Emmel_2010.pdf; POC_Attach6_Quino_Protocol_02-21-2014.pdf; POC_Attach7_USFWS-BIA_Memo_2012.pdf

Dear Mr. Hingtgen:

Attached are supplemental comments on the Soitec Solar draft Program Environmental Impact Report and attachments sent on behalf of The Protect Our Communities Foundation. If you have any problems opening any of the files, please contact me.

O15-1

Please confirm that these comments have been received.

Thank you for this opportunity to submit comments on the project. It is very much appreciated.

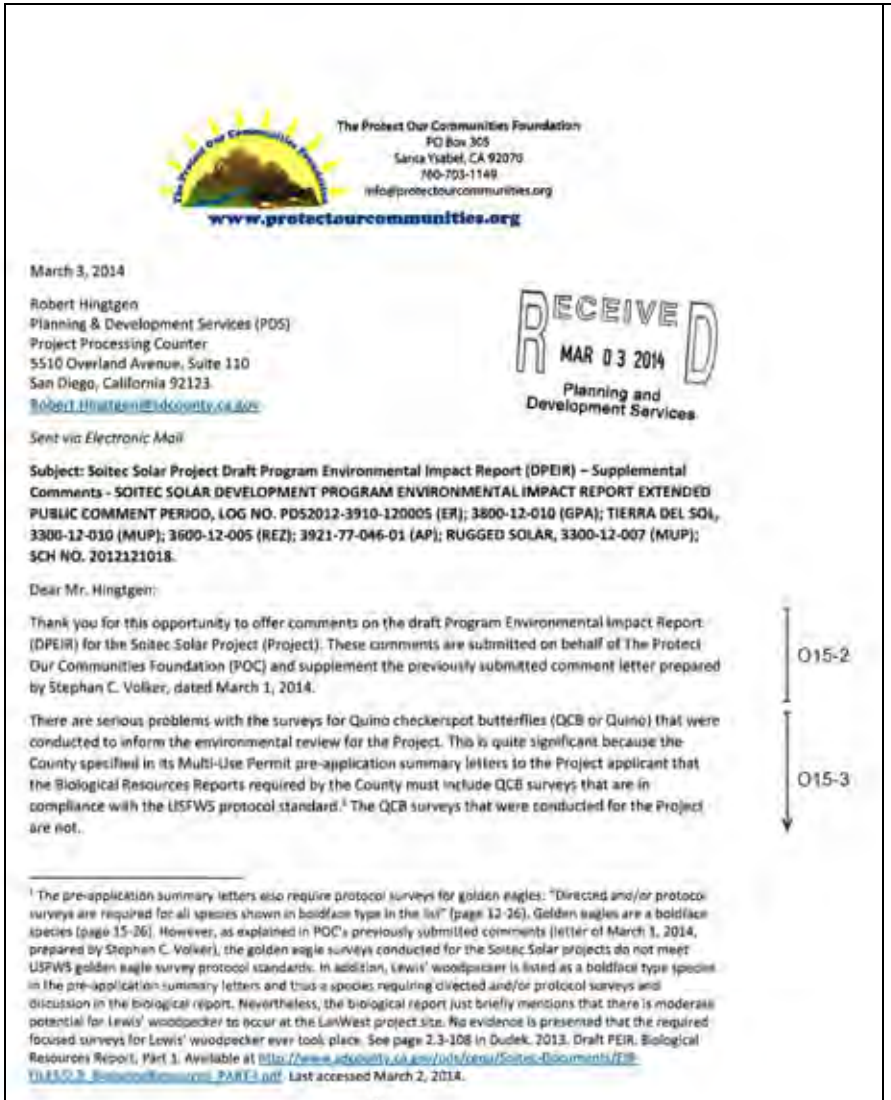
Best wishes,

Kelly Fuller
Consultant to The Protect Our Communities Foundation
kelly@kellyfuller.net

Response to Comment Letter O15

The Protect Our Communities Foundation
Kelly Fuller
March 3, 2014

O15-1 This comment is introductory in nature and does not raise a significant environmental issue for which a response is required.



The Protect Our Communities Foundation
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760-703-1149
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March 3, 2014

Robert Hingtgen
Planning & Development Services (PDS)
Project Processing Counter
5510 Overland Avenue, Suite 110
San Diego, California 92123
Robert.Hingtgen@sdcounty.ca.gov

RECEIVED
MAR 03 2014
Planning and Development Services

Sent via Electronic Mail

Subject: Soitec Solar Project Draft Program Environmental Impact Report (DPEIR) – Supplemental Comments - SOITEC SOLAR DEVELOPMENT PROGRAM ENVIRONMENTAL IMPACT REPORT EXTENDED PUBLIC COMMENT PERIOD, LOG NO. PDS2012-3910-120005 (ER); 3800-12-010 (GPA); TIERRA DEL SOL, 3300-12-010 (MUP); 3600-12-005 (REZ); 3921-77-046-01 (AP); RUGGED SOLAR, 3300-12-007 (MUP); SCH NO. 2012121018.

Dear Mr. Hingtgen:

Thank you for this opportunity to offer comments on the draft Program Environmental Impact Report (DPEIR) for the Soitec Solar Project (Project). These comments are submitted on behalf of The Protect Our Communities Foundation (POC) and supplement the previously submitted comment letter prepared by Stephan C. Volker, dated March 1, 2014.

O15-2

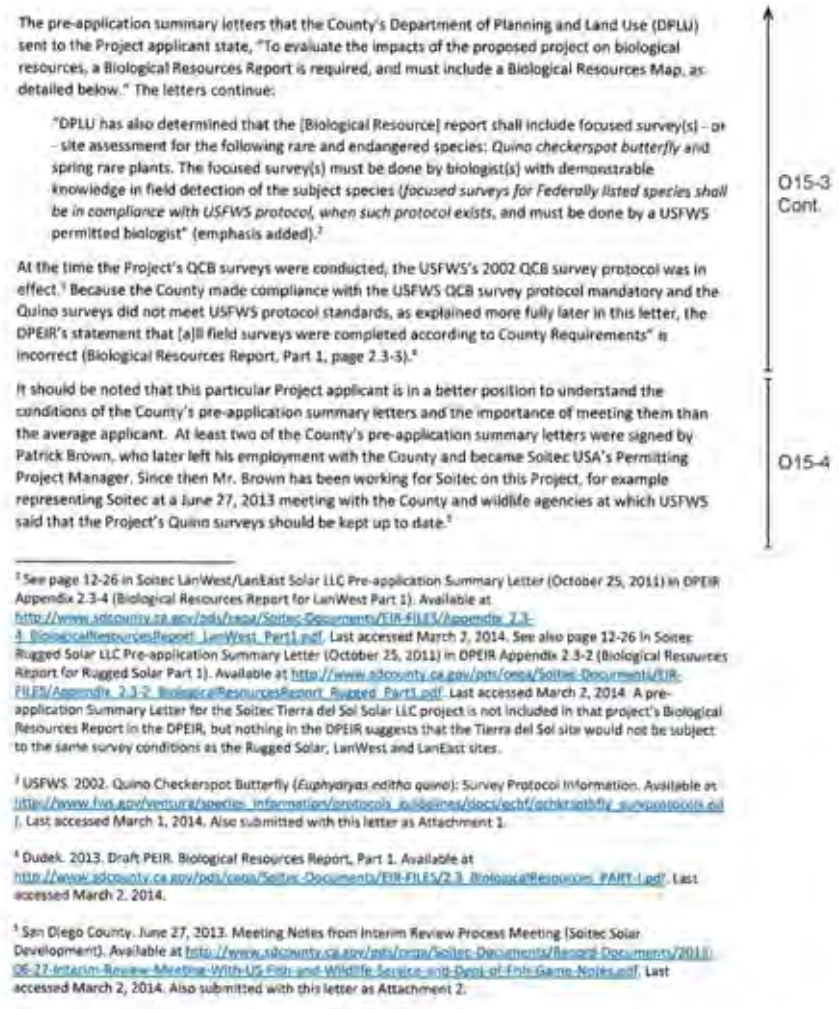
There are serious problems with the surveys for Quino checkerspot butterflies (QCB or Quino) that were conducted to inform the environmental review for the Project. This is quite significant because the County specified in its Multi-Use Permit pre-application summary letters to the Project applicant that the Biological Resources Reports required by the County must include QCB surveys that are in compliance with the USFWS protocol standard.[1] The QCB surveys that were conducted for the Project are not.

O15-3

[1] The pre-application summary letters also require protocol surveys for golden eagles: "Directed and/or protocol surveys are required for all species shown in boldface type in the list" (page 12-26). Golden eagles are a boldface species (page 15-26). However, as explained in POC's previously submitted comments (letter of March 1, 2014, prepared by Stephan C. Volker), the golden eagle surveys conducted for the Soitec Solar projects do not meet USFWS golden eagle survey protocol standards. In addition, Lewis' woodpecker is listed as a boldface type species in the pre-application summary letters and thus a species requiring directed and/or protocol surveys and discussion in the biological report. Nevertheless, the biological report just briefly mentions that there is moderate potential for Lewis' woodpecker to occur at the LanWest project site. No evidence is presented that the required focused surveys for Lewis' woodpecker ever took place. See page 2.3-108 in Dudek. 2013. Draft PEIR. Biological Resources Report, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/PEIR-Vol-II-2.3_BiologicalResources_PART-1.pdf. Last accessed March 2, 2014.

O15-2 This comment is introductory in nature and does not raise a significant environmental issue for which a response is required. Specific comments on the Proposed Project are addressed below.

O15-3 The County of San Diego (County) does not concur with the assertion that Quino checkerspot butterfly (*Euphydryas editha quino*) surveys were not in compliance with the U.S. Fish and Wildlife Service (USFWS) protocol standard. The commenter is referred to response to comment O10-49. The County also disagrees that its Major Use Permit (MUP) pre-application letter to the applicants required protocol-level surveys for golden eagles. Please see response to comment O10-36 to O10-44, and common response BIO1. Since there are no accepted survey protocols for Lewis' woodpecker (*Melanerpes lewis*), the County asserts that a habitat analysis is sufficient to assess the potential for this species to occur within the project area.



The pre-application summary letters that the County's Department of Planning and Land Use (DPLU) sent to the Project applicant state, "To evaluate the impacts of the proposed project on biological resources, a Biological Resources Report is required, and must include a Biological Resources Map, as detailed below." The letters continue:

> "DPLU has also determined that the [Biological Resource] report shall include focused survey(s) – or – site assessment for the following rare and endangered species: *Quino checkerspot butterfly* and spring rare plants. The focused survey(s) must be done by biologist(s) with demonstrable knowledge in field detection of the subject species (*focused surveys for Federally listed species shall be in compliance with USFWS protocol, when such protocol exists*, and must be done by a USFWS permitted biologist" (emphasis added).[2]

At the time the Project's QCB surveys were conducted, the USFWS's 2002 QCB survey protocol was in effect.[3] Because the County made compliance with the USFWS QCB survey protocol mandatory and the Quino surveys did not meet USFWS protocol standards, as explained more fully later in this letter, the DPEIR's statement that [a]ll field surveys were completed according to County Requirements" is incorrect (Biological Resources Report, Part 1, page 2.3-3).[4]

It should be noted that this particular Project applicant is in a better position to understand the conditions of the County's pre-application summary letters and the importance of meeting them than the average applicant. At least two of the County's pre-application summary letters were signed by Patrick Brown, who later left his employment with the County and became Soitec USA's Permitting Project Manager. Since then Mr. Brown has been working for Soitec on this Project, for example representing Soitec at a June 27, 2013 meeting with the County and wildlife agencies at which USFWS said that the Project's Quino surveys should be kept up to date.[5]

O15-3 Cont.

O15-4

[2] See page 12-26 in Soitec LanWest/LanEast Solar LLC Pre-application Summary Letter (October 25, 2011) in DPEIR Appendix 2.3-4 (Biological Resources Report for LanWest Part 1). Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-4_BiologicalResourcesReport_LanWest_Part1.pdf. Last accessed March 2, 2014. See also page 12-26 in Soitec Rugged Solar LLC Pre-application Summary Letter (October 25, 2011) in DPEIR Appendix 2.3-2 (Biological Resources Report for Rugged Solar Part 1). Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 2, 2014. A pre-application Summary Letter for the Soitec Tierra del Sol Solar LLC project is not included in that project's Biological Resources Report in the DPEIR, but nothing in the DPEIR suggests that the Tierra del Sol site would not be subject to the same survey conditions as the Rugged Solar, LanWest and LanEast sites.

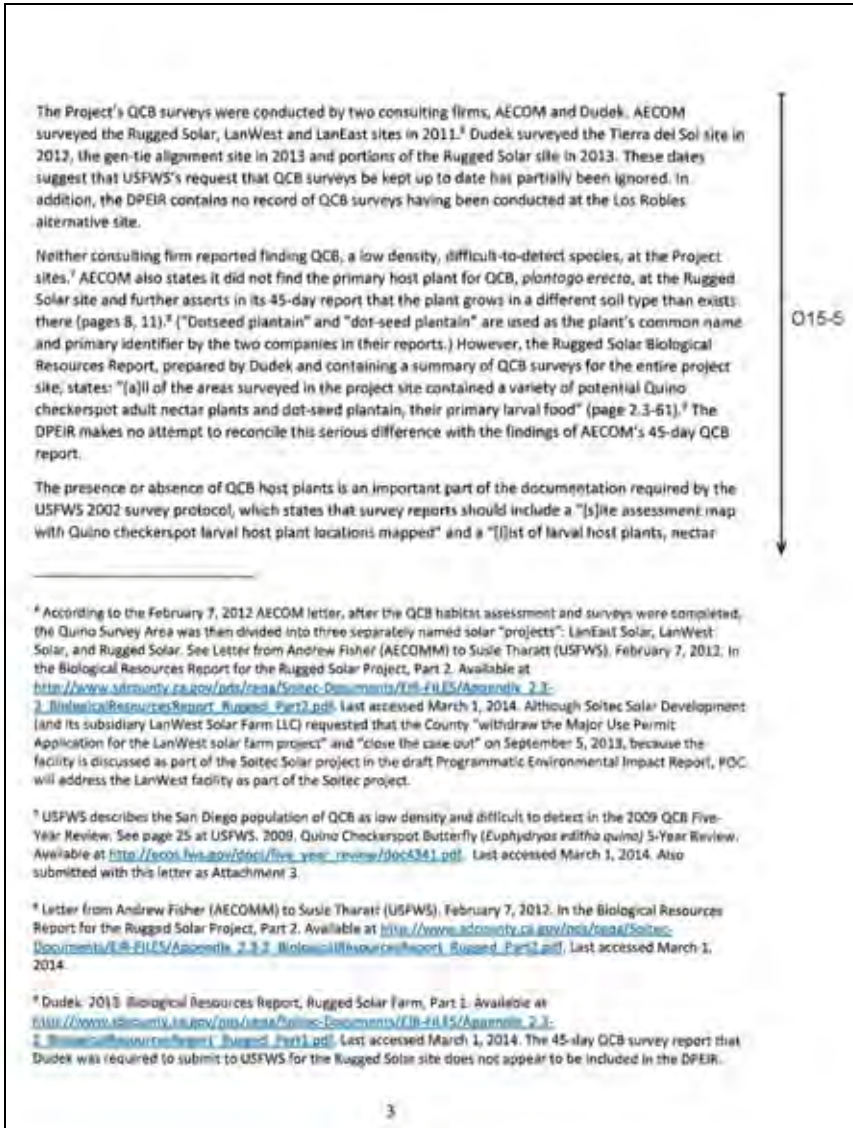
[3] USFWS. 2002. Quino Checkerspot Butterfly (*Euphydryas editha quino*): Survey Protocol Information. Available at http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/echt/echkerspbtfly_surveyprotocols.pdf. Last accessed March 1, 2014. Also submitted with this letter as Attachment 1.

[4] Dudek. 2013. Draft PEIR. Biological Resources Report, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/2.3_BiologicalResources_PART-I.pdf. Last accessed March 2, 2014.

[5] San Diego County. June 27, 2013. Meeting Notes from Interim Review Process Meeting (Soitec Solar Development). Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/Record-Documents/2013-06-27-Interim-Review-Meeting-With-US-Fish-and-Wildlife-Service-and-Dept-of-Fish-Game-Notes.pdf. Last accessed March 2, 2014. Also submitted with this letter as Attachment 2.

2

O15-4 The County acknowledges that Mr. Patrick Brown was previously employed at the County and now is employed by Soitec Solar Development LLC.



The Project's QCB surveys were conducted by two consulting firms, AECOM and Dudek. AECOM surveyed the Rugged Solar, LanWest and LanEast sites in 2011.[3] Dudek surveyed the Tierra del Sol site in 2012, the gen-tie alignment site in 2013 and portions of the Rugged Solar site in 2013. These dates suggest that USFWS's request that QCB surveys be kept up to date has partially been ignored. In addition, the DPEIR contains no record of QCB surveys having been conducted at the Los Robles alternative site.

Neither consulting firm reported finding QCB, a low density, difficult-to-detect species, at the Project sites.[7] AECOM also states it did not find the primary host plant for QCB, *plantago erecta*, at the Rugged Solar site and further asserts in its 45-day report that the plant grows in a different soil type than exists there (pages 8, 11).[8] ("Dotseed plantain" and "dot-seed plantain" are used as the plant's common name and primary identifier by the two companies in their reports.) However, the Rugged Solar Biological Resources Report, prepared by Dudek and containing a summary of QCB surveys for the entire project site, states: "(a)ll of the areas surveyed in the project site contained a variety of potential Quino checkerspot adult nectar plants and dot-seed plantain, their primary larval food" (page 2.3-61).[9] The DPEIR makes no attempt to reconcile this serious difference with the findings of AECOM's 45-day QCB report.

O15-5

The presence or absence of QCB host plants is an important part of the documentation required by the USFWS 2002 survey protocol, which states that survey reports should include a "[s]ite assessment map with Quino checkerspot larval host plant locations mapped" and a "[l]ist of larval host plants, nectar

[6] According to the February 7, 2012 AECOM letter, after the QCB habitat assessment and surveys were completed, the Quino Survey Area was then divided into three separately named solar "projects": LanEast Solar, LanWest Solar, and Rugged Solar. See Letter from Andrew Fisher (AECOMM) to Susie Tharatt (USFWS). February 7, 2012. In the Biological Resources Report for the Rugged Solar Project, Part 2. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part2.pdf. Last accessed March 1, 2014. Although Soitec Solar Development (and its subsidiary LanWest Solar Farm LLC) requested that the County "withdraw the Major Use Permit Application for the LanWest solar farm project" and "close the case out" on September 5, 2013, because the facility is discussed as part of the Soitec Solar project in the draft Programmatic Environmental Impact Report, POC will address the LanWest facility as part of the Soitec project.

[7] USFWS describes the San Diego population of QCB as low density and difficult to detect in the 2009 QCB Five-Year Review. See page 25 at USFWS. 2009. Quino Checkerspot Butterfly (*Euphydryas editha quino*) 5-Year Review. Available at http://ecos.fws.gov/docs/five_year_review/doc4341.pdf. Last accessed March 1, 2014. Also submitted with this letter as Attachment 3.

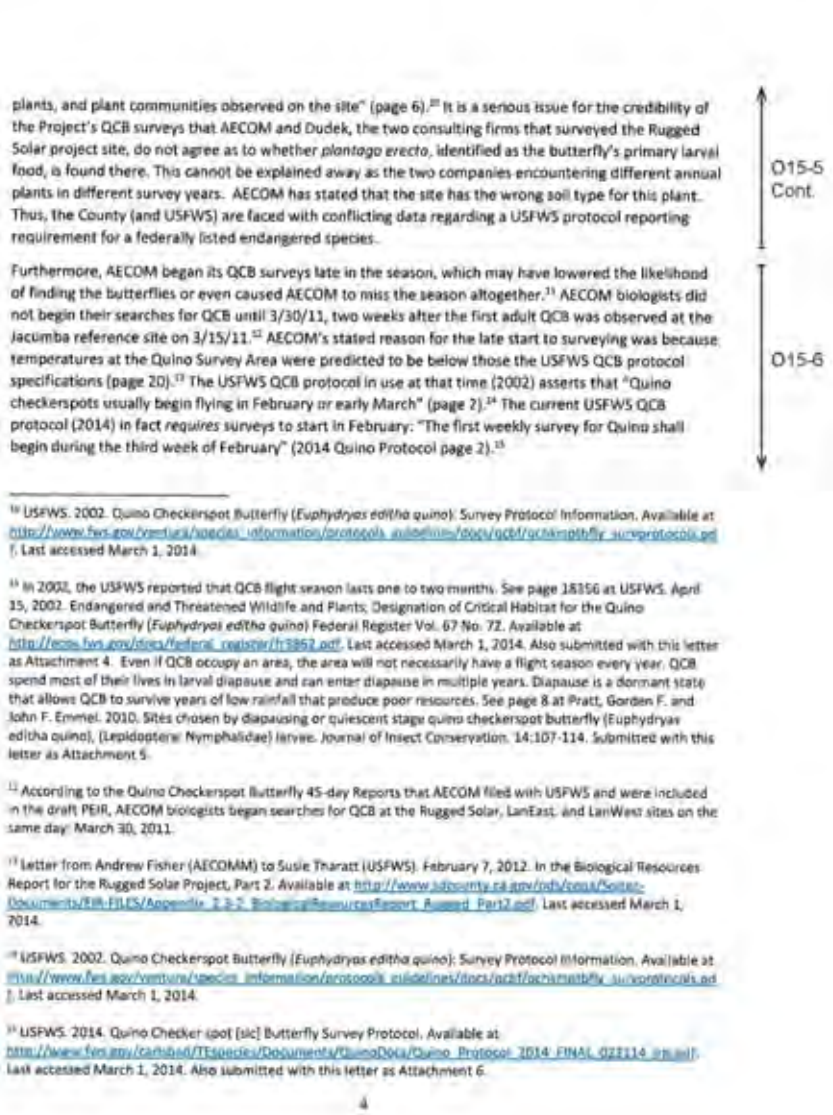
[8] Letter from Andrew Fisher (AECOMM) to Susie Tharatt (USFWS). February 7, 2012. In the Biological Resources Report for the Rugged Solar Project, Part 2. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part2.pdf. Last accessed March 1, 2014.

[9] Dudek. 2013. Biological Resources Report, Rugged Solar Farm, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 1, 2014. The 45-day QCB survey report that Dudek was required to submit to USFWS for the Rugged Solar site does not appear to be included in the DPEIR.

3

O15-5 The commenter states the dates of the Quino checkerspot butterfly surveys do not follow the USFWS's request of keeping surveys up to date and have been partially ignored. To meet USFWS requests, additional voluntary surveys will be conducted prior to construction to verify presence or absence of this species. These surveys would be in addition to requirements necessary to satisfy California Environmental Quality Act (CEQA) analysis needs.

As stated in the response to comment O10-49, protocol surveys for this species, which require that the host plants be mapped, were conducted on all Proposed Project sites. Based on these intensive, multi-day, multi-week surveys, the presence of the host plants was found to be limited to a few small populations or minimal habitat (see Appendix 2.3-1 and Appendix 2.3-2 of the DPEIR). The only potential Quino host plant detected within the LanEast site was a small population (approximately 10 individual plants) of darktip bird's beak (*Cordylanthus rigidus*) (Appendix 2.3-3 of the Draft Program Environmental Impact Report (DPEIR)). On LanWest, two small Quino checkerspot butterfly host plant populations (darktip bird's beak) were found and other host plants were absent (see Appendix 2.3-4 of the DPEIR). These small populations of host plants are not a significant source of host plants for the species.



plants, and plant communities observed on the site" (page 6).[10] It is a serious issue for the credibility of the Project's QCB surveys that AECOM and Dudek, the two consulting firms that surveyed the Rugged Solar project site, do not agree as to whether *plantago erecta*, identified as the butterfly's primary larval food, is found there. This cannot be explained away as the two companies encountering different annual plants in different survey years. AECOM has stated that the site has the wrong soil type for this plant. Thus, the County (and USFWS) are faced with conflicting data regarding a USFWS protocol reporting requirement for a federally listed endangered species.

Furthermore, AECOM began its QCB surveys late in the season, which may have lowered the likelihood of finding the butterflies or even caused AECOM to miss the season altogether.[11] AECOM biologists did not begin their searches for QCB until 3/30/11, two weeks after the first adult QCB was observed at the Jacumba reference site on 3/15/11.[12] AECOM's stated reason for the late start to surveying was because temperatures at the Quino Survey Area were predicted to be below those the USFWS QCB protocol specifications (page 20).[13] The USFWS QCB protocol in use at that time (2002) asserts that "Quino checkerspots usually begin flying in February or early March" (page 2).[14] The current USFWS QCB protocol (2014) in fact *requires* surveys to start in February: "The first weekly survey for Quino shall begin during the third week of February" (2014 Quino Protocol page 2).[15]

O15-5 Cont.

O15-6

[10] USFWS. 2002. Quino Checkerspot Butterfly (*Euphydryas editha quino*): Survey Protocol Information. Available at http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/qcbf/qcbfsurveyprotocols.pdf. Last accessed March 1, 2014.

[11] In 2002, the USFWS reported that QCB flight season lasts one to two months. See page 18356 at USFWS. April 15, 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Quino Checkerspot Butterfly (*Euphydryas editha quino*) Federal Register Vol. 67 No. 72. Available at http://ecos.fws.gov/docs/federal_register/fr3852.pdf. Last accessed March 1, 2014. Also submitted with this letter as Attachment 4. Even if QCB occupy an area, the area will not necessarily have a flight season every year. QCB spend most of their lives in larval diapause and can enter diapause in multiple years. Diapause is a dormant state that allows QCB to survive years of low rainfall that produce poor resources. See page 8 at Pratt, Gorden F. and John F. Emmel. 2010. Sites chosen by diapausing or quiescent stage quino checkerspot butterfly (Euphydryas editha quino), (Lepidoptera: Nymphalidae) larvae. Journal of Insect Conservation. 14:107-114. Submitted with this letter as Attachment 5.

[12] According to the Quino Checkerspot Butterfly 45-day Reports that AECOM filed with USFWS and were included in the draft PEIR, AECOM biologists began searches for QCB at the Rugged Solar, LanEast, and LanWest sites on the same day: March 30, 2011.

[13] Letter from Andrew Fisher (AECOMM) to Susie Tharatt (USFWS). February 7, 2012. In the Biological Resources Report for the Rugged Solar Project, Part 2. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part2.pdf. Last accessed March 1, 2014.

[14] USFWS. 2002. Quino Checkerspot Butterfly (*Euphydryas editha quino*): Survey Protocol Information. Available at http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/qcbf/qcbfsurveyprotocols.pdf. Last accessed March 1, 2014.

[15] USFWS. 2014. Quino Checker spot [sic] Butterfly Survey Protocol. Available at http://www.fws.gov/carlsbad/TEspecies/Documents/QuinoDocs/Quino_Protocol_2014_FINAL_022114_signed.pdf. Last accessed March 1, 2014. Also submitted with this letter as Attachment 6.

4

The statement in Section 2.3.1.4 referring to the presence of dot-see plantain on the Rugged solar farm site, is incorrect. Dotseed plantain (*Plantago erecta*) was not observed within any of the Proposed Project sites. In response to this comment, the County has made revisions and clarifications to the DPEIR. These revisions to the DPEIR are presented in ~~strikeout~~/underline format; refer to Section 2.3.1.4 of the DPEIR and Section 1.4.6.2 of Appendix 2.3-2. The changes do not raise important new issues about significant effects on the environment. Such changes are insignificant as the term is used in Section 15088.5(b) of the CEQA Guidelines.

In response to Footnote 9 of the comment letter, the 45-day QCB survey report for the Rugged solar farm was included as Appendix D to the Biological Resources Report for the Rugged Solar Farm (Appendix 2.3-2).

O15-6 The County disagrees with the commenter's assertion that AECOM's protocol surveys were not conducted during the appropriate time and were late in the season. AECOM conducted surveys in accordance with the *Survey Protocol for the Endangered Quino Checkerspot Butterfly (*Euphydryas editha quino*)* (USFWS 2002). The survey protocol states that flight season *generally* begins in late February to early March. As stated in AECOM's 45-day Summary

	Report (see Appendix 2.3-3), the first adult was detected at the Jacumba reference site on March 15, 2011; however, due to low temperatures throughout March, the surveys could not be conducted per the USFWS protocol (USFWS 2002). The commenter also states that the 2014 USFWS Quino checkerspot butterfly protocol requires surveys to start in February. AECOM conducted Quino checkerspot butterfly focused surveys in 2011 on the Rugged site; therefore, the 2014 USFWS protocol had not been released. AECOM was in compliance with the USFWS 2002 protocols in effect at the time of the surveys. The County disagrees that AECOM's Quino checkerspot butterfly protocol survey for the LanEast site was too short. Protocol surveys of the LanEast site began on March 30, 2011, and continued for six weeks, concluding in the first week of May. The entire site (except excluded areas) was surveyed for the required minimum of five weeks. (USFWS 2002.) AECOM permitted biologists properly exercised professional judgment in accordance with the 2002 USFWS protocol by excluding 110.58 acres of the site from surveying in the first week of May (the sixth week of surveying) because the area was highly disturbed by agricultural activities due to "increased evidence of cattle grazing." (DPEIR, Appendix 2.3-3.) Furthermore, the commenter's alleged survey

AECOM's QCB searches were also short in weekly duration. The AECOM QCB 45-day Report for the LanEast project misinterprets the USFWS 2002 protocol surveying requirements, saying that "Although protocol was satisfied with the 5 weeks of survey, in the interest of survey rigor, AECOM biologists decided to continue with a 6th week of survey within portions of the Quino survey area considered to have the greatest (if any) potential to support Quino" (page 9).[16] However, the USFWS 2002 survey protocol states, "[i]f butterflies are not detected during the first 5 surveys, weekly surveys should continue until the end of the flight season to maximize likelihood of detection of low-density populations" (page 3).[17] Nowhere does the protocol say that after five weeks, surveying should continue only on the portions of the site that the survey biologists think are most likely to support QCB. The AECOM report further attempts to excuse the reduced survey area the AECOM biologists searched in the sixth week by stating, "According to USFWS guidelines, areas with active/in-use grazing and a lack of native vegetation can be excluded from protocol-level surveys. Evidence of cattle grazing was present in weeks 1 through 5 but these areas were still searched for 5 weeks given the presence of native vegetation despite active grazing" (page 9). In reality, the 2002 protocol lists areas that are "not recommended for butterfly surveying, including "active/in-use agricultural fields without natural or remnant inclusions of native vegetation (i.e., fields completely without any fallow sections, unplowed areas, and/or rocky outcrops)," but is completely silent on grazing (page 2). In other words, AECOM's misinterpretation of the 2002 survey protocol cannot be used to justify excluding of areas of the project site from surveying after the fifth week.

O15-6 Cont

The AECOM Quino Checkerspot Butterfly 45-day Report for the LanWest site also misinterprets the USFWS 2002 survey protocol's instructions about survey duration. The AECOM report states, "protocol was satisfied with the 5 weeks of survey" (page 8). However, as explained earlier, if QCB are not found within the first five weeks of surveys, the USFWS 2002 protocol says surveying should continue to the end of the flight season. AECOM continued to survey a sixth week, but excluded portions of the site based on "increased evidence of heavy cattle grazing, a lack of host plant populations, sparse nectaring resources" (page 8). Again, as with AECOM's sixth week surveys at the LanEast site, this decision to not to survey certain portions of the site in the final week of surveying does not conform to the USFWS 2002 survey protocol. The protocol says "[a]ll areas that are not excluded should be surveyed for butterflies, regardless of Quino checkerspot host plant presence, absence and/or density" and "[a]ll non-excluded portions of the site should be thoroughly surveyed for butterflies during each weekly survey" (page 3).

O15-7

The supplemental QCB surveys conducted by Dudek in 2013 at the Rugged Solar site are also problematic. Like the AECOM surveys, they began late in the season, in the fourth week of March

O15-8

[16] Letter from Andrew Fisher (AECOM) to Erin McCarthy (USFWS). December 19, 2011. Appendix 2.3-3 (Quino Checkerspot Butterfly 45-Day Summary Report). Available at http://www.sdcounty.ca.gov/pds/ceqa/Jamul-Documents/EIR-FEIR/Appendix_2.3-3_QuinoCheckerspotButterfly45-DaySummaryReport_LanEast.pdf. Last accessed March 2, 2014.

[17] USFWS. 2002. Quino Checkerspot Butterfly (Euphydryas editha quino): Survey Protocol Information. Available at http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/qcb/qcbsurveyprotocols.pdf. Last accessed March 1, 2014.

5

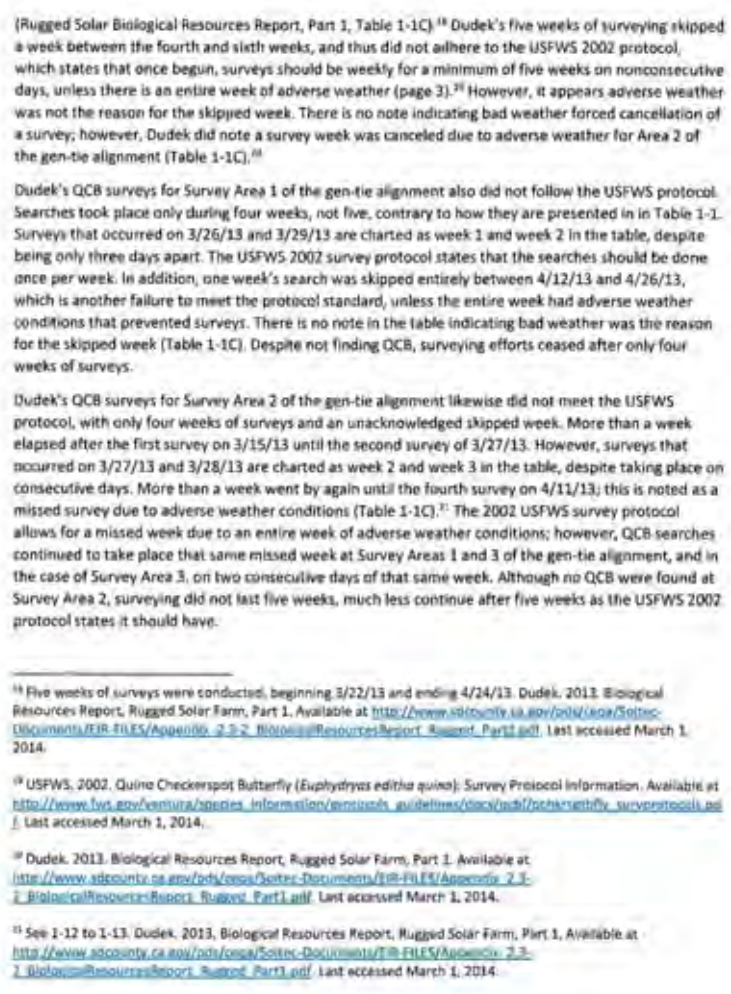
inadequacy during the first week of May is immaterial because AECOM completed five weeks of surveys, which is the minimum requirement according to the 2002 USFWS protocol.

Furthermore, in response to comments received from the California Department of Fish and Game, most impact determinations associated with future development of the LanEast site have been removed from the FPEIR. The County refers the commenter to response to comment S3-3.

O15-7 The commenter is referred to the response to comment O15-6.

O15-8 The County disagrees that Quino checkerspot butterfly surveys did not follow USFWS 2002 protocols. The commenter states that surveys on the Rugged solar farm site began late in the season (i.e., the fourth week in March). As discussed in the response to comment O15-6, flight season *generally* begins in late February to early March and as stated in the Biological Resources Report (BRR) for the Rugged solar farm (Section 1.3.5.1), survey methodology adhered to the 2002 USWFS protocol.

The commenter also states that Dudek's 2013 survey for the Rugged solar site skipped a week between the fourth and sixth weeks, thus not adhering to the USFWS 2002 protocol. The County disagrees with



(Rugged Solar Biological Resources Report, Part 1, Table 1-1C).[19] Dudek's five weeks of surveying skipped a week between the fourth and sixth weeks, and thus did not adhere to the USFWS 2002 protocol, which states that once begun, surveys should be weekly for a minimum of five weeks on nonconsecutive days, unless there is an entire week of adverse weather (page 3).[20] However, it appears adverse weather was not the reason for the skipped week. There is no note indicating bad weather forced cancellation of a survey; however, Dudek did note a survey week was canceled due to adverse weather for Area 2 of the gen-tie alignment (Table 1-1C).[21]

Dudek's QCB surveys for Survey Area 1 of the gen-tie alignment also did not follow the USFWS protocol. Searches took place only during four weeks, not five, contrary to how they are presented in in Table 1-1. Surveys that occurred on 3/26/13 and 3/29/13 are charted as week 1 and week 2 in the table, despite being only three days apart. The USFWS 2002 survey protocol states that the searches should be done once per week. In addition, one week's search was skipped entirely between 4/12/13 and 4/26/13, which is another failure to meet the protocol standard, unless the entire week had adverse weather conditions that prevented surveys. There is no note in the table indicating bad weather was the reason for the skipped week (Table 1-1C). Despite not finding QCB, surveying efforts ceased after only four weeks of surveys.

Dudek's QCB surveys for Survey Area 2 of the gen-tie alignment likewise did not meet the USFWS protocol, with only four weeks of surveys and an unacknowledged skipped week. More than a week elapsed after the first survey on 3/15/13 until the second survey of 3/27/13. However, surveys that occurred on 3/27/13 and 3/28/13 are charted as week 2 and week 3 in the table, despite taking place on consecutive days. More than a week went by again until the fourth survey on 4/11/13; this is noted as a missed survey due to adverse weather conditions (Table 1-1C).[22] The 2002 USFWS survey protocol allows for a missed week due to an entire week of adverse weather conditions; however, QCB searches continued to take place that same missed week at Survey Areas 1 and 3 of the gen-tie alignment, and in the case of Survey Area 3, on two consecutive days of that same week. Although no QCB were found at Survey Area 2, surveying did not last five weeks, much less continue after five weeks as the USFWS 2002 protocol states it should have.

O15-8 Cont

[19] Five weeks of surveys were conducted, beginning 3/22/13 and ending 4/24/13. Dudek. 2013. Biological Resources Report, Rugged Solar Farm, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 1, 2014.

[20] USFWS. 2002. Quino Checkerspot Butterfly (*Euphydryas editha quino*): Survey Protocol Information. Available at http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/inbl/pchkrspotbfly_surveyprotocols.pdf. Last accessed March 1, 2014.

[21] Dudek. 2013. Biological Resources Report, Rugged Solar Farm, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 1, 2014.

[22] See 1-12 to 1-13. Dudek. 2013. Biological Resources Report, Rugged Solar Farm, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec-Documents/EIR-FILES/Appendix_2.3-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 1, 2014.

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this, as depicted in Table 1-1 in DPEIR Appendix 2.3-2; 5 weeks of surveys were conducted by Dudek in 2013 on the following dates: 3/22/2013 (Week 1); 3/29/2013 (Week 2); 4/4/2013 (Week 3); 4/12/2013 (Week 4); and 4/24/2013 (Week 5).

The County disagrees with the statement that Survey Area 1 for the Tierra del Sol gen-tie was only surveyed for 4 weeks. The 2002 USFWS survey protocol states that surveys should occur once per week, for a minimum of 5 weeks, throughout the flight season but does not state that the surveys need to be 7 days apart. The survey weeks for the gen-tie alignment Survey Areas 1, 2, and 3 were from Thursday to Wednesday. Although the surveys took place on the same calendar week, they are still considered separate weeks. The following table O15-8-1 shows the survey weeks and dates of the surveys.

Table O15-8.1
Tierra del Sol Gen-Tie Quino Checkerspot Butterfly Surveys

Survey Week	Survey Week Range	Survey Area 1	Survey Area 2	Survey Area 3
1	March 13–March 19	—	March 15	March 16
1	March 21–March 27	March 26	—	—
2	March 28–April 3	March 29	March 27	March 27
3	April 4–April 10	April 4	March 28	April 3
4	April 11–April 17	April 12	April 11	April 5
5	April 18–April 25	April 24	April 18	April 17

This table shows a total of five surveys were conducted over a 5-week period, none of the surveys took place on consecutive days, and no week was skipped.

The commenter states that the Quino checkerspot butterfly survey for Survey Area 2 of the gen-tie alignment did not meet USFWS protocol by only conducting 4 weeks of surveys and an unacknowledged skipped week. The County disagrees with this assertion, as demonstrated in Table 1-1C of the BRR for the Tierra del Sol solar farm (DEIR Appendix 2.3-1) and Table O15-8-1, above. In fact, 5

	weeks were surveyed for all survey areas of the Tierra del Sol gen-tie alignment. Survey Week 4 for Survey Area 2 was not conducted due to inclement weather and an additional survey was added in order to meet the USFWS protocol of a minimum of 5 weeks. This survey occurred on 4/18/2013. The County acknowledges that surveys were conducted on back-to-back days for Survey Area 2 (March 27 and March 28), which does not comply with USFWS guidance. Regardless of the minor error in survey methods, all survey results were negative. The Quino checkerspot butterfly is not expected to occur in the Tierra del Sol gen-tie Survey Area 2 because neither the primary larval host plant dwarf plantain (*Plantago erecta*); or other species that have been documented as important larval host plants, including desert plantain, sometimes called woolly plantain (*P. patagonica*); thread-leaved bird's beak (*Cordylanthus rigidus*); white snapdragon (*Antirrhinum coulterianum*); owl's clover (*Castilleja exserta*); and Chinese houses (*Collinsia* spp.) were observed within the gen-tie alignment. The surveys constitute substantial evidence under CEQA. Furthermore, at the request of the USFWS and the commenter, the applicants will conduct voluntary preconstruction surveys on Rugged, Tierra del Sol, LanEast, and LanWest to verify presence or absence of the Quino checkerspot butterfly (see Sections 2.3.1.3 through 2.3.1.6 of the DPEIR and the response to comment F1-17). These surveys would

Dudek's QCB surveys for Survey Area 3 of the gen-tie alignment follow the same pattern as the other two Areas. They do not adhere to the 2002 USFWS survey protocol. There were only four weeks of surveys and two unacknowledged skipped weeks. The first survey occurred on 3/16/13 and more than a week went by before the second happened on 3/27/13. Surveys took place only two days apart on 4/3/13 and 4/5/13, but Table 1-1C identifies them as occurring on weeks three and four. Almost two weeks elapsed between the fourth survey on 4/5/13 and the final survey on 4/17/13 (Table 1-1C). There are no notes in the table indicating that adverse weather was the reason for the skipped weeks.[22] No QCB were found, but surveying did not continue past four weeks, another way in which these surveys are noncompliant with the USFWS 2002 survey protocol.

O15-8 Cont.

In order to safeguard an important natural resource that is fully protected by the Endangered Species Act, the County needs to be particularly careful with the QCB surveys done for this Project. In 2009 USFWS predicted that QCB populations might be entering a downswing due to the beginning of a severe drought, possibly exacerbated by climate change (5-Year Review page 8).[23] The drought USFWS noted in 2009 has intensified dramatically in the last year. However, new QCB populations have been found east of Campo since 2002.[24] This combination of worsening conditions and new QCB populations being discovered not far from the Project sites mean that it is more important than ever that the County enforce its requirement that QCB surveys be conducted according to USFWS protocol standards. As the USFWS has stated in the most-recent QCB five-year review, "Protection of habitat from destruction is a necessary first step toward recovery" (page 16).[25] If approved, this Project would destroy large areas of potential QCB habitat that have not been surveyed according to USFWS QCB protocol.

O15-9

The lack of USFWS protocol surveys also means that the assessment of impacts to QCB in the DPEIR, which are judged to be less than significant, is not based on credible data. Thus in order for the DPEIR's analysis of impacts to QCB to be valid, the QCB surveys for the Soitec Solar project need to be conducted again, carefully following the current USFWS survey protocol, in a year when there is sufficient rainfall for a flight season.[26] This would also help satisfy the USFWS's June 2013 request that Quino surveys for this Project be kept up to date.

[22] See 1-13. Dudek. 2013. Biological Resources Report, Rugged Solar Farm, Part 1. Available at http://www.sdcounty.ca.gov/pds/ceqa/Soitec_Documents/EIR-FILES/Appendix_2.5-2_BiologicalResourcesReport_Rugged_Part1.pdf. Last accessed March 1, 2014.

[23] USFWS. 2009. Quino Checkerspot Butterfly (*Euphydryas editha quino*) 5-Year Review. Available at http://ecos.fws.gov/docs/five_year_review/doc4341.pdf. Last accessed March 1, 2014.

[24] See page 7 at USFWS. 2009. Quino Checkerspot Butterfly (*Euphydryas editha quino*) 5-Year Review. Available at http://ecos.fws.gov/docs/five_year_review/doc4341.pdf. Last accessed March 1, 2014.

[25] USFWS. 2009. Quino Checkerspot Butterfly (*Euphydryas editha quino*) 5-Year Review. Available at http://ecos.fws.gov/docs/five_year_review/doc4341.pdf. Last accessed March 1, 2014.

[26] QCB may re-enter diapause in low rainfall years with poor plant resources. See page 108. Pratt, Gordon F. and John F. Emmel. 2010. Sites chosen by diapausing or quiescent stage quino checkerspot butterfly (Euphydryas editha quino), (Lepidoptera: Nymphalidae) larvae. Journal of Insect Conservation. 14:107-114. Attachment 5.

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be in addition to requirements necessary to satisfy the CEQA analysis.

Surveys were conducted for only 5 weeks due to the end of the flight season.

O15-9 As discussed in the responses to comments O15-3 to O-15-8, and O10-49, the DPEIR states that protocol surveys for Quino checkerspot butterfly were conducted and were negative (DPEIR Sections 2.3.1.3, 2.3.1.4, 2.3.1.5, and 2.3.3.1). Completion of the USFWS protocol surveys fulfills the assessment standards necessary for evaluating the status of the Quino checkerspot butterfly on the Proposed Project site for CEQA purposes.

To meet USFWS requests, preconstruction surveys will be conducted to verify presence or absence of this species. These voluntary surveys would be in addition to requirements necessary to satisfy CEQA analysis.

In addition to these supplemental comments on QCB, POC is submitting today one document that was inadvertently not attached to the previous comment letter prepared on POC's behalf by Stephan C. Volker, dated March 1, 2014. It is the USFWS Memorandum to Bureau of Indian Affairs, RE: Draft Avian and Bat Protection Plan for the Tule Reduced Ridgeline Project.[7] It is referenced on pages 30 and 31 of that previous letter. O15-10

Thank you again for this opportunity to comment on the DPEIR for the Soitec Solar Project. O15-11

Sincerely yours,

Kelly Fuller

Kelly Fuller
Consultant to The Protect Our Communities Foundation
kelly@kellyfuller.net

[7] Submitted here as Attachment 7.

O15-10 This attachment is acknowledged and will be provided in the FPEIR for review and consideration by the decision makers.

O15-11 This comment concludes the letter and does not raise a significant environmental issue for which a response is required.

References

USFWS (U.S. Fish and Wildlife Service). 2002. "Survey Protocol for the Endangered Quino Checkerspot Butterfly (*Euphydryas editha quino*) for the Year 2002 Field Season." February 2002.

Quino Checkerspot Butterfly

(*Euphydryas editha quino*)

SURVEY PROTOCOL INFORMATION

February 2002

U.S. Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, CA 92009

Summary

The Quino checkerspot butterfly (*Euphydryas editha quino*, Quino) was listed as an endangered species on January 16, 1997 (62 FR 2313), and is protected under the provisions of the Endangered Species Act of 1973, as amended (Act). This survey protocol provides recommended guidance on survey methodology and outlines additional reporting terms and conditions (absent amended terms and conditions) for biologists possessing a current recovery permit for the Quino checkerspot pursuant to section 10(a)(1)(A) of the Act.

We recommend site assessments be conducted for all project sites within the recommended survey areas (see recommended Quino Checkerspot Survey Area Map). Site assesements determine if the project site contains areas where butterfly surveys are recommended. If a site is composed solely of excluded areas, weekly butterfly surveys are not recommended.

The following items summarize the recommended Quino checkerspot survey protocol:

- The site assessment should be conducted prior to the first butterfly survey.
- Butterfly surveys should be conducted weekly for a minimum of 5 weeks during the flight season for non-excluded portions of the site.
- The timing of the butterfly flight season will be monitored and reported by the U. S. Fish and Wildlife Service (Service) for a number of occupied reference sites throughout the Quino checkerspot's range to assist biologists in determining when to initiate surveys. The flight season generally begins in late February to early March.
- Live capture and transport of an individual Quino checkerspot under very limited circumstances for identification and documentation purposes is authorized by recovery permits under section 10(a)(1)(A).

Introduction

To minimize take of the Quino checkerspot during surveys and provide a credible "presence-absence" methodology, we recommend that site assessments be conducted for project sites that occur, in whole or in part, within the recommended survey areas (see recommended Quino checkerspot Survey Area Map), and that butterfly surveys be conducted as indicated by such site assessments. Because adult Quino checkerspot surveys may result in take, such surveys should only be conducted by a biologist possessing a current recovery permit for the Quino checkerspot pursuant to section 10(a)(1)(A) of the Act (permitted biologist). Generally, a recovery permit for the Quino checkerspot authorizes the pursuit of butterflies for identification and photography, and under limited circumstances (described below), live capture and transport of a larva or butterfly for identification purposes.

We continue to work with local, State, and Federal biologists; scientific and academic institutions; commercial organizations; and other interested parties to collect additional data on the distribution, ecology, and biology of the Quino checkerspot. We will revise this survey protocol as needed, using the best available data. This survey protocol supersedes all previously recommended Quino checkerspot protocols.

Survey reports should be sent to Field Supervisor, Carlsbad Fish and Wildlife Office,6010 Hidden Valley Road, Carlsbad, CA 92009

QUINO CHECKERSPOT BUTTERFLY SURVEY PROTOCOL

Determining The Need For A Protocol Survey

Protocol surveys are recommended for all sites partially or completely within the recommended survey areas (see Recommended Quino checkerspot Survey Area Map). Protocol surveys consist of an initial site assessment to determine if the site contains areas recommended for butterfly surveys. If the site is determined to be comprised solely of excluded areas (described below), surveys are not recommended. If a site has areas suitable for butterfly surveys (non-excluded areas), then surveys should be conducted for those portions of the site.

Butterfly emergence from pupae varies according to environmental factors, so the butterfly flight season varies regionally and annually. To assist biologists in initiating butterfly surveys during the beginning of the flight season at their survey sites, we will monitor the phenology of Quino checkerspot larvae and their host plants at a number of occupied reference sites throughout the species' range. Quino checkerspots usually begin flying in February or early March. The Service will distribute information on monitored occupied reference sites to permit holders, jurisdictional authorities, and other parties who have expressed interest prior to the beginning of the flight season.

SITE ASSESSMENTS

Site assessments should be conducted before the first butterfly survey to identify which portions of a site should be surveyed for the Quino checkerspot. These assessments involve conducting a general field survey of the site and broadly mapping excluded areas and butterfly survey areas on a U.S. Geological Survey 7.5' (1:24,000) topographic quadrangle map that has been enlarged 200 percent (See Appendix 1 for example). We request that this site assessment map be submitted with the report within 45 days of the last survey. We will not be providing concurrence on site assessments. We will use negative and positive site assessments and butterfly survey results to refine future survey area maps.

Excluded Areas

The following areas are not recommended for butterfly surveys:

- Orchards, developed areas, or small in-fill parcels (plots smaller than an acre completely surrounded by urban development) largely dominated by non-native vegetation;
- Active/in-use agricultural fields without natural or remnant inclusions of native vegetation (i.e., fields completely without any fallow sections, unplowed areas, and/or rocky outcrops);
- Closed-canopy forests or riparian areas, dense chaparral, and small openings (less than an acre) completely enclosed within dense chaparral:

  "Closed-canopy" describes vegetation in which the upper portions of the trees converge (are touching) to the point that the open space between two or more plants is not significantly different than the open space within a single plant. Dense chaparral is defined here as vegetation so thick that it is inaccessible to humans except by destruction of woody vegetation for at least 100 meters.

2

Butterfly Survey Areas

All areas that are not excluded should be surveyed for butterflies, regardless of Quino checkerspot host plant presence, absence, and/or density. The Quino checkerspot is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), and on hilltops and ridgelines.

BUTTERFLY SURVEY GUIDELINES

Surveys for Quino checkerspot butterflies should be conducted:

- By a permitted biologist. Quino checkerspot protocol surveys should not be conducted concurrently with any other focused survey (e.g. a coastal California gnatcatcher survey).
- Once per week (weather permitting, see below) for a minimum of 5 weeks throughout the flight season on non-consecutive days. All non-excluded portions of the site should be thoroughly surveyed for butterflies during each weekly survey, even if Quino checkerspots are observed on an earlier visit.
- At an average rate of 10-15 acres (4.05-6.07 hectares) per hour. In large, open areas, 16-33 feet (5-10 meters) on either side of a survey route can generally be examined for Quino checkerspot butterfly presence, so survey routes in these areas should be roughly parallel and 33-66 feet (10 -20 meters) apart. Surveyors should walk within approximately 16 feet (5 meters) of excluded areas such as closed-canopy shrub lands.
- Only under acceptable weather conditions. Weekly surveys may not be considered credible if one or more of the following weather conditions occur: fog, drizzle, or rain; sustained winds greater than 15 miles (24 kilometers) per hour measured 4-6 feet (1.2-1.8 meters) above ground level; temperature in the shade at ground level less than 60° F (15.5° C) on a clear, sunny day; or less than 70° F (21° C) on an overcast or cloudy day.

A weekly survey should only be missed because of week-long adverse weather. If butterflies are detected during the first 5 weekly surveys, surveyors need not conduct additional surveys. If butterflies are not detected during the first 5 surveys, weekly surveys should continue until the end of the flight season to maximize likelihood of detection of low-density populations. If weather conditions as described above preclude conducting a weekly survey, two surveys can be conducted on non-consecutive days the following week. If adverse weather precludes surveys two weeks in a row, two protocol surveys may be conducted on non-consecutive days each of the two weeks immediately following the weeks of adverse weather.

SURVEY MAPS

- The locations of all adult Quino checkerspot and larvae observed should be mapped on a non-enlarged 7.5' USGS topographic map (Appendix 2). We suggest using a Global Positioning System (GPS) unit and/or aerial photos if available. All GPS locations should be corrected with an accuracy not to exceed 5 meters.

3

- All areas of Quino checkerspot larval host plants should be mapped on the site assessment map (Appendix 1). The plant communities on the site should be mapped.

SURVEY TECHNIQUES

Recommended equipment includes: binoculars, wind meter, thermometer, and a camera with close focus telephoto or macro lens. A GPS unit is also useful. Permitted biologists surveying outside Survey Areas 1 and 3 should carry a butterfly net, clear glass or plastic jar with a lid, and 35 mm film canister.

- Survey carefully to avoid trampling or otherwise harming Quino checkerspot larvae and butterflies. *Plantago erecta* and *P. patagonica*, small, often inconspicuous annual plants, are two of Quino checkerspot's primary host plants. Care should be taken to avoid stepping on all host plants, whether occurring singly, in small patches, or in dense stands. Female Quino checkerspots often select lone plants found on bare soil or in open areas for depositing their eggs.

- Walk slowly and stop periodically within areas that have an especially high potential for Quino checkerspot use, such as patches of host plants or nectar sources; ridgelines and hilltops; bare or sparsely vegetated areas between shrubs; and areas of cryptobiotic soil crusts. Field observations indicate that females may deposit eggs on *P. erecta*, *P. patagonica*, *Antirrhinum coulterianum*, *Cordylanthus rigidus* and/or *Castilleja exserta*. *C. rigidus* flowers after the adult flight season, often grows intermingled with *C. exserta*, and its vegetative parts resemble those of *C. exserta*. Therefore, care should be taken to correctly identify *C. rigidus* within survey areas, perhaps after butterfly surveys are completed. Nectar plants most likely to be visited include but are not limited to members of the Asteraceae (e.g. *Lasthenia* spp., *Layia* spp., *Ericameria* spp.), *Cryptantha* spp., and *Allium* spp. Quino checkerspots cannot use flowers with deep corolla tubes, such as monkey flowers, or those evolved to be opened by bees, such as snapdragons.

- Stop occasionally to look around–surveyors standing still are more likely to see a moving butterfly. Use binoculars to scan the area ahead and around you, and to help identify butterflies from a distance.

- Follow the movements of other butterflies. Quino checkerspot males are aggressive, can spot other butterflies from a distance, and will chase them away. If a Quino checkerspot is resting with wings closed, they can be very difficult to notice until another butterfly flies by and they give chase.

APPROACHING A BUTTERFLY SUSPECTED OF BEING A QUINO CHECKERSPOT

Approaching a Quino checkerspot butterfly may result in take as defined by the Act, and therefore should only be conducted by a permitted biologist. When approaching a butterfly, move slowly and keep the movement of your hands, arms, legs, and body to a minimum. If the butterfly is first seen in flight, follow it discreetly, keeping at least 5-6 feet away from it until it alights (lands). Do not make sudden movements.

If the butterfly is circling, stand still and wait for it to alight–if it perceives your movement, it is less likely to stop. Observe the flight pattern. If the butterfly is a Quino checkerspot and flies in a zigzag motion with frequent abrupt changes of direction, it is likely a male. If it appears to be flying in a straight line, or with more gradual changes of direction, it is likely a female.

Once the butterfly has alighted, or if it is first seen when alighted, approach it slowly from an angle where it is not likely to perceive your shadow–from the side may give you the best view of the butterfly's body. Take a photograph of the butterfly when approximately 5-6 feet away (or at a greater distance if your camera has adequate telephoto capabilities), taking care not to allow your shadow to fall on the butterfly.

Slowly move toward the butterfly, taking photographs periodically. When your shadow is within about 1 meter of the butterfly, circle slowly around it if necessary to approach it more closely without casting a shadow on it. As you get closer you should move more and more slowly. Insects that are engaged in some activity such as courtship or feeding on flowers are easier to approach than those that are basking.

Biologists may wish to practice their approach and species identification techniques with other grassland Nymphalid butterflies such as buckeye (*Junonia coenia*), California ringlet (*Coenonympha californica*), and West Coast lady (*Vanessa annabella*) as it will greatly improve their ability to approach and identify Quino checkerspots.

QUINO CHECKERSPOTS OUTSIDE THE AREAS OF RECENT DOCUMENTATION

If a permitted biologist observes a larva or butterfly known or suspected to be a Quino checkerspot outside of Survey Areas 1 and 3, the biologist should attempt to live capture one larva or butterfly using the techniques described below. As a term and condition of their recovery permit, permitted biologists are to notify us by phone at (760) 431-9440 and fax (760) 431-9624 the same day and as soon as possible after capture so we can arrange for identification.

To collect a larva, gently pick it up, taking care not to crush it, and place it in a 35 mm film canister or similar container. Keep the container in a cool place out of direct sunlight.

To capture a butterfly, try to net it using a gentle sweeping motion through the air. If the animal is resting, you may be able to approach it slowly and place the net over it. Do not slap the net on the ground or onto a bush to capture a resting adult–this will likely result in damage or death. Do not chase the butterfly. Many butterflies will return to the same basking site or shrub after a disturbance. Once the adult has been netted, gently place the individual in a clear glass or plastic jar with ventilation. Keep the animal in a cool location while it is transported for identification. Collect the larva or butterfly even if it is inadvertently injured or killed during capture and contact the Service as described below under "Reporting Terms and Conditions."

Map where the known or suspected Quino checkerspot was captured on a non-enlarged 7.5' USGS topographic map (Appendix 2). Include in your field notes a description of the location, habitat type, time of day, date, weather conditions, and the collector's name and permit number.

REPORTING TERMS AND CONDITIONS FOR PERMITTED BIOLOGISTS

If a permitted biologist observes or collects a suspected or known Quino checkerspot adult or larva, within 24 hours the biologist is to notify us by phone (760) 431-9440, and fax (760) 431-9624. Fax a photocopy of a 7.5' USGS topographic map with the observation site marked and a detailed description of the location of the Quino checkerspots.

Within 45 days of the last survey, permitted biologists are to send us a written report based on the terms and conditions of the Quino checkerspot recovery permit and signed by the permitted biologist(s) who conducted the surveys. Survey reports should include:

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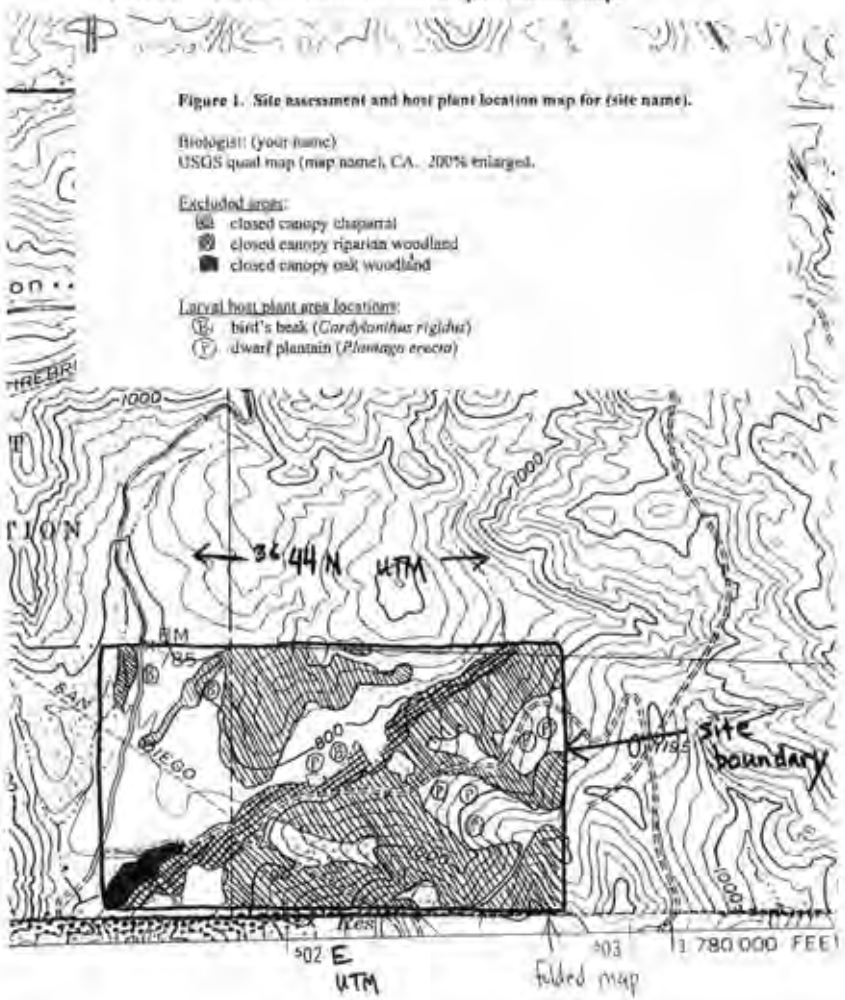
- Name, permit number, and legible copies of field notes of the permitted biologist(s) who conducted the surveys. Please note that all personnel conducting butterfly surveys should seek authorization under a section 10(a)(1)(A) recovery permit for Quino checkerspot.
- Non-enlarged 7.5' USGS topographic map (and aerial photo if available) with Quino checkerspot larvae and/or adult locations marked.
- Site assessment map with Quino checkerspot larval host plant locations mapped.
- Dates and times of each weekly survey.
- Air temperature, wind speed, and weather conditions at the start and end of each survey.
- List of butterflies observed during each weekly survey.
- List of larval host plants, nectar plants, and plant communities observed on the site.
- Photographs of any Quino checkerspot larvae and/or butterflies observed.

ADDITIONAL INFORMATION AND LIMITATIONS

Butterfly surveys may not be considered credible if: 1) unfavorable weather such as drought limits Quino checkerspot butterfly detectability; 2) the specific survey methods described above are not followed (unless deviations are requested in writing prior to the survey and agreed to by the Service); or 3) additional information indicates that the survey was inadequate or inaccurate. We will attempt to advise the public in advance if unfavorable weather limits or precludes Quino checkerspot butterfly detectability at monitored reference sites.

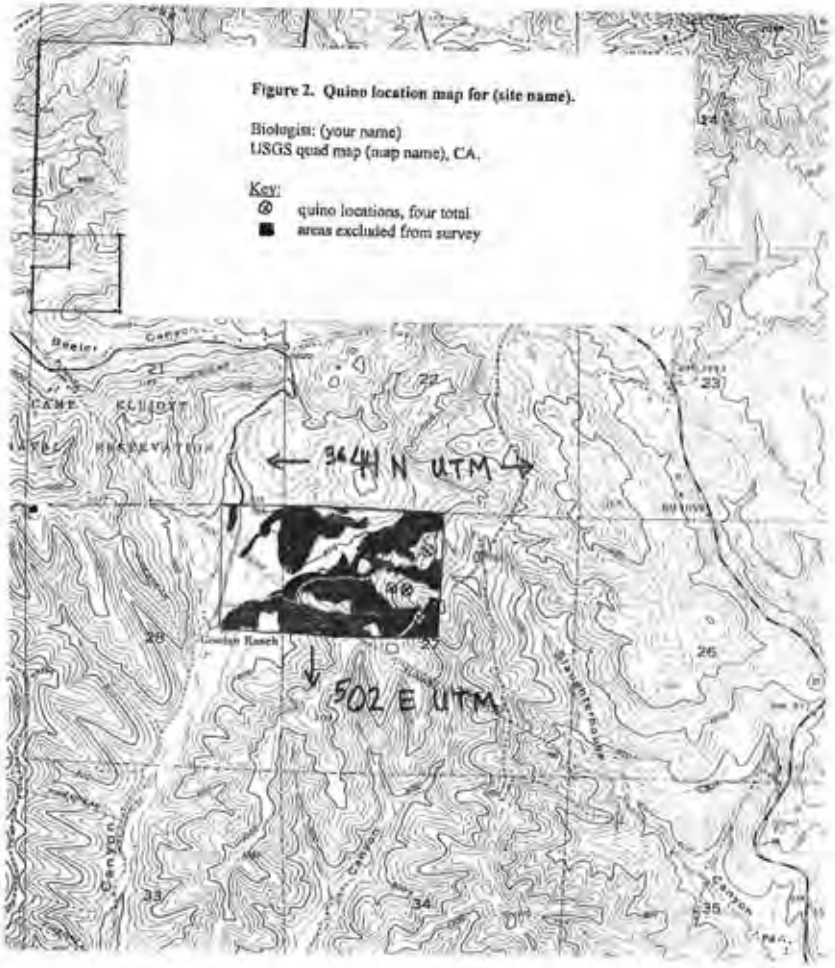
Questions regarding the protocol or its application to specific projects should be directed to the Carlsbad Fish and Wildlife Office Entomologist, and/or the Permit Coordinator, and/or the staff supervisor responsible for the geographic area in which the survey site is located at (760) 431-9440. We will try to provide a response within 72 hours for time-sensitive questions.

Appendix 1. Sample site assessment and host plant location map.



[redacted]

Appendix 2. Sample quino location map.



Interim Review Process Meeting With U.S Fish and Wildlife Service and Department of Fish and Game for projects within Draft East and North County MSCP

Date: June 27, 2013

Project Name: Soitec Solar Development

Project Number: P12-007, P12-010, REZ12-005, AP77-046, P12-002, GPA 12-010, ER120005

Name of Note Taker:

Name of County Staff Presenting Case: Ashley Gungle

Name of USFWS Staff: [redacted] Eric Porter, Doreen Stadtlander

Name of DFG Staff: Randy Rodriguez, Eric Weiss

Other Attendees: please see sign up sheet

1. Where is the project located (Identify street location, community, APN, etc.)?
   The projects are located throughout the Boulevard Community Plan area, within unincorporated San Diego County.
   - **Rugged- north of Interstate 8 between McCain Valley Road and Ribbonwood Road.**
   - **Tierra Del Sol- adjacent to the US Mexico border and south of Tierra Del Sol Road.**
   - **LanWest and LanEast- directly south of Interstate 8 and directly north of Old Highway 80**
2. What is the total acreage of the project site?
   1,480 acres
3. Does the project site support any rare, threatened or endangered species?
   No
4. Is the Project in East or North County MSCP? Current MSCP designation? And County Habitat Evaluation?
   The project site is located within the draft East County MSCP and is designated as Agriculture or Natural Upland within FCA and Agriculture or Natural Upland outside FCA.

5. List of concerns related to negative impacts on the biological resources which the Wildlife Agencies believe could occur from the project as proposed, and the agency's assessment as to whether those impacts have the potential to conflict with the preliminary conservation objectives in the Planning Agreement.

- Need to quantify numbers of data for species of special concerns to verify mitigation
- Identify and mitigate significant populations of sensitive species.
- Quantify suitable habitat for individual sensitive species.

6. List of any additional studies on specific species which the Wildlife Agencies believe are necessary.

- Quino surveys should be kept up to date.
- Golden Eagle – look at methodology used for surveys as it compares to current guidelines
  - ↳ need more info on Rugged as foraging habitat (Rugged supports high amount of prey species)
- Focused raptor surveys (Rugged)
  - ↳ nesting, foraging, migratory
- Herp surveys – need focused survey on Rugged

7. List of any project alternatives, mitigation measures, or studies which the Wildlife Agencies believe should be considered in the environmental review process.

8. Guidance on anticipated Wildlife Agency permits required for the project including permit requirements and processing guidance.

9. **Yes/No** Were there specific concerns raised by the USFWS?

- Quino - surveys should be kept up to date
- Need to look at how impacts on species may affect ECMSCP species coverage
- Concerns addressed with preservation of FCA areas based on LanW/E ~~focal~~ and Rugged project locations.
- Need to justify why lack of connectivity to FCA would not preclude movement.
- USFWS to do further review of Golden Eagle study

10. **Yes/No** Were there specific concerns raised by DFG?

- Higher mitigation ratios may be recommended based on higher value of habitat
- Impact neutral areas may need to be considered impacted and be mitigated
- Rugged Corridors will need to be looked at for specific species using them.
- 50' wetland buffers should be 100' or additional information should justify 50' buffers

11. **Yes/No** Were determinations made?

- Field trip w/ agencies (September)
- Want to see complete biology report (surveys, addressing County comments) and information on mitigation site

MEETING ATTENDEES

DATE: June 27, 2013
PROJECT: Soitec Solar Development

NAME	*ORGANIZATION*	*PHONE NUMBER/ EMAIL*
Ashley Gungle	County (PDS)	8)495-5375 ashley.gungle@sdcounty.ca.gov
maggie Loy	County (PDS)	8) 694-3736 maggie.loy@sdcounty.ca.gov
Vipul Joshi	Dudek	7) 479-4284 vjoshi@dudek.com
Jim Whalen	JWA	619-683-5544 jim@jwhelen.net
Patrick Brown	Soitec	619 733-2649 Patrick.Brown@Soitec.com
Randy Rodriguez	CDFW	(858)637-7100 rfrodriguez@dfg.ca.gov
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Quino Checkerspot Butterfly
(*Euphydryas editha quino*)

5-Year Review:
Summary and Evaluation

Painting by Alison Anderson after photo by Frank Ohrmund

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California

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5-YEAR REVIEW
Quino Checkerspot Butterfly (*Euphydryas editha quino*)

I. GENERAL INFORMATION

Purpose of 5-Year Review:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview:

As summarized in the Recovery Plan (USFWS 2003a) and recent revisions to critical habitat for this species (USFWS 2009, 74 FR 28776), the Quino checkerspot butterfly (*Euphydryas editha quino*) (Quino) is a member of the family Nymphalidae (brushfooted butterflies) and the subfamily Melitaeinae (checkerspots). It is restricted to Riverside and San Diego Counties in California, and northern areas of Baja California Norte, Mexico (Mexico). Habitat for the Quino is characterized by patchy shrub or small tree landscapes with openings of several meters between woody plants, or a landscape of open swales alternating with dense patches of shrubs, habitats often collectively termed "scrublands". Quino will frequently alight on vegetation or other substrates to mate or bask, and require open areas with high solar exposure to facilitate breeding and movement. *Euphydryas editha* populations often display a metapopulation structure, and require conservation of temporarily unoccupied patches of habitat for population resilience. A metapopulation is composed of a number of local populations. Individuals interact among local populations within a metapopulation just enough to reduce the extinction probability of the metapopulation compared to the extinction probability of any local population.

Methodology Used to Complete the Review:

This review was prepared by the Carlsbad Fish and Wildlife Office (CFWO) using information from the Recovery Plan, survey information from experts, and 10(a)1(A) Recovery Permit reports. The Recovery Plan, published peer-reviewed scientific studies, survey reports, other submitted or collected data, and personal communications with experts were our primary sources of information used to update the species' status and threats. We received two letters containing

information from the public in response to our *Federal Register* Notice initiating this 5-year review from: (1) The State of California Attorney General on May 6, 2008; and (2) the Center for Biological Diversity, including copies of cited literature, on May 13, 2008. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing and at the time of Recovery Plan publication (USFWS 2003a). We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

Contact Information:

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FR Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the *Federal Register* on March 5, 2008 (USFWS 2008, 73 FR 11945). We received two letters containing information from the public in response to our Federal Notice initiating this 5-year review; relevant information specific to the taxon being reviewed here was incorporated.

Listing History:

Original Listing
FR Notice: 62 FR 2313
Date of Final Listing Rule: January 16, 1997
Entity Listed: Quino checkerspot butterfly (*Euphydryas editha quino*), an insect subspecies
Classification: Endangered

Associated Rulemakings:

Original Proposed Critical Habitat
FR Notice: 66 FR 9476
Date of Proposed Critical Habitat Rule: February 7, 2001

Final Critical Habitat
FR Notice: 67 FR 18356
Date of Final Critical Habitat Rule: April 15, 2002

Proposed Revision to Critical Habitat
FR Notice: 73 FR 3328
Date of Proposed Revised Critical Habitat Rule: January 17, 2008

Final Revision to Critical Habitat
FR Notice: 74 FR 28776
Date of Final Revised Critical Habitat Rule: June 17, 2009

Review History: No previous 5-year reviews have been completed for the Quino.

Species' Recovery Priority Number at Start of 5-Year Review:

The recovery priority number is 6C according to the recovery plan (USFWS 2003, p. iv; the recovery priority number in the USFWS' 2008 Recovery Data Call for the CFWO was in error because it was never updated after the recovery plan was published). This ranking is based on a 1-18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (USFWS 1983, 48 FR 43098). This number indicates the taxon is a subspecies that faces a high degree of threat and has a low potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline:

Name of Plan or Outline: Recovery Plan for the Quino Checkerspot Butterfly (*Euphydryas editha quino*)
Date Issued: August 11, 2003

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy:

The Endangered Species Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition limits listing as distinct population segments to vertebrate species of fish and wildlife. Because the species under review is an invertebrate and the DPS policy is not applicable, the application of the DPS policy to the species' listing is not addressed further in this review.

Information on the Species and its Status:

The Quino Recovery Plan (USFWS 2003a) was co-authored by a Technical Recovery Team of seven expert biologists and ecologists (USFWS 2003a, p. ii) and provides a comprehensive scientific review and analysis of published and non-published information and data through 2002 relevant to conservation of the Quino. Therefore, the Recovery Plan was cited as a primary source for some of the scientific information discussed below.

Species Description

Quino differ from other *Euphydryas editha* subspecies in a variety of characteristics including size, wing coloration, and larval and pupal phenotypes (Mattoni *et al.* 1997, p. 100). Adult Quino have a wingspan of approximately 1.5 inches (4 centimeters) (USFWS 2003a, p. 6). The dorsal (top) sides of the wings have a red, black, and cream colored checkered pattern; the ventral (bottom) sides are dominated by a checkered red and cream pattern (USFWS 2003a, p. 6). The abdomen of the Quino has red stripes across the top (USFWS 2003a, p. 6).

Species Biology and Life History

The Quino life cycle includes four distinct life stages: egg, larva (caterpillar), pupa (chrysalis), and adult, with the larval stage divided into 5 to 7 instars (periods between molts, or shedding skin) (USFWS 2003a, p. 157). There is usually one generation of adults per year, although larvae may remain in diapause (summer dormancy) for multiple years prior to maturation (USFWS 2003a, p. 8).

Quino are exothermic (cold-blooded) and therefore require an external heat source to increase their metabolic rate to levels needed for normal growth and behavior. Within open, woody-canopy communities, larvae seek microclimates with high solar exposure for basking in order to speed their growth rate (Weiss et al. 1987, p. 161; Weiss et al. 1988, p. 1487; Osborne and Redak 2000, p. 113; USFWS 2003a, p. 20). Like most butterflies, adult Quino frequently bask and remain in sunny areas to increase their body temperature to the level required for normal active behavior (USFWS 2003a, p. 18).

Spatial Distribution

The Quino's historical range included much of non-montane southern California: southwestern Ventura; southwestern San Bernardino; Los Angeles; Western Riverside; and San Diego counties (USFWS 2003a, p. 1; USFWS GIS database). More than 75 percent of the Quino's historical range has been lost (Brown 1991, p. 10), including more than 90 percent of its coastal mesa and bluff distribution (USFWS 2003a, p. 1; USFWS GIS database). At listing, Quino populations were reduced in number and size from historical conditions by more than 95 percent range wide. This reduction was primarily due to direct and indirect human impacts including habitat loss and fragmentation, invasion of nonnative plant species, and catastrophic natural events such as increased frequency of drought and wildfire (USFWS 1997, 62 FR 2313). The current range for Quino includes multiple areas in southern Riverside County, south into Mexico. For detailed current United States population distribution information, see discussions below and Figures 1 and 2.

Delineating Population Distributions

The scientific data available to us for use in delineating Quino population distributions consists of geographic information system (GIS)-based habitat information, subspecies observation locations, and subspecies movement data from mark-release-recapture studies. Population-scale occupancy (a population distribution) is defined by all areas used by adults during the persistence

time of a population (years to decades; USFWS 2003a, p. 24). Distribution studies over multiple years are required to quantify Quino population distributions based on recorded subspecies locations. Therefore, we discuss Quino population locations in terms of "occurrence complexes" (USFWS 2003a, p. 35), which are our best estimators of approximate population location and population membership. Occurrence complexes are mapped in the Recovery Plan using a 0.6 mile (1 kilometer) movement radius from each butterfly observation, and may be based on the observation of a single individual (Figures 1 and 2). Occurrences within approximately 1.2 miles (2 kilometers) of each other are considered to be part of the same occurrence complex, as these occurrences are proximal enough that the observed butterflies were likely to have come from the same population (USFWS 2003a, p. 35). Occurrence complexes may expand due to new butterfly observations, or contract due to habitat loss (e.g., occurrence complexes are defined in part by extant habitat, USFWS 2003a, p. 78).

Some occurrence complexes are identified in the Recovery Plan (USFWS 2003a, p. 35) and revised critical habitat rule (USFWS 2009, 74 FR 28776) as "core." These occurrence complexes are considered likely centers of population density based on characteristics including geographic size, number of reported individuals, documented reproduction, and repeated observations. Such population density centers are likely to contain habitat supporting local "source" populations for a metapopulation (Murphy and White 1984, p. 353; Ehrlich and Murphy 1987, p. 125; Mattoni et al. 1997, p. 111; USFWS 2003a, pp. 25-26), or "source" populations for megapopulations (a group of populations also dependent on one another, but on a time scale greater than that of subpopulations; USFWS 2003a, pp. 21, 24-26). A local source population is one in which the emigration rate typically exceeds the immigration rate, and is thus a source of colonists for unoccupied habitat patches within a metapopulation distribution (USFWS 2003a, p. 166). Therefore, in the final revised critical habitat rule (USFWS 2009, 74 FR 28776), we define a core occurrence complex as an area where at least two of the following criteria apply: (1) 50 or more adults have been observed during a single survey; (2) immature life stages have been recorded; and (3) the geographic area within the occurrence complex (i.e., within 0.6 mile (1 kilometer) of subspecies occurrences) is greater than 1,290 acres (522 hectares). In the final revised critical habitat rule (USFWS 2009, pp. 74 FR 28776), we also described habitat-based population distributions for core occurrence complexes (proposed revised critical habitat units). Habitat-based population distributions include any contiguous habitat within an occurrence complex (described above) and within an additional 0.6 mile (1 kilometer) of an occurrence complex. We used biological and geographic information (primarily USFWS GIS host plant occurrence data, vegetation layers, and satellite imagery) to capture the physical or biological features essential to the conservation of the subspecies in these areas. Any areas within the occurrence complex that we determined did not contain habitat were removed. This process resulted in the identification of a habitat-based population distribution for each core occurrence complex that is occupied at a population distribution scale, but where detectability may vary annually. Though we have not mapped habitat-based population distributions for all occurrence complexes, we are able to estimate habitat-based population distribution membership of all occurrence complexes by distances between them and satellite imagery of intervening habitat (Figures 1 and 2). In this document, we refer to habitat-based population distributions as "core", instead of occurrence complexes (Table 1; Figures 1 and 2); however, population dynamics have not been studied for this subspecies and it is still possible some habitat-based populations contain more than one population, or more than one distribution belongs to a single

population. Because population distributions are estimated, we believe it is prudent not to name populations at this time.

The number of known populations has increased since the time of listing. The listing rule (USFWS 1997, 62 FR 2313) identified "seven or eight" Quino populations within the United States. All extant populations in the United States were said to occur in southwestern Riverside and north-central San Diego Counties. At least one population was known to exist in Mexico, in the Sierra Juarez near Tecate. Based on our current analysis (Table 1) occupied areas known at the time of listing fall within three extant core habitat-based population distributions, and one core and one non-core habitat-based population distribution of unknown status. The remaining habitat-based population distributions documented post-listing were either not known or considered extirpated. Population distributions documented post-listing consist of 6 core and 15 non-core extant distributions, 6 non-core distributions of unknown status, and 4 non-core distributions extirpated post-listing.

Status and Local Distribution of Populations

Mattoni et al. (1997, p. 99) predicted that Quino would be the "passenger pigeon butterfly" – a once common, widespread species crashing to extinction over a few decades; however, those authors underestimated the number of remaining populations and potential of this eruptive species to once more increase its abundance, and possibly its range. Occurrence data collected since the Recovery Plan was published in 2003 expanded many occurrence complexes, merged others, and established new ones (Figures 1 and 2).

Recent survey information indicates the Tule Peak habitat-based population distribution (Riverside County) supports the only extant, resilient population that undergoes periodic high density events similar to the 1977 event described by Murphy and White (1984, p. 351; Ehrlich and Murphy 1987, p. 127) in San Diego County (CFWO 2004; Pratt 2004, p. 17;). Occupancy in the Tule Peak habitat-based population distribution was first documented in 1998 (Pratt 2001, p. 17). Hundreds of adults were observed during surveys in 2001, which was unprecedented, because five or fewer individuals are typically reported during project-based surveys (USFWS GIS database). In 2004, following a year of above-average host plant density in the Anza area (CFWO 2004), another high-density Quino event occurred with higher abundance than was reported in 2001. An estimated 500 to 1,000 adult Quino were reported in a single day in 2004 (Anderson 2007, p. 1; CFWO 2004; Pratt 2004, pp. 16-17). Over 30 new occurrence locations were reported in 2004 in the vicinity of Tule Peak Road (92 to over 100 observations in a single day), south of the Cahuilla Band of Indians Tribal lands and the community of Anza (Osborne 2004, pp. 1-6, 8-10; Anderson 2007, p. 5; CFWO 2004; Osborne 2007, pp. 13-16). Most recently, a relatively high abundance year occurred in 2009, following a year of average to above-average rainfall in 2008 (CFWO 2009; G. Pratt, University of California, Riverside, pers. comm. 2009a, p. 1, 2009b, p. 1). These post-Recovery Plan observations indicate the Tule Peak habitat-based population distribution contains higher densities and produces more emigrants than any other occupied area within the subspecies' range.

New Quino observations in San Diego County (USFWS GIS database) between occurrence complexes identified in the Recovery Plan have resulted in merging of the Otay Valley, West

Otay Mountain, Otay Lakes, Proctor Valley, Dulzura, and Honey Springs occurrence complexes into a single, expanded Otay Occurrence Complex (Table 1, Figure 2). The merging of occurrence complexes in the Otay area was expected based on the Recovery Plan, which noted that occupied habitat in the vicinity of Otay Lakes and Rancho Jamul is an area of key landscape connectivity for all subpopulations in southwest San Diego County (USFWS 2003a, pp. 53-54). The Otay core habitat-based population distribution also includes the Marron Valley, West Otay Valley, Jamul Butte, and Rancho San Diego/Jamul occurrence complexes (Table 1, Figure 2).

Six new Quino observation locations were reported in central San Diego County since the Recovery Plan was published in 2003 (Figure 2). The Recovery Plan described two occurrence complexes in central San Diego County: San Vicente and Alpine (USFWS 2003a, p. 48). Four of the six new occurrence complexes (South San Vicente, Sycamore Canyon, Fanita Ranch, and North East Miramar) combined with the previously known San Vicente Occurrence Complex, belong to the San Vicente core habitat-based population distribution (Table 1, Figure 2). These new occurrence complexes provide the information needed to establish a new Central San Diego Recovery Unit as described in the Recovery Plan (USFWS 2003a, pp. 86-88, 111-112).

Multiple new Quino observation locations have been reported in south-central San Diego County since 2002 east of the community of Campo (Dicus 2005a, p. 1, 2005b, p. 1; PSBS 2005a, p. 18, 2005b, p. 26; O'Conner 2006, pp. 2-4). We consider this cluster of new observations near Campo to belong to a new, independent Campo population (core habitat-based population distribution; Figure 2). The Jacumba Occurrence Complex was not classified as core in the Recovery Plan (USFWS 2003a, p. 52) due to its relatively small geographic size and small number of observed individuals. However, adult Quino are consistently observed in the area (CFWO 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009). As many as 50 individuals are estimated to have been observed in one day near Jacumba Peak (Pratt, pers comm. 2007a, p. 1). Furthermore, reproduction was documented in the Jacumba Occurrence Complex in 1998 and again in 2004 (Pratt, pers. comm. 2007b, p. 1). Therefore, we now consider the Jacumba occurrence complex to represent a relatively resilient population and the associated habitat-based population distribution is therefore classified as core.

Abundance

Accounts of large population density fluctuations at historical Quino population sites (Orsak 1977, pp. 137-138; Murphy and White 1984, pp. 350-354) and collection record data (Anderson 2003, p. 4) indicate that the Quino is a climate-sensitive, "eruptive" species that periodically experiences order of magnitude increases in abundance every 5-20 years, then drop back to much lower abundance over time (Orsak 1977, pp. 137-138; Murphy and White 1984, pp. 350-351; Anderson 2003, p. 4; USFWS GIS database).

Major weather pattern-driven fluctuations in Quino population abundance are similar to long-term population fluctuations in the *Euphydryas editha bayensis* (bay checkerspot butterfly) recorded by Paul Ehrlich's research group at Jasper Ridge (see Ehrlich et al. 1975, pp. 221-228). The balance between resilience and vulnerability may have been disrupted in this case, because the Jasper Ridge bay checkerspot butterfly population was functionally extirpated in 1997 (Mattoni et al. 1997, p. 110). The last rangewide Quino population abundance low was in the

late 1980s (Anderson 2003, p. 4). Historically, population abundance lows for this species occurred in the mid 1960s, early 1950s, the late 1930s-early 1940s, and the mid-1920s, corresponding with either drought or one-time extreme weather events such as floods (Anderson 2003, p. 4).

The extirpation of Quino from Orange County is an example of permanent regional-scale loss of populations due to a combination of human impacts and natural (from a historical/evolutionary perspective) fluctuations in abundance. Examination of the history of Orange County Quino populations (Anderson 2003, pp. 3-4) reveals a combination of naturally occurring stochastic events (drought, flood, and fire) exacerbated by ongoing human-caused habitat destruction and degradation (development, agriculture, and grazing), which resulted in the extirpation of Quino populations from Orange County. In 1938, a 100-year flood (Paulson et al. 1989, p. 1) marked the last year of any recorded lower-elevation Quino collection in Orange County (Anderson, 2003, p. 3). Significant changes in Quino abundance were noted by lepidopterists in Orange County for over 60 years (Mattoni et al. 1997, p. 110). Quino were collected in high numbers at Irvine County Park between 1917 and 1922, followed by an almost complete absence of collections correlated with drought (Mattoni et al. p. 110; Anderson 2003, p. 3). In 1933 and 1934, the species was again common, but extirpation quickly followed, correlated with ongoing development and the 1938 flood that filled Irvine Lake (Santiago Reservoir) (USFWS 2003a, p. 30; Anderson 2003, p. 3). The last Quino population was extirpated in Orange County by a fire in 1967 in the Black Star Canyon/Hidden Valley area (see Orsak 1977, p. 137 for description of extirpation). If the lower elevation population that existed at Irvine Park had not been permanently extirpated, it may have served as a source of recolonization for habitat occupied by the higher-elevation Black Star Canyon population (approximately 3 miles (5 kilometers) away). It is difficult for higher elevation populations to recolonize lower elevation habitats because host plant and other aspects of breeding habitat suitability decline earlier at lower elevations with the approach of drier summer weather.

Dispersal and recolonization events were probably high during the 1990s and 2000s, however abundance peaks during the 2000s were reduced relative to the "hundreds to thousands of individuals" (Murphy and White 1984, p. 351) reported from multiple sites in the late 1970s (Anderson 2003, p. 4; USFWS GIS database). Examination of weather patterns and Quino occurrence records indicate drought such as occurred during the 1980s also occurred in the 1960s (Anderson 2003, p. 4). Recent climate evidence (Hidalgo et al. 2007, pp. 54-59; Environmental News Service 2009) suggests we are already experiencing the beginning of a severe drought, possibly exacerbated by climate change, and the effects are likely to cause another Quino population collapse in the next 5-10 years. Recent evidence supports Murphy and White's (1984, p. 355) hypothesis:

> The extirpation of a single, large reservoir population of [Quino] may effectively deny other habitats necessary migrants, creating a ripple effect of irreversible long-term extinctions. We suspect that just such a circumstance has eliminated [Quino] from Orange County and much of coastal San Diego County, and now threatens populations in Riverside and inland San Diego Counties in California.

On the regional distribution scale, each consecutive Quino abundance peak was reduced from the previous one due to ongoing human-caused destruction of habitat and loss of source populations. With the exception of severe flooding, this series of events and recorded Quino abundance and distribution patterns leading to the regional extirpation of Quino in Orange County mirror the recent extirpation of the subspecies in the Harford Springs habitat-based population distribution (the Gavilan Hills in northwest Riverside County; see Orsak 1977, p. 138; Martin 1970, p. 4; Table 1) and trends in extant core habitat-based population distributions such as Warm Springs Creek, Skinner/Johnson, Oak Mountain/Vail Lake, and western portions of Otay. This long-term downward abundance trend (last population lost was in 2008, Horse Thief Canyon, see Table 1) should be considered when assessing current species' status.

Habitat or Ecosystem

Quino habitat is characterized by patchy shrub or small tree landscapes with openings of several meters between large plants, or a landscape of open swales alternating with dense patches of shrubs (Mattoni et al. 1997, p. 112); such habitats are often collectively termed "scrublands." Quino will frequently perch on vegetation or other substrates to mate or bask, and require open areas to facilitate movement (USFWS 2003a, pp. 10-11).

Adult butterflies will only deposit eggs on species they recognize as host plants. Quino oviposition (i.e., egg deposition) has been documented on *Plantago erecta* (erect or dwarf plantain), *Plantago patagonica* (Patagonian plantain), and *Antirrhinum coulterianum* (white snapdragon) (USFWS 2003a, pp. 14-18). In 2008, oviposition and larval development were recorded for the first time on a new species of host plant, *Collinsia concolor* (Chinese houses) (Pratt, pers. comm. 2008a, p. 1; 2008b, p. 1; 2008c, p. 1; 2008d, p. 1; 2008e, p. 1). Although *C. concolor* commonly occurs in habitats with *P. erecta*, *P. patagonica*, and *A. coulterianum*, (Pratt 2001, pp. 42-43; Anderson unpubl. data 2008, pp. 2-3), this plant species is typically found in cooler and moister micro-habitats that tend to grow in the shade on north facing slopes (Pratt 2001, p. 40; Pratt, pers. comm. 2008b, p. 1).

Newly hatched pre-diapause larvae cannot move more than a few centimeters during the first two instars, restricting their development during this stage to the individual host plant where the eggs were deposited. Older pre-diapause larvae usually wander independently in search of food and may switch to feeding on a different species of host plant (USFWS 2003a, p. 7). All known species of host plant (see species listed above) may serve as primary or secondary host plants, depending on location and environmental conditions (USFWS 2003a, p. 17). Quino egg clusters and pre-diapause larval clusters have also been documented in the field on *Cordylanthus rigidus* (thread-leaved bird's beak) and *Castilleja exserta* (purple owl's-clover) (USFWS 2003a, pp. 14-18). However, use of *C. rigidus* and *C. exserta* is rare, and these species alone are not believed to support Quino breeding (USFWS 2003a, pp. 16-17).

The physical structure of flowers is the primary factor that determines nectar source use. Adult checkerspot butterflies of the genus *Euphydryas* have a short tongue, approximately 0.43 inch (11 millimeters) long (Pratt, pers. comm. 2007a, p. 1), and typically cannot feed on flowers that have deep corolla tubes or flowers evolved to be opened by bees (USFWS 2003a, p. 19). Although adults may nectar on flowers with a corolla length nearly a centimeter longer than their probuscis (0.59-1.10 inch (15-28 millimeters)), such as *Linanthus androsaceus* (false baby stars)

(Murphy 1984, p. 114; Hickman 1993, p. 842), they are not likely to prefer such species (Murphy 1984, p. 114). Therefore, flowers with a corolla tube greater than 0.43 inch (11 millimeters) are less likely to be used as nectar sources by the Quino. Edith's checkerspot butterflies prefer flowers with a platform-like surface on which they can remain upright while feeding (USFWS 2003a, p. 19).

White and Levin (1981, pp. 350-351) found that adult Quino's within-habitat patch movement distances from larval host plant patches to adult nectar sources often exceeded 656 feet (200 meters). Movement distances greater than this distance were the extreme values recorded by White and Levin (1981, p. 349), as 656 feet (200 meters) was more than double the average recapture distance in 1972, and almost 4 times the average distance in 1973. Therefore, nectar sources greater than 656 feet (200 meters) from larval host plants are not likely used by the subspecies.

It is not possible to determine habitat suitability based on standing host plant densities. Densities of *Plantago erecta* required for larval development have been estimated (USFWS 2003a, pp. 22-23); however, it is not always possible to determine typical host plant densities because: (1) Germinating host plants may be entirely consumed by larvae; or (2) seeds may not germinate and larvae may return to in diapause when precipitation levels are below-average (USFWS 2003a, p. 23). These principles apply to all host plant species to some extent; therefore, host plants detected in habitat appearing otherwise suitable should be considered an indicator of habitat suitability.

Changes in Taxonomic Classification or Nomenclature

The taxon now commonly called the Quino has undergone several nomenclatural changes. It was originally described as *Melitaea quino* (Behr 1863, pp. 90-91). Gunder (1929, pp. 5-8) reduced it to a subspecies of *Euphydryas chalcedona*. At the same time, he described *Euphydryas editha wrighti* from a checkerspot butterfly specimen collected in San Diego. After reexamining Behr's descriptions and specimens, Emmel *et al.* (1998, p. 101) concluded that the Quino should be associated with *E. editha*, not *E. chalcedona*, and that it was synonymous with *E. editha wrighti*. Because *E. editha wrighti* is a junior synonym for the Quino, *E. editha quino* is now the accepted scientific name (USFWS 2003a, pp. 5-6).

Genetics

Dr. Michael Singer (University of Texas, Austin) is currently conducting a genetics study with the primary goal of investigating the dispersal and colonization potential of the Quino based on the genetic relationships among populations. This information is needed for decisions regarding reintroduction of extirpated populations from extant populations and augmentation of extant low density populations that are vulnerable to extirpation. In particular, the research should facilitate the restoration of occupancy to historically occupied areas on Otay Mesa. The research focuses on comparing the genetic relatedness of historical Quino on Otay Mesa to potential source sites in San Diego County that could be used in an augmentation effort. Additionally, the research may explore the genetic relatedness of populations surrounding Otay Mountain with populations in southeastern San Diego County, populations in Riverside County, and populations in Mexico.

Initial Amplified Fragment Length Polymorphism analyses (Singer, pers. comm. 2009, p. 1) placed the Marron Valley and Lake Skinner occurrence complexes on the genetic map that already existed for Edith's checkerspot. This analysis clearly supports the integrity of the Quino subspecies as a coherent genetic entity within the species. This genetic map confirms a strong isolation by distance relationship among populations. Approximately 70 percent of the variation among populations can be explained by the geographic distance between them (Wee 2004, p. 13). In other words, populations that are geographically closest to each other are also genetically closest to each other. This relationship can be used to choose the most appropriate source populations for restoration in circumstances where available genetic information from extinct populations is inadequate.

Species-specific Research and/or Grant-supported Activities

See the description above of the ongoing genetic study being conducted by Dr. Michael Singer at the University of Texas, Austin. The project was funded by California Transportation Ventures to satisfy the funding obligation outlined in the biological opinion for the SR 125 South Project (USFWS 1999, 1-6-99-F-14). The money was placed in a non-endowment fund (Quino Checkerspot Butterfly Genetic and Captive Propagation Research Fund) and is currently managed by the San Diego Foundation.

Following the 2003 fires, the Service conducted a post-fire assessment study of affected occurrence complexes in San Diego County (USFWS 2007). The results of post-fire Quino observations and monitoring were generally positive, indicating continued persistence of occupancy after fire (USFWS 2007, p. 2). Most surveyors and Service staff reported small patches of unburned habitat within or adjacent to fire perimeters where host plants and in some cases even larvae were found (CFWO 2004, 2006). Contracted surveyors and CFWO staff noted that the fires are a threat to population resilience because they exacerbate nonnative plant invasion (e.g., *Eradium sp.*; CFWO 2006) that is already ubiquitous throughout the subspecies' range. Monitoring of areas adjacent to the Otay Fire perimeter provided comparative evidence of negative fire impacts as well, and we concluded that Quino population resiliency within the Otay Recovery Unit was likely compromised by the 2003 fires (USFWS 2007, p. 3); although it is not clear what the magnitude of the effect may be, or the time scale on which the effect may be apparent.

Edith Allen (University of California, Riverside) conducted research in 2004 and 2005 to determine effective methods for restoration of Quino habitat that had been converted to agricultural land (Marushia and Allen 2005). The study was conducted at Johnson Ranch (Marushia and Allen 2005, p. 1) in the Skinner/Johnson habitat-based population distribution. They found that discing after initial germination of grasses in the fall was an effective treatment against nonnative species, and provided good site preparation for solarization (tarping), which was the most effective among the treatments tested. Solarization produced the highest diversity and cover of native species, especially the Quino host plants, and the least density and cover of nonnative species (Marushia and Allen 2005, p. 2).

In 2008, the Service coordinated a rangewide study of occupancy using sample sites throughout the species range. Field surveys indicated that 2008 was a year of average detectability (based

on environmental conditions). This study was designed to: (1) Help us determine the likelihood of species detectability using standard survey methods; (2) determine the likelihood of occupancy in a given year of habitat proximal to recent Quino observations; and (3) establish an occupancy baseline for future conservation analyses and management. Specific study objectives included estimating the percentage of areas within 262 feet (80 meters) of at least one Quino occurrence between 1997 and 2007 used by adults during the 2008 flight season, and estimating detection probabilities (CFWO 2008, p. 1). Sample plots were approximately 2 acres (0.8 hectare) and centered on randomly placed points within the sample area (described above; CFWO 2008, p. 1). Surveys were conducted by 10(A)1(a) recovery permit holders in a manner similar to that specified in the CFWO presence-absence survey protocol (CFWO 2008, p. 2; CFWO 2002, pp. 1-6). Initial data analysis was conducted using the program MARK (White and Burnham 1999, pp. 120-138). In San Diego County, Quino adults were detected in 7 of 164 plots (4 percent naïve rate, not corrected for detection probability) where at least one survey was conducted (T. Grant, CFWO, pers. obs. 2009, p. 1). The cumulative detection probability was between 0.5 and 0.8 (T. Grant, pers. obs. 2009, p. 1), meaning that there was a 50 to 80 percent chance of observing at least 1 Quino on a plot if it was occupied. The revised occupancy estimate using the calculated detection probability was 5.5 percent (95 percent CI 0.025-0.115) (T. Grant, pers. obs., 2009, p. 3). In Riverside County, Quino adults were detected in 22 out of 107 plots (21 percent naïve rate), where at least one survey was conducted (Western Riverside County Multiple Species Habitat Conservation Plan (Western Riverside County MSHCP) Biological Monitoring Program 2009, p. 11). The cumulative detection probability after 3 visits was 0.96, meaning that there was a 96 percent chance of observing at least 1 Quino on a plot if it was occupied. The revised occupancy estimate using the calculated detection probability was 23 percent (95 percent confidence intervals: 0.16-0.34), a slight increase from the naïve estimate. These results indicate adult Quino presence within an estimated population distribution can vary substantially (approximately 30 percent maximum likelihood of occupancy in habitat where occupancy has been documented since listing), and the likelihood of detecting Quino occupancy using standard survey methods is relatively high (may be greater than 95 percent), but may be as low as 50 percent. Additionally, there may be substantial differences between the north and south portions of the subspecies' range in occupancy rates and detectability.

Dr. Gordon Pratt (University of California, Riverside) has successfully reared Quino in captivity since listing in 1997 under a Service 10(a)1(A) recovery permit. He has obtained funding through the Service and third parties through a Habitat Conservation Plan (HCP) implementation. In 2006, Dr. Pratt (p. 9; Pratt and Emmel 2009, pp. 1, 5) conducted a study of diapause site choice at his captive propagation facility using captive stock and found that Quino larvae prefer to diapause in or near the base of native shrubs, such as *Eriogonum fasciculatum*.

The CFWO monitors Quino reference sites for larval and adult activity during the active season (possible December through May). Sites are monitored and information is posted on the internet for the general public. Monitoring is primarily for phenological information and to document continued Quino presence. Search efforts are not always equal, and negative surveys under unsuitable weather conditions (per survey protocol) are not reported. The CFWO staff also work with permitted volunteers to provide the best biological information possible. We share the most relevant information available to us on our website (e.g., CFWO 2009) regarding habitat areas throughout the subspecies' range.

Five-Factor Analysis

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act. Although we believe that most populations described above were likely extant at the time of listing, the listing rule analyzed threats in the context of approximately seven known populations. Our current analysis applies to all habitat known to be occupied since listing.

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

At the time of listing, the Quino was imperiled primarily because habitat was being damaged, fragmented, and destroyed by human activities. Urban development, grazing, and invasion of nonnative plants were the predominant threats at that time (USFWS 1997, 62 FR 2313). Threats associated with Factor A were identified in the Recovery Plan (section entitled "Reasons for Decline and Current Threats") and included: loss and fragmentation of habitat and landscape connectivity, invasion by nonnative plants, off-road vehicle activity, grazing, enhanced soil nitrogen, and increased atmospheric carbon dioxide concentration (USFWS 2003a, pp. 56-60). Little has changed with regard to the magnitude and immediacy of these threats since publication of the Recovery Plan. We now believe the magnitude and immediacy of the threat of climate change-induced habitat modification to lower latitudes (in Mexico and lower elevation populations) has increased, though the magnitude of development as a threat has likely decreased due to listing, habitat conservation to-date and a slowdown in development caused by the current economic conditions.

Land Use Changes

Since completion of the Recovery Plan in 2003, loss and modification of Quino habitat continue to be a primary threat to the subspecies, especially in areas where urbanization is expected to expand (Southeast San Diego County, and the Bautista Road Occurrence Complex and associated habitat in the final revised critical habitat Unit 7; USFWS 2009, 74 FR 28776) (Table 1). In areas where habitat is protected, urbanization of surrounding lands may result in the fragmentation of protected habitats, which could prevent movement of the subspecies between habitat areas.

Acquisitions of land and conservation easements have resulted in preservation of much habitat for the subspecies (Table 1). We do not yet know how much local Quino abundance, distribution, and habitat availability can be reduced without critically compromising population resiliency. We believe it is important to consider a historical perspective and acknowledge that some insect extinctions occur in places or at spatial scales different from those of vertebrates and plants, and that insects often have extremely high reproductive and dispersal capacities under optimal environmental conditions compared to those taxa, as well as different habitat requirements during different life stages (Dunn 2005, p. 1031). Several documented extinctions have occurred for insect species with high periodic abundance and large geographic ranges for which habitat suitability under suboptimal environmental conditions were extremely limited in at least one life stage (reviewed by Dunn 2005, pp. 1033-1034). Although we know some required

Quino habitat components (e.g., host plant presence), habitat suitability within population distributions has not been studied or quantified, especially with regard to environmental conditions and temporal variability. Because during periods of extreme high or low precipitation the amount of suitable habitat within an Edith's checkerspot population distribution is extremely limited and geographically variable depending on conditions (Weiss *et al.* 1988, p. 1495), some crucial areas for Quino were likely destroyed within many extant population distributions (e.g., Harford Springs habitat-based population distribution; USFWS 2003a, pp. 36 and 39; see Table 1 and Figures 1 and 2 for estimated habitat losses). Such losses of crucial areas within habitat patches might not be apparent until consecutive years of severe drought or high rainfall, but then have an impact disproportional to the size of the area lost (Weiss *et al.* 1988, p. 1495). Therefore, despite slightly elevated population abundances, the discovery of previously unknown population locations, habitat conservation to-date, and additional planned conservation since listing, we believe the subspecies continues to be threatened by habitat loss, degradation, and fragmentation.

Based on our population distribution estimates, there may have been as many as 37 extant populations at the time of listing (6 known, thought to be 7 or 8); there are currently 33, with 10 (4 known at the time of listing) categorized as "core" (Table 1, Figures 1 and 2). The status of all occurrence complexes within 12 habitat-based population distributions are classified as unknown (e.g., Winchester and West Otay mesa habitat-based population distributions), and habitat within two core habitat-based population distributions has been significantly reduced. The entire Warm Springs Creek core habitat-based population distribution is considered highly threatened and the population status is unknown (Table 1, Figure 1). Approximately 52 percent (2,953 acres (1,194 hectares)) of habitat within the Warm Springs Creek occurrence complexes has been lost since listing, and 21 percent (560 acres (227 hectares)) of remaining habitat is outside the planned preserve (see *Regional Planning Efforts* subsection below) and will likely be destroyed (Table 1). The Skinner/Johnson core habitat-based population distribution has more conserved habitat than Warm Springs Creek and is less isolated by development; however, approximately 41 percent (6,491 acres (2,627 hectares)) of habitat within occurrence complexes (including two entire occurrence complexes) has been lost since listing (Table 1).

Of the total 147,359 acres (59,634 hectares) of mapped occurrence complexes extant at the time of listing or documented post-listing (all area within 0.6 mile (1 kilometer) of observations), approximately 42 percent are on public lands or privately owned preserves that are not subject to large-scale land-use conversion, approximately 19 percent are privately owned lands likely to be conserved under an HCP, approximately 24 percent are private and tribal lands where the likelihood of habitat loss is variable, and approximately 15 percent have been destroyed by development or land use changes (Table 1). The fact that the majority of habitat within occurrence complexes has been or is likely to be conserved since listing demonstrates how effective listing under the Act is to achieving and encouraging habitat conservation.

Disturbance

Disturbance of habitat can open woody canopies and may sometimes increase habitat suitability, but frequent off-road vehicle use compacts soil, destroys host plants, increases erosion and fire frequency, creates trails that are conduits of nonnative plant invasion, and in occupied habitat

causes direct mortality of Quino (USFWS 2003a, pp. 58-59). If there are no Quino proximal and abundant enough to recolonize disturbed habitat, an increase in habitat suitability the following year due to disturbance is irrelevant. Increased human population densities proximal to occupied habitat increase the rate of disturbance due to recreational activities such as off-road vehicle activity. Recreational disturbance is frequently observed in monitored, occupied habitat where larvae are observed on host plants (USFWS 2003a, p. 59; CFWO 2008).

Nonnatives

Conversion from native vegetation to nonnative annual grassland is the greatest threat to conserved habitat (USFWS 2003a, pp. 57-58), and a high magnitude threat to all habitat that is not managed. Increased dominance of nonnative plant species reduces the abundance (by competition) and suitability (by shading) of Quino host plants (USFWS 2003a, pp. 57-58). Females are less likely to deposit eggs on host plants that are shaded by other plants. Female Quino deposit eggs on plants located in full sun, preferably surrounded by bare ground or sparse, low vegetation (USFWS 2003a, p. 18). Plants shaded through the midday hours (1100 to 1400) or embedded in taller vegetation appear to be less likely targets for oviposition (Singer 1983, p. 392; USFWS 2003a, p. 12), probably because of the high temperature requirements of developing larvae (Osborne and Redak 2000, p. 12). Habitat fragmentation exacerbates vegetation type conversion because ground disturbance and edge effects in fragments with large edge-to-area ratios experience higher rates of invasion. Other causes of vegetation type conversion include fire, grazing, off-road vehicle activity, and increased nitrogen deposition (USFWS 2003a, pp. 57-58; see discussion below).

Altered Host Plant Phenology

The ongoing and predicted climate change trends (see "Factor E" section below) likely contribute to increased prediapause larval death due to early host plant aging at the southern range edge (in Mexico) and at lower elevations in the United States (USFWS 2003a, p. 64). Field studies have documented population crashes and extirpations in several butterfly species, including Edith's checkerspot, as a direct result of butterfly-host asynchrony (Parmesan 2006, p. 646).

Nitrogen Deposition

Nitrogen deposition influences nonnative plant invasion by increasing soil fertility, as invasive species are often better competitors for soil nutrients than native plant species (Padgett *et al.* 1999, p. 769). Soils in urbanized and agricultural regions are being fertilized by excess nitrogen generated by human activities, and this threat continues to increase in magnitude as human population densities increase (USFWS 2003a, p. 65). Soils in the most polluted regions near Riverside, California, have more than 80 parts per million (weight) extractable nitrogen, more than four times the typical concentration detected in natural, unpolluted soils (Padgett *et al.* 1999, pp. 776 and 778).

Grazing

Grazing by cattle and sheep increase initial rates of invasion by nonnative plants by disturbing the soil, and cause direct mortality of Quino (USFWS 2003a, pp. 59-60). However, once grazing is removed, the rate of nonnative plant invasion increases; therefore the Recovery Plan recommended commercial grazing in occupied habitat be phased out and replaced by other, less destructive, nonnative plant control methods (USFWS 2003a, p. 60). The threat of grazing has been removed (e.g., Marron Valley) or is being managed (e.g., San Bernardino National Forest lands) in most areas, though no plans or actions to control nonnative plant species are currently in place.

Summary of Factor A

Much habitat has been conserved since listing in 1997. Population extirpation within several non-core habitat-based population distributions (e.g. Winchester), and at least one core habitat-based population distribution (Warm Springs Creek) is probable in the near future due primarily to the ongoing effects of Factor A threats, past and present. While it is clear the rate of habitat destruction has slowed and much future destruction has been precluded, some habitat loss is likely to continue. The rate and scope of habitat modification has increased due to impacts of growing proximal human populations, ongoing nonnative species invasion, climate change effects, and nitrogen deposition. Protection of habitat from destruction is a necessary first step toward recovery. The greatest challenge will be to continue managing the remaining habitat and populations to prevent future population losses, and implementing management objectives for Quino under regional HCPs (see "Factor D" section below). Destruction, modification, and curtailment of habitat and range continue to be threats to Quino.

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

At the time of listing, over-collection was considered a potential threat to Quino because of specimen value to collectors (USFWS 1997, 62 FR 2313). The impact of overutilization for any purpose is not known at this time (USFWS 2003a, p. 55).

FACTOR C: Disease or Predation

At the time of listing, disease was not known to be a factor affecting the Quino (USFWS 1997, 62 FR 2313). The listing rule (USFWS 1997, 62 FR 2313) stated there was evidence predation by invasive nonnative species may pose a threat to the Quino; however, the magnitude of this threat was not known. Threats associated with this factor were also identified in the Recovery Plan under the "Reasons for Decline and Current Threats" section (USFWS 2003a, pp. 55). The impacts of disease and predation remain unknown.

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

At the time of listing, regulatory mechanisms thought to have some potential to protect the Quino included: (1) the California Environmental Quality Act (CEQA); (2) the National Environmental

Protection Quality Act (NEPA); and (3) the Act in those cases where Quino occur and is incidentally protected in habitat occupied by a listed wildlife species. The listing rule (USFWS 1997, 62 FR 2313) provides an analysis of the level of protection that was anticipated from those regulatory mechanisms. This analysis remains valid.

State Protections

The State's authority to conserve rare wildlife and plants is comprised of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, CEQA, and the Natural Community Conservation Planning Act (NCCPA). Insect taxa are not listable entities under the California Endangered Species Act (CESA), therefore this protection does not apply to Quino. The CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved. The Natural Community Conservation Program is a cooperative effort to protect regional habitats and species under the Natural Community Conservation Planning Act. The program helps identify and provide for area wide protection of plants, animals, and their habitats while allowing compatible and appropriate economic activity. Many Natural Community Conservation Plans (NCCPs) are developed in conjunction with HCPs prepared pursuant to the Act.

Federal Protections

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq.*) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects (40 C.F.R. 1502.16). These mitigations provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Sikes Act: The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans with the Secretaries of Agriculture and the Interior for natural resources on public lands. The Sikes Act Improvement Act of 1997 requires Department of Defense installations to prepare Integrated Natural Resource Management Plans (INRMPs) that provide for the conservation and rehabilitation of natural resources on military lands consistent with the use of military installations to ensure the readiness of the Armed Forces. INRMPs incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary to sustain military land uses. While INRMPs are not technically regulatory mechanisms because their implementation is subject to funding availability, they can be an added conservation tool in promoting the recovery of endangered and threatened species on military lands.

The Navy has updated its Naval Base Coronado INRMP to specifically address the Quino and its habitat at the La Posta Facility and is awaiting approval by the Service. The INRMP will incorporate all conservation measures included in the current Quino Habitat Enhancement Plan and address expansion plans for the La Posta Facility (see above discussion under "Factor A" for further details).

National Park Service (NPS) Organic Act: The NPS Organic Act of 1916 (39 Stat. 535, 16 U.S.C. 1, as amended), states that the National Park Service "shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations … to conserve the scenery and the national and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The National Park Service Management Policies indicate that the Park Service will "meet its obligations under the National Park Service Organic Act and the Endangered Species Act to both pro-actively conserve listed species and prevent detrimental effects on these species." This includes working with the Service and undertaking active management programs to inventory, monitor, restore, and maintain listed species habitats, among other actions.

National Forest Management Act (NFMA): The National Forest Management Act (36 C.F.R. 219.20(b)(1)) has required the USDA Forest Service to incorporate standards and guidelines into Land and Resource Management Plans, including provisions to support and manage plant and animal communities for diversity and for the long-term, rangewide viability of native species. Recent changes to NFMA may affect future management of listed species, particularly rare plant occurrences, on National Forests. On January 5, 2005, the Forest Service revised National Forest land management planning under NFMA (70 FR 1023). The 2005 planning rule changed the nature of Land Management Plans so that plans generally would be strategic in nature and could be categorically excluded from NEPA analysis, and thus not subject to public review. Under the 2005 planning rule, the primary means of sustaining ecological systems, including listed species, would be through guidance for ecosystem diversity. If needed, additional provisions for threatened and endangered species could be provided within the overall multiple-use objectives required by NFMA. The 2005 planning rule did not include a requirement to provide for viable populations of plant and animal species, which had previously been included in both the 1982 and 2000 planning rules. On March 30, 2007, however, the United States District Court in *Citizens for Better Forestry et al. v. USDA* (N.D. Calif.) enjoined (prohibited) the USDA from implementing and utilizing the 2005 rule until the Forest Service provided for public comment and conducted an assessment of the rule's effects on the environment, including listed species.

On April 21, 2008, the Forest Service published a final 2008 planning rule and a record of decision for a final environmental impact statement examining the potential environmental impacts associated with promulgating the new rule (73 FR 21468). The 2008 planning rule also does not include a requirement to provide for viable populations of plant and animal species on Forest Service lands. As part of the environmental analysis, a biological assessment was prepared to address the 2008 planning rule's impact to threatened, endangered, and proposed species and designated and proposed critical habitat. The assessment concluded that the rule does not affect, modify, mitigate, or reduce the requirement for the Forest Service to consult or

conference on projects or activities that it funds, permits, or carries out that may affect listed or proposed species or their designated or proposed critical habitat. On August 8, 2008, the Forest Service published an interim directive and requested public comment on its section 7 consultation policy for developing, amending, or revising Land Management Plans under the 2008 planning rule. Thus, the impact of the 2008 rule to listed species is unknown at this time.

Federal Land Policy and Management Act of 1976 (FLPMA): The Bureau of Land Management is required to incorporate Federal, State, and local input into their management decisions through Federal law. The FLPMA (Public Law 94-579, 43 U.S.C. 1701) was written "to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes". Section 102(f) of the FLPMA states that "the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures ... to give Federal, State, and local governments and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands". Therefore, through management plans, the Bureau of Land Management is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall "give priority to the designation and protection of areas of critical environmental concern" in the development of plans for public lands. Although the Bureau of Land Management has a multiple-use mandate under the FLPMA which allows for grazing, mining, and off-road vehicle use, the Bureau of Land Management also has the ability under the FLPMA to establish and implement special management areas such as Areas of Critical Environmental Concern, wilderness, research areas, etc., that can reduce or eliminate actions that adversely affect species of concern (including listed species).

The Lacey Act: The Lacey Act (P.L. 97-79), as amended in 16 U.S.C. 3371, makes unlawful the import, export, or transport of any wild animals whether alive or dead taken in violation of any United States or Indian tribal law, treaty, or regulation, as well as the trade of any of these items acquired through violations of foreign law. The Lacey Act further makes unlawful the selling, receiving, acquisition or purchasing of any wild animal, alive or dead. The designation of "wild animal" includes parts, products, eggs, or offspring.

National Wildlife Refuge System Improvement Act of 1997: This act establishes the protection of biodiversity as the primary purpose of the National Wildlife Refuge system. This has lead to various management actions to benefit the federally listed species. Much habitat in southern San Diego County has been conserved within the National Wildlife Refuge System (Otay core habitat-based population distribution).

Endangered Species Act of 1973, as amended (Act): The Act is the primary Federal law providing protection for this species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 CFR 402.02).

A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines "take" to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Service regulations (50 CFR 17.3) define "harm" to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 CFR 402.02).

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Regional Planning Efforts

Incidental take permits, pursuant to section 10(a)(1)(B) of the Act, may be issued to authorize take of listed animal species resulting from projects without a Federal nexus. This section provides protection for the Quino through the approval of HCPs that detail measures to minimize and mitigate the potential impacts of projects to the maximum extent practicable. To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved HCP that details measures to minimize and mitigate the project's adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species, and many of these HCPs are coordinated with California's related NCCP Program.

City of Chula Vista Subarea Plan under the San Diego MSCP

Although not covered under the umbrella of the of the subregional San Diego County MSCP document, the Quino is a covered species under the City of Chula Vista (City) Subarea Plan (Chula Vista Subarea Plan), which provides for the long-term conservation of this subspecies. The MSCP subregional plan has been in place for more than a decade. The plan provides for establishment and management of approximately 171,920 acres (69,574 hectares) of preserve

lands within the Multiple Habitat Preserve Area (MHPA; preserve planning area) and Pre-approved Mitigation Areas (PAMA; area where purchase of land is approved for mitigation). The MSCP was developed in support of applications for incidental take permits for several federally listed species by 12 participating jurisdictions and many other stakeholders in southwestern San Diego County. Under the umbrella of the MSCP, each of the 12 participating jurisdictions is required to prepare a subarea plan that implements the goals of the MSCP within that particular jurisdiction. Planned conservation estimates in Table 1 (PC) are based on the MHPA and PAMA within all approved subarea plans.

The Chula Vista Subarea Plan contains requirements to monitor and adaptively manage Quino habitats. This area-specific management plan is comprehensive and addresses a broad range of management needs at the preserve and species levels intended to reduce threats to the Quino. Lands preserved under the Chula Vista Subarea Plan are adaptively managed and maintained to: (1) Ensure the long-term viability and sustainability of native ecosystem function and natural processes throughout the preserve; (2) protect existing and restored biological resources from the impacts of human activities within the preserve while accommodating compatible uses; (3) enhance and restore, where feasible, appropriate native plant associations and wildlife connections to adjoining habitat to provide viable wildlife and sensitive species habitat; (4) facilitate monitoring of selected target species, habitats, and linkages to ensure long-term persistence of viable populations of priority plant and animal species (including the Quino); and (5) ensure functional habitats and linkages for those species (USFWS 2003b, pp. 18, 70, FWS-SDG-882.1).

The MSCP and the Chula Vista Subarea Plan incorporate many processes that allow for Service oversight and participation in program implementation. These processes include: annual reporting requirements, review and approval of proposed subarea plan amendments or preserve boundary adjustments, review and comment on projects through CEQA, and chairing the Habitat Management Technical Committee and the Monitoring Subcommittee (MSCP 1998, pp. 5-11 to 5-23).

Western Riverside County MSHCP

The Western Riverside County MSHCP is a large-scale, multi-jurisdictional HCP encompassing approximately 1.26 million acres (510,000 hectares) of land in western Riverside County. The Western Riverside County MSHCP addresses 146 listed and unlisted "covered species", including the Quino. The Western Riverside County MSHCP is a multi-species conservation program minimizing and mitigating expected loss of habitat and associated incidental take of covered species. On June 22, 2004, the USFWS issued an incidental take permit (USFWS 2004, TE-088609-0) under section 10(a)(1)(B) of the Act to 22 permittees under the Western Riverside County MSHCP for a period of 75 years.

Preservation and management of approximately 67,493 acres (27,314 hectares) of Quino habitat under the Western Riverside County MSHCP will contribute to conservation and ultimate recovery of this subspecies. The Western Riverside County MSHCP removes or reduces threats to this subspecies by placing large blocks of occupied and unoccupied habitat into preservation throughout the MSHCP Conservation Area. The approximately 67,493 acres (27,314 hectares)

that will be conserved under this plan for the Quino capture a variety of habitat characteristics supporting Quino throughout western Riverside County. Distribution of the subspecies within the existing Western Riverside County MSHCP Conservation Area is documented through annual surveys. Surveys will continue annually as lands are added to the Conservation Area. The surveys are intended to verify continued occupancy at a minimum of 75 percent of the occupied locations identified in the plan. An adaptive management program is being implemented to maintain or enhance all conserved habitat to increase its value for, and the viability of, Quino populations (Dudek 2003, Volume I, Section 9, Table 9-2, pp. 9-28, 9-29).

Mexican Law

The Service is not aware of any existing regulatory mechanisms that protect the Quino or its habitat in Mexico. The Quino is not listed under the Mexican equivalent of the Act (Norma Oficial Mexicana NOM-059).

Tribal Policies and Programs

Although all tribes that have occupied Quino habitat within their jurisdictions have environmental programs engaged in general conservation planning, we are not aware of any existing regulatory mechanisms that specifically protect the Quino or its habitat.

Summary of Factor D

In summary, the Act is the primary Federal law that provides protection for this species since its listing as endangered in 1997. Under the Act and the NCCPA, regional HCPs provide considerable conservation benefit for Quino. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we believe that State and other Federal laws and regulations have limited ability to protect the species in absence of Act.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

The listing rule (USFWS 1997, 62 FR 2313) stated that the restricted range, localized distribution, and small population sizes of the Quino made it more vulnerable to Factor A threats. The listing rule also stated that restricted range, localized distribution, and small population sizes make historical levels of natural events such as fire and periodic drought significant threats to the subspecies. Threats associated with climate change were emphasized in the Recovery Plan (USFWS 2003a, pp. 63-65), and further exacerbate Factor A and other Factor E threats. Current scientific data support the continued existence of those threats. Although the range is less restricted as was believed at the time of listing (Table 1, Figures 1 and 2), it is likely small population size and localized distribution threatens existing populations such as Warm Springs Creek (core habitat-based population distribution) in Riverside County (see above discussion under "Factor A").

Stochastic events

Droughts, wildfires, and floods can severely reduce population abundance of Quino, while intermediate amounts of precipitation, combined with high temperatures, can restore higher population abundance (Murphy and White 1984, pp. 351-352; Anderson 2003, p. 4; see "Abundance" section above for detailed discussion). While natural catastrophic events existed under historical environmental conditions and were likely to temporarily impact resilient populations (see USFWS 2007, p. 2 regarding impacts of recent fires), increased frequency and intensity of stochastic events due to climate change (see below discussion; IPCC 2007, p. 8) and interaction with Factor A threats increase the magnitude and severity of impacts of stochastic events on Quino populations. The more habitat that is lost and degraded, the smaller and more localized populations become, and the more likely catastrophic natural events are to extirpate populations that have reduced resiliency.

Small Population Size

Small population size increases the vulnerability of Quino to stochastic events, makes it more difficult for individuals to find mates, and may result in inbreeding (Prast pers comm. 2009c, p. 1). Inbreeding depression was found to increase the extirpation probability of a related, similar butterfly species, *Melitaea cinxia* (the Glanville fritillary; Nieminen *et al.* 2001, pp. 242-243).

Climate Change

As discussed in the final revised critical habitat designation, the best available scientific information suggests the Baufista Road Occurrence Complex (above 4,000 feet (1,219 meters) in elevation) supports ongoing range shift for this subspecies upslope in elevation, and extirpation of many populations in lower-elevation, where drier habitats are likely to occur. It is also likely that smaller occurrence complexes north of the community of Anza are the result of relatively recent colonization events (post-1980s drought).

Parmesan (1996, pp. 765-766) concluded that the average position of known Edith's checkerspot butterfly populations shifted north and up in elevation, likely due to a warming, drying climate. Parmesan (1996, pp. 765-766) compared the distribution of the Edith's checkerspot butterfly in the early part of the 20th century to its distribution from 1994 to 1996 using historical records and field surveys. This study identified a rangewide pattern of local Edith's checkerspot butterfly extirpations and noted that 80 percent of historical populations in the southern part of the range were currently extinct in the mid-1990s (with the majority being Quino populations). In contrast, historical populations in the mid-latitude part of Edith's checkerspot butterfly's range experienced only 40 percent extirpations, and the extirpation rate in the northern part was as low as 20 percent (Parmesan 1996, pp. 765-766). Fewer than 15 percent of the Edith's checkerspot butterfly extirpations occurred in the highest elevation band (above 7,874 feet (2,400 meters) (Parmesan 1996, pp. 765-766). Parmesan (1996, pp. 765-766) concluded that this pattern of extirpation indicates contraction of the southern boundary of the subspecies' overall distribution by almost 100 miles (160 kilometers) and a shift in the average location of an Edith's checkerspot butterfly occurrence northward by 57 miles (92 kilometers). A parallel elevation gradient in extirpations shifted the mean location of Edith's checkerspot butterfly populations

upward by 407 feet (124 meters). A breakpoint in the pattern of extirpations occurred at approximately 7,874 feet (2400 meters), with about 40 percent of all populations below the breakpoint recorded as extirpated in suitable habitats, while less than 15 percent were extirpated above the breakpoint. This range shift closely matched shifts in mean yearly temperature (Parmesan 1996, pp. 765-766; Karl et al. 1996, pp. 279-292). The Quino may be the subspecies of Edith's checkerspot most affected by climate change, because Parmesan's study found extirpations to be most common at lower elevations and latitudes, and the Quino's range includes both extremes.

Studies demonstrate a correlation of population distribution and phenology changes with climate changes for many other butterfly and insect species in California and around the world (Parmesan et al. 1999, p. 580; Forister and Shapiro 2003, p. 1130; Parmesan and Yohe 2003, pp. 38-39; Karban and Strauss 2004, pp. 251-254; Thomas et al. 2004, pp. 146-147; Osborne and Ballmer 2006, p. 1; Parmesan 2006, pp. 646-647; Thomas et al. 2006, pp. 415-416). Metapopulation viability analyses of other endangered nymphalid butterfly species also indicate that current climate trends pose a major threat to butterfly metapopulations by reducing butterfly growth rates and increasing subpopulation extirpation rates (Schtickzelle and Baguette 2004, p. 277; Schtickzelle et al. 2005, p. 89). Most recently, Preston et al. (2008, p. 2506) incorporated biotic interactions into niche models to predict suitable habitat for species under the range of climate conditions predicted for southern California in recent climate change models (Hayhoe et al. 2004, pp. 12422-12427; IPCC 2007, p. 9). Preston et al. (2008, p. 2508) found that Quino habitat decreased and became fragmented under altered climate conditions based on the climate-only model. For increasing temperatures and 110 percent precipitation, there was a shift in habitat to the eastern portion of the currently occupied range corresponding with an upslope movement of the species to higher elevations in adjacent mountains (Preston et al. 2008, p. 2508). The abiotic–biotic model (better performing model) predicted 98 to 100 percent loss of suitable Quino habitat when the temperature increased 1.7 and 2.8 °C or when the precipitation is 50 percent (significantly lower) or 150 percent (significantly higher) of current levels (Preston et al. 2008, p. 2508). An increase of less than 1.8° F (1 °C) with no change in current precipitation resulted in no predicted habitat shift, although there was an eastward (upslope) shift within the current distributional footprint at 110 percent precipitation (Preston et al. 2008, p. 2508). Such similar climate response patterns in modeled habitat and related and co-occurring insect species further support the validity of Parmesan's (1996, pp. 765–766) Quino observations and conclusions (Preston et al. 2008, pp. 2511-2512). Therefore, the hypothesis of climate-driven range shift occurring in the foothills north of the community of Anza is well supported by the best available scientific information.

Documentation of past climate-related changes that have already occurred in California (Ehrlich and Murphy 1987, p. 124; Croke et al. 1998, pp. 2128, 2130; Davis et al. 2002, p. 820; Breshears et al. 2005, p. 15144) and future drought predictions for the state (e.g., Field et al. 1999, pp. 8-10; Brunelle and Anderson 2003, p. 21; Lenihen et al. 2003, p. 1667; Hayhoe et al. 2004, p. 12422; Breshears et al. 2005, p. 15144; Seager et al. 2007, p. 1181) and North America (IPCC 2007, p. 9), and extirpation of Edith's checkerspot butterfly populations following extreme climate events (Ehrlich et al. 1980, pp. 101-105; Singer and Ehrlich 1979, pp. 53–60; Singer and Thomas 1996, pp. 9–39) indicate prolonged drought and other climate-related changes will continue into the near future, and these changes will affect Quino populations. Thomas et al.

(2004, p. 147) estimated 29 percent of species in scrublands (habitat for the Quino) face eventual extinction, and 7 (with dispersal) to 9 (without dispersal) percent of butterfly species in Mexico will become extinct due to climate change-driven impacts (mid-range climate predictions; Thomas et al. 2004, p. 146). During drought conditions in 2007 surveyors noted that, for the first time since the subspecies was listed, no Quino were observed during Riverside County surveys or occurrence complex monitoring (CFWO 2007). In 2008 and 2009, the only occupied site below 3,500 feet (1067 meters) in elevation in Riverside County where relatively high Quino densities were reported was on the top of Oak Mountain at approximately 2,600 feet (793 meters) in elevation (CFWO 2008, 2009). Oak Mountain is unique in that it is the highest topographic point within an area encompassing over 7,000 acres (2833 hectares) of relatively suitable and contiguous Quino habitat surrounding Vail Lake (Helix Environmental Planning 2003, pp. 1–2, USFWS GIS database and satellite imagery). Above 3,500 feet (1067 meters) in elevation in Riverside County and in southwestern San Diego County adult densities appeared to be relatively high in 2008 (CFWO 2008, 2009) compared to elsewhere in the range. Therefore, recent field evidence supports the hypothesis that more extreme climatic conditions throughout the subspecies' range are causing reduced densities in the lowest elevation, driest habitats.

Comparison of Figures 1 and 2 indicate more populations have been documented in San Diego County than in Riverside County since the Recovery Plan was published, though there is reason to believe these populations do not represent local range expansion, as those north of the community of Anza are believed. The elevation gradient is less pronounced in San Diego County than in Riverside County, and all San Diego populations are below 4,000 feet (1,219 meters) in elevation, well within what we believe is the subspecies' historical elevation range. Furthermore, examination of the difference in weather patterns (less variable climate in San Diego; Anderson 2000, p. 6) and survey detectability (lower detectability in San Diego) indicates San Diego County is more likely to support stable, low-density, difficult-to-detect populations than Riverside County. Therefore, it is likely these recently documented populations in San Diego County have existed since listing and were not detected, or are the result of recolonization of habitat within the subspecies' historical range.

Summary of Factor E

In summary, the restricted range, localized distribution, and small population sizes make Quino more vulnerable to stochastic events (such as drought and fire), climate change effects, and Factor A threats. Of particular concern is the vulnerability of Quino populations to prolonged drought, and the likelihood that climate change significantly increases this vulnerability.

III. RECOVERY CRITERIA

The Service published a final Recovery Plan in 2003. Recovery plans provide guidance to the USFWS, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species is robust

enough, to downlist or delist the species. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated. The Quino recovery plan (USFWS 2003) did not have threat-based recovery criteria.

Recovery Criteria:

The Recovery Plan (USFWS 2003a, pp. v-vi) states the Quino could be downlisted to threatened when the following criteria are met. Below we discuss the current applicability of these criteria, progress toward meeting them, and how they help reduce or eliminate threats attributable to one or more of the listing factors above.

1) Permanently protect the habitat within occurrence complexes (estimated occupied areas based on habitat within 0.6 mile (1 kilometer) of recent butterfly occurrences), in a configuration designed to support resilient populations. One or more occurrence complexes may belong to a single greater population distribution, or an occurrence complex may contain more than one whole or partial population distributions. When population distributions are determined, they will replace the occurrence complex as the protected unit. There are currently 46 described occurrence complexes.

This recovery criterion is still applicable, but requires updating. The number of occurrence complexes should be revised because some have been merged to form a single complex, new occurrences complexes have been discovered, and habitat-based population distributions should be substituted for occurrence complexes as the relevant conservation unit. Habitat-based population distributions better reflect the long-term distributions of populations and associated habitat. Much habitat has been conserved since publication of the Recovery Plan (as described above), and more habitat associated with the occurrence complexes will continue to be conserved under regional HCPs such as the Western Riverside County MSHCP and the San Diego MSCP. Populations in the vicinity of the community of Anza and State Route 371 are likely the most resilient throughout the range of the subspecies; however, development has been steadily reducing the amount of habitat in that area since the subspecies was listed (USFWS GIS database, satellite imagery). The largest gap in plans for protection of habitat needed to support resilient populations is on private lands (Tule Peak and Bautista Road) and the smaller occurrence complexes in the vicinity of the community of Anza. The newly discovered Barbara Trail Occurrence Complex (western edge of the Tule Peak habitat-based population distribution) is privately owned by a landowner who has sold much land in the past for mitigation (Greg Reeden, former owner of the Silverado Mitigation Bank), but is not currently planned for conservation. The newly discovered Terwilliger Valley Occurrence Complex (eastern edge of

the Tule Peak habitat-based population distribution) is also largely under private ownership and threatened by encroaching development.

Maintenance of populations in the Tule Peak and Bautista Road core habitat-based population distributions, and habitat connectivity to smaller, higher elevation habitat-based population distributions, is needed to support climate change-driven range shift and prevent an increase in the subspecies' extinction probability (USFWS 2003a, pp. 46-47; Osborne 2007, pp. 9-10). The Anza/Mount San Jacinto foothills area (in and adjacent to the Bautista Road core habitat-based population distribution) supports the greatest elevation gradient within the extant range of the Quino, and is proximal to population that likely produces the most emigrants within the subspecies' range (Tule Peak core habitat-based population distribution, see above discussion). The highest elevation core habitat-based population distributions (Tule Peak and Bautista Road) also support the highest (co-occurring) diversity of host plant species (*Plantago patagonica, Antirrhinum coulterianum, Collinsia concolor, Cordylanthus rigidus*, and *Castilleja exserta*) within the range of the Quino, a factor known to mitigate the effects of climate extremes on Edith's checkerspot butterfly populations (Hellmann 2002, p. 925). Therefore, this high-elevation habitat is most likely to retain climatic suitability, increase in suitability, or expand under the influence of climate change.

This criterion helps reduce or eliminate loss and modification of Quino habitat by eliminating the threat of urban development and other land use changes.

2) Conduct research including: determine the current short-term and potential long-term distributions of populations and associated habitat; and conduct preliminary modeling of metapopulation dynamics for core occurrence complexes.

This recovery criterion is still applicable. As described above habitat-based population distributions have been delineated for these (formerly categorized as "core") occurrence complexes that better reflect the long-term distributions of populations and associated habitat. No metapopulation modeling has been attempted. Genetic research described above will help determine relatedness among individuals at different sites and should help better determine population membership of occupied sites. Other specific current needs are methods for reintroduction (for example in northern Orange County or northwestern Riverside County), site-specific use of primary and secondary host plant species, and effective, safe use of herbicides for habitat restoration (see Russell and Schultz 2009, p. 1).

This criterion helps reduce or eliminate loss and modification of Quino habitat by providing information needed to determine what habitat requires protection and (other research mentioned above) how to restore modified habitat. This criterion also helps reduce the threats posed by fire, enhanced soil nitrogen, increased atmospheric carbon dioxide concentration, and climate change by providing information needed to determine what conservation measures (protection and management) are needed to counteract these threats.

3) Permanently provide for and implement management of occurrence complexes (or population distributions when delineated) to restore or enhance habitat quality and population resilience.

This recovery criterion is still applicable. Although some management is occurring at a few conserved sites scattered throughout the subspecies range (e.g., Johnson Ranch in Riverside County), no occurrence complex/population is currently being managed as a whole. Most sites are not currently managed for Quino conservation and a comprehensive assessment of the success of management practices has not been conducted. This criterion helps reduce or eliminate modification of Quino habitat by providing means to enhance or preserve suitability of habitat required for species recovery.

4) The protected, managed (conserved) population segments within core occurrence complexes (or population distributions when delineated) must demonstrate evidence of resilience. Evidence of resilience is demonstrated if a decrease in the number of occupied habitat patches over a 10- to 20-year period within an occurrence complex (or population distribution when delineated) is followed by increases of equal or greater magnitude. Monitoring must be initiated in the third of three years of favorable climate (total annual January and February precipitation within one standard error of the average total for those months over the past 30 years, based on local or proxy climate data). Populations that do not demonstrate resilience after 20 years should be augmented and monitoring reinitiated.

This recovery criterion is still applicable, but requires updating. Monitoring of threats such as nonnative plant invasion should be incorporated in a measurable way. No formal monitoring has been initiated as described, although the Service continues to qualitatively track the persistence and abundance of Quino in some occurrence complexes. A one-time rangewide survey was conducted in 2008 (described above), and qualitative information suggests some of these populations (none fully protected yet) may be relatively resilient. This criterion may require modification depending on what the population structure may be and how well habitat patches can be defined. Not all populations may be well-defined metapopulations with clearly delineated habitat patches.

This criterion is required to demonstrate successful reduction of all threats and subspecies recovery.

5) One additional population should be documented or introduced within the Lake Matthews population site (formerly occupied, not known to be currently occupied) in the Northwest Riverside Recovery Unit. At least one of the extant populations outside of current recovery units (e.g., the San Vicente Reservoir occurrence complex) must meet resilience specifications above unless an additional population is established or documented within 6 miles (10 kilometers) of the ocean (a more stable marine climate influence should minimize susceptibility to drought and reduce probability of extirpation).

The intent of this recovery criterion is still applicable, but it should be updated. It is possible that establishment of an experimental population in the Irvine Ranch Preserve (USFWS 2003a, p. 112) could fulfill the intent of the reintroduction requirement. It is not likely more than one reintroduction is required for downlisting to threatened. The new San Vicente core habitat-based population distribution is evidence that there is a potentially resilient population in this area. Several new populations have been documented at higher elevations, and it is not clear that

coastal environments are currently more likely to support resilient Quino populations than more montane environments. Recovery units should be updated (USFWS 2003a, p. 111).

This criterion helps reduce the magnitude of all threats because additional populations reduce the probability of extinction. In particular, this criterion helps reduce the threat of population extirpation due to restricted range.

6) Establish and maintain a captive propagation program for purposes of maintenance of representative refugia populations, research, and reintroduction and augmentation of wild populations, as appropriate.

This recovery criterion is still applicable in part. It is not likely that all populations require refugia populations to prevent extirpation, although some likely do, such as the Warm Springs Creek habitat-based population distribution. We no longer believe refugia populations are needed to prevent extinction of the subspecies as a whole. However, there is still a need for captive populations for research, and possibly for reintroduction or augmentation of extirpated populations (see discussions and criterion 5 above). There is an ongoing captive propagation program, which has developed methodologies for rearing all life stages in captivity in support of Quino research activities.

This criterion helps reduce or eliminate loss and modification of Quino habitat by providing information needed to determine how to restore modified habitat. Second, this criterion helps reduce the threats posed by fire, enhanced soil nitrogen, increased atmospheric carbon dioxide concentration, and climate change by providing information needed to determine what conservation measures (protection and management) are needed to counteract these threats. Finally, this criterion reduces the threat of population extirpation due to restricted range, localized distribution, and small population size.

7) Initiate and implement a cooperative outreach program targeting areas where Quino populations are concentrated in western Riverside and southern San Diego Counties.

This recovery criterion is still applicable. No centralized cooperative outreach program or coordinated tracking of outreach has been established to-date, although various outreach efforts regularly occur through regional HCPs programs and Service staff interactions with entities such as educational institutions and tribes. Outreach also occurs through interactions of such experts as the captive propagation manager, Dr. Gordon Pratt with members of local communities where he works or conducts studies.

This criterion helps reduce or eliminate loss and modification of Quino habitat by informing the public of threat effects and garnering support for conservation.

IV. SYNTHESIS

The extinction vulnerability of Quino based on the number of known populations has been greatly reduced since the subspecies was listed, and has improved since the Recovery Plan was published. The listing rule (USFWS 1997, 62 FR 2313) identified "seven or eight" extant Quino

populations within the United States. Based on our current analysis (Table 1), populations described in the listing rule belong to 4 core and one non-core habitat-based population distributions. Three of the core habitat-based population distributions known at the time of listing are extant, and the status of one is unknown. The status of the non-core habitat-based population distribution known at the time of listing is unknown. Based on our current analysis (Table 1) 6 core and 25 non-core habitat-based population distributions were documented post-listing. All 6 core habitat-based population distributions documented post-listing are extant. Of the 25 non-core habitat-based population distributions documented post-listing 15 are extant, 6 are of unknown status, and 4 were extirpated post-listing. The habitat conservation status of the subspecies has also improved, because much habitat has been preserved and more is planned for preservation under regional HCPs (Table 1). However, the species is still vulnerable to extinction with current habitat destruction and population losses. Habitat protection and future management mandates, which occurred as a result of listing, make it possible to manage most core populations to prevent future population collapse. Quino still needs the protection and management of the Act in order to achieve recovery, because of continued threats of habitat loss, stochastic environmental events, altered habitat suitability due to climate change, and nonnative species invasions. Therefore, we recommend no status change at this time.

V. RESULTS

Recommended Listing Action:

___ Downlist to Threatened
___ Uplist to Endangered
___ Delist (indicate reason for delisting according to 50 CFR 424.11):
  ___ *Extinction*
  ___ *Recovery*
  ___ *Original data for classification in error*
_X_ No Change

New Recovery Priority Number and Brief Rationale: Change to 9C. This number indicates the taxon is a subspecies that faces a moderate degree of threat and has a high potential for recovery (USFWS 1983, 48 FR 43098). The "C" indicates conflict with construction or other development projects or other forms of economic activity. The degree of threat is considered moderate because if recovery were held off for 1-5 years the subspecies would not face immediate extinction. Recovery potential is considered high because the threats to and biological and ecological limiting factors of Quino are well understood. Habitat loss and nonnative species invasions are manageable threats. Furthermore, there is an increased focus on studying and understanding the effects of climate change.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

1. Work with partners to help protect habitat in the vicinity of the community of Anza, in particular that associated with the new observations west and east of the Tule Peak critical habitat unit (Unit 6; USFWS 2009, 74 FR 28776) and private land within the Bautista critical habitat unit (Unit 7; USFWS 2009,74 FR 28776). Prudent design of

reserves should include landscape connectivity to other habitat patches and ecological connectivity (habitat patches linked by dispersal areas; USFWS 2003a, p. 162) to accommodate range shift due to climate change (USFWS 2003a, p. 64). This action helps meet recovery criterion 1 by reducing or eliminating loss and modification of Quino habitat by eliminating the threat of urban development and other land use changes.

2. Identify partners to conduct potential research to aid in management and conservation of Quino:
   a. Research the effects of common herbicides on immature life stages for use in restoring/managing occupied habitat.
   b. Determine primary and secondary host plant species used in the Campo core habitat-based population distribution.
   c. Determine if larvae are using *Penstemon sp.* as a secondary host plant in the field.

   This action helps meet recovery criterion 2 by providing information needed to determine what habitat requires protection and how to restore modified habitat, which will ultimately contribute to reduced Quino habitat loss and modification.

3. Conduct an experimental reintroduction at Irvine Ranch Preserve using current captive stock (owned by the Irvine Ranch Conservancy) in Orange County at the north end of the Santa Ana Mountains (USFWS 2003a, p. 111). This action helps meet recovery criterion 5 by reducing the threat of population extirpation due to restricted range, localized distribution, and small population size.

4. Conduct surveys to determine the extent of new population discovered in 2009 on CDFG preserve lands (Cañada de San Vicente) in Ramona, and evaluate its status. This action is required to meet recovery criteria 1 and 3, which help reduce or eliminate loss and modification of Quino habitat by eliminating the threat of urban development and other land use changes.

5. Work with partners to help conserve the Quino checkerspot butterfly. Identify opportunities to continue conservation and initiation of formal monitoring of all core habitat-based population distributions (including Warm Springs, Sage, and Bautista Road in Riverside County, and all San Diego County). Currently the Riverside Conservation Authority monitors reference sites in all other core habitat-based population distributions in Riverside County. Other current monitoring is informal and occurs on select conserved lands that may not reflect population status (e.g., in the Warm Springs occurrence complex by Center for Natural Lands Management), or as Service staff or volunteers are available (CFWO 2009). This action helps reduce loss and modification of Quino habitat by eliminating the threat of urban development and other land use changes, and is required to demonstrate successful reduction of all threats and subspecies recovery. This action will help meet recovery criteria 1 and 4.

6. Consider updating the Recovery Plan and recovery units (possible revised units are illustrated in Figures 1 and 2; USFWS 2003a, p. 111). Revision should include a new recovery unit in central San Diego County (USFWS 2003a, pp. 86-88, 111-112) that captures the San Vicente, Cañada de San Vicente, and Mission Trails Park habitat-based

population distributions (Figure 2), and one in northern Orange County that captures suitable habitat for reintroduction (USFWS 2003a, pp. 90-91, 112-113). This action will help achieve subspecies recovery (downlisting or delisting).

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Quino checkerspot butterfly (*Euphydryas editha quino*)

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

___ Downlist to Threatened
___ Uplist to Endangered
___ Delist
_X_ No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

Lead Field Supervisor, U.S. Fish and Wildlife Service

ACTING

Approve _____ Date AUG 13 2009

Scott A. Sobiech

REGIONAL OFFICE APPROVAL:

Assistant Regional Director, U.S. Fish and Wildlife Service, Region 8

Approve _____ Date _____

Table 1. Quino checkerspot butterfly occurrence status within the United States, 1986-2009 (time period for recent observations analyzed in the Recovery Plan was within 10 years of listing, 1986–2002). GIS occurrence data is not available for the portion of the subspecies' range in Mexico.

Occurrence Complex[1]	Habitat-based population distribution[2]	Location (Recovery Unit/ Proposed Recovery Unit)	Status at Listing[3]	Status in Recovery Plan	Status Post-Recovery Plan	Current Conservation Estimate	Current Threats[4]
1. Harford Springs	1. Harford Springs	SW of Lake Matthews, RC (NW Riverside)	Extp	Extant	Extp	33 % C 18 % PC 30 % NC 18 % Dev	High: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire.
2. Canyon Lake	2. Canyon Lake	W of Canyon Lake, RC (NW Riverside)	ND	Extant	Unk.	29 % C 30 % PC 10 % NC 30 % Dev	High: "
3. Horse Thief Canyon	3. Horse Thief Canyon	N of Lake Elsinore (none)	Extp	Extp	DE	100 % Dev	N/A
4. N Murrieta	4. Murrieta	Between I 215 and I 15	ND	DE	Extp	100 % Dev	N/A
5. Murrieta	4. Murrieta	Between I 215 and I 15	ND	DE	Extp	100 % Dev	N/A
6. N Warm Springs Creek	5. Warm Springs Creek Core	N of the City of Murrieta, RC (SW Riverside)	ND	Extant	Unk.	13 % C 46 % PC 8 % NC 33 % Dev	High: climate change effects, habitat destruction, degradation, and

7. Warm Springs Creek	5. Warm Springs Creek Core	N of the City of Murrieta, RC (SW Riverside)	Extant	Extant	Unk	2 % C 32 % PC 10 % NC 57 % Dev	fragmentation, nonnative plant invasion, drought, and fire.
8. Winchester	6. Winchester	S of the community of Winchester, RC (SW Riverside)	ND	Extant	Unk	9 % C 0 % PC 16 % NC 75 % Dev	High: "
9. Domenigoni Valley	7. Domenigoni Valley	SW of Domenigoni Valley Reservoir, RC (SW Riverside)	ND	Extant	Unk	58 % C 46 % PC 15 % NC 22 % Dev	Medium; climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire.
10. Skinner/ Johnson	8. Skinner/ Johnson Core	Surrounding Lake Skinner, RC (SW Riverside)	Extant	Extant	Extant	38 % C 9 % PC 20 % NC 33 % Dev	Medium; "
11. Crowne Hill	8. Skinner/ Johnson Core	City of Temecula, RC (none)	ND	DE	Extp	100 % Dev	N/A
12. N Butterfield Stage Road	8. Skinner/ Johnson Core	City of Temecula, RC (none)	ND	DE	Extp	100 % Dev	N/A

13. Red Hawk	9. Red Hawk	City of Temecula, RC (none)	ND	DE	Exp	100 % Dev	N/A
14. Pauba Valley	10. Oak Mountain/ Vail Lake Core	W of Oak Mountain RC (S Riverside)	ND	Extant	Unk	1 % C 28 % PC 5 % NC 66 % Dev	High: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire.
15. Black Hills	10. Oak Mountain/ Vail Lake Core	N of Oak Mountain RC (S Riverside)	ND	Extant	Unk	0 % C 12 % PC 57 % NC 31 % Dev	High."
16. Oak Mountain/ Vail Lake	10. Oak Mountain/ Vail Lake Core	Surrounding Vail Lake, RC (S Riverside)	Extant	Extant	Extant	23 % C 62 % PC 6 % NC 9 % Dev	Medium: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire.
17. Sage	11. Wilson Valley Core	Surrounding the community of Sage, RC (S Riverside)	Extant	Extant	Unk	5 % C 59 % PC 14 % NC 23 % Dev	High."
18. Rocky Ridge	11. Wilson Valley Core	S of the community of Sage, RC	ND	Extant	Unk	18 % C 40 % PC 37 % NC	High."

		(S Riverside)				5 % Dev	
19. Wilson Valley	11. Wilson Valley Core	NW of Wilson Valley, RC (S Riverside)	ND	Extant	Extant	26 % C 63 % PC 4 % NC 7 % Dev	Medium: "
20. Billy Goat Mountain	11. Wilson Valley Core	E of Wilson Valley, RC (S Riverside)	ND	Extant	Unk	49 % C 50 % PC 1 % NC 0 % Dev	Medium: "
21. Agtsanga	12. Dameron Valley	W of community of Agtsanga, RC (S Riverside)	ND	Extant	Unk	26 % C 38 % PC 16 % NC 19 % Dev	Medium: "
22. Dameron Valley	12. Dameron Valley	SE of community of Agtsanga, RC (S Riverside)	ND	Extant	Unk	37 % C 7 % PC 42 % NC 14 % Dev	High: "
23. Oak Grove	13. Oak Grove	Community of Oak Grove, SD (S Riverside)	Extant	Extant	Unk	14 % C 0 % PC 72 % NC 14 % Dev	High: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
24. Brown Canyon	14. Brown Canyon	SE of the community of Hemet, RC (S Riverside)	ND	Extant	Unk	14 % C 86 % PC 0 % NC 0 % Dev	Medium: habitat degradation, nonnative plant invasion, drought, and fire

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25. Barbara Trail	15. Tule Peak Core	SW of the community of Anza, RC (S. Riverside/N San Diego)	ND	Extant	Extant	7 % C 21 % PC 56 % NC 16 % Dev	High: habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
26. Tule Peak	15. Tule Peak Core	S of the community of Anza, RC (S Riverside/N San Diego)	ND	Extant	Extant	26 % C 36 % PC 36 % NC 2 % Dev	Medium.”
27. Iron Spring Canyon	15. Tule Peak Core	S of the community of Anza, RC (S Riverside/N San Diego)	ND	Extant	Extant	28 % C 71 % PC 2 % NC 0 % Dev	Low: habitat degradation, nonnative plant invasion, and fire.
28. Terwilliger Valley	15. Tule Peak Core	S E of the community of Anza, RC (S Riverside/N San Diego)	ND	ND	Extant	48 % C 0 % PC 38 % NC 15 % Dev	High: habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
29. Cahuilla Creek	16. Cahuilla Creek	SW of the community of Anza, RC (S Riverside/N San Diego)	ND	Extant	Unk	0 % C 0 % PC 92 % NC 8 % Dev	High: habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
30. Cave Rocks	17. Cave Rocks	The community	ND	ND	Unk	66 % C 0 % PC	High.”

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		of Anza, RC (S Riverside/N San Diego)					31 % NC 62 % Dev	
31. Bautista Road	18. Bautista Road Core	N of the community of Anza, RC (S Riverside/N San Diego)	ND	Extant	Extant	45 % C 9 % PC 23 % NC 22 % Dev		Medium: habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
32. Quinn Flat	19. Quinn Flat	NE of Garner Valley, RC (S Riverside/N San Diego)	ND	ND	Extant	100 % C		Low: nonnative plant invasion and fire.
33. Horse Creek	20. Horse Creek	SE of Bautista Spring, RC (S Riverside/N San Diego)	ND	ND	Extant	98 % C 0 % PC 0 % NC 2 % Dev		Low: "
34. N Rouse Ridge	21. N Rouse Ridge	Rouse Ridge, RC (S Riverside/N San Diego)	ND	ND	Extant	100 % C 0 % PC 0 % NC 0 % Dev		Low: nonnative plant invasion, grazing, and fire.
35. S Fork Trail	22. S Fork Trail	S of State Route 78, NW of Lake Hemet, RC (S Riverside/N San Diego)	ND	ND	Extant	98 % C 0 % PC 2 % NC 0 % Dev		Low: "

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36. Pine Meadow	23. Pine Meadow	W Garner Valley, RC (S Riverside/N San Diego)	ND	Extant	Extant	81 % C 0 % PC 15 % NC 5 % Dev	Low: nonnative plant invasion, grazing, and fire.
37. Lookout Mountain	23. Pine Meadow	S Garner Valley, RC (S Riverside/N San Diego)	ND	Extant	Extant	39 % C 0 % PC 61 % NC 0 % Dev	Medium: habitat destruction, degradation, and fragmentation, grazing, nonnative plant invasion, and fire.
38. N Garner Valley	24. N Garner Valley	S Garner Valley, RC (S Riverside/N San Diego)	ND	ND	Extant	79 % C 0 % PC 18 % NC 2 % Dev	Low: nonnative plant invasion and fire.
39. Cañada de San Vicente	25. Cañada de San Vicente	S of community of Ramona SD (none/ Central San Diego)	ND	ND	Extant	89 % C 11 % PC 6 % NC 0 % Dev	Medium: climate change effects, nonnative plant invasion, drought, and fire.
40. San Vicente	26. San Vicente Core	N of San Vicente Reservoir, SD (none/ Central San Diego)	ND	Extant	Extant	88 % C 11 % PC 0 % NC 1 % Dev	Medium: "
41. S San Vicente	26. San Vicente Core	N of San Vicente Reservoir, SD (none/ Central San	ND	ND	Extant	27 % C 5 % PC 0 % NC 68 % Dev	Medium: "

42. Fanita Ranch	26. San Vicente Core	N of the community of Santee, SD (none/ Central San Diego)	ND	ND	Unk	9 % C 36 % PC 54 % NC 1 % Dev	High: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire.
43. Sycamore Canyon	26. San Vicente Core	Sycamore Canyon Open Space Preserve S of the City of Poway, SD (none/ Central San Diego)	ND	ND	Extant	88% C 6 % PC 6 % NC 0 % Dev	Medium: climate change effects, nonnative plant invasion, drought, and fire.
44. NE Miramar	26. San Vicente Core	NE border of Miramar Naval Air Station, SD (none/ Central San Diego)	ND	ND	Extant	70 % C 18 % PC 3 % NC 10 % Dev	Medium: climate change effects, habitat degredation, nonnative plant invasion, drought, and fire.
45. Mission Trails Park	27. Mission Trails Park	Mission Trails Regional Park, SD (none/ Central San Diego)	Extp	Extp	Extant	93 % C 0 % PC 1 % NC 6 % Dev	Medium: climate change effects, habitat degradation, nonnative plant invasion, drought, and fire.
46. Alpine	28. Alpine	S of the community	ND	Extant	Unk	13 % C 0 % PC	High: climate change effects.

		of Alpine; SD (some/ Central San Diego)					38 % NC 48 % Dev	habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
47. W Otay Mesa	29. W Otay Mesa	W Otay Mesa, SD (SW San Diego/ S San Diego)	Exp	Extant	Unk	7 % C 0 % PC 0 % NC 93 % Dev		High: climate change effects, habitat destruction, nonnative plant invasion, and drought.
48. W Otay Valley	30. Otay Core	N of Otay Mesa SD (SW San Diego/ S San Diego)	ND	Extirp	Extant	7 % C 15 % PC 8 % NC 69 % Dev		High: "
49. Otay	30. Otay Core	Vicinity of Otay Mountain, Lakes, Mesa, and River, SD (SW San Diego/ S San Diego)	Extant	Extant	Extant	55 % C 17 % PC 19 % NC 9 % Dev		Medium: climate change effects; habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
50. Rancho San Diego/Jamul	30. Otay Core	Vicinity of the community of Jamul, and E of Sweetwater reservoir.	Extp	Extant	Extant	48 % C 15 % PC 16 % NC 21 % Dev		Medium: "

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		SD (SW San Diego/ S San Diego)						
51. Jamul Butte	30. Otay Core	N of Jamul Butte, SD (SW San Diego/ S San Diego)	ND	ND	Unk.	0 % C 0 % PC 59 % NC 41 % Dev	High: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
52. Marron Valley	30. Otay Core	W of Otay Mountain, Marron Valley, SD (SW San Diego/ S San Diego)	ND	Extant	Extant	76 % C 0 % PC 24 % NC 0 % Dev	Medium: climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
53. Barrett Junction	30. Otay Core	NW of Tecate Peak, SD (SW San Diego/ S San Diego)	Extp	Extant	Extant	22 % C 0 % PC 73 % NC 6 % Dev	High."
54. Tecate	31. Tecate	N of the City of Tecate, SD (SW San Diego/ S San Diego)	ND	Extant	Extant	8 % C 0 % PC 43 % NC 48 % Dev	High."
55. W Barrett	32. W	W of Barrett	Extp	Extp	Extant	78 % C	Medium: habitat

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Lake	Barrett Lake	Lake, SD (none/ S San Diego)				0 % PC 17 % NC 5 % Dev	destruction, degradation, and fragmentation, nonnative plant invasion, and fire.
56. Round Portrero	33. Round Portrero	SE of Barrett Lake, SD (none/ S San Diego)	ND	ND	Extant	85 % C 0 % PC 15 % NC 0 % Dev	Medium: "
57. SE Morena	34. SE Morena	SE of Lake Morena and Morena Butte, SD (none/ S San Diego)	ND	ND	Extant	62 % C 0 % PC 38 % NC 0 % Dev	Medium: "
58. Canyon City	35. Canyon City	Vicinity of the community of Canyon City, SD (none/ S San Diego)	ND	ND	Extant	20 % C 0 % PC 80 % NC 0 % Dev	High: "
59. E Canyon City	35. Canyon City	"	ND	ND	Extant	33 % C 0 % PC 67 % NC 0 % Dev	High: "
60. N La Posta	36. Campo Core	NE of the Community of Campo, SD (none/ S San Diego)	ND	ND	Extant	91 % C 0 % PC 9 % NC 0 % Dev	Medium: habitat degradation, destruction, nonnative plant invasion, and fire.
61. La Posta	36. Campo	"	ND	ND	Extant	86 % C	Medium: "

	Core						0 % PC 14 % NC 0 % Dev	
62. E La Puita	36. Campo Core	"	ND	ND	Extant	0 % C 0 % PC 100 % NC 0 % Dev		High:[10]
63. Campo	36. Campo Core	E of the Community of Campo, SD (mine/ S San Diego)	ND	ND	Extant	30 % C 0 % PC 70 % NC 0 % Dev		Medium: [9]
64. S Campo	36. Campo Core	"	ND	ND	Extant	37 % C 0 % PC 63 % NC 0 % Dev		Medium:[9]
65. E Campo	36. Campo Core	"	ND	ND	Extant	0 % C 0 % PC 86 % NC 14 % Dev		High:[10]
66. Jacumba	37. Jacumba Core	NW of the community of Jacumba, SD (SE San Diego/ S San Diego)	Extp	Extant	Extant	59 % C 0 % PC 40 % NC 1 % Dev		Medium: habitat degradation, destruction, nonnative plant invasion, drought, and fire.

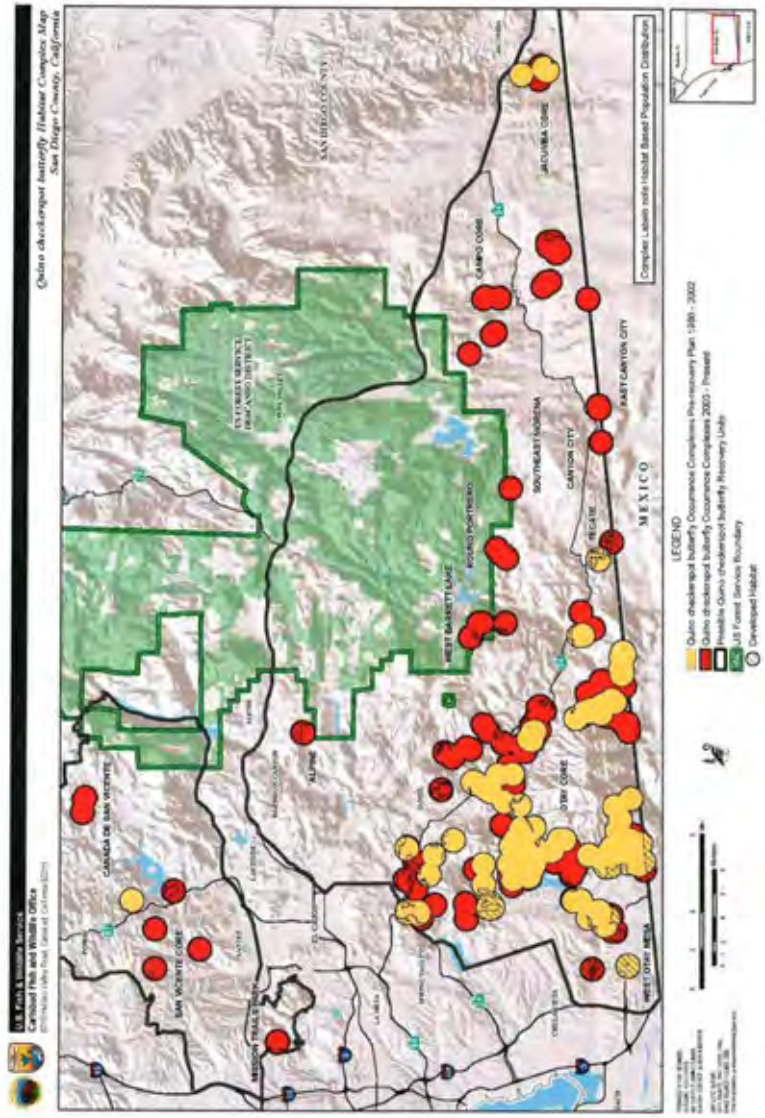
Abbreviations: C- conserved based on public ownership or privately owned for conservation purposes, includes tribal lands; Dev- developed or converted to agriculture based on GIS land use data and satellite imagery; DE- documented then subsequently extirpated; E- east; Extp- extirpated; I- Interstate; N- north; N/A- not applicable; NC- no conservation planned based on private ownership and no inclusion in an HCP reserve design; ND- not documented, no historic records; PC- planned for conservation based on a Habitat Conservation Plan reserve design model or map; RC- Riverside County; S- south; SD- San Diego County; Unk- unknown; W- west;

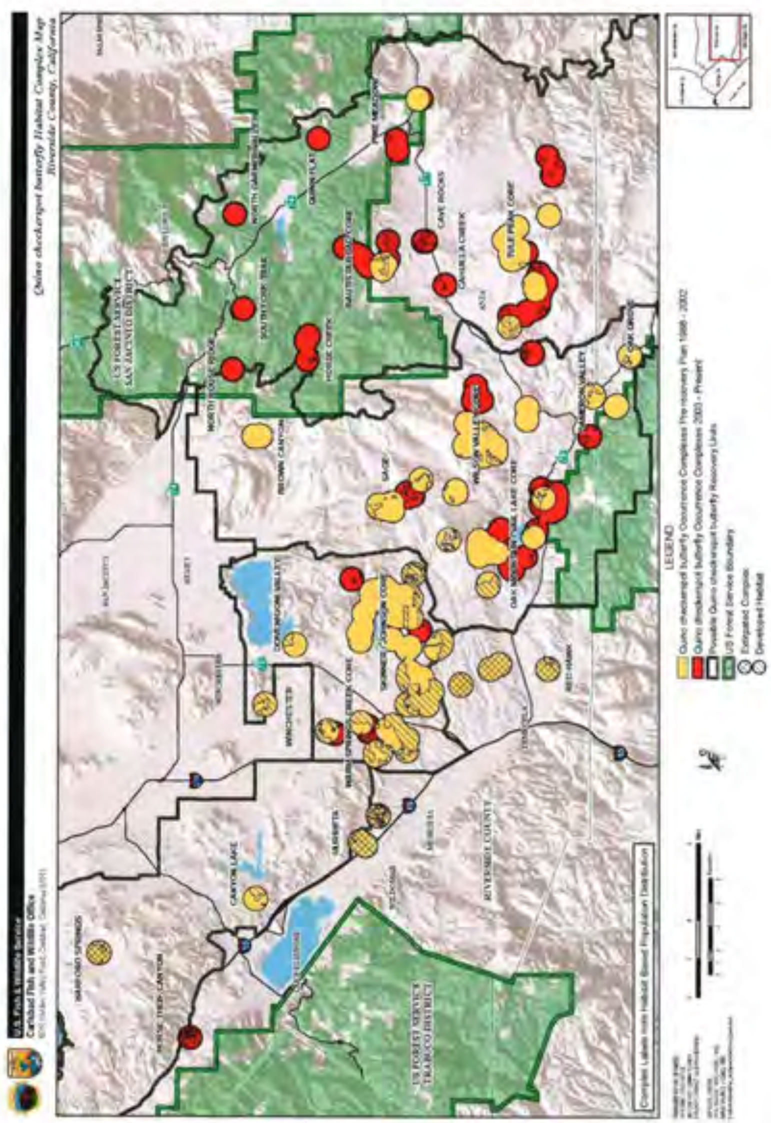
[a]The area within overlapping one km radii of the most recent observation locations (may be a single-spot-overlapping area).

[b]Estimated population membership and categorization based on methods used in the final revised critical habitat rule to map critical habitat units (USFWS 2009, 62 FR 2313). Membership is based on contiguous, suitable habitat between occurrence complexes that are less than 1.2 mile (2 kilometer) apart.

2009 5-year Review for *Euphydryas editha quino*

"Estimate based on GIS occurrence data and listing rule text. "Currently, only seven or eight populations are known within the United States. All known extant populations in the United States occur in southwestern Riverside and north-central San Diego counties. . . In 1996, a very small group of [Quino checkerspot butterflies] was sighted on Otay Mesa, but . . .is not expected to persist" (January 16, 1997, 62 FR, p. 2315). "Climate-change effects are listed as a threat for all lower elevation occurrence complexes that are likely to experience increasing habitat unsuitability (Preston et al. 2008, p. 2508); we used a break point of 2,500 feet (762 meters). Non-climate change-related drought is listed as a threat for all occurrence complexes with a 1961-1990 annual average precipitation below 15 inches (38 centimeters) (Oregon Climate Service 1993, p. 1).


U.S. Fish & Wildlife Service
Carlsbad Fish and Wildlife Office
Quino checkerspot butterfly Habitat Complex Map
San Diego County, California
CAMPO CORE
JACUMBA CORE
SOUTHEAST MORENA
CANYON CITY
EAST CANYON CITY
WEST OTAY MESA
OTAY CORE
WEST BARRETT LAKE
ALPINE
MEXICO
LEGEND
Developed Habitat



Federal Register

Monday,
April 15, 2002

Part III

Department of the Interior

Fish and Wildlife Service

50 CFR Part 17
Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Quino Checkerspot Butterfly (Euphydryas editha quino); Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AH03

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Quino Checkerspot Butterfly (*Euphydryas editha quino*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), designate critical habitat for the Quino checkerspot butterfly (*Euphydryas editha quino*) pursuant to the Endangered Species Act of 1973, as amended (Act). A total of approximately 99,440 hectares (ha) (171,606 acres (ac)) in Riverside and San Diego Counties, California, are designated as critical habitat for the Quino checkerspot butterfly.

Critical habitat identifies specific areas, both occupied and unoccupied, that are essential to the conservation of a listed species and that may require special management considerations or protection. The primary constituent elements for the Quino checkerspot butterfly are those habitat components that are essential for the Quino checkerspot butterfly. All areas designated as critical habitat for the Quino checkerspot butterfly contain one or more of the primary constituent elements essential to the conservation of the species. This final rule takes into consideration the potential economic and other effects of designating critical habitat for the Quino checkerspot butterfly.

We solicited data and comments from the public on all aspects of the proposed rule and draft economic analysis. We revised the proposal and the draft economic analysis to incorporate or address new information received from habitat and butterfly surveys conducted during the 2001 butterfly flight season; public comments on the proposed critical habitat designation and the draft economic analysis on the proposed designation; the Quino Checkerspot Butterfly Recovery Plan (Service, in prep.); and any new scientific and commercial information made available since the proposal was published.

DATES: This designation becomes effective on May 15, 2002.

ADDRESSES: Comments and materials received, as well as supporting documentation used in the preparation of this final rule, are available for public inspection, by appointment, during normal business hours at the Carlsbad Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, CA 92008.

FOR FURTHER INFORMATION CONTACT: Douglas Krofta, Chief, Branch of Listing, Carlsbad Fish and Wildlife Office, at the above address (telephone 760/431–9440; facsimile 760/431–9624).

SUPPLEMENTARY INFORMATION:

Background

The Quino checkerspot butterfly (*Euphydryas editha quino*) is a member of the family Nymphalidae (brush-footed butterflies) and the subtribe Melitaeinae (checkerspots and fritillaries). The Quino checkerspot differs in physical appearance from other subspecies of *E. editha* in size, wing coloration, larval, and pupal characteristics (Mattoni *et al.* 1997). Researchers have spent more than 4 decades conducting extensive focused research on Edith's checkerspot (*Euphydryas editha*), in particular the federally-listed bay checkerspot butterfly (*Euphydryas editha bayensis*). While an extraordinary amount of information is available on Edith's checkerspot in general, specific information on the Quino checkerspot is sparse (Murphy and White 1984, Mattoni *et al.* 1997, Osborne and Redak 2000), including only two formal ecological studies (White and Levin 1981, Osborne and Redak 2000). Therefore, much of the information used in developing this critical habitat designation, as well as the recovery and management strategy for the Quino checkerspot butterfly, as discussed in the recovery plan that is currently being finalized (Service, in prep.), is based on research on other subspecies of Edith's checkerspot, especially the bay checkerspot butterfly. Because there are a number of biological and ecological similarities between the two federally endangered subspecies of Edith's checkerspot, including shared host plant species, a primarily coastal (historic) distribution, and apparently similar within-patch dispersal behavior (Mattoni *et al.* 1997, White and Levin 1981), we believe that extrapolation of bay checkerspot butterfly research conclusions to the Quino checkerspot butterfly is justified in most cases.

The Quino checkerspot butterfly has undergone several nomenclatural changes. Originally described as *Melitaea quino* (Behr 1863), Gunder (1929) reduced it to a subspecies of *Euphydryas chalcedona*. At the same time, he described *Euphydryas editha wrighti* from a checkerspot specimen collected in San Diego County. After reexamining Behr's descriptions and specimens, Emmel *et al.* (1998) concluded that the Quino checkerspot butterfly should be associated with *E. editha*, not *E. chalcedona*. For the Quino checkerspot butterfly, *E. editha quino* is now the accepted scientific name.

The life cycle of the Quino checkerspot butterfly includes four distinct life stages: egg, larva (caterpillar), pupa (chrysalis), and adult, with the larval stage divided into 5 to 7 instars (periods between molts, or shedding skin). There is typically one generation of adults per year, with a 4- to 6-week flight period beginning between late February and May, depending on weather conditions (Emmel and Emmel 1973). Adult emergence from pupae is staggered, resulting in a 1- to 2-month flight season, with each adult butterfly living approximately 10 to 14 days (Service, in prep.).

The adult Quino checkerspot butterfly has a wingspan of approximately 4 centimeters (cm) (1.5 inches (in.)). The top sides of the wings have a red, black, and cream colored checkered pattern while the bottom sides have a red and cream marbled pattern. The abdomen of the Quino checkerspot butterfly has red stripes across the top. Quino checkerspot butterfly larvae are dark black with a row of orange (reddish), hairy extensions on their backs. Pupae are mottled black on a pale blue-gray background.

Peak adult butterfly emergence for most brush-footed butterfly species, and probably for Quino checkerspot butterflies as well, occurs shortly after the beginning of the flight season, usually in the second or third week (Zonneveld 1991). Female bay checkerspot butterflies usually mate on the day they emerge from the pupa and lay 1 or 2 egg clusters per day for most of their adult life. Bay and Quino checkerspot egg clusters typically contain 30 to 150 eggs (M. Singer, C. Parmesan, and G. Pratt, pers. comm., 1999). Eggs deposited by adults on host plants hatch in 10 to 14 days. If sufficient rain falls in late summer or early fall, a rare second generation of fewer adults may occur (Mattoni *et al.* 1997).

Quino checkerspot butterfly larvae may undergo as many as seven molts prior to pupation. During the first two instars, pre-diapause (before summer dormancy) larvae cannot move more than a few centimeters and are usually restricted to the primary host plant species (plants on which the adult

female butterfly lays her eggs). Newly hatched larvae spin a web and feed in clusters on the plant where their eggs were deposited. During the third instar (about 10 days after hatching), larvae are able to move between individual host plants. Third instar larvae usually wander independently in search of food and may switch from feeding on the plant on which they hatched to another host plant, either of the same species or another one that serves as an alternate food source. If larvae have accumulated sufficient energy reserves, they enter diapause (summer dormancy) as host plants age and become dry and inedible, and usually remain in diapause until December or January. Although the exact location of diapausing Quino checkerspot butterfly larvae is not known, clusters of post-diapause larvae found near dense grass and shrub cover indicate that they may diapause in these areas (Osborne and Redak 2000). Laboratory observations have demonstrated Quino checkerspot butterfly larvae are capable of sustaining or resuming diapause for multiple years, the maximum duration of which has not yet been determined (G. Pratt, pers. comm., 2001).

Sufficient rainfall, usually during November or December, stimulates germination and growth of host plants, and apparently causes larvae to break diapause. Records of Quino checkerspot butterfly individuals collected following unusual summer rains indicate that it does not require winter chilling to break diapause, and may not diapause at all under some circumstances (Mattoni *et al.* 1997). Post-diapause larvae can crawl up to several meters in search of food and disperse among their host plants. Post-diapause larval dispersal has been well documented in the bay checkerspot butterfly. Post-diapause larvae seek microclimates (small habitats with uniform climate) with exposure to sunlight, which speeds development (White 1974, Weiss *et al.* 1987, Osborne and Redak 2000). Because of variable weather during winter and early spring, the time between the termination of diapause and pupation can range from 2 weeks, if conditions are warm and sunny, to over 2 months if cold, rainy conditions prevail (G. Pratt, pers. comm., 2001). Post-diapause larvae undergo from 2 to as many as 4 instars prior to pupating in webbed shelters near ground level. Adults emerge from pupae after approximately 10 days, depending on the weather (Mattoni *et al.* 1997).

Adult Quino checkerspot butterflies spend time searching for mates, basking in the sun to regulate body temperature, feeding on nectar, defending territories, and in the case of females, searching for sites to deposit eggs. The Quino checkerspot butterfly, like other subspecies of Edith's checkerspot, shows a habitat preference for low-growing vegetation interspersed with barren spots (Osborne and Redak 2000). The thermodynamic requirements of the butterfly and its natural avoidance of shaded areas deter flight below the canopy of vegetation (M. Singer, pers. comm., 2001).

Male Quino checkerspot butterflies, and to a lesser extent females, are frequently observed on hilltops and ridgelines (Carlsbad Fish and Wildlife Office GIS Quino checkerspot butterfly database and metafile, Osborne 2001). A number of behaviors characteristic of species commonly found on hilltops have been documented. For example, male Quino checkerspots have been observed to perch consistently in prominent locations on hilltops devoid of host plants and "attack" any other males that approach (Osborne 2001, Pratt 2001). Further evidence that Edith's checkerspots may display facultative "hilltopping" behavior was found in Colorado, where males of an Edith's checkerspot population were also observed aggregating on hilltops, where females have to seek mates, when population densities were low (Ehrlich and Murphy 1987). Hilltops may also represent centers of Quino checkerspot population density in some areas. Based on occurrence data, Quino checkerspot butterfly adults are frequently observed on hilltops (Service, in prep.), even in the absence of nearby larval host plants (Osborne 2001). Based on current knowledge of the Quino checkerspot butterfly ecology and biology, we believe hilltops provide essential breeding areas for some local populations.

Habitat patch distributions are defined by a matrix of adult resources (all larval resources are found within areas of adult movement), primarily nectar plants, oviposition plants, and basking sites. Habitat patches for the bay checkerspot butterfly can vary greatly in area and distribution (Harrison *et al.* 1988). Habitat patch fragmentation occurs when land use changes compromise adult movement patterns and frequently results from habitat destruction that reduces resource availability. Such fragmentation may significantly reduce the ability of habitat patches to support local populations.

Most Quino checkerspot butterfly populations are part of a larger metapopulation structure (sets of local habitat patch populations) (Service, in prep.). Isolated habitat patches are not sufficient to ensure the long-term persistence of butterfly metapopulations (Hanski 1999). A local habitat patch population may be expected to persist on the time scale of years (Harrison 1989). Persistence of metapopulations for longer terms results from the interaction among sets of local habitat patch populations at larger geographic scales. Although local habitat patch populations may change in size independently, their probabilities of existing at a given time are not independent of one another because they are linked by processes of extirpation and mutual recolonization, processes that occur on the order of every 10 to 40 years for some butterflies, including the Quino checkerspot (Harrison *et al.* 1988, Murphy and White 1984).

Metapopulations should be stable over the course of decades, since most of their constituent habitat patch populations will be recolonized within approximately 10 years of extirpation. The intervening distance and topography among habitat patches primarily determine colonization rates (Harrison 1989). The long-term persistence of butterfly species with metapopulation dynamics depends on the maintenance of temporarily unoccupied habitat patches and recolonization events that link habitat patches within metapopulations (Murphy and White 1984, Hanski 1999, Service, in prep.). Maintenance of landscape connectivity (habitat patches linked by intervening dispersal areas) is essential in order to maintain metapopulation resilience. Land use changes that disperse between habitat patches and isolate local populations by compromising landscape connectivity can be just as detrimental to metapopulation survival as those that destroy or reduce the size of habitat patches (Service, in prep.).

Possibly the most extensive documentation of metapopulation dynamics in any species has been carried out over the past 42 years on several subspecies of Edith's checkerspot, primarily the endangered bay checkerspot (e.g., Ehrlich 1961, 1965; Singer 1972; Murphy and Ehrlich 1980; White and Levin 1981; Ehrlich and Murphy 1987; Harrison 1989; Boughton 1999, 2000). Although not every population of Edith's checkerspot studied has demonstrated metapopulation dynamics (Ehrlich and Murphy 1987), the majority of studies (e.g., Ehrlich 1961, 1965; Singer 1972; Murphy and Ehrlich 1980; White and Levin 1981; Ehrlich and Murphy 1987; Harrison 1989; Boughton 1999, 2000) and local climate and habitat patterns

[Service, in prep.] indicate most Quino checkerspot populations should display some type of metapopulation dynamics. Until the specific long-term dynamics or genetic composition of Quino checkerspot populations are documented and suggest otherwise, it is prudent to assume that local populations belong to a greater metapopulation at some spatial and temporal scale [Hanski 1999; Service, in prep.].

Mark-release-recapture studies indicate that in most seasons Edith's checkerspot subspecies exhibit sedentary behavior during the majority of their adult lives, although these studies were not specifically designed to quantify long-distance dispersal. In this type of study, researchers mark captured individuals, release them, and then recapture as many as possible within a target area after a period of time. Most recaptures have occurred within 100 to 200 meters (m) [492 to 985 feet (ft)] of release (Ehrlich 1961, 1965; Gilbert and Singer 1973; White and Levin 1981; Harrison *et al.* 1988; Harrison 1989; Boughton 1999, 2000). Harrison *et al.* (1988) documented no between-habitat patch transfers of marked individuals greater than 1 km (0.6 mi). Harrison (1989) recaptured bay checkerspots in a target habitat patch greater than 1 km (0.6 mi) from the point of release in only 8 percent of cases. However, dispersal tendency appears to be relatively variable in Edith's checkerspots (White and Levin 1981) and appears to have evolved to fit local or regional situations (Gilbert and Singer 1973). White and Levin (1981) noted that, "It seems likely from the lower return rate in 1972 [a dry year] and from the observed pattern of out-dispersal, that many marked [male Quino checkerspot butterflies] individuals dispersed beyond the area covered by our efforts that year." Research indicated that females were more likely to emigrate than males (Ehrlich *et al.* 1984), and older adults appeared to have a greater tendency to disperse as butterfly densities, host plant suitability, and female egg load weights declined (White and Levin 1981, Harrison 1989).

When quality host plants are in short supply, larvae respond by dispersing (if they are mature enough) and adults respond by dispersing (White and Levin 1981, Murphy and White 1984). Several populations of Quino checkerspots studied for almost a decade increased in number by nearly two orders of magnitude in 1977, and many habitat patches were defoliated by larvae, resulting in very high rates of dispersal (Murphy and White 1984). Dispersal tendency also increased when dry conditions reduced the number and suitability of host plants (White and Levin 1981). Long-distance dispersal in bay checkerspot butterflies has been documented as far as 6.4 km (3.9 mi) (Murphy and Ehrlich 1980), 6.6 km (3.4 mi) (1 male), and 2 km (1.8 mi) (1 female) (Harrison 1989). Individual long-distance dispersal may be prevalent under certain conditions, but the likelihood of long-distance colonization by a given individual is usually low because environmental conditions promoting dispersal are not likely to also promote colonization due to reduced butterfly densities and host plant quality.

Dispersal direction from habitat patches seems to be random in the bay checkerspot butterfly, but dispersing butterflies are likely to move into habitat patches when they can detect them (pass within approximately 50 m (165 ft)), and are most likely to remain where the existing density of butterflies is lowest (Harrison 1989). Bay checkerspot butterfly patch occupancy patterns also suggest that patches separated from a source population by hilly terrain are less likely to be colonized than those separated by flat ground (Harrison 1989). Harrison (1989) concludes that because establishment rates were low during his study, and initial dispersal direction was random, relatively large numbers of butterflies must have emigrated from the source populations at some point to explain the apparent long term habitat patch re-colonization pattern. High habitat patch colonization rates probably only occur during rare outbreak years, when high local densities combine with favorable establishment conditions in unoccupied patches [Harrison 1989]. Rare outbreak events are thought to play a crucial role in Quino checkerspot butterfly metapopulation resilience (Murphy and White 1984).

Long-distance habitat patch colonization may be achieved within a single season through dispersal of individual butterflies, or over several seasons through stepping-stone habitat patch colonization events. Bay checkerspot island habitat patch recolonization distances from the Morgan Hill mainland habitat patch population averaged 3.4 km (2.1 mi) between the late 1970s and late 1980s, with a minimum distance (individual butterfly movement) of 1.4 km (0.9 mi), and a maximum of 4.4 km (2.7 mi) (Harrison *et al.* 1988). An overview of dispersal studies suggests that long-distance movements by individuals are not common, but may allow for infrequent between-patch exchanges of up to 6.0 km (3.7 mi) under optimal conditions. Bay checkerspot butterfly habitat patch colonization patterns and models suggest that habitat patches as distant as 7.0 km (4.3 mi) may provide sources of recolonization for each other via stepping-stone dispersal over a 40- to 50-year period (Harrison 1988 *et al.*; Harrison 1989).

Quino checkerspot butterfly oviposition (egg deposition) has most often been documented on *Plantago erecta* (dwarf plantain). However, egg clusters and pre-diapause larvae have also recently been documented on other species of host plant. *Plantago patagonica* (woolly plantain) and *Antirrhinum coulterianum* (white snapdragon) appear to be the primary host plants utilized above the elevational limits of dwarf plantain (approximately 3000 m [9750 ft] [Pratt 2001]. In 2000 (a dry year), all larval clusters at the Silverado pre-approved mitigation area in Riverside County were found on woolly plantain (and few white snapdragon plants were observed). In 2001, however, when host host plants were abundant, all larval clusters were found on white snapdragon despite the presence of woolly plantain (Pratt 2001). In 2001, a site near Barrett Junction in southern San Diego County yielded another interesting primary host plant observation. Although dwarf plantain was abundant, the plants were small in stature and all larval clusters were found on *Castilleja rigida* [threat-leaved bird's beak] within the patches of dwarf plantain, confirming earlier observations of this species as a primary host plant (Pratt 2001). All host plant species occur in coastal sage scrub, open chaparral, grassland, and similar open-canopy plant communities. Dwarf plantain is often associated with soils with fine-textured clay or with cryptogamic crusts [i.e., soil crusts composed of fungi, mosses, and lichens].

The two most important factors affecting the suitability of host plants for Quino checkerspot butterfly oviposition are exposure to solar radiation and host plant phenology [timing of development]. Quino checkerspot butterflies deposit eggs on plants located in full sun, preferably surrounded by bare ground or sparse, low-growing vegetation (Weiss *et al.* 1987, 1988; Osborne and Redak 2000). Primary host plants must remain edible for approximately 6 weeks to support pre-diapause larvae if no secondary host plants (species of host plant adults do not deposit eggs on) are available (Singer 1972, Singer and Ehrlich 1979).

Secondary host plants may be important before and after larval

response. Secondary host plants are important for pre-diapause larvae when the primary hosts become unavailable before larvae can enter diapause and for post-diapause larvae when primary host plant availability is limited when the larvae emerge from diapause. Such was the case with many populations of the bay checkerspot where dwarf plantain was the primary host plant, but most larvae survived to reach diapause by migrating to *Castilleja exserta* (owl's clover). Pre-diapause larvae fed on owl's clover until diapause, then returned to feeding on dwarf plantain when they broke diapause in the winter (Singer 1972, Ehrlich *et al.* 1975). Some populations of the Quino checkerspot butterflies may depend on secondary hosts for their survival. Multiple overlapping primary and secondary host plant distributions within a habitat patch probably contribute to patch suitability. For example, in 2001 a host plant micro-patch was documented in southwestern San Diego County where thread-leaved bird's beak was the primary host plant, but dwarf plantain (relatively small in stature) and owl's clover were also present (Pratt 2001). It is possible that dwarf plantain is an important post-diapause secondary host plant at sites such as the one near Barrett Junction because thread-leaved bird's beak is very immature, and less abundant, than dwarf plantain when larvae come out of diapause (Pratt 2001).

Edith's checkerspot butterflies use a much wider range of plant species for adult nectar feeding than for larval foliage feeding. The butterflies frequently take nectar from *Lomatium* spp. (lomatium), *Muilla* spp. (goldenstar), *Achillea millefolium* (milfoil or yarrow), *Amsinkia* spp. (fiddleneck), *Lasthenia* spp. (goldfields), *Plagiobothrys* and *Cryptantha* spp. (popcorn flowers), *Gilia* spp. (gilia), *Eriogonum fasciculatum* (California buckwheat), *Allium* spp. (onion), and *Erodictyon* spp. (yerba santa) (D. Murphy and G. Pratt, pers. comm., 2000). *Salvia columbariae* (chia) may also be used for nectar feeding (Orsak 1979; S. Osborne, pers. comm., 2001), but is probably not preferred (G. Pratt, D. Murphy, pers. comm., 2001). Quino checkerspot butterflies have been observed flying several hundred meters from the nearest larval habitat patch to nectar sources.

Although habitat patches may theoretically be delineated by long-term studies based on host and nectar plant distribution and density, delineation of long-term habitat patch footprints, or extant larval occupancy, may be difficult to estimate at any given point in time (Service, in prep.). Plant population quality, density, and distribution change over time for a variety of reasons, and Quino checkerspot populations have evolved to respond to shifting habitat patch suitability in space and time (Service, in prep.). For example, environmental conditions may not favor plant germination one season, or force germination of other plant species, but low-density germination of host plant individuals or a seed bank may still result in abundant germination at a later date. Lower primary host plant density may be sufficient if secondary host plant species are present, and feeding by herbivores, including Quino checkerspot butterfly larvae, will reduce the density of host plants, even under the best environmental conditions (Service, in prep.). During years when host plant densities are too low to support larvae to maturity, the larvae may remain in diapause for 2 or more years. Host plant densities may even remain very low for a long enough period to result in the extirpation of larval residents (of micropatches) or local populations (of habitat patches). If the canopy opens or environmental conditions improve, these sites may support larvae again. Because the size, quality, and number of host plant micropatches and habitat patches fluctuate regularly, so do Quino checkerspot population distributions and the number of Quino checkerspot individuals that mature each season.

The Quino checkerspot butterfly is threatened primarily by urban and agricultural development, non-native plant species invasion, off-road vehicle use, grazing, and fire management practices (62 FR 2313). These threats destroy and degrade the quality of habitat and result in the extirpation of local Quino checkerspot populations. Quino checkerspot butterfly populations decline likely has been, and will continue to be, caused in part by unbalanced nitrogen deposition, elevated atmospheric carbon dioxide concentrations, and climate change (Service, in prep.). Nonetheless, urban development poses the greatest threat and exacerbates all other threats. Activities resulting in habitat fragmentation or host or nectar plant removal reduce habitat quality and increase the probability of local Quino checkerspot butterfly population extirpation and species extinction.

Other threats to the species identified in the final listing rule (62 FR 2313) include illegal trash dumping and predation. Dumping, a documented problem for some populations (G. Pratt, pers. comm., 2000, 2001), is detrimental because of resulting habitat degradation and destruction. Over-collection by butterfly hobbyists and dealers is a probable threat, although the magnitude of this activity is unknown. Stamp (1984) and White (1986) examined the effects of parasitism and predation on the genus *Euphydryas*, although it is not clear whether these mortality factors pose a significant threat to this species. Predation by Argentine ants (*Iridomyrmex humilis*) has been observed in colonies of the butterfly in the laboratory (G. Pratt, pers. comm., 2000) and intense predation by non-native Brazilian fire ants (*Solenopsis invicta*) is likely where they co-occur with Quino checkerspot butterflies (Porter and Savignano 1990). Brazilian fire ants were documented in 1998 in the vicinity of historic Quino checkerspot butterfly habitat in Orange County and have subsequently been found in Riverside and Los Angeles Counties (California Department of Food and Agriculture 1999).

The recovery strategy for the Quino checkerspot butterfly focuses on conservation of occurrence complexes within recovery units, as discussed in the recovery plan that is currently being finalized (Service, in prep.). Occurrence complexes are based on Quino checkerspot butterfly observations, probably within a greater distribution of undetermined metapopulations. Occurrences are mapped in the recovery plan (Service, in prep.) using a 1 km (0.6 mi) dispersal radius. This distance delineates the area within which we would expect to find the habitat patch associated with an individual observed butterfly (Gilbert and Singer 1973, Harrison *et al.* 1988, Harrison 1989). Occurrences within 2 km (1.2 mi) of each other are considered to be part of the same occurrence complex because such observations are proximal enough that the observed butterflies would have come from the same population (Ehrlich and Murphy 1987, Harrison *et al.* 1988, Harrison 1989).

Recovery units represent the primary areas for managing recovery efforts (Service, in prep.). Most recovery units contain of one or more core occurrence complexes and correspond to habitat regions described in the recovery plan (Service, in prep.). Several factors were considered in identifying recovery units, including biological factors, political boundaries, and ongoing conservation efforts. In some instances, recovery unit boundaries were modified to maximize efficiency of reserves, encompass areas of common threats, or accommodate logistic concerns. Recovery units include areas of apparent landscape connectivity that are

not currently known to be occupied (e.g., the Railroad Canyon Reservoir (Canyon Lake) area in Riverside County), when evidence warranted inclusion. Because of their broad scale, recovery units include lands both essential and non-essential to the long-term conservation of the Quino checkerspot butterfly.

Although the Quino checkerspot butterfly is a subspecies of Euphydryas chalcedonia, for ease in description we refer to it as a species for the remainder of this document.

Previous Federal Action

On September 30, 1988, we received a petition dated September 28, 1988 to list the Quino checkerspot butterfly as endangered under the Act from Dr. Dennis Murphy of the Stanford University Center for Conservation Biology. At the time the petition was submitted, Quino checkerspot butterfly observations had not been reported for several years. The status of the Quino checkerspot butterfly had been under review since 1984 (49 FR 21664). It was classified as a Category 1 candidate species on November 21, 1991 (56 FR 58804), meaning that information on file was sufficient to support a proposal to list this species as endangered or threatened.

On August 4, 1994, we published a petition finding in the **Federal Register** (59 FR 39866) with a proposed rule to list the Quino checkerspot butterfly as endangered. This publication included the 90-day finding that the petition presented substantial information that listing the Quino checkerspot butterfly may be warranted, the 12-month petition finding that listing the Quino checkerspot butterfly was warranted, and the proposed rule to list the species. On September 26, 1994, we published a notice extending the public comment period and announcing a public hearing on the proposed rule for the Quino checkerspot butterfly and several other species (59 FR 49045). We published a final rule listing the Quino checkerspot butterfly as endangered on January 16, 1997 (62 FR 2313). In the final listing rule, we determined that designation of critical habitat was not prudent for the Quino checkerspot butterfly.

On June 30, 1999, the Center for Biological Diversity filed suit in the U.S. District Court, challenging the not-prudent finding for critical habitat as published in the final listing rule for the Quino checkerspot butterfly. The plaintiff contended that we did not properly consider the benefits of designating critical habitat or adequately document known or perceived threats that would result from a critical habitat designation. On February 16, 2000, we agreed to a stipulated settlement that required us to re-evaluate the existing not-prudent finding. If we found that critical habitat was prudent, then a proposal to designate critical habitat was to be submitted for publication in the **Federal Register** by February 1, 2001, and a final designation made by October 1, 2001. If we found that critical habitat was not prudent, then a final determination was to be submitted for publication in the **Federal Register** by June 1, 2001.

In accordance with the stipulated settlement agreement, we re-evaluated the not-prudent finding as determined at the time of listing. Following our re-evaluation, we determined that designating critical habitat was, in fact, prudent and published a proposed rule to designate it on February 7, 2001 (66 FR 9476).

Because completion of the draft economic analysis for the proposed designation was delayed and we required time to hold public hearings, we requested a 90-day extension to adequately address public comments and complete the final designation from the plaintiffs. The plaintiffs agreed to the extension and on October 2, 2001 the District Court approved the 90-day extension requiring us to complete the final designation by January 8, 2002. We subsequently received another extension giving us until April 4, 2002 to complete the final designation of critical habitat for the Quino checkerspot butterfly.

Critical Habitat

Critical habitat is defined in section 3 of the Act as—(i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. ''Conservation'' means the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which listing under the Act is no longer necessary.

Critical habitat receives protection under section 7 of the Act through prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 also requires conferences on Federal actions that are likely to result in the destruction or adverse modification of proposed critical habitat. In our regulations at 50 CFR 402.02 we define destruction or adverse modification as ''the direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.'' Aside from the added protection that may be provided under section 7, the Act does not provide for other forms of protection to lands designated as critical habitat. Because consultation under section 7 of the Act does not apply to activities on private or other non-Federal lands that do not involve a Federal nexus, critical habitat designation would not afford any additional protections under the Act against such activities.

To be included in a critical habitat designation, the habitat must first be ''essential to the conservation of the species.'' Critical habitat designations identify, to the extent known, habitat areas that provide for the essential life cycle needs of the species (i.e., areas containing the primary constituent elements, as defined at 50 CFR 424.12(b)) using the best scientific and commercial data available.

Section 4 requires that we designate critical habitat for a species, to the maximum extent determinable and practicable, at the time of listing. When we designate critical habitat at the time of listing or under short court-ordered deadlines, we will often not have sufficient information to identify all areas which are essential for the conservation of the species. Nevertheless, we are required to designate those areas we know to be essential, at the time of designation, using the best information available.

Within the geographic area occupied by the species, we will designate only areas currently known to be essential. Essential areas should already have the features and habitat characteristics that are necessary to sustain the species. We will not speculate about what areas might be found to be essential if better information became available, or what areas may become essential over time. If the information available at the time of designation does not show that an area provides essential life cycle needs of the species, then the area should not be included in the critical habitat designation.

Our regulations state that, ''The Secretary shall designate as critical

habitat areas outside the geographic area presently occupied by the species only when a designation limited to its present range would be inadequate to ensure the conservation of the species" (50 CFR 424.12(e)). Accordingly, when the best available scientific and commercial data do not demonstrate that the conservation needs of the species require designation of critical habitat outside the range of occupied areas, we will not designate critical habitat in areas outside the geographic area occupied by the species.

Our Policy on Information Standards Under the Endangered Species Act, published in the **Federal Register** on July 1, 1994 (59 FR 34271), provides criteria, establishes procedures, and provides guidance to ensure that decisions made by the Service represent the best scientific and commercial data available. It requires us, to the extent consistent with the Act, and with the use of the best scientific and commercial data available, to rely on primary and original sources of information as the basis for critical habitat designations. When determining which areas are critical habitat, a primary source of information should be the listing package for the species. Additional information may be obtained from a recovery plan, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, biological assessments, unpublished materials, and expert opinion.

Habitat is often dynamic and species may move from one area to another over time. Furthermore, we recognize that designation of critical habitat may not include all of the habitat areas that may eventually be determined to be necessary for the recovery of the species. For these reasons, it is understood that critical habitat designations do not signal that habitat outside the designation is unimportant or may not be required for conservation of the species. Areas outside the critical habitat designation will continue to be subject to conservation actions that may be implemented under section 7(a)(1) and the regulatory protections afforded by the section 7(a)(2) jeopardy standard and the section 9 take prohibition, as determined on the basis of the best available information at the time of the action. Therefore, federally funded or assisted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available to these planning efforts calls for a different outcome.

Methods

We used the best scientific and commercial data available to determine areas essential to the conservation of the Quino checkerspot butterfly. We reviewed available information that pertains to the habitat requirements of this species, including data from research and survey observations published in peer-reviewed articles; information from private and institutional collections; regional GIS coverages; data collected from biological reports submitted by holders of section 10(a)(1)(A) recovery permits, including data from the 2001 flight season; and recommendations from the Quino checkerspot butterfly recovery team during the development of the draft and final recovery plans for the butterfly.

Primary Constituent Elements

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, we are required to base critical habitat determinations on the best scientific and commercial data available and to consider those physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. These include, but are not limited to, space for individual and population growth and normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing (or development) of offspring; and habitats that are protected from disturbance or representative of the historic geographical and ecological distribution of a species. All areas designated as critical habitat for the Quino checkerspot butterfly contain one or more of these physical or biological features.

The areas designated as critical habitat are designed to provide sufficient habitat to maintain self-sustaining populations of Quino checkerspot butterflies throughout its range and provide those habitat components essential for the conservation of the species. Habitat components that are essential for the Quino checkerspot butterfly (i.e., primary constituent elements) include the biological needs of larval diapause; feeding, and pupation, adult oviposition, nectaring, roosting and basking, and dispersal, genetic exchange, and shelter. The critical habitat units are configured to provide room for metapopulation dynamics, which is essential for the conservation of the species, including dispersal corridors.

Primary constituent elements occur in undeveloped areas that support various types of open-canopy woody and herbaceous plant communities. They include, but are not limited to, plant communities that provide populations of host plant and nectar sources for the Quino checkerspot butterfly.

The primary host plants (species of plants that butterflies deposit eggs on) that have been documented for the Quino checkerspot butterfly include dwarf plantain, woolly plantain, white snapdragon, and thread-leaved bird's beak, with dwarf plantain being both the most common and the most commonly used as a host. Dwarf plantain is an annual herb found in coastal sage scrub, open chaparral, grassland and similar plant communities. The plant is often associated with cryptogamic crusts and fine-textured clay soils.

Some local populations of Quino checkerspot butterfly larvae may depend on secondary host plants to survive. Typically, secondary hosts are important when the primary host plants begin to dry up and become inedible before larvae are mature enough to respond by entering diapause (Singer 1972, Ehrlich *et al.* 1975). Owl's clover is important as a pre-diapause secondary host plant. Secondary host plant species may also be important for post-diapause larvae if primary host plant species are not abundant enough when the larvae come out of diapause. Species that serve as primary host plants at one site may serve as secondary host plants at another. Use may also vary annually, depending on local population preferences and environmental conditions.

Adult Quino checkerspot butterflies use a variety of plants for nectar feeding. Quino checkerspot butterflies prefer flowers with a platform-like surface on which they can remain upright while feeding (D. Murphy and C. Pratt, pers. comm., 2000). The Quino checkerspot butterfly frequently takes nectar from lomatium, goldenstar, yarrow, fiddleneck, goldfields, popcorn flower, gilia, California buckwheat, onion, and yerba santa (D. Murphy and C. Pratt, pers. comm., 2000).

Topographic features (i.e., hills and ridges) that are relatively prominent for the geographic area associated with an occupied habitat patch are also frequently inhabited by Quino checkerspot butterflies during mating season. Male Quino checkerspot

butterflies have been observed to patrol territories, perch in open areas on hilltops, and chase away competing males when they approach (Osborne 2001, Pratt 2001). Further evidence that Edith's checkerspots may display facultative "hilltopping" behavior was found in Colorado. Males of another subspecies of Edith's checkerspot also appeared to aggregate on hilltops, where females travel to seek mates, when population densities were low (Ehrlich and Wheye 1986 as discussed in Shelton and Murphy 1987). Such "hilltopping" behavior is believed to be important to reproduction in some local populations (Service, in prep.). These topographic features also constitute primary constituent elements of Quino checkerspot butterfly habitat.

In summary, the primary constituent elements of Quino checkerspot butterfly habitat consist of:

(1) Grassland and open-canopy woody plant communities, such as coastal sage scrub, open red shank chaparral, and open juniper woodland with host plants or nectar plants;

(2) Undeveloped areas containing grassland or open-canopy woody plant communities, within and between habitat patches, utilized for Quino checkerspot butterfly mating, basking, and movement; or

(3) Prominent topographic features, such as hills and/or ridges, with an open woody or herbaceous canopy at the top. Prominence should be determined relative to other local topographic features.

Criteria Used To Identify Critical Habitat Units

The draft recovery plan (Service 2001) for the Quino checkerspot butterfly identifies the specific recovery needs of the species, and serves as guidance for identifying areas essential to conservation of the Quino checkerspot butterfly to propose as critical habitat. This recovery plan is being finalized based on data from the 2003 adult butterfly flight season and public comments received on the draft recovery plan. The final recovery plan (Service, in prep.) details a strategy for recovering the butterfly to the point at which it can be downlisted to threatened. This recovery strategy focuses on lands described as essential for the long term conservation of the Quino checkerspot butterfly because they: (1) Contain extant populations that must be managed to recover the species; (2) provide landscape connectivity or linkages among populations, or at least are required to maintain natural long term resilience and genetic exchange among smaller populations or metapopulations; or (3) contain habitats that were part of a historical population distribution adjacent to occupied areas and either contain habitat necessary to support the expansion of small, low-density populations or have the potential to contain suitable habitat for them if they are restored.

Areas supporting core populations (large occurrence complexes) of the Quino checkerspot butterfly, or that have the potential to support core populations (i.e., areas currently containing or supporting primary constituent elements), are essential to the long term conservation of the species because they represent the foundation for continued persistence of the species. Furthermore, some habitat areas that would not be considered essential if they were geographically isolated are, in fact, essential when situated in locations where they facilitate continued landscape connectivity among surrounding local populations or otherwise play a significant role in maintaining metapopulation viability (e.g., by providing sources of immigrants to recolonize adjacent habitat patches following periodic extirpation events). Populations on the periphery of the species' range, or in atypical environments, are important for maintaining the genetic diversity of the species and could be essential to evolutionary adaptation to rapidly changing climatic and environmental conditions (Lesica and Allendorf 1995).

In the proposed designation of critical habitat for the Quino checkerspot butterfly we used a 4.8 km (3 mi) radius from each recent occurrence to define areas essential to the conservation of the butterfly. Following the proposal, we re-evaluated the use of this approach based on public comments and data in peer-reviewed literature. In the final recovery plan (Service, in prep.), we define spatially clustered Quino checkerspot butterfly observations as occurrence complexes. Based on our understanding of likely Quino movement patterns, occurrence complexes are delineated and mapped using a 1 km (0.6 mi) dispersal distance around recent butterfly occurrences. This method ensures inclusion of the habitat likely used by the butterflies in each observation. We have based this final critical habitat designation on these occurrence complexes. For portions of this final critical habitat designation (the Temecula/Murrieta/Oak Grove subunit and the Otay unit), we used a configuration of the mapped occurrence complexes that provided for landscape connectivity and viable Quino checkerspot butterfly metapopulations. In these two areas, we mapped the distribution of the occurrence complexes defined by the 1 km (0.6 mi) dispersal distance around recent butterfly occurrences and evaluated those intervening lands proximal to the complexes. Initially, we evaluated lands that were included in the proposal. For this final rule, we then defined critical habitat by first connecting the outer tangents of complexes, thereby including the essential lands among complexes, to form a cohesive unit that would provide for survival and conservation of regional populations. We made the determination that the lands among the complexes are essential based on knowledge of the ecology of the Quino checkerspot butterfly, the relationship of occurrence complexes to each other, interpretation of aerial photography, GIS land use coverage, and information from field visits. Finally, we excluded lands within the complex configuration that we knew were not essential, for example, developed areas greater than 2.0 ha (5.0 ac), and lands dominated by Tecate cypress woodland.

We then used these occurrence complexes to prepare initial maps of the final critical habitat units. Where occurrence complexes are relatively close to each other, within about 4.8 km (3 mi) of another occurrence complex, we prepared the initial unit maps by connecting the peripheries of all the nearby occurrence complexes. Based on what we understand about Quino checkerspot butterfly dispersal behavior, we believe the butterflies within these areas represent a regional metapopulation; the occurrence complexes may represent subpopulations of these metapopulations which are located close enough to other subpopulations to provide for recolonization in the event of local extirpation.

As we discussed above, 4.8 km (3 mi) is the maximum estimated 10-year recolonization distance using a stepping-stone dispersal model, based on results from the Morgan Hill bay checkerspot population (Harrison et al. 1988); that is, it is unlikely that populations located more than 4.8 km (3 mi) from the nearest known population play a significant role in maintaining a metapopulation (unless there are closer populations we have not yet identified). However, for specific reasons described below for each unit, we believe that several of these more isolated occurrence complexes are in areas essential to the conservation of the butterfly. We used a different approach, similar to that which we used in the proposed rule, to develop initial unit

maps for these isolated occurrences. In these cases, we initially evaluated areas that were included in the proposal and were within 4.8 km (3 mi) of each recent observation. We made the determination that the lands surrounding the occurrences are essential based on knowledge of the ecology of the Quino checkerspot butterfly, interpretation of aerial photography, GIS land use coverage, and information from field visits. Finally, we excluded all lands within 4.8 km (3 mi) of occurrences that available data indicated were not essential, for example, agricultural areas greater than 2.0 ha (5.0 ac) and hills with very little vegetation dominated almost entirely by boulders and exposed rock. We believe that this identifies the minimum area needed to provide sufficient habitat to support the long-term conservation of the butterfly in these locations. This method was used to map isolated occurrence complexes in the Hartford Springs subunit of Unit 1, the Brown Canyon subunit of Unit 2, and the Jacumba Unit.

For the Lake Mathews/Estelle Mountain Reserve subunit of Unit 1 that is currently not known to be occupied, we used a variation of the methodology based on the 4.8 km (3 mi) dispersal radii. In the proposed designation, we used the 4.8 km (3 mi) method based on 1998 occurrence data and expanded the subunit to include an additional portion of the Lake Mathews/Estelle Mountain Reserve to the south that was not captured. For this final designation, we limited critical habitat in this subunit to only those lands within the Lake Mathews/Estelle Mountain Reserve. This reserve captures the highest quality habitat known to remain within the dispersal radius and is the focal point of future recovery efforts (Service, in prep.).

For the development of this final designation we also took into consideration information provided through public comments, the draft and final economic analyses, and biological information that became available since the proposed designation was published. This latter information included data from the 2001 adult butterfly flight season, which corroborated and further supported decisions made during the development of the proposed designation in most cases. In general, the data from the 2001 flight season: (1) Provided additional support for the inclusion of areas into critical habitat that we determined to be essential during the development of the proposed rule; (2) indicated several areas believed to be essential but not known to be occupied were now, in fact, occupied (specifically in the northeastern portion of Unit 3); and (3) documented several new areas of occupancy outside of proposed critical habitat. These areas outside of proposed critical habitat, in which the Quino checkerspot butterfly has recently been documented (2001), have not been included in this final designation. These new occurrences are discussed later in the Critical Habitat and Summary of Comments and Recommendations sections of this final rule.

We identified and mapped areas essential to the conservation of the species using the configuration of occurrence complexes and the characteristics of essential habitat described above. The initial unit and subunit maps were based on interpretation of aerial photography at a scale of 1:24,000 (comparable to the scale of a 7.5 minute U.S. Geological Survey Quadrangle topographic map) and current digital ortho-photography. We then revised these initial units based on other information, including boundaries of approved habitat conservation plans (HCPs), information developed through section 7 consultations, boundaries of active restoration efforts for the butterfly, and information obtained from ongoing analyses used for the development of reserve systems for future conservation plans that may cover the butterfly (*e.g.*, Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)). Additionally, in Riverside County (Units 1 and 2), we used an updated GIS land use coverage from the County of Riverside to exclude lands greater than or equal to 2.0 ha (5.0 ac) designated as urban or intense agriculture. A comparable updated GIS coverage was not available for use for San Diego County. However, we attempted to manually exclude areas of similar description from those critical habitat units (Units 3 and 4).

For the purpose of this designation, critical habitat units have been described using Universal Transverse Mercator (UTM) North American Datum of 1927 (NAD 27) coordinates derived from a 100-m grid that approximated the essential critical habitat line delineated from digital aerial photography with the exception of the Lake Mathews portion of Unit 1 and Unit 3 (Otay Unit). The Lake Mathews portion of Unit 1 was described referencing the Lake Mathews/Estelle Mountain Reserve. The Otay Unit was described using a combination of UTM coordinates and boundaries for the Multiple Habitat Preservation Area, the County of San Diego's pre-approved mitigation areas, the Major Amendment Areas, State and Federal lands, and State Route 94.

In defining critical habitat boundaries, we made an effort to exclude all developed areas, such as towns, housing developments, and other lands unlikely to contain primary constituent elements essential for Quino checkerspot butterfly conservation. Our 100-m UTM grid minimum mapping unit was designed to minimize the amount of development along the urban edge included in our designation. However, this minimum mapping unit did not allow us to exclude all developed areas, such as buildings, paved or improved roads, aqueducts, railroads, other paved areas, lawns, large areas of closed canopy woody vegetation such as chaparral and cypress, active agricultural fields, and other urban landscaped areas that do not contain primary constituent elements. Federal actions limited to these areas would not trigger a section 7 consultation unless they would affect the species and/or primary constituent elements in adjacent critical habitat.

Critical Habitat

The approximate area encompassing the designation of critical habitat for the Quino checkerspot butterfly by county and land ownership is shown in Table 1.

TABLE 1. APPROXIMATE CRITICAL HABITAT IN HECTARES (HA) (ACRES (AC)) BY COUNTY AND LAND OWNERSHIP (AREA ESTIMATES REFLECT CRITICAL HABITAT UNIT BOUNDARIES.[1])

County	Federal[2]	Tribal	Local/State	Private	Total
Riverside	3,985 ha (9,850 ac)	525 ha (1,300 ac)	4,805 ha (11,875 ac)	29,945 ha (74,005 ac)	39,260 ha (97,030 ac)
San Diego	9,785 ha (24,175 ac)	0 ha (0 ac)	3,800 ha (9,395 ac)	16,595 ha (41,005 ac)	30,180 ha (74,575 ac)

TABLE 1. APPROXIMATE CRITICAL HABITAT IN HECTARES (HA) (ACRES (AC)) BY COUNTY AND LAND OWNERSHIP (AREA ESTIMATES REFLECT CRITICAL HABITAT UNIT BOUNDARIES.[1])—Continued

County	Federal[2]	Tribal	Local/State	Private	Total
Total	13,770 ha (34,025 ac)	525 ha (1,300 ac)	8,605 ha (21,270 ac)	46,540 ha (115,010 ac)	69,440 ha (171,605 ac)

[1] Approximate hectares have been converted to acres (1 ha = 2.47 ac). Based on the level of imprecision of mapping at this scale, approximate hectares and acres have been rounded to the nearest 5.
[2] Federal lands include Bureau of Land Management (BLM, Department of Defense (DOD), National Forest, and Service lands).

Critical habitat includes Quino checkerspot butterfly habitat throughout the species' current range in the United States (i.e., Riverside and San Diego Counties, California). Lands designated are under private, local, State, Federal, and Tribal ownership, with Federal lands including lands owned or managed by BLM, Forest Service, DOD, and the Service. Lands designated as critical habitat have been divided into four critical habitat units.

We are designating critical habitat on lands that are considered essential to the conservation of the Quino checkerspot butterfly. Using the recovery plan for guidance (Service, in prep.), we determine that an area is essential if it has one or more of the following characteristics: (1) Lands considered to be occupied within recovery unit boundaries that are part of occurrence complexes identified in the recovery plan (Service, in prep.); (2) lands that provide landscape connectivity among occurrence complexes; and (3) lands not known to be occupied that contain confirmed historic Quino checkerspot butterfly locations identified as essential in the recovery plan (Service, in prep.). In this final rule, we are designating approximately 2,450 ha (6,050 ac) of land within the Estelle Mountain Reserve in Unit 3 (western Riverside County) that is currently not known to be occupied by the Quino checkerspot butterfly.

Areas designated as critical habitat are designed to provide sufficient habitat to maintain self-sustaining populations of the Quino checkerspot butterfly throughout its range and provide those habitat components essential for the conservation of the species. Critical habitat units are configured to provide for metapopulation dynamics, including dispersal, which, as stated in the recovery plan (Service, in prep.), are essential for the conservation of the species.

A brief description of each unit and the reasons for proposing to designate it as critical habitat are presented below.

Unit 1: Lake Mathews Unit

Unit 1 encompasses approximately 5,765 ha (14,250 ac) within the northwestern portion of Riverside County and occurs within the Northwest Riverside Recovery Unit described in the recovery plan. All habitat identified as essential in this recovery unit is being designated as critical habitat, except the habitat within the Lake Mathews MSHCP, which is being excluded under section 4(b)(2) of the Act (discussed below in the section entitled "Exclusions Under Section 4(b)(2)"). Approximately 220 ha (540 ac) of this unit is Federal land, approximately 2,655 ha (6,565 ac) is State or local government land, and the remaining 2,890 ha (7,145 ac) is private land. This unit is divided into two subunits: The Harford Springs subunit and the Lake Mathews/Estelle Mountain Reserve subunit.

The Harford Springs subunit includes approximately 3,220 ha (8,200 ac) of lands, including Harford Springs County Park. Quino checkerspot butterflies were observed in Harford Springs County Park in 1998. This site was once part of a more extensive, well-documented distribution with one of the most well-known historic collection localities (i.e., Lilly Hill). The Quino checkerspot butterfly was historically abundant in this area, with consistently high densities reported by collectors from the 1950s to the mid 1980s (Orsak 1978; K. Osborne and C. Pratt, pers. comm., 2000).

The Lake Mathews/Estelle Mountain Reserve subunit, about 2,450 ha (6,050 ac) in size, is currently not known to be occupied, but considered essential to the conservation of the species (Service, in prep.). This subunit contains the Lake Mathews population site. Quino checkerspot butterflies were last observed at the southern margin of Lake Mathews in 1982 (Carlsbad Fish and Wildlife Office GIS Quino checkerspot butterfly database and metafile) when dozens of butterflies were documented. Similar to the area containing the Harford Springs occurrence complex, the Quino checkerspot butterfly was historically abundant at this location. Essential habitat for the butterfly exists in the vicinity of Lake Mathews and within the Lake Mathews/Estelle Mountain Reserve established for the Stephens' kangaroo rat, which is directly south of the Lake (Service, in prep.). As discussed later in this rule, the lands within the Lake Mathews MSHCP, where the 1982 occurrences were documented, have been excluded from critical habitat designation because the Lake Mathews MSHCP provides coverage for the Quino checkerspot butterfly. The land including the butterfly habitat, within the Lake Mathews/Estelle Mountain Reserve in the south is not currently managed for the Quino checkerspot butterfly. This area is considered essential and included in designated critical habitat because: (1) The butterfly was historically regionally abundant, as recently as 1982; (2) quality habitat containing the primary constituent elements exists; and (3) it is the focus of restoration and reestablishment efforts as described in the recovery plan (Service, in prep.).

The Harford Springs and Lake Mathews/Estelle Mountain Reserve subunits are characterized by diverse topography and high-quality habitat patches, with extensive, dense stands of dwarf plantain in open spaces within (usiper woodland, coastal) sage scrub, and grassland communities. Landscape connectivity still exists between Harford Springs County Park and the Lake Mathews area. The Lake Mathews/Estelle Mountain Reserve also contains possibly the "largest continuous stand of dwarf plantain in Riverside County," south of Lake Mathews in the vicinity of Black Rocks, west of Monument Peak (K. Osborne, pers. comm., 2000).

Unit 2: Southwest Riverside Unit

Unit 2 encompasses approximately 34,760 ha (85,950 ac) within southwestern Riverside County and northern San Diego County. This critical habitat unit supports all or part of 21 of the 22 occurrence complexes identified as important to Quino checkerspot butterfly recovery in the southwestern Riverside region (Service, in prep.). Mapped portions of some of the complexes identified as important to

recovery to the final recovery plan (Service, in prep.) were not designated because those portions fell outside the proposed critical habitat. Under the Act and the Administrative Procedure Act (5 U.S.C. 702 & 706), we are required to allow the public an opportunity to comment on the proposed rulemaking. Therefore, we are unable to include this area in the final rule. This critical habitat similarly contains two subunits, the Brown Canyon subunit and the Temecula/Murrieta/Oak Grove subunit. All lands within this critical habitat unit (i.e., both subunits) are considered to be occupied by the Quino checkerspot butterfly.

Unit 2 includes approximately 3,955 ha (9,775 ac) of Federal lands; an estimated 525 ha (1,300 ac) of lands within the Cahuilla Band of Mission Indians' Reservation, just north of the Silverado Ranch mitigation bank; approximately 2,150 ha (5,310 ac) of lands under State or local jurisdictional ownership; and an estimated 28,150 ha (69,565 ac) of lands in private ownership. We discuss the relationship of designated critical habitat for the Quino checkerspot butterfly to the inclusion of lands within the Cahuilla Band of Mission Indians' Reservation below (see the section "Government-to-Government Relationship With Tribes").

The Brown Canyon subunit encompasses approximately 4,915 ha (12,140 ac) of land east-southeast of the town of Hemet in Riverside County. This subunit contains the Brown Canyon occurrence complex, a persistent population identified as essential in the recovery plan (Service, in prep.). Because it is not proximal to other occurrence complexes in Unit 2, and may lack landscape connectivity with the main Temecula/Murrieta/Oak Grove subunit, this subunit has been defined using the 4.8 km (3 mi) dispersal radius to maintain a critical mass of habitat (refer to the Criteria Used To Identify Critical Habitat section of this final rule). The Brown Canyon occurrence complex is the northeastern-most complex within the current range of the butterfly, and is contiguous with the last remaining undeveloped landscape corridor to the northern portion of its former range. If the species is undergoing a northern range shift, as hypothesized (Parmesan 1996 as discussed in the draft recovery plan, Service 2001), this occurrence complex potentially represents the only remaining route for northern expansion of the species. Further, the resiliency of this population has not likely been compromised by habitat impacts associated with development and recreational use due to the insulation provided by surrounding hilly terrain and publicly owned lands.

The Temecula/Murrieta/Oak Grove subunit encompasses approximately 29,865 ha (73,810 ac) in southwest Riverside County. This unit stretches east from Interstate 215 near the towns of Murrieta and Temecula to the mountains and desert edge, north to near the town of Hemet in Riverside County, and south to Oak Grove Valley in San Diego County.

Recent observations have been recorded throughout the Temecula/Murrieta/Oak Grove subunit, indicating a degree of landscape connectivity throughout, especially in the less-urbanized eastern areas. Several large occurrence complexes are found within the subunit in the vicinity of Warm Springs Creek near the town of Murrieta, in the vicinity of Lake Skinner within the proposed Southwest Riverside County Multiple Species Reserve, and on BLM and pre-approved mitigation lands at Oak Mountain, near Wilson Valley, and south of the Cahuilla Band of Mission Indians' Reservation. The easternmost Quino checkerspot butterfly population is a recent extension of the known geographic and elevational range for the species (Pratt et al., submitted). A new primary host plant for the species, white snapdragon, was documented in this area in 2001 and represents a vital element of habitat heterogeneity in the species' range. The Scottish Road occurrence complex (northeast of the town of Anza in Riverside County) occurs at the periphery of the known regional butterfly distribution within the recovery unit and outside of critical habitat. However, this occurrence complex is not included in designated critical habitat because it was first documented in 2001 following the publication of the proposal and we do not currently have sufficient information concerning habitat within the complex and landscape connectivity to other complexes to determine that it is essential to the conservation of the species.

Unit 3: Otay Unit

Unit 3 encompasses approximately 26,075 ha (64,430 ac) within the southwestern portion of San Diego County. Land ownership for this unit includes approximately 9,440 ha (23,330 ac) of Federal land, including 180 ha (450 ac) of the Naval Space Surveillance Station managed by the DOD and lands within the San Diego National Wildlife Refuge (SDNWR) Otay-Sweetwater Unit; approximately 1,620 ha (3,945 ac) under State or local jurisdictional ownership; and approximately 13,075 ha (32,165 ac) that are privately owned. All lands within this critical habitat unit are considered to be occupied by the Quino checkerspot butterfly.

Lands encompassed by this unit stretch south from the San Diego National Wildlife Refuge (SDNWR) Otay-Sweetwater Unit and State Route 94 to the international border with Mexico, west along Otay River Valley and the northern rim of Otay Mesa, and east to the town of Tecate. Unit 3 supports all or part of 12 of the 13 occurrence complexes identified in the final recovery plan (Service, in prep.) as important to recovery in southwestern San Diego County. Mapped portions of some of the complexes identified as important to recovery in the final recovery plan (Service, in prep.) were not designated because those portions fell outside the proposed critical habitat.

Recent Quino checkerspot butterfly observations are concentrated in lower elevation areas surrounding east Otay Valley, Otay Mountain, the Jamul Mountains, and San Miguel Mountain. The Otay Lakes area historically supported large populations that extended south to Otay Mesa and across the international border (White and Levin 1981, Murphy and White 1984). The western portion of this unit contains the only known occupied habitat with a marine climate influence, an environmental factor prevalent throughout most of the species' historic range and thought to be beneficial to population resiliency because it provides climatic stability and higher average humidity, minimizing host plant susceptibility to drought (Service, in prep.). The Otay area west of the mountain, therefore, represents a vital element of habitat heterogeneity within the species' range.

The Dulzura Occurrence Complex was documented during the 2001 flight season outside of proposed critical habitat. Based on an initial analysis during the scoping amendment process for the MSCP in late 2001, we determined that this occurrence complex is essential to the conservation of the Quino checkerspot butterfly. Under the Act and the Administrative Procedure Act (5 U.S.C. 702 & 706), we are required to allow the public an opportunity to comment on the proposed rulemaking. Therefore, because the Dulzura Occurrence Complex was not in the proposed rule we are unable to include this area in the final rule. Due to the short court-ordered schedule for completing this designation and budgetary constraints, we are unable to re-propose critical habitat at this time.

It is important to note that the land that supports the Dulzura occurrence complex does not appear to be threatened by actions that may negatively affect the butterfly or its habitat. The land that supports this new occurrence complex is primarily in a designated wilderness area owned and managed by the BLM. Because of regulations governing designated wilderness areas (e.g., minimizing development and off-road impacts), habitat essential to the Quino checkerspot butterfly is unlikely to be impacted by such threats. We will continue to work closely with BLM concerning the protection and management of the Quino checkerspot butterfly in this area. Further, as indicated, the occurrence complex is being considered in the current amendment process to the MSCP. If amended, the MSCP will provide for additional protections and management for the Quino checkerspot butterfly and its habitat. Furthermore, because the area is occupied by the butterfly, any actions that have a Federal nexus and may affect the butterfly will require consultation under section 7 of the Act.

Unit 4: Jacumba Unit

Unit 4 encompasses approximately 2,820 ha (9,970 ac) of land in southeastern San Diego County south of Interstate 8 in the vicinity of the town of Jacumba. This critical habitat unit supports the Jacumba occurrence complex identified as important to recovery in the recovery plan. Land ownership for this unit includes approximately 154 ha (380 ac) of Federal land, approximately 180 ha (450 ac) under State or local jurisdictional ownership, and approximately 2,485 ha (6,145 ac) under private ownership. All lands within this critical habitat unit are considered to be occupied by the Quino checkerspot butterfly.

The Jacumba occurrence complex occurs within the Southeast San Diego Recovery Unit described in the recovery plan (Service, in prep.). This apparently isolated population center occurs in a unique high-desert region of juniper woodlands, which provides a vital element of habitat heterogeneity in the species' range. Recent Quino checkerspot butterfly observations are concentrated northwest of the community of Jacumba in Anza Borrego Desert State Park and private lands. The metapopulation distribution likely extends south across the international border. Occupancy has been documented approximately 6 km (3.7 mi) to the south in El Cajon (Baja California, Mexico) and the U.S. occurrence complex may belong to the same metapopulation.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a) of the Act requires Federal agencies, including the Service, to ensure that actions they fund, authorize, or carry out do not destroy or adversely modify critical habitat. Destruction or adverse modification occurs when a Federal action directly or indirectly alters critical habitat to the extent it appreciably diminishes the value of critical habitat for the conservation of the species. Individuals, organizations, States, local governments, and other non-Federal entities are affected by the designation of critical habitat only if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened, and with respect to its critical habitat, if any is designated or proposed. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with us on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. Conference reports provide conservation recommendations to assist the agency in eliminating conflicts that may be caused by the proposed action. The conservation recommendations in a conference report are advisory.

We may issue a formal conference report, if requested by the Federal action agency. Formal conference reports include an opinion that is prepared according to 50 CFR 402.14, as if the species was listed or critical habitat was designated. We may adopt the formal conference report as the biological opinion when the species is listed or critical habitat is designated, if no substantial new information or changes in the action alter the content of the opinion (see 50 CFR 402.10(d)).

If a species is listed or critical habitat is designated, section 7(a)(2) of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Through this consultation, the Federal action agency would ensure that the permitted actions do not destroy or adversely modify critical habitat.

If we issue a biological opinion concluding that a project is likely to result in the destruction or adverse modification of critical habitat, we would also provide reasonable and prudent alternatives to the project, if any are identifiable. Reasonable and prudent alternatives are defined at 50 CFR 402.02 as alternative actions identified during consultation that can be implemented in a manner consistent with the intended purpose of the action, that are consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that the Director believes would avoid destruction or adverse modification of critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate consultation on previously reviewed actions in instances where critical habitat is subsequently designated and the Federal agency has retained discretionary involvement or control over the action or such discretionary involvement or control is authorized by law. Consequently, some Federal agencies may request reinitiation of consultation with us on actions for which formal consultation has been completed if those actions may affect designated critical habitat.

Activities on Federal lands that may affect the Quino checkerspot butterfly or its critical habitat will require section 7 consultation. Activities on private or State lands requiring a permit from a Federal agency, such as a permit from the U.S. Army Corps of Engineers (Corps) under section 404 of the Clean Water Act, or some other Federal action, including funding (e.g., from the Federal Highway Administration, Federal Aviation Administration, Federal Emergency Management Agency, or Natural Resources Conservation Service) will also continue to be subject to the section 7 consultation process. Federal actions not affecting listed species or critical habitat and actions on non-Federal lands that are not federally funded or permitted do not require section 7 consultation.

Section 4(b)(8) of the Act requires us to evaluate briefly in any proposed or final regulation that designates critical

habitat those activities involving a Federal action that may adversely modify such habitat or that may be affected by such designation. Activities that may result in the destruction or adverse modification of critical habitat include those that alter the primary constituent elements to an extent that the value of critical habitat for the survival and recovery of the Quino checkerspot butterfly is appreciably reduced. We note that such activities also may jeopardize the continued existence of the species.

To properly portray the effects of critical habitat designation, we must first compare the section 7 requirements for actions that may affect critical habitat with the requirements for actions that may affect a listed species. Section 7 prohibits actions funded, authorized, or carried out by Federal agencies from jeopardizing the continued existence of a listed species or destroying or adversely modifying the listed species' critical habitat.

Actions likely to result in the destruction or adverse modification of critical habitat would almost always result in jeopardy to the species concerned, particularly when the area affected by the proposed action is occupied by the species concerned. In those cases, critical habitat provides little additional protection to a species, and the ramifications of its designation are few or none. However, critical habitat designation in unoccupied areas may trigger consultation under section 7 of the Act where it would not have otherwise occurred if critical habitat had not been designated.

Federal agencies already consult with us on activities in areas currently occupied by the species to ensure that their actions do not jeopardize the continued existence of the species. These actions include, but are not limited to:

(1) Regulation of activities affecting waters of the United States, including vernal pool and other Quino checkerspot butterfly habitat areas in watersheds, by the Corps under section 404 of the Clean Water Act;

(2) Regulation of grazing, mining, and recreation by the BLM, Forest Service or the Service;

(3) Road construction and maintenance, right-of-way designation, and regulation of agricultural activities on Federal land by BLM, Forest Service, DOD, and the Service;

(4) Regulation of airport improvement activities by the Federal Aviation Administration jurisdiction;

(5) Construction of roads and fences along the International Border with Mexico and immigration enforcement activities by the Immigration and Naturalization Service/Border Patrol that take place in Quino checkerspot butterfly habitat;

(6) Hazard mitigation and post-disaster repairs funded by the Federal Emergency Management Agency;

(7) Construction of communication sites licensed by the Federal Communications Commission;

(8) Activities funded by the U. S. Environmental Protection Agency, Department of Energy, or any other Federal agency; and

(9) Construction of fire breaks by the BLM, Forest Service, Service, or other Federal agencies for the maintenance or control of fire management and suppression activities.

Federal agencies already consult with us on activities in areas currently occupied by the species, or if the species may be affected by the action, to ensure that their actions do not jeopardize the continued existence of the species. In the area designated as critical habitat that is currently not known to be occupied by the Quino checkerspot butterfly, we already consult on other listed species, including the coastal California gnatcatcher (Polioptila californica californica) and the Stephens' kangaroo rat (Dipodomys stephensi), and have designated critical habitat. Thus, we do not anticipate a significant additional regulatory burden will result from the designation of critical habitat for the Quino checkerspot butterfly.

If you have questions regarding whether specific activities will constitute adverse modification of critical habitat, contact the Field Supervisor, Carlsbad Fish and Wildlife Office (see **ADDRESSES** section). Requests for copies of the regulations on listed wildlife, and inquiries about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Branch of Endangered Species, 911 N.E. 11th Avenue, Portland, Oregon 97232 (telephone 503/231–6131; facsimile 503/231–6243).

Exclusions Under Section 4(b)(2)

Subsection 4(b)(2) of the Act allows us to exclude areas from critical habitat designation where the benefits of exclusion outweigh the benefits of designation, provided such exclusion will not result in the extinction of the species. For the following reasons, we believe that in most instances, the benefits of excluding legally operative HCPs, for which the Quino checkerspot butterfly is a covered species and take has been authorized, from critical habitat designations will outweigh the benefits of including them.

1. Benefits of Inclusion

The benefits of including HCP lands in critical habitat are normally small. The principal benefit of any designated critical habitat is that activities that may affect such habitat require consultation under section 7 of the Act. Such consultation would ensure that adequate protection is provided to avoid adverse modification of critical habitat. Where HCPs are in place, our experience indicates that this benefit is small or non-existent. Currently approved and permitted HCPs are already designed to ensure the long term survival of covered species within the plan area. Where we have an approved HCP, lands that we ordinarily would define as critical habitat for the covered species will normally be protected in reserves and other conservation lands by the terms of the HCPs and their implementing agreements. These HCP's and Implementing Agreements (IAs) include management measures and protections for conservation lands that are crafted to protect, restore, and enhance their value as habitat for covered species.

In addition, an HCP application itself requires consultation under section 7 of the Act. As part of this process, we are required to evaluate the issuance of incidental take permits for a proposed action to ensure that the action as proposed would not jeopardize the continued existence of the species covered under the HCP or result in the destruction or adverse modification of designated critical habitat. Because HCPs, particularly large regional HCPs, address land use within the plan boundaries, habitat issues will have been thoroughly addressed in the HCP and through consultation on the HCP. Our experience is also that, under most circumstances, consultations under the jeopardy standard will achieve the same result as consultations under the adverse modification standard.

Further, HCPs typically provide greater conservation benefits to a covered species than section 7 consultations because HCPs assure the long term protection and management of a covered species and its habitat, and funding for such management, through the standards found in the Joint Service and National Marine Fisheries Service HCP Handbook, 5-Point Addendum to the HCP Handbook (64 FR 35242), and the HCP No Surprises regulation (63 FR 8859). Such assurances are typically not provided by section 7 consultations which, in contrast to HCPs, often do not commit the project proponent to implementing long-term special management or protections. Thus, a

consultation typically does not accord the lands it covers the extensive benefits an HCP provides.

The development and implementation of HCPs provide other important conservation benefits, including the collection and development of additional biological information to guide conservation efforts and assist in species recovery, and the creation of innovative solutions to conserve species while allowing for development. The educational benefits of critical habitat, including informing the public of areas that are important for the long-term survival and conservation of the species, are essentially the same as those that would occur from the public notice and comment procedures required to establish an HCP, as well as the public participation that occurs in the development of many regional HCPs. For these reasons, we believe that designation of critical habitat has little benefit in areas covered by approved and legally operative HCPs.

2. Benefits of Exclusion

The benefits of excluding HCPs from designation as critical habitat may be more significant than the benefits of including HCPs in critical habitat. Benefits include relieving landowners, communities, and counties of any additional minor regulatory review that might be imposed by critical habitat. Many HCPs, particularly regional HCPs, take many years to develop and, upon completion, become regional conservation plans that are consistent with the recovery of covered species. Most regional plans benefit many species, both listed and unlisted. Imposing additional regulatory review after HCP completion may jeopardize conservation efforts and partnerships in many areas, and could be viewed as a disincentive to those developing HCPs. Excluding HCPs provides us with an opportunity to streamline regulatory compliance and confirm regulatory assurances for HCP participants.

A related benefit of excluding HCPs is that it would encourage the continued development of partnerships with HCP participants, including States, local governments, conservation organizations, and private landowners, that together can implement conservation actions we would be unable to accomplish alone. By excluding areas covered by HCPs from critical habitat designation, we preserve these partnerships and, we believe, set the stage for more effective conservation actions in the future.

In general, then, we believe the benefits of critical habitat designation to be small in areas covered by approved and legally operative HCPs. We also believe that the benefits of excluding HCPs from designation are significant. Weighing the small benefits of inclusion against the benefits of exclusion, including the benefits of relieving property owners of an additional layer of approvals and regulation, together with the encouragement of conservation partnerships, would generally result in HCPs being excluded from critical habitat designation under section 4(b)(2) of the Act.

Not all HCPs are alike with regard to species coverage and design. Within this general analytical framework, we need to evaluate completed and legally operative HCPs in which the Quino checkerspot butterfly is a covered species on a case-by-case basis to determine whether the benefits of excluding those particular areas outweigh the benefits of including them.

Relationship to Habitat Conservation Plans

Section 4(b)(2) of the Act allows us broad discretion to exclude from critical habitat designation areas where the benefits of exclusion outweigh the benefits of designation, provided the exclusion will not result in the extinction of the species. We expect that critical habitat may be used as a tool to identify those areas essential for the conservation of the species, and we encourage development of HCPs for such areas on non-Federal lands. HCPs currently under development are intended to provide for protection and management of habitat areas essential for the conservation of the Quino checkerspot butterfly, while directing development and habitat modification to nonessential areas of lower habitat value.

Only HCPs within the boundaries of designated critical habitat units are discussed here. Those approved and legally operative HCPs that provide coverage and incidental take approval for the Quino checkerspot butterfly have been excluded from this designation. These include the Assessment District 161 Subregional HCP; the Rancho Bella Vista HCP; and the Lake Mathews MSHCP in Riverside County that provide coverage and incidental take authorization for the Quino checkerspot butterfly.

The Riverside County Assessment District 161 Subregional HCP, which authorizes take of the Quino checkerspot butterfly, has been completed and approved. This HCP includes protection measures for Quino checkerspot butterfly habitat, habitat restoration research, educational outreach, and captive propagation. The Rancho Bella Vista HCP also occurs within the Riverside County Assessment District 161, but an independent HCP was approved for this project. Although no Quino checkerspot butterflies have been observed within the project boundaries, the butterfly is known from adjacent occupied habitat patches and is covered by the Rancho Bella Vista HCP. This HCP provides for conservation of the Quino checkerspot butterfly through monitoring of this species, habitat and dispersal corridor preservation and management, and habitat restoration and enhancement.

The Lake Mathews MSHCP has been completed and approved by the California Department of Fish and Game (CDFG) and the Service. As explained below in the Summary of Comments section and the Recommendations and Summary of Changes from the Proposed Rule section, this HCP and accompanying section 10(a)(1)(B) permits provide for conservation and management of Quino checkerspot butterfly habitat and take authorization for the butterfly. Although the Quino checkerspot butterfly has not been recently observed (since 1982) within reserve boundaries, dozens of butterflies were documented within the reserve during the 1981 and 1982 adult butterfly flight seasons.

The benefits of excluding lands covered by these HCPs would be significant in preserving positive relationships with our conservation partners, lessening potential additional regulatory review and potential economic burdens, reinforcing the regulatory assurances provided for in implementation agreements for approved HCPs, and providing for more established and cooperative partnerships for future conservation efforts.

In summary, excluding lands covered by HCPs in critical habitat designations outweigh the benefits of including lands covered by HCPs. Furthermore, we have determined in section 7 consultations on these approved HCPs that they would not jeopardize the continued existence of the Quino checkerspot butterfly, which means that they will not appreciably reduce likelihood of the survival and recovery of the species. Consequently, excluding these lands from the critical habitat designation will not result in the extinction of the species. Therefore, these lands have not been designated as critical habitat for the species.

Currently, there are several HCPs within the boundaries of designated critical habitat that are now under development or being amended to provide protection for the Quino

checkerspot butterfly and its habitat. These include the County of San Diego's Multiple Species Conservation Program (MSCP) Subarea Plan, the North San Diego County Subarea of the San Diego MSCP, and the Western Riverside MSHCP. These are discussed in more detail below.

The San Diego MSCP encompasses approximately 236,000 ha (582,606 ac) of southwestern San Diego County, and involves multiple jurisdictions. Approximately 69,600 ha (172,656 ac) are targeted to be conserved. We approved the overall MSCP and the City of San Diego's Subarea Plan in July 1997. The City of Poway's plan was approved in 1996; the County of San Diego's in 1998; San Diego Gas and Electric's in 1995; and the City of La Mesa's in 2000. Other jurisdictions, including the City of Chula Vista, are expected to complete their subarea planning processes in the near future. The Quino checkerspot butterfly is not a covered species for any of the approved subarea plans under the MSCP; therefore we are including areas essential to the conservation of the species that are covered by these subarea plans in designated critical habitat. However, both the County of San Diego and San Diego Gas and Electric are developing amendments to their permits to gain coverage for the Quino checkerspot butterfly, and the City of Chula Vista has included the Quino Checkerspot butterfly on its target list of species for coverage.

The Quino checkerspot butterfly is also a target species for the North San Diego County Subarea (Subarea) of the MSCP currently under development. This Subarea encompasses the area north of the MSCP planning areas and unincorporated lands east of the existing Multiple Habitat Conservation Program (another regional HCP currently being developed for northern San Diego County). Because the Quino checkerspot butterfly is not yet a covered species, we are including appropriate areas of this Subarea of the MSCP in this critical habitat designation.

The Western Riverside MSHCP was initiated by the County of Riverside on October 8, 1998. The planning area encompasses 530,000 ha (1.3 million ac) and is proposed to include conservation measures for over 100 species, including the Quino checkerspot butterfly. Currently, 12 cities within the western portion of Riverside County have endorsed, and will participate in, this planning effort. A draft Western Riverside MSHCP is proposed to be released for public review in 2002. Because this HCP is not yet completed, we are including lands within the planning area in this critical habitat designation.

Habitat conservation plans currently under development or being amended are intended to provide for the protection and management of habitat areas essential to the conservation of the Quino checkerspot butterfly, while directing developments and habitat modification to nonessential areas of lower habitat value. The HCP development process provides an opportunity for additional data collection and analysis regarding the use of particular habitat areas by the Quino checkerspot butterfly. The HCP process also enables us to conduct detailed evaluations of the importance of such lands to the long term survival of the species in the context of constructing a biologically configured system of linked habitat blocks. We fully expect that HCPs undertaken by local jurisdictions (e.g., counties, cities) and other parties will identify, protect, and provide appropriate management for those specific lands within the boundaries of the plans that are essential for the long term conservation of the species. We fully expect that our analyses of proposed HCPs will show that covered activities carried out in accordance with the provisions of the HCPs and accompanying section 7 biological opinions will not result in destruction or adverse modification of critical habitat.

We will provide technical assistance and work closely with applicants throughout the development of future HCPs to identify appropriate conservation and management actions. The take minimization and mitigation measures provided under these HCPs are expected to protect the essential habitat lands designated as critical habitat in this rule and provide for the conservation of the covered species. If an HCP or HCP amendment that addresses the Quino checkerspot butterfly is ultimately approved, we will reassess the critical habitat boundaries in light of the HCP. If, consistent with available funding and program priorities, we elect to revise this designation, we will do so through a subsequent rulemaking.

Should additional information become available that changes our analysis of the benefits of excluding any of these (or other) areas compared to the benefits of including them in the critical habitat designation, we may revise the designation. If, consistent with available funding and program priorities, we elect to revise this designation, we will do so through a subsequent rulemaking.

Summary of Comments and Recommendations

In the February 7, 2001, proposed critical habitat designation (66 FR 9476), we requested all interested parties submit comments on specifics of the proposal, including information related to biological justification, policy, treatment of HCPs, and proposed critical habitat boundaries. The first comment period closed on April 8, 2001. The comment period was reopened from June 20, 2001, to July 30, 2001 (66 FR 33048), to allow for additional comments on the proposed designation, and comments on the draft economic analysis of the proposed designation. Comments received after the close of this latter comment period were determined not to provide substantive comment that had not already been raised or addressed and entered into the supportive record for this rulemaking.

We contacted all appropriate State and Federal agencies, Tribes, county governments, elected officials, and other interested parties and invited them to comment. In addition, we invited public comment through the publication of notices in the following newspapers in southern California: San Diego Union Tribune and Riverside Press Enterprise on February 9, 2001, and again in both papers on June 20, 2001. In addition to inviting public comment on the proposed designation and the draft economic analysis for the proposed designation, the later notices announced the dates and times of public hearings on the proposed designation. These hearings were held on July 17, 2001, in Escondido, California from 1 p.m. to 4 p.m. and 6 p.m. to 8 p.m. Transcripts of these hearings are available for inspection (see **ADDRESSES** section).

We requested five biologists, who have knowledge of the Quino checkerspot butterfly and its ecology, peer review the proposed critical habitat designation. None of the peer reviewers submitted comments on the proposed critical habitat designation.

We received a total of 37 written comments during the two comment periods. Comments were received from 2 Federal agencies, 4 local agencies, and 22 separate private organizations or individuals. We reviewed all comments received for substantive issues and new information regarding critical habitat and the Quino checkerspot butterfly. Similar comments were grouped into three general issues relating specifically to the proposed critical habitat determination and draft economic analysis on the proposed determination. Comments were either incorporated directly into the final rule or final

addendum to the economic analysis or addressed in the following summary.

Issue 1: Biological Justification and Methodology

1. *Comment:* Several commenters requested that we take into consideration data collected from the 2001 adult butterfly flight season, as the best available science, while developing the final designation of critical habitat.

Our Response: As stated in several sections of this final designation, including the Methods and Summary of Changes from the Proposed Rule, we relied on data from the 2001 flight season to develop the boundaries of final critical habitat for the Quino checkerspot butterfly. Data from the 2001 flight season, for the most part, corroborated decisions made during the development of the proposed critical habitat, and identified several new areas of occupancy outside of lands defined in the proposal. Three areas outside of the proposed critical habitat, in which the Quino checkerspot butterfly was documented for the first time in 2001, have not been included in the final designation for reasons discussed in the Critical Habitat section of this rule.

2. *Comment:* The scale of proposed critical habitat for the Quino checkerspot butterfly is overly broad, resulting in vague unit boundaries. Several commenters questioned the biological justification for preparing critical habitat for the Quino checkerspot butterfly using such a landscape-scale approach when they believed that more precise information is available for use by the Service. Furthermore, several commenters voiced concern that their property was within proposed critical habitat boundaries for the Quino checkerspot butterfly even though their land contained no butterflies or primary constituent elements.

Our Response: We recognize that not all parcels of land designated as critical habitat will contain the habitat components essential to the conservation of the Quino checkerspot butterfly. Due to time constraints, and the absence of more detailed map information during the preparation of the proposed and final designations, we used a 100-m UTM grid and reserve boundaries to describe the boundaries of critical habitat. Additionally, we have revised and refined our approach to mapping Quino checkerspot butterfly critical habitat. Some lands included in the proposed designation have not been included in this final designation. Based on our refined methodology, we included only those lands that we believe to be essential to the conservation of the Quino checkerspot butterfly in the final designation of critical habitat.

In developing the final designation, we made an effort to minimize the inclusion of nonessential areas that do not contain the primary constituent elements for the butterfly. However, due to our mapping scale, some areas not essential to the conservation of the Quino checkerspot butterfly were included within the boundaries of final critical habitat. These areas, such as towns, housing developments, or other developed lands are unlikely to provide habitat for the butterfly. Because they do not contain one or more of the primary constituent elements for the species, Federal actions limited to these areas will not trigger a section 7 consultation, unless they affect the species or primary constituent elements in adjacent critical habitat.

3. *Comment:* The descriptions of the primary constituent elements of critical habitat for the Quino checkerspot butterfly are vague.

Our Response: The description of the primary constituent elements for the Quino checkerspot butterfly was based on the best available scientific and commercial data regarding the species, including a compilation of data from peer-reviewed published literature, unpublished or non-peer-reviewed survey and research reports, opinions of biologists knowledgeable about the Quino checkerspot butterfly and its habitat, and the draft recovery plan. We have updated the biological information, including the primary constituent elements, based on the 2001 adult butterfly flight season and refined their description in response to public comment. The primary constituent elements, as described in this final rule, represent our best estimate of what habitat components are essential for the conservation of the species. Please refer to the Primary Constituent Elements section of this final rule for a more detailed discussion of the primary constituent elements for the Quino checkerspot butterfly.

4. *Comment:* The proposed rule inappropriately uses a "recovery standard" to determine critical habitat, resulting in the inclusion of large areas in which the Quino checkerspot butterfly is not known to occur or have occurred. The Service ignores the intent of Congress to designate only occupied areas and those areas essential to a species' conservation and the Service has failed to determine if these unoccupied areas are essential to the Quino checkerspot butterfly.

Our Response: The definition of critical habitat in section 3(5)(A) of the Act includes "(i) specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species." The term "conservation," as defined in section 3(3) of the Act, means "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary."

The draft recovery plan (Service 2001) and the final recovery plan (Service, in prep.) detail efforts required to meet recovery needs of the Quino checkerspot butterfly, and provide a description of habitat attributes essential to the survival and recovery of the species. We did not include all areas currently occupied by butterfly, but designated those areas that possess core populations, have unique ecological characteristics, and/or represent the historic geographic areas where the species can be re-established. After weighing the best available information including both the draft and final (Service, in prep.) versions of the recovery plan, we conclude that the areas designated by this final rule, including areas that are not known to be currently occupied, are essential for the recovery of the species and eventual removal from the List of Endangered and Threatened Species.

5. *Comment:* Several commenters were concerned with the methodology by which we defined areas that we believed to be occupied in the proposed designation of critical habitat.

Our Response: In the proposed designation of critical habitat for the Quino checkerspot butterfly we used a 4.8-km (3 mi) radius from each occurrence to define occupancy and lands essential to the conservation of the butterfly. This distance was based on the maximum recolonization distance over a 10-year period of a peripheral (island) habitat patch from the core (mainland) patch documented in the Morgan Hill bay checkerspot metapopulation (Harrison *et al.* 1988). Following the proposal, we re-evaluated how we defined occupancy in those areas.

For this final rule, we mapped known occurrences using a 1 km (0.6 mi) dispersal distance around recent

butterfly observations. Occurrences within 1 km (1.2 mi) of each other, where the 1 km (0.6 mi) dispersal radii intersect, are considered part of the same occurrence complex. To map the critical habitat units for this final designation, we connected the outer periphery of nearby occurrence complexes. The specific, final configuration around these complexes is based on local and regional habitat variability, final recovery plan (Service, in prep.) recommendations, and ongoing restoration and re-establishment efforts for the butterfly that provide for viable Quino checkerspot butterfly metapopulations.

6. *Comment:* Several commenters were concerned that we based much of our information pertaining to dispersal distances, and therefore, occupancy and critical habitat, on research done with a surrogate species, the bay checkerspot butterfly.

Our Response: In the biological sciences, information is not always known concerning the biology, ecology, behavior, etc., of each plant or animal species. In cases when information is lacking on a species of interest, it has been a common practice of scientists to extrapolate trends, or other relevant data, from research that has been conducted on similar species. Because research on the Quino checkerspot butterfly is limited, much of data we use concerning biological and ecological trends, including behavior, has been extrapolated from research on other subspecies of Edith's checkerspot, especially the ecologically similar bay checkerspot butterfly.

As discussed in the background section of this rule, researchers have spent over three decades conducting extensive focused research on Edith's checkerspot subspecies, in particular the federally listed bay checkerspot butterfly. While an extraordinary amount of information is available on Edith's checkerspot in general, specific information on the Quino checkerspot is sparse (Murphy and White 1984, Mattoni *et al.* 1997, Osborne and Redak 2000), including only two formal ecological studies (White and Levin 1981, Osborne and Redak 2000). Therefore, much of the information on which we have based the recovery and management strategy for the Quino checkerspot butterfly, as discussed in the final recovery plan (Service, in prep.), and critical habitat designation comes from research on other subspecies of Edith's checkerspot. Because of the biological and ecological similarities between these two subspecies of Edith's checkerspot, including shared host plant species, a primarily coastal (historic) distribution, and similar within-patch dispersal behavior (Mattoni *et al.* 1997, White and Levin 1981), we are confident that the bay checkerspot is a reasonable surrogate species from which to extrapolate the results of research. We believe this is among the best scientific information available for designation of critical habitat for the Quino checkerspot butterfly.

Issue 2: Policy and Regulations:

7. *Comment:* Several commenters indicated that our reevaluation of the prudency of designating critical habitat for the Quino checkerspot butterfly was arbitrary.

Our Response: In our final rule listing the Quino checkerspot as endangered under the Act (62 FR 2313), we found that designation of critical habitat was not prudent because we believed that designation could increase the degree of threats to the species and would not provide any benefit. As we discuss in the Previous Federal Action section of this final rule, we were challenged on our original not-prudent finding. On February 18, 2000, we agreed to a stipulated settlement that required us to re-evaluate the existing not-prudent finding. The proposed rule detailed our reasons for determining that critical habitat is, in fact, prudent for the Quino checkerspot butterfly. We prepared this analysis in accordance with the Act and recent relevant case law regarding application of the "not prudent" exception in designating critical habitat.

8. *Comment:* We did not provide for adequate public notice of the proposed rule and sufficient opportunity for public comment.

Our Response: We published the proposed rule to designate critical habitat for the Quino checkerspot butterfly on February 7, 2001 (66 FR 9476), and accepted comments from the public for 60 days, until April 9, 2001. The comment period was reopened from June 20, 2001, to July 30, 2001 (66 FR 33046), to allow for additional comments on the proposed designation, and comments on the draft economic analysis of the proposed critical habitat. Comments received following the close of the first comment period, but prior to the opening of the second comment period, were addressed and entered into the supportive record for this rulemaking as part of the second comment period.

We contacted all appropriate State and Federal agencies, Tribes, county governments, elected officials, and other interested parties and invited them to comment. In addition, we invited public comment through the publication of notices in the following newspapers in southern California: San Diego Union-Tribune and Riverside Press Enterprise on February 9, 2001, and again in both papers on June 20, 2001. We provided notification of the draft economic analysis through telephone calls, letters, and news releases faxed and/or mailed to affected elected officials, local jurisdictions, and interest groups. We also published the draft economic analysis and associated material on our Fish and Wildlife Office internet site following the draft's release on June 20, 2001. In addition to inviting public comment on the proposed designation and the draft economic analysis for the proposed designation, the later notices announced the dates and times of public hearings on the proposed designation. Those hearings were held on July 17, 2001, in Escondido, California from 1 to 3 p.m. and 6 to 8 p.m. Transcripts of these hearings are available for inspection (see **ADDRESSES** section).

9. *Comment:* Several commenters indicated that we violated the Administrative Procedure Act because the proposal does not provide adequate description of the location of critical habitat units for impacted landowners, causing a burden to landowners who must determine which portions of their land contain critical habitat.

Our Response: We identified specific areas in the proposed determination that are referenced by UTM coordinates, which are found on standard topographic maps. We also made available, during the public comment period at the Carlsbad Fish and Wildlife Office, a public viewing room where the proposed critical habitat units, superimposed on 7.5 minute topographic maps, could be inspected. Furthermore, we distributed geographic data and maps of the proposed critical habitat to individuals, organizations, local jurisdictions, and State and Federal agencies that requested them. We believe the information made available to the public was sufficiently detailed to allow for determination of critical habitat boundaries. This final rule contains the legal descriptions of areas designated as critical habitat required under 50 CFR 424.12(c). The accompanying maps are for illustrative purposes only. If additional clarification is necessary, contact the Carlsbad Fish and Wildlife Office (see **ADDRESSES** section).

10. *Comment:* An Environmental Impact Statement, as defined under National Environmental Policy Act of 1969 (NEPA), should be written to address the potential significant impacts of the proposed designation of Quino checkerspot butterfly critical habitat.

Our Response: We have determined that an Environmental Assessment and/or an Environmental Impact Statement, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Act. A notice outlining our reason for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

11. *Comment:* The Bureau of Indian Affairs commented on behalf of the Cahuilla Band of Mission Indians requesting that the portion of their Reservation in Riverside County included in the proposed designation be excluded from the final designation based on the provision contained within Secretarial Order 3206.

Our Response: As we discuss in the section on Government-to-Government Relationship with Tribes of this final rule, the Secretarial Order 3206, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act" (1997) provides that critical habitat should not be designated in an area that may impact Tribal trust resources unless it is determined to be essential to conserve a listed species. The Secretarial Order further states that in designating critical habitat, "the Service shall evaluate and document the extent to which the conservation needs of a listed species can be achieved by limiting the designation to other lands."

In our proposed critical habitat rule, we indicated that approximately 4,405 ha (10,890 ac) of lands within the Cahuilla Band of Mission Indians' Reservation in western Riverside County were essential for the conservation of the Quino checkerspot butterfly. This determination was based on the close proximity of two butterfly occurrence complexes—the Silverado and Southwest Cahuilla complexes—and the continuity of butterfly habitat adjacent to and along the southwest portion of the Reservation. We are committed to developing a positive working relationship with the Tribe and will continue attempting to work with them to develop conservation measures for the butterfly. However, due to the time constraints for completing this final rule, we were required to finalize the designation based on our own analysis of the relative importance of the lands within the Cahuilla Band of Mission Indians' Reservation for the conservation of the Quino checkerspot butterfly.

Additional information corroborating the distribution of the species, relative to the Reservation, became available following the publication of the critical habitat proposal. During the 2001 Quino adult flight season, an additional population of Quino checkerspot butterfly was identified in close proximity to the southern boundary of the Reservation. This occurrence complex has been labeled the Tule Peak complex. Consequently, based on data from the 1998 through the 2001 flight seasons, there are an estimated 226 butterfly occurrences grouped into three occurrence complexes adjacent to the southern boundary of the Reservation. These complexes include the majority of documented Quino checkerspot butterflies in the eastern portion of western Riverside County and constitute one or more significant and substantial regional core populations of the species.

Based on the proximity of these occurrence complexes to the Reservation and the apparent continuity of butterfly habitat from the complexes across much of the Reservation, we have determined that lands on the Reservation defined by the occurrence complexes that support the primary constituent elements for the Quino checkerspot butterfly are essential to the conservation of this species and are therefore designated as critical habitat. Based on the distribution and dispersal of the Quino checkerspot butterfly and our analysis of areas essential for the conservation of this species, we have reduced the area designated as critical habitat to 525 ha (1,300 ac) on the Cahuilla Band of Mission Indians' Reservation.

12. *Comment:* Several commenters stated that critical habitat should be retained within the boundaries of approved HCPs covering the Quino checkerspot butterfly. They felt that HCPs cannot be viewed as a functional substitute for critical habitat designation, and the approved HCPs provided inadequate protection and special management considerations for the species and their habitat. Other commenters supported the exclusion of approved HCPs covering the Quino checkerspot butterfly from critical habitat designation, and several of these same commenters wanted pending HCPs to be excluded as well. They supported their recommendations by asserting that landowners will be reluctant to participate in HCP's unless they have incentives, including the removal of critical habitat from HCP boundaries.

Our Response: We recognize that critical habitat is only one of many conservation tools for federally listed species. However, HCPs are one of the most important tools for reconciling land use with the conservation of listed species on non-Federal lands. Section 4(b)(2) of the Act allows us to exclude from critical habitat designation areas where the benefits of exclusion outweigh the benefits of designation, provided the exclusion will not result in the extinction of the species. We believe that in most instances the benefits of excluding HCPs from critical habitat designations will outweigh the benefits of including them. For this designation we find that the benefits of exclusion outweigh the benefits of designation for all approved and legally operative HCPs in which the Quino checkerspot butterfly is a covered species, take of the butterfly is authorized under an incidental take permit, and the plan provides provisions for long-term conservation. These include the following HCPs in Riverside County: Assessment District 161 Subregional HCP, Rancho Bella Vista HCP, and the Lake Mathews MSHCP. There are no currently approved and legally operative HCPs in which the Quino checkerspot butterfly is a covered species in San Diego County. However, several are working on amendments to their HCPs that will provide coverage for the butterfly. These amendments are not yet complete.

We anticipate that future HCP's in the range of the Quino checkerspot butterfly will include it as a covered species and provide for its long term conservation. We expect that HCPs undertaken by local jurisdictions (*e.g.*, counties and cities) and other parties will identify, protect, and provide appropriate management for those specific lands within the boundaries of the plans that are essential for the long-term conservation of the species. Section 10(a)(1)(B) of the Act states that HCPs must meet issuance criteria, including minimizing and mitigating any take of the listed species covered by the permit to the maximum extent practicable, and that the taking must not appreciably reduce the likelihood of the survival and recovery of the species in the wild. We fully expect that our future analyses of HCP's and section 10(a)(1)(B) permits under section 7 will show that covered activities carried out in accordance with the provisions of the HCPs and section 10(a)(1)(B) permits will not result in the destruction or adverse modification of critical habitat designated for the Quino checkerspot butterfly. The take minimization and mitigation measures provided under these HCPs are expected to adequately protect the essential habitat lands designated as critical habitat in this rule, such that the value of these lands for the survival and recovery of the Quino checkerspot

butterfly is not appreciably diminished through direct or indirect alterations. If an HCP that addresses the Quino checkerspot butterfly as a covered species is ultimately approved, we will reassess the critical habitat boundaries in light of the HCP. If, consistent with available funding and program priorities, we elect to revise this designation, we will do so through a subsequent rulemaking.

The designation of critical habitat should not deter participation in the NCCP or HCP processes. Approvals issued under these processes include assurances of no additional mitigation through the 5-HCP No Surprises regulation (63 FR 8859). The development of new HCPs or NCCPs should not be affected by designation of critical habitat primarily because we view the standards of jeopardy for listed species and of adverse modification for critical habitat as being virtually identical. We discuss these standards in detail in the Section 7 Consultation section portion of this document.

13. *Comment:* One commenter requested that the Lake Matthews MSHCP be removed from the final designation because it is an approved HCP that provides coverage for the Quino checkerspot butterfly.

Our Response: As discussed in two sections of this final rule, Relationship To Habitat Conservation Plans and Summary of Changes from the Proposed Rule, we reviewed the approved HCP and accompanying Implementation Agreement. We found that the Lake Mathews MSHCP: (1) Is an approved and legally operative HCP in which the Quino is a covered species, (2) provides take authorization for the Quino checkerspot butterfly, and (3) provides special management considerations for and protection of Quino habitat. Consequently, we believe that the Lake Mathews MSHCP meets the criteria for exclusion under section 4(b)(2) of the Act and has therefore been excluded from final critical habitat for the Quino checkerspot butterfly.

14. *Comment:* One commenter expressed concern over the inclusion of El Sobrante landfill HCP planning area in final critical habitat.

Our Response: Portions of the El Sobrante landfill have been excluded from the final critical habitat designation because they do not contain habitat essential to the conservation of the Quino checkerspot butterfly. However, because the Quino checkerspot butterfly is not a covered species in the HCP, those lands within the HCP planning area that are believed to be essential to the conservation of the butterfly are included in final critical habitat.

15. *Comment:* The Cleveland National Forest expressed concern over the inclusion of the Oak Grove fire station and other Forest Service facilities in proposed critical habitat.

Our Response: As a result of using the configuration of occurrence complexes defined by 1 km (0.6 mi) around essential core butterfly populations to delineate lands essential to the conservation of the Quino checkerspot butterfly, the Oak Grove fire station and other Forest Service facilities are not included in this final designation of critical habitat.

16. *Comment:* One of the members of the Quino checkerspot butterfly recovery team expressed concern over the exclusion of Spring Canyon and the majority of the West Otay Mesa occurrence complex from proposed critical habitat.

Our Response: The West Otay Mesa occurrence complex was discovered during the 2001 adult butterfly flight season, after the publication of the proposed critical habitat. We evaluated this occurrence complex to determine if it was essential to the conservation of the butterfly and should be included in critical habitat through a re-proposal. Currently, we do not have sufficient information concerning this occurrence complex to determine that it is essential to the conservation of the Quino checkerspot butterfly. Therefore, based on available information, we have not included Spring Oak Canyon and portions of the West Mesa occurrence complex in designated critical habitat.

17. *Comment:* Several commenters expressed concern that the proposed designation of critical habitat for the Quino checkerspot butterfly included areas with existing pipelines, aqueducts, and similar water exchange facilities. They believed that if these lands were designated as critical habitat, the maintenance of these facilities would be negatively affected. Therefore, they requested that these lands be excluded from critical habitat.

Our Response: Existing pipelines and aqueducts generally lack the primary constituent elements for the Quino checkerspot butterfly. Facilities that remain within the boundaries of this final determination are considered to be critical habitat. Periodic maintenance of existing pipelines, roads, or aqueducts would not constitute an adverse effect to critical habitat when primary constituent elements are not affected. If maintenance activities would adversely affect primary constituent elements, and a Federal nexus existed, then a consultation pursuant to section 7 may be required.

18. *Comment:* One commenter expressed concern over the use of Service files, in particular those of the Carlsbad Fish and Wildlife Office (CFWO), to extrapolate future consultations, project modifications, and re-initiate consultations based on consultation histories for the purpose of evaluating the potential economic effects of the designation. The commenter cited the findings of a recent Government Accounting Office report that indicated that files at the CFWO were unorganized, incomplete, and poorly managed.

Our Response: As a result of the Government Accounting Office's review of the CFWO's files and the subsequent report indicating some weaknesses in file management, we have instituted an electronic file management system that has corrected many of the apparent weaknesses. Because the Quino checkerspot butterfly has only been listed since 1997 and has been a highly scrutinized listed species, files and information relevant to the butterfly have been, and are, well organized, complete, and properly managed. Therefore, we, the Division of Economics, and Industrial Economics, Inc. have a high level of confidence in information extrapolated from those files. Additionally, as discussed in the draft economic analysis, estimates of costs attributable to future consultations and project modifications are averages from data collected at Fish and Wildlife Offices across the country.

19. *Comment:* Some landowners expressed concern that because their property was located within critical habitat for the Quino checkerspot butterfly they would be subject to additional constraints under the California Environmental Quality Act (CEQA).

Our Response: According to 15065 (California Code of Regulations Title 14, Chapter 3) of CEQA guidelines, environmental impact reports are required by local lead agencies when, among other things, a project has the potential to "reduce the number or restrict the range of an endangered, rare or threatened species." Though federally listed species are presumed to meet the CEQA definition of "endangered, rare or threatened species" under 15380 (California Code of Regulations Title 14, Chapter 3), no additional constraints should result from the designation of critical habitat beyond that now in place for all federally listed species, including the Quino checkerspot butterfly.

30. *Comment:* Several commenters asserted that because more than 80 percent of Quino checkerspot butterfly sightings through the 2000 adult flight season occurred within the preserve areas (MHPA) for the San Diego MSCP, critical habitat should be limited to the preserve areas. They further contended that lands outside of the MHPA are not necessary, nor essential, and therefore, should not be designated as critical habitat for the butterfly in the region.

Our Response: While there may be considerable overlap between those areas we have designated as critical habitat and the boundaries of the MHPA and pre-approved mitigation areas, the MHPA and pre-approved mitigation areas were not originally drawn to take into consideration the conservation needs of the Quino checkerspot butterfly. We are now in the process of re-assessing the boundaries of the MHPA relative to the Quino checkerspot butterfly through the amendments to the MSCP for coverage of the butterfly to ensure that lands essential to the conservation of the butterfly are captured within the MHPA.

Issue 3: Economic Issues

31. *Comment:* Several commenters expressed concern that the proposed rule was not accompanied by an economic analysis as required by law.

Our Response: Pursuant to section 4(b)(2) of the Act, we are to evaluate, among other relevant factors, the potential economic effects of the designation of critical habitat for the Quino checkerspot butterfly. We published our proposed designation in the **Federal Register** on February 7, 2001 (66 FR 9476). At that time, our Division of Economics and their consultants, Industrial Economics, Inc., initiated the draft economic analysis. The draft economic analysis was made available for public comment and review beginning on June 20, 2001 (66 FR 33046). Following a 30-day public comment period on the proposal and draft economic analysis, a final addendum to the economic analysis was proposed. Both the draft economic analysis and final addendum were used in the development of this final designation of critical habitat for the Quino checkerspot butterfly. Please refer to the Economic Analysis section of this final rule for a more detailed discussion of these documents.

32. *Comment:* Several commenters were concerned that our economic analysis was incorrect to assume that a Regulatory Flexibility Analysis was not required or that we did not appropriately address potential economic effects of the designation.

Our Response: The Regulatory Flexibility Act, as amended by the Small Business Regulatory Enforcement Fairness Act, generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act, or any other statute, unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. We are certifying that this rule will, in fact, not have a significant economic impact on a substantial number of small entities and, as a result, we do not need to prepare either an initial or final regulatory flexibility analysis. Please refer to the Economic Analysis and Regulatory Flexibility Act sections of this rule for further discussions concerning the potential economic effects of this designation.

33. *Comment:* Several commenters stated that we should have analyzed the cumulative effect of the critical habitat designation for the Quino checkerspot butterfly along with the effect of existing and proposed critical habitat for other species in the area.

Our Response: The commenters appear to be using the term "cumulative impacts" in the context of the National Environmental Policy Act. This is not appropriate in analyzing the effects of a regulation designating critical habitat for a listed species. We are required to consider only the effect of the proposed government action, which in this case is the designation of critical habitat for the Quino checkerspot butterfly. The appropriate baseline for use in this analysis is the regulatory environment without this regulation. Against this baseline, we attempt to identify and measure the incremental costs and benefits associated with this designation of critical habitat. When critical habitat for other species has already been designated, it is properly considered part of the baseline for this analysis. Proposed and future critical habitat designations for other species in the area will be part of separate rulemakings, and consequently, their economic effects will be considered separately.

34. *Comment:* Several commenters expressed concern that the draft economic analysis failed to consider the effect the critical habitat designation for the Quino checkerspot butterfly would have on the demand for new housing and land values, and that the economic analysis ignores the impact of the designation on California's critical housing shortage.

Our Response: We are aware that some of the land that we are designating as critical habitat for the Quino checkerspot butterfly faces significant development pressure. Development activities can have a significant effect on the land and the species dependent on the habitat being developed. We also recognize that many large-scale development projects are subject to some type of Federal nexus before work actually begins. As a result, we expect that future consultations will, in part, include planned and future real estate development.

We included additional analysis of these impacts in the addendum to the economic analysis. Estimates of acres likely to become urbanized over ten years were derived from California Urban and Biodiversity Analysis (CURBA) model estimates. A sensitivity analysis of these figures found that changing the model results by 25 percent or less resulted in a very small change in the number of estimated consultations due to the designation. Planners at the San Diego Planning and Land Use Department, Land Use and Environment Group (LUEG) state that in these areas, development pressure is primarily from large landowners requesting permits for residential developments (Pfanner, San Diego Department of Planning and Land Use, pers. comm., March 22, 2001). Thus, as a conservative estimate, this analysis assumes that all urbanized acres will be developed as residential housing projects. The low consultation estimate assumes that proposed projects will average 100 acres in size, and that 20 percent of proposed projects will have a Federal nexus and primary constituent elements (PCEs). These figures are based on historical evidence from Quino checkerspot surveys and estimates of typical project size by the Service and others. The high estimate assumes that proposed projects will average 75 acres in size, and that 80 percent of these projects will have a Federal nexus and PCEs. Thus, the high estimate is likely to represent an upper bound estimate of the number of likely future consultations. This calculation results in an estimate of approximately 10 to 98 consultations on the Quino checkerspot over the next ten years regarding residential or light commercial development projects. Total costs for such consultations are estimated to be approximately $190,080 to $1,587,900. As noted in the draft economic analysis, project modifications are assumed to include the following project modifications: Habitat mitigation, captive breeding programs (0 to 50 percent of consultations), biological monitor present, pre-construction

surveys, signage, no night lighting, and construction season limits. Total costs of project modifications are estimated at $1.0 to $16.1 million.

However, we believe that these resulting consultations will not take place solely with respect to critical habitat issues. While it is true that development activities can adversely affect designated critical habitat, we believe that our future consultations regarding new housing development will take place because such actions have the potential to adversely affect a federally listed species. We believe that such planned projects would require a section 7 consultation or a section 10 permit regardless of the critical habitat designation because areas other than those covered by the reserve are occupied by the butterfly or other federally listed species, including the coastal California gnatcatcher (*Polioptila californica californica*), Stephens kangaroo rat (*Dipodomys stephensi*), Munz' onion (*Allium munzii*), least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and arroyo toad (*Bufo californicus*). As we have previously mentioned, section 7 of the Act requires Federal agencies to consult with us whenever actions they fund, authorize, or carry out may affect a listed species or adversely modify its critical habitat.

25. *Comment:* Some commenters felt that the economic analysis is flawed because it is based on the premise that we have proposed designating only occupied habitat as critical habitat.

Our Response: The determination of whether or not proposed critical habitat is within the geographic range occupied by the Quino checkerspot butterfly is part of the biological decision-making process and lies beyond the scope of an economic analysis. Please refer to the Methods and Criteria Used To Define Critical Habitat Units sections of this rulemaking for a discussion of the decision-making process.

26. *Comment:* The assumption that future section 7 consultations would not be subject to regulatory uncertainty and legal challenge, and that the designation of critical habitat will cause no impacts above and beyond those caused by listing the species is faulty, legally indefensible, and contrary to the Act. "Adverse modification" and "jeopardy" are different, will result in different impacts, and should be analyzed as such in the economic analysis.

Our Response: We agree with the commenter's assertion that "jeopardy" and "adverse modification" represent different standards. However, the outcome of a consultation using one standard may be very similar to that of a consultation under the other. Section 7 prohibits actions funded, authorized, or carried out by Federal agencies from jeopardizing the continued existence of a listed species or destroying or adversely modifying the listed species' critical habitat. Actions likely to "jeopardize the continued existence" of a species are those that would appreciably reduce the likelihood of both the survival and recovery of a listed species. Actions likely to result in the destruction or adverse modification of critical habitat are those that would appreciably reduce the value of critical habitat for the recovery of the listed species. Common to both definitions is an appreciable detrimental effect on recovery of a listed species. Given the similarity of these definitions, actions likely to result in the destruction or adverse modification of critical habitat would almost always result in jeopardy to the species concerned, particularly where, as here, designation of critical habitat is primarily limited to habitat within the geographic range occupied by the Quino checkerspot butterfly.

27. *Comment:* Several commenters stated that the assumptions in the draft economic analysis suggesting that the designation of critical habitat for the Quino checkerspot butterfly is not expected to result in significant restrictions in addition to those currently in place due to the butterfly being federally listed are flawed.

Our Response: In the proposed rule and draft economic analysis, we indicated that we do not expect that the designation of critical habitat would provide significant additional regulatory or economic burdens or restrictions (incremental) to those afforded the species pursuant to the Act. This assertion is based on the regulatory protections afforded the butterfly and the fact that most of the lands (96.5 percent) designated as critical habitat are considered occupied by the species. Additionally, the lands which are not currently known to be occupied that are included in the designation because of future re-establishment efforts are within the Lake Mathews/Estelle Mountain Reserve (or Unit 1. For additional information please refer to our draft economic analysis and final addendum to the economic analysis and the Regulatory Flexibility section of this final rule.

28. *Comment:* Several commenters stated that the draft economic analysis only looked at "current and planned" land uses and ignored the designation's impact on future, not yet planned uses.

Our Response: In our economic analysis, we attempted to estimate economic impacts that are reasonably certain to result from designation of critical habitat for the Quino checkerspot butterfly over a ten-year period. Consideration of unplanned and unforeseeable future costs and benefits would be purely speculative and would not add anything of appreciable value to the economic analysis of this rulemaking. For further information concerning our economic analysis and potential economic impacts resulting from the designation discussed therein, please refer to the Economic Analysis and Required Determinations sections of this final rule. Additional copies of the draft economic analysis and final addendum to the draft economic analysis are available from the Carlsbad Fish and Wildlife Office (refer to **ADDRESSES** section).

29. *Comment:* Several commenters expressed concern over the fact that they did not believe that our draft economic analysis evaluated the potential economic effects of the designation consistently with the recent 10th Circuit Court ruling on the southwestern willow flycatcher critical habitat.

Our Response: On May 11, 2001, the U.S. Court of Appeals in the Tenth Circuit issued a ruling that addressed the analytical approach used by the Service to estimate the economic impacts associated with the critical habitat designation for the southwestern willow flycatcher. Specifically, the court rejected the approach used by the Service to define and characterize baseline conditions. Defining the baseline is a critical step within an economic analysis, as the baseline in turn identifies the type and magnitude of incremental impacts that are attributed to the policy or change under scrutiny. In the flycatcher analysis, the Service defined baseline conditions to include the effects associated with the listing of the flycatcher and, as is typical of many regulatory analyses, proceeded to present only the incremental effects of the rule.

The court's decision, in part, reflects the uniqueness of many of the more recent critical habitat rulemakings. The flycatcher was initially listed by the Service as an endangered species in 1995, several years prior to designating critical habitat. Once a species has been officially listed as endangered under the Act, it is afforded special protection under Federal law. In particular, it is illegal for any one to "take" a protected species once it is listed. "Take" is defined to mean harass, harm pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Implementing regulations

promulgated by the Service further define "harm" to mean "* * * an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Because the southwestern willow flycatcher was initially listed as endangered by the Service in 1995, several years before the designation of critical habitat, the flycatcher, along with its habitat, already received considerable protection before the designation of critical habitat in 1997. As a result, the economic analysis concluded that the resulting impacts of the designation would be insignificant. This conclusion was based on the facts that: (1) The designation of critical habitat only requires the Federal government to consider whether their actions could adversely modify critical habitat; and (2) the Federal government already was required to consult on actions that may adversely affect the flycatcher and to ensure that its actions did not jeopardize the flycatcher.

For a Federal action to adversely modify critical habitat the action would have to adversely affect the critical habitat's constituent elements or their management in a manner likely to appreciably diminish or preclude the role of that habitat in both the survival and recovery of the species. However, the Service defines jeopardy, which was a pre-existing condition prior to the designation of critical habitat, as to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." The "survival and recovery" standard is used in the definition of both terms and as a result, the additional protection afforded the flycatcher due to the designation of critical habitat was determined to be negligible.

The court, however, considered why Congress would want an economic analysis performed by the Service when making a decision about designating critical habitat if, in fact, the designation of critical habitat adds no significant additional protection to a listed species. In the court's mind, "[b]ecause [the] economic analysis done using the Service's baseline model is rendered essentially without meaning by 50 CFR 402.02, we conclude Congress intended that the Service conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes."

Even though the court's ruling applies only to the designation of critical habitat for the southwestern willow flycatcher, this analysis attempts to comply with the court's instructions by revising the approach to defining baseline conditions within the areas of proposed critical habitat. This approach to baseline definition employed in the analysis of the designation of critical habitat for the Quino checkerspot butterfly is similar to that employed in previous approaches in that the goal is to understand the incremental effects of a designation. However, it does provide more extensive discussion of pre-existing baseline conditions than previous critical habitat economic analyses. Typical economic analyses concentrate mostly on identifying and measuring, to the extent feasible, economic effects most likely to occur because of the action being considered. Baseline conditions, while identified and discussed, are rarely characterized or measured in any detailed manner because, by definition, these conditions remain unaffected by the outcome of the decision being contemplated. While the goal of this analysis remains the same as previous critical habitat economic analyses, that is to identify and measure the estimated incremental effects of the proposed rulemaking, the information provided in this analysis concerning baseline conditions is more detailed than that presented in previous studies. The final addendum to this analysis provided further information concerning the baseline and potential incremental effects of the designation of critical habitat for the Quino checkerspot butterfly.

Summary of Changes From the Proposed Rule

Based on a review of public comments received on the proposed determination of critical habitat and economic analysis for the Quino checkerspot butterfly, we reevaluated our proposed designation of critical habitat for this species. The primary changes include the following: (1) Revising the mapping using the distribution of occurrence complexes (based on 1 km (0.6 mi) radii of recent observations) known to be essential for viable Quino checkerspot butterfly populations in this final rule (except for the isolated populations at Incumba, Brown Canyon, and Lake Mathews), instead of the 4.8 km (3 mi) dispersal distance used in the proposal to define lands essential to the conservation of the butterfly (refer to the Criteria Used To Identify Critical Habitat section of this rule for a more detailed discussion of this revised methodology); (2) the removal of the Lake Mathews MSHCP in Riverside County that provides coverage and incidental take authorization for the Quino checkerspot butterfly; (3) the inclusion of occurrence data collected during the 2001 adult butterfly flight season; (4) removal of areas not known to be essential; and 5) refinements to provide consistency with the final recovery plan for the Quino checkerspot butterfly.

The Lake Mathews MSHCP in Riverside County was included in proposed critical habitat for the Quino checkerspot butterfly because we believe the habitat is essential to the conservation of the butterfly. During the public comment period we received comments from the Metropolitan Water District of Southern California (MWD) concerning the inclusion of the Lake Mathews MSHCP in proposed critical habitat for the Quino checkerspot butterfly. They indicated that the butterfly was a covered species under the Lake Mathews MSHCP, and that it provided sufficient special management for the butterfly. Additionally, they indicated that there was conditional take authorization for Quino checkerspot butterflies. We subsequently reviewed the Lake Mathews MSHCP and its Implementation Agreement to determine whether the management afforded the butterfly through its provisions would be sufficient for consideration to be excluded from final critical habitat under section 4(b)(2) of the Act. We found that the Lake Mathews MSHCP: (1) Is an approved and legally operative HCP in which the Quino checkerspot butterfly is a covered species, (2) provides take authorization for the Quino checkerspot butterfly, and (3) provides special management considerations for, and protections of, Quino checkerspot butterfly habitat. Consequently, we believe that the Lake Mathews MSHCP meets the criteria for exclusion under section 4(b)(2) of the Act. It has, therefore, been excluded from the final designation of critical habitat for the Quino checkerspot butterfly.

The proposed critical habitat was published in February of 2001, prior to the start of the 2001 adult butterfly flight season. It was our intent to use the data collected during the 2001 flight season to develop the final critical habitat rule, so that the final designation was based on the best available scientific and commercial data. In fact, many of the comments we received from the public suggested that we take into consideration the 2001 data prior to

finalizing the rule. Therefore, we used the data from the 2001 flight season in developing our final designation of critical habitat for the Quino checkerspot butterfly.

The data from the 2001 flight season, for the most part, corroborated decisions made during the development of the proposed critical habitat and provided additional information concerning the known occupancy of areas we believed to be essential to the conservation of the butterfly. Four new occurrence complexes were documented in Riverside County and seven in San Diego County. These new complexes occur primarily within the boundaries of areas we proposed as critical habitat. The locations of three new occurrence complexes are completely outside of our proposed critical habitat boundaries. We do not currently have sufficient information to determine if two of these complexes are essential to the conservation of the Quino checkerspot butterfly. However, one of the new occurrence complexes is believed to be essential to the conservation of the Quino checkerspot butterfly. This complex (the Dulzura Occurrence Complex) is located adjacent to the Otay Mesa Unit in a BLM designated wilderness area (please refer to the unit descriptions in the Critical Habitat section of this rule for a discussion of why this complex was not designated as critical habitat). As a result of the information pertaining to the new occurrence complexes, portions of Units 2 and 3, which were not previously known to be occupied by the Quino checkerspot butterfly, are now considered to be occupied.

Additionally, based on the 2001 adult flight season data, public comments, and updated aerial photography, we reassessed the lands that we determined to be essential to the conservation of the butterfly during the development of the final designation. Based on this reevaluation, we made some significant changes to Units 1, 2, and 4 which resulted in a reduction of 52,374 ha (129,405 ac) of land being designated as critical habitat for the Quino checkerspot.

The primary changes in Unit 1 consisted of removing the Lake Mathews MSHCP (discussed above), reducing the habitat not known to be occupied or within the boundaries of the Estelle Mountain Reserve, and refining the Harford Springs subunit to exclude areas not known to be essential to the conservation of the butterfly. This resulted in a reduction of approximately 7,212 ha (17,820 ac) from Unit 1.

The primary changes to Unit 2 consisted of: (1) Removing additional lands not known to be essential (e.g., urban and agricultural lands); (2) removing portions of the Assessment District 161 HCP, that were mistakenly included in the proposed designation; and (3) implementing the revised methodology based on the 1 km (0.6 mi) dispersal distance. This resulted in a reduction of critical habitat in the following areas: (1) West of Oak Mountain and Vail Lake, in the vicinity of Pauba Valley; (2) on the Cahuilla Indian Reservation; (3) northeast and southeast of the town of Oak Grove in San Diego County; and (4) south of the town of Hemet, southwest of Diamond Valley Reservoir, and northwest of the town of Anza (*i.e.*, roughly between the towns of Sage and Hemet in Riverside County). These changes resulted in a reduction of approximately 35,457 ha (87,610 ac) lands being designated as critical habitat in Unit 2 from those that were proposed.

The primary changes that occurred to Unit 3 were: (1) Removing Otay Lake, which was mistakenly included in the proposed designation; (2) removing nonessential lands on Otay Mountain primarily Tecate cypress woodland; (3) removing lands not known to be essential northwest of the town of Tecate; and (4) implementing the revised methodology based on the 1 km (0.6 mi) dispersal distance. This resulted in a reduction approximately 3,253 ha (8,040 ac).

The primary change in Unit 4 consists of removing lands not known to be essential north of Interstate 8 and east of the town of Jacumba, including associated active agricultural fields. This resulted in a reduction of 6,447 ha (15,930 ac) from this unit.

Further, because the final recovery plan for the Quino checkerspot butterfly was drafted concurrently with the final designation of critical habitat, we wanted to ensure recommendations for the conservation of the Quino checkerspot butterfly were consistent. Based on the 2001 data, the habitat complexes were redefined and renamed occurrence complexes, and new biological information was acquired about host and nectar plants. We believed that it was important to capture this new information consistently in both documents. Therefore, the background section and unit descriptions in this rule have been updated to reflect the new information and are now consistent with the final recovery plan being developed.

Additionally, based on the refinements to designated critical habitat discussed above, the amount of land in the designation that is currently not known to be occupied has been reduced from approximately 16,416 ha (45,530 ac) to an estimated 2,450 ha (6,050 ac). As a result, 98.5 percent of the designation is currently known to be occupied by the Quino checkerspot butterfly. The approximately 3.5 percent of the designation that is not currently known to be occupied is located with the Lake Mathews/Estelle Mountain Reserve in the Lake Mathews/Estelle Mountain Reserve subunit of Unit 1 in western Riverside County.

Economic Analysis

Section 4(b)(2) of the Act requires us to designate critical habitat on the basis of the best scientific and commercial data available, and to consider the economic and other relevant impacts of designating a particular area as critical habitat. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as critical habitat. We cannot exclude such areas from critical habitat when such exclusion will result in the extinction of the species.

Following the publication of the proposed critical habitat designation, a draft economic analysis was conducted to estimate the potential economic effect of the designation. The draft analysis was made publicly available for review on June 20, 2001 (66 FR 33046). We accepted comments on the draft analysis until July 30, 2001. Additionally, we held two public hearings on the proposed designation and the draft economic analysis on July 17, 2001, in Escondido, California.

Our draft economic analysis evaluated the potential future effects associated with the listing of the Quino checkerspot butterfly as an endangered species under the Act, as well as any potential effect of the critical habitat designation above and beyond those regulatory and economic impacts associated with listing. To quantify the proportion of total potential economic impacts attributable to the critical habitat designation, the analysis evaluated a "without critical habitat" baseline and compared it to a "with critical habitat" scenario. The "without critical habitat" baseline represented the current and expected economic activity under all modifications prior to the critical habitat designation, including protections afforded the species under Federal and State laws. The difference between the two scenarios measured the net change in economic activity attributable to the designation of critical habitat. The categories of potential costs considered in the analysis included the costs associated with: (1) Conducting section 7 consultations associated with

the listing or with the critical habitat, including incremental consultations and technical assistance; (2) modifications to projects, activities, or land uses resulting from the section 7 consultations; (3) uncertainty and public perceptions resulting from the designation of critical habitat; and (4) potential offsetting beneficial costs associated with critical habitat, including educational benefits.

The majority of consultations resulting from the critical habitat designation for the Quino checkerspot butterfly are likely to address land development, road construction, or road expansion activities. The draft analysis estimated that over a 10-year period, the critical habitat designation would result in approximately 10 additional biological surveys, 21 to 40 additional formal consultations, and 3 re-initiations of consultations that were previously initiated due to the presence of the butterfly. In addition, it was estimated that we would provide technical assistance for 180 inquiries regarding uncertainty about the presence or extent of critical habitat. Furthermore, many consultations would likely result in recommendations for project modifications. Based on our draft analysis, we concluded that the designation of critical habitat would not result in a significant economic impact and estimated that the potential economic effects over a 10-year period would range from $3.5 to $14.1 million.

Following the close of the comment period on the draft economic analysis, a final addendum was completed which incorporated public comments on the draft analysis. The potential economic effects of the designation were reevaluated. Based on this new analysis, it was determined that there would be potential for additional consultations and assistance over and above the estimates projected in the draft analysis. Subsequently, the addendum concluded that the designation may result in potential economic effects ranging from between $5.4 and $10.9 million over a 10-year period. Because these values were believed to be relatively insignificant over the projected time period, the addendum concluded that no significant economic impacts were anticipated from the designation of critical habitat for the Quino checkerspot butterfly. Additionally, these values may overestimate the potential economic effects of the designation because a number of areas that were not considered to be occupied in the proposed designation, and therefore the economic analysis, are now known to be occupied based on data from the 2001 adult butterfly flight season. Further, the final designation has been reduced to encompass 69,446 ha (171,605 ac) versus the 124,814 ha (401,010 ac) proposed as critical habitat, a difference of approximately 52,374 ha (129,403 ac). Consequently, future consultations occurring in these areas would be due to the presence of the butterfly and not be solely attributable to the designation of critical habitat.

A more detailed discussion of our analyses is contained in the Draft Economic Analysis of Proposed Critical Habitat Designation for the Quino Checkerspot Butterfly (June 2001) and the Addendum to Economic Analysis of Critical Habitat Designation for the Quino Checkerspot Butterfly (January 2002). Both documents are included in the supporting documentation for this rulemaking and available for inspection at the Carlsbad Fish and Wildlife Office (refer to **ADDRESSES** Section).

Required Determinations

Regulatory Planning and Review

In accordance with Executive Order 12866, this document is a significant rule and was reviewed by the Office of Management and Budget (OMB) in accordance with the four criteria discussed below.

a. This rule will not have an annual economic effect of $100 million or more or adversely affect an economic sector, productivity, jobs, the environment, or other units of government. The Quino checkerspot butterfly was listed as an endangered species in 1997. In fiscal years 1997 through 2001, we have conducted, or are in the process of conducting, an estimated 11 formal section 7 consultations with other Federal agencies to ensure that their actions will not jeopardize the continued existence of the Quino checkerspot butterfly. We have also issued section 10(a)(1)(B) incidental take permits for approximately 12 projects in areas where the species occurs, in which the project proponents have prepared either individual HCPs or were signatories to the AD161 HCP in western Riverside County.

Under the Act, Federal agencies shall consult with the Service to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of critical habitat. The Act does not impose any restrictions through critical habitat designation on non-Federal persons unless they are conducting activities funded, authorized, or permitted by a Federal agency. Based upon our experience with this species, we conclude that any Federal action that is likely to result in the destruction or adverse modification of critical habitat would also be considered likely to jeopardize the continued existence of this species in areas occupied by the species. Accordingly, the designation of occupied areas as critical habitat for the Quino checkerspot butterfly is not anticipated to have any incremental impacts on actions that may or may not be conducted by Federal agencies or non-Federal persons that receive Federal authorization or funding beyond the effects resulting from the listing of this species. Non-Federal persons that do not have a Federal involvement in their actions are not restricted by the designation of critical habitat (however they continue to be bound by the provisions of the Act concerning "take" of the species). The designation of areas as critical habitat: where section 7 consultations would not have occurred but for the critical habitat designation, may have impacts on actions that may or may not be conducted by Federal agencies or non-Federal persons who receive Federal authorization or funding that are not attributable to the listing of the species. Those impacts were evaluated in our economic analysis (under section 4 of the Act; see Economic Analysis section of this rule).

b. This rule will not create inconsistencies with other agencies' actions. As discussed above, Federal agencies are required to ensure that their actions do not jeopardize the continued existence of the Quino checkerspot butterfly since its listing under the Act in 1997. In our economic analysis (see Economic Analysis section of this rule), we have evaluated the impact of designating areas where section 7 consultations would not have occurred but for the critical habitat designation. The designation of critical habitat is not expected to impose any additional restrictions beyond those that currently exist on currently occupied lands and will not create inconsistencies with other agencies' actions on unoccupied lands. Specifically, land management activities in areas not currently known to be occupied, such as the Lake Mathews/Estelle Mountain Reserve in the Lake Mathews/Estelle Mountain Reserve subunit of Unit 1, are expected to benefit the Quino checkerspot butterfly and other listed species in the long term; therefore, those actions should not be significantly affected by this designation.

c. This rule is not expected to materially affect entitlements, grants, user fees, loan programs, or the rights

and obligations of their recipients. Federal agencies are currently required to ensure that their activities do not jeopardize the continued existence of the species, and as discussed above, we do not anticipate that the adverse modification analysis (resulting from critical habitat designation) will have any significant incremental effects.

d. OMB has determined that this rule may raise novel legal or policy issues. Therefore, this rule is significant under E.O. 12866, and, as a result, has undergone OMB review.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic effect on a substantial number of small entities. In this rule, we are certifying that the critical habitat designation for the Quino checkerspot butterfly will not have a significant effect on a substantial number of small entities. The following discussion explains our rationale.

Small entities include small organizations, such as independent non-profit organizations, small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents, as well as small businesses. Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. To determine if potential economic impacts to these small entities are significant, we consider the types of activities that might trigger regulatory impacts under this rule as well as the types of project modifications that may result. In general, the term "significant economic impact" is meant to apply to a typical small business firm's business operations.

To determine if the rule would affect a substantial number of small entities, we consider the number of small entities affected within particular types of economic activities (e.g., housing development, grazing, oil and gas production, water storage and transfer, etc.). We apply the "substantial number" test individually to each industry to determine if certification is appropriate. In some circumstances, especially with critical habitat designations of limited extent, we may aggregate across all industries and consider whether the total number of small entities affected is substantial. In estimating the numbers of small entities potentially affected, we also consider whether their activities have any Federal involvement.

Designation of critical habitat only affects activities conducted, funded, or permitted by Federal agencies. Some kinds of activities are unlikely to have any Federal involvement, and so will not be affected by critical habitat designation. In areas where the species may be present, Federal agencies already are required to consult with us under section 7 of the Act on activities that they fund, permit, or implement that may affect the Quino checkerspot butterfly. Federal agencies also must consult with us if their activities may affect critical habitat. Designation of critical habitat, therefore, could result in additional economic impacts to small entities due to the requirement to reinitiate consultation for ongoing Federal activities, or due to consultations being triggered in critical habitat where the species is currently not known to occur.

Since the Quino checkerspot butterfly was listed in January 1997, we have conducted only 11 formal consultations. The analysis provided in the Addendum to Economic Analysis of Critical Habitat Designation for the Quino Checkerspot Butterfly (January 2002) indicates that the potential number of small entities affected is approximately 1 percent. These consultations were for the construction of State Route 125 in San Diego County and for the construction of new housing developments and road expansions/improvements in Riverside County (California Department of Transportation and large development corporations) and related to HCPs done in both areas. The designation of critical habitat for the Quino checkerspot butterfly may result in the reinitiation of these consultations. However, as stated above, these consultations do not affect a substantial number of small entities. Furthermore, because the consultations already addressed the presence of the Quino checkerspot butterfly and the effects of the actions on the continued existence of the species, (*i.e.*, jeopardy), we believe that the designation of critical habitat would not result in significant additional regulatory or economic burdens on these entities.

In areas where the species is currently not known to occur, designation of critical habitat could trigger additional review of federally funded, authorized, or permitted activities under section 7 of the Act. The area of the designation that is not known to be occupied is located in Lake Mathews/Estelle Mountain Reserve subunit of Unit 1. This subunit encompasses approximately 2,450 ha (6,050 ac) of land and is located within the Lake Mathews/Estelle Mountain Reserve established for the Stephens' kangaroo rat. We do not anticipate any federal actions to occur on this reserve at this time.

Current activities with Federal involvement that may require consultation include: Regulation of activities affecting waters of the United States by the Corps under section 404 of the Clean Water Act; regulation of water flows, damming, diversion, and channelization by any Federal agency; regulation of grazing, mining, and recreation by the BLM, Forest Service, or the Service; road construction, maintenance, and right of way designation; regulation of agricultural activities; regulation of airport improvement activities by the Federal Aviation Administration; construction of roads and fences along the international border with Mexico and associated immigration enforcement activities by the Immigration and Naturalization Service; hazard mitigation and post-disaster repairs funded by the Federal Emergency Management Agency; construction of communication sites licensed by the Federal Communications Commission; and activities funded by the U.S. Environmental Protection Agency, Department of Energy, or any other Federal agency. Many of the activities sponsored by Federal agencies within critical habitat areas are carried out by small entities (as defined by the Regulatory Flexibility Act) through contracts, grants, permits, or other Federal authorizations. Based on past consultation history, anticipated future consultations would not involve a substantial number of small entities. Therefore, the designation of critical

habitat is not anticipated to have any significant additional effects on these activities.

In the economic analysis for the proposed rule, we found that the proposed designation could potentially impose total economic costs for consultations and modifications to projects within proposed critical habitat for the Quino checkerspot butterfly to range between $3.4 to $19.9 million dollars over a 10-year period. This figure includes the total costs associated with heavy construction (*i.e.*, highway construction), estimated to range between $0.6 and $1.4 million, and the total costs associated with commercial and residential real estate development, estimated to range between $0.8 and $8.2 million dollars.

In determining whether this rule could "significantly affect a substantial number of small entities," the economic analysis first determined whether critical habitat could potentially affect a "substantial number" of small entities in counties supporting critical habitat areas. While SBREFA does not explicitly define "substantial number," the Small Business Administration, as well as other Federal agencies, have interpreted this to represent an impact on 20 percent or greater of the number of small entities in any industry. Residential development on private land constitutes the primary activity expected to be impacted by the designation of critical habitat for the Quino checkerspot butterfly.

To be conservative (*i.e.*, more likely overstate impacts than understate them), the economic analysis assumed that all potentially affected parties that may be engaged in development activities within critical habitat are small entities. There are approximately 715 residential development and construction companies in San Diego and Riverside Counties that are small businesses. Of these, approximately nine may potentially be affected by the designation of critical habitat for the Quino checkerspot butterfly, according to the Addendum to Economic Analysis of Critical Habitat Designation for the Quino Checkerspot Butterfly (January 2002). Therefore, approximately 1 percent of residential development and construction companies in San Diego and Riverside Counties may be affected by the designation of critical habitat for the Quino checkerspot butterfly. Because 1 percent is far less than the 20 percent threshold that would be considered "substantial," this analysis concludes that this designation will not affect a substantial number of small entities in the residential development and construction industries as a result of the designation of critical habitat for the Quino checkerspot butterfly. The analysis also estimated that less than 0.2 percent of the small businesses in the highway construction industry could be affected.

In general, two different mechanisms in section 7 consultations could lead to additional regulatory requirements. First, if we conclude in a biological opinion that a proposed action is likely to jeopardize the continued existence of a species or adversely modify its critical habitat, we will make every effort to offer "reasonable and prudent alternatives." Reasonable and prudent alternatives are alternative actions that can be implemented in a manner consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that would avoid jeopardizing the continued existence of listed species or destroying or adversely modifying critical habitat. A Federal agency and an applicant may elect to implement a reasonable and prudent alternative associated with a biological opinion that has found jeopardy or adverse modification of critical habitat. An agency or applicant could alternatively choose to seek an exemption from the requirements of the Act or proceed without implementing the reasonable and prudent alternative. However, unless an exemption was obtained, the Federal agency or applicant would be at risk of violating section 7(a)(2) of the Act if it chose to proceed without implementing a reasonable and prudent alternative. Second, if we find that a proposed action is not likely to jeopardize the continued existence of a listed animal species, we may identify reasonable and prudent measures designed to minimize the amount or extent of take and require the Federal agency or applicant to implement such measures through non-discretionary terms and conditions. We may also identify discretionary conservation recommendations designed to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, help implement recovery plans, or to develop information that could contribute to the recovery of the species.

Based on our experience with consultations pursuant to section 7 of the Act for all listed species, virtually all projects—including those that, in their initial proposed form, would result in jeopardy or adverse modification determinations—can be implemented successfully with, or most, the adoption of reasonable and prudent alternatives. These measures, by definition, must be economically feasible and within the scope of authority of the Federal agency involved in the consultation. As we have a limited consultation history for the Quino checkerspot butterfly, we can only describe the general kinds of actions that may be identified in future reasonable and prudent alternatives. These are based on our understanding of the needs of the species and the threats it faces, as described in the final listing rule and this critical habitat designation.

It is likely that a developer could modify a project or take measures to protect the Quino checkerspot butterfly. Based on the types of modifications and measures that have been implemented in the past for this species, a developer may take such steps as re-aligning the project to avoid sensitive areas, sponsoring a captive breeding program, having a biological monitor present during the construction phase, and performing pre-construction surveys. The total estimated cost for implementing these measures is estimated to range between $3.9 and $38.1 million dollars over a 10-year period within critical habitat. However, it is estimated that the majority of these costs would occur regardless of the critical habitat designation. It should also be noted that developers likely would already be required to undertake such measures due to regulations in CEQA. These measures are not likely to result in a significant economic impact to project proponents. The rule itself, as proposed, is estimated to result in total costs between $0.8 and $8.2 million to this industry (this figure includes the additional costs of participating in section 7 consultations).

The cost per-business, for real estate development activities that will likely require a consultation with the Service, was estimated to average $380,622 per project. Given that approximately nine small businesses, at the most, could bear these costs each year (in estimating effects to small businesses, the analysis conservatively assumes that all potentially affected businesses are small), only about 1 percent of the total number of small real estate development businesses in the area would incur costs considered significant. Furthermore, given that the analysis assumes that the size of such projects would range between 75 and 100 ac, the average cost per project associated with section 7 represents a small percentage, overall, on the total worth of the project.

As required under section 4(b)(2) of the Act, we conducted an analysis of the potential economic impacts of this critical habitat designation, and that analysis was made available for public review and comment before finalization of this designation. Based on estimates

provided in the economic analysis, the potential economic impact of critical habitat designation for the Quino checkerspot butterfly over the next 10 years is estimated to range between $6.4 and $19.9 million. Assuming that these costs are spread out evenly over the period of study, the average annual cost of the designation, as proposed ranges between $0.5 and $2.0 million. Furthermore, due to the changes made in the final rule regarding the designation of private lands (a reduction of approximately 46,540 ha (115,030 ac) from the proposal), the actual impact of critical habitat designation on private landowners will be less than that estimated in the economic analysis.

In summary, we have considered whether this rule would result in significant economic effects on a substantial number of small entities. We have determined, for the above reasons, that it will not affect a substantial number of small entities. Furthermore, we believe that the potential compliance costs for the number of small entities that may be affected by this rule will not be significant. Therefore, we are certifying that the designation of critical habitat for the Quino checkerspot butterfly will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis is not required.

Small Business Regulatory Enforcement Fairness Act (5 U.S.C. 804(2))

As discussed above, this rule is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This final designation of critical habitat: (a) does not have an annual effect on the economy of $100 million; (b) will not cause a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions because, as explained in our economic analysis, the designation is anticipated to have a total estimated economic effect ranging between $6.4 and $19.9 million over a 10-year period. Additionally, these values may be an overestimate of the potential economic effects of the designation because approximately 18,416 ha (45,510 ac) of land not known to be occupied in the proposed designation, and considered not occupied in the economic analysis, are now known to be occupied based on data from the 2001 adult butterfly flight season (only 2,450 ha (6,050 ac) are not known to be occupied in this final designation); and (c) does not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

Proposed and final rules designating critical habitat for listed species are issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). Competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises are not affected by this action and will not be affected by the final rule designating critical habitat for this species. This final rule will not place additional burdens on any entity. We anticipate that the designation of critical habitat will not have any additional effects on these activities in areas of critical habitat occupied by the species. In addition, we anticipate that the designation will not have any adverse effects on activities in areas not known to be occupied due to the presence of other federally listed species.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.):

a. This rule, as designated, will not "significantly or uniquely" affect small governments. A Small Government Agency Plan is not required. Small governments will be affected only to the extent that any programs having Federal funds, permits, or other authorized activities must ensure that their actions will not destroy or adversely modify critical habitat. However, as discussed above, these actions are currently subject to equivalent restrictions through the listing protections of the species, and no further significant restrictions are anticipated in areas of occupied designated critical habitat.

b. This rule, as designated, will not produce a Federal mandate of $100 million or greater in any year. That is, it is not a "significant regulatory action" under the Unfunded Mandates Reform Act. The designation of critical habitat imposes no obligations on State or local governments.

Takings

In accordance with Executive Order 12630, ("Government Actions and Interference with Constitutionally Protected Private Property Rights"), we have analyzed the potential takings implications of designating 69,440 ha (171,605 ac) of lands in Riverside and San Diego Counties, California as critical habitat for the Quino checkerspot butterfly in a takings implication assessment. The takings implications assessment concludes that this final designation of critical habitat does not pose significant takings implications for lands within or affected by the designation.

Federalism

In accordance with Executive Order 13132, the rule does not have significant Federalism effects. A Federalism assessment is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this critical habitat designation, with appropriate State resource agencies in California. The designation of critical habitat within the geographic range occupied by the Quino checkerspot butterfly imposes no significant additional restrictions to those currently in place and therefore, has little incremental impact on State and local governments and their activities. The designation may have some benefit to these governments in that the areas essential to the conservation of the species are more clearly defined, and the primary constituent elements of the habitat necessary to the survival of the species are specifically identified. While this definition and identification does not alter where and what federally sponsored activities may occur, it may assist these local governments in long-range planning (rather than waiting for case-by-case section 7 consultations to occur).

Civil Justice Reform

In accordance with Executive Order 12988, the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Order. We are designating critical habitat in accordance with the provisions of the Endangered Species Act. The rule uses standard property descriptions and identifies the primary constituent elements within the designated areas to assist the public in understanding the habitat needs of the Quino checkerspot butterfly.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain any information collection requirements for which Office of Management and Budget approval under the Paperwork Reduction Act is required.

National Environmental Policy Act

We determined we do not need to prepare an Environmental Assessment and/or an Environmental Impact Statement, as defined by the National

Environmental Policy Act of 1969, in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act, as amended. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This critical habitat designation does not constitute a major Federal action significantly affecting the quality of the human environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, and 512 DM 2, we are coordinating with federally recognized Tribes on a Government-to-Government basis. Further, Secretarial Order 3206, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act" (1997) provides that critical habitat should not be designated in an area that may impact Tribal trust resources unless it is determined to be essential to the conservation of a listed species. The Secretarial Order further states that in designating critical habitat, "the Service shall evaluate and document the extent to which the conservation needs of a listed species can be achieved by limiting the designation to other lands."

In our proposed critical habitat rule, we indicated that approximately 4,409 ha (10,890 ac) of lands within the Cahuilla Band of Mission Indians' Reservation in western Riverside County were essential for the conservation of the Quino checkerspot butterfly. This determination was based on the close proximity of two butterfly occurrence complexes—the Silverado and Southwest Cahuilla complexes—and the continuity of butterfly habitat adjacent to and along the southern portion of the Reservation. We are committed to developing a positive working relationship with the Tribe and will continue our attempts to work with them on developing conservation measures for the butterfly. However, due to time constraints for completing this final rule, we were required to finalize the designation based on our own analysis of the relative importance of the lands within the Cahuilla Band of Mission Indians' Reservation for the conservation of the Quino checkerspot butterfly.

Additional information about the distribution of the species on or near the Reservation became available following the publication of the critical habitat proposal. During the 2001 Quino adult flight season, an additional population of Quino checkerspot butterflies was identified in close proximity to the southern boundary of the Reservation. This occurrence complex has been labeled the Tule Peak complex. Consequently, based on data from the 1998 through the 2001 flight seasons, there are an estimated 228 butterfly occurrences grouped into three occurrence complexes adjacent to and overlapping the southern boundary of the Reservation. These complexes include the majority of documented Quino checkerspot butterflies in the eastern portion of western Riverside County and constitute one of seven significant and substantial essential core regional populations of the species.

Because these occurrence complexes overlap lands within the Reservation, and due to the apparent continuity of butterfly habitat from the complexes across much of the Reservation, we have determined that lands on the Reservation defined by the occurrence complexes that support the primary constituent elements for the Quino checkerspot butterfly are essential to the conservation of this species and are therefore designated as critical habitat. Based on the distribution and dispersal of the Quino checkerspot butterfly and our analysis of areas essential for the conservation of this species, we have reduced the area designated as critical habitat to 525 ha (1,300 ac) on the Cahuilla Band of Mission Indian's Reservation.

Energy Supply, Distribution or Use (Executive Order 13211)

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Though this rule is a significant regulatory action under Executive Order 12866, it is not expected to significantly affect energy supplies, distribution, and use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

Relationship to Mexico

Although this species occurs in Mexico, as well as the United States, according to CFR 402.12(h), "Critical habitat shall not be designated within foreign countries or in other areas outside of the United States' jurisdiction." Therefore, Mexico will not be affected by this designation.

References Cited

A complete list of all references cited in this designation is available upon request from the Carlsbad Fish and Wildlife Office (see **ADDRESSES** section).

Authors

The primary authors of this designation are Douglas Krofta and Alison Anderson of the Carlsbad Fish and Wildlife Office (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. In § 17.11(h) revise the entry for "Butterfly, Quino checkerspot" under "INSECTS" to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	*
INSECTS							

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*	*	*
Butterfly, Quino checkerspot	*Euphydryas editha quino*	U.S.A. (CA), Mexico	Entire	E	804	17.95(i)	NA
*	*	*	*	*	*	*	*

3. Amend § 17.95(i) by adding critical habitat for the Quino checkerspot butterfly (*Euphydryas editha quino*), in the same alphabetical order as this subspecies occurs in § 17.11(h).

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(i) *Insects.* * * *

Quino Checkerspot Butterfly (*Euphydryas editha quino*)

(1) Critical habitat units are depicted for Riverside and San Diego Counties, California, on the maps below.

(2) Primary constituent elements occur in undeveloped areas that support various types of open-canopy woody and herbaceous plant communities. They include, but are not limited to, plant communities that provide populations of host plant and nectar sources for the Quino checkerspot butterfly. The primary constituent elements for the Quino checkerspot butterfly consist of:

(i) Grassland and open-canopy woody plant communities, such as coastal sage scrub, open red shank chaparral, and open juniper woodland, with host plants or nectar plants;

(ii) Undeveloped areas containing grassland or open-canopy woody plant communities, within and between habitat patches, utilized by Quino checkerspot butterfly mating, basking, and movement; or

(iii) Prominent topographic features, such as hills and/or ridges, with no open woody or herbaceous canopy at the top. Prominence should be determined relative to other local topographic features.

(3) Critical habitat does not include non-Federal lands covered by a legally operative incidental take permit for which the Quino checkerspot butterfly is a covered species and has take authorization, issued under section 10(a)(1)(B) of the Act on or before April 15, 2002.

(4) Existing features and structures within the boundaries of mapped critical habitat units, such as buildings, paved or improved roads, aqueducts, railroads, airports, other paved areas, lawns, large areas of closed, canopy woody vegetation such as chaparral and cypress, active agricultural fields, and other urban landscaped areas are not and do not contain constituent elements. Federal actions limited to those areas, therefore, would not trigger a section 7 consultation, unless they affect the species and/or primary constituent elements in adjacent critical habitat.

(5) Critical Habitat Map Units—Index Map follows:

BILLING CODE 4310-55-P

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BILLING CODE 4310–55–C

(B) Map Unit 1: Lake Mathews, Riverside County, California.

(1) Lake Mathews/Estelle Mountain Reserve Subunit. From 1:24,000 USGS quadrangle maps Alberhill and Lake Mathews, California, lands bounded by the following Universal Transverse Mercator (UTM) North American Datum of 1927 (NAD27) coordinates (E, N): 461000, 3738300; 461000, [illegible]

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[illegible] returning to [illegible]; land bounded by [illegible] ... [illegible]

(ii) Harford Springs Subunit. From 1:24,000 USGS quadrangle maps Steele Peak and Lake Mathews, California, lands bounded by the following UTM NAD27 coordinates (E, N): [illegible] ... [illegible] and land bounded by 464100, [illegible]; 464100, [illegible]; [illegible] 464100, [illegible].

(iii) Map Unit 3 follows:

BILLING CODE [illegible]

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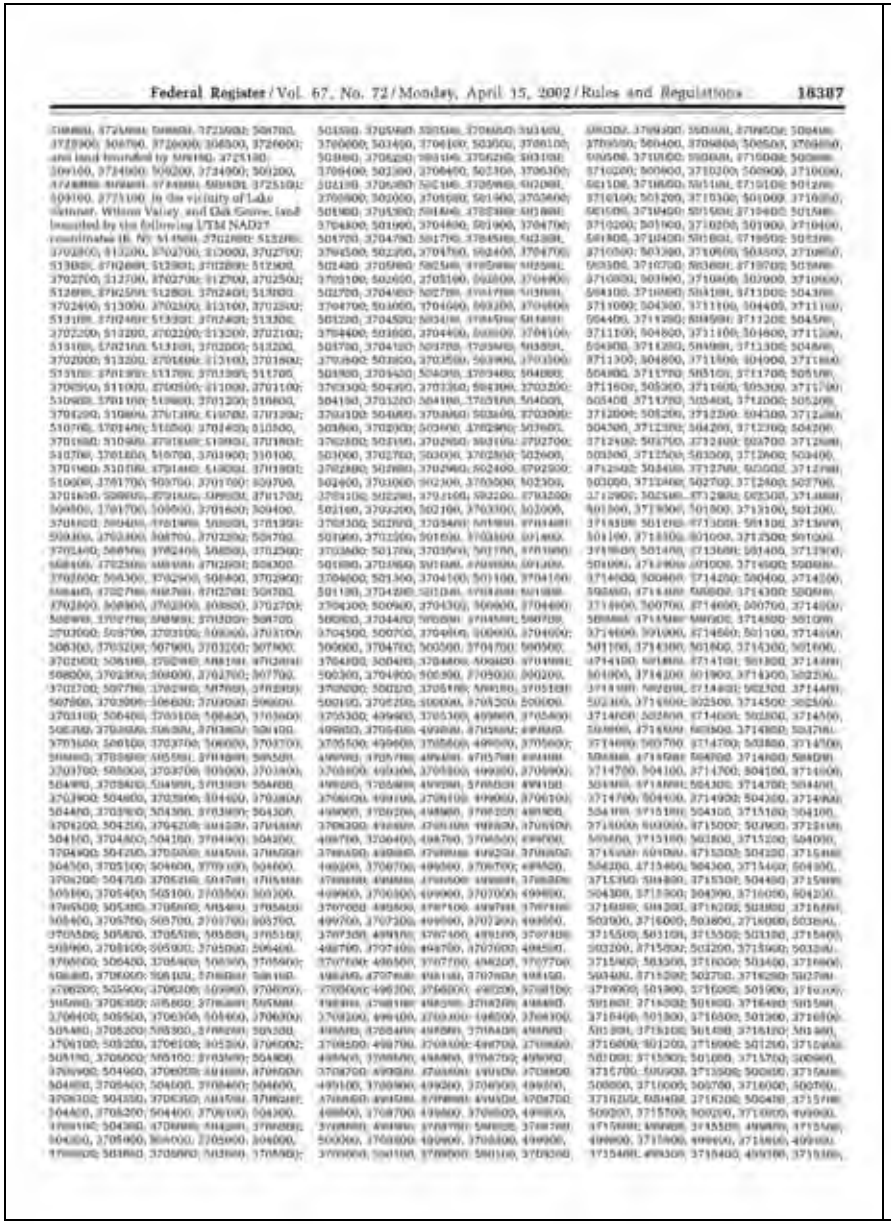
(7) Unit 2: Southwest Riverside County, California.

(i) From USGS 1:24,000 quadrangle maps Romoland, Winchester, Hemet, Blackburn Canyon, Murrieta, Bachelor Mountain, Sage, Cahuilla Mountain, Anza, Pechanga, Vail Lake, Aguanga, and Beauty Mountain, California.

(ii) Brown Canyon Subunit: In the vicinity of Hemet and Brown Canyon, land bounded by the following UTM NAD27 coordinates (E, N): 511000, 3730000; [illegible] returning to 511000, 3730000; and

(iii) Temecula/Murrieta/Oak Grove Subunit: Land bounded by [illegible] excluding land bounded by [illegible]; land bounded by [illegible]



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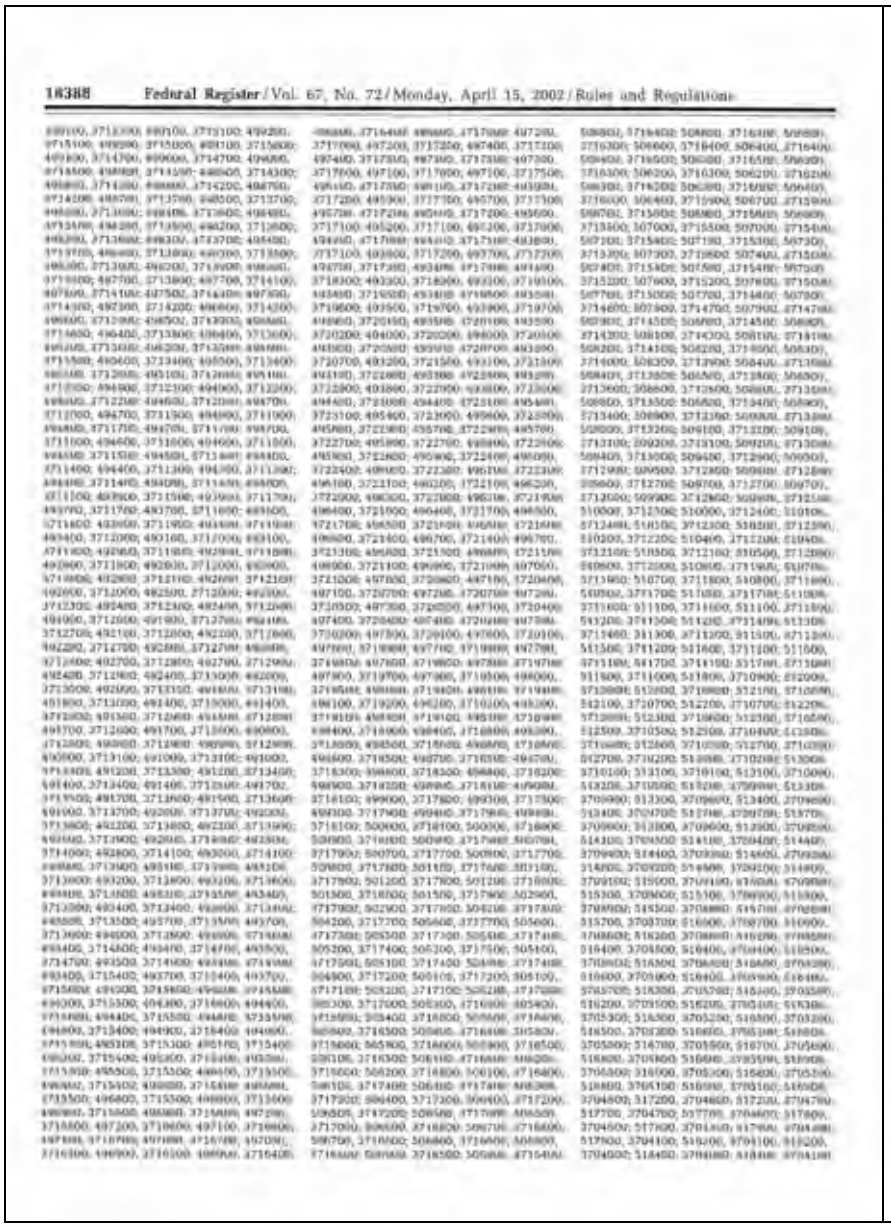

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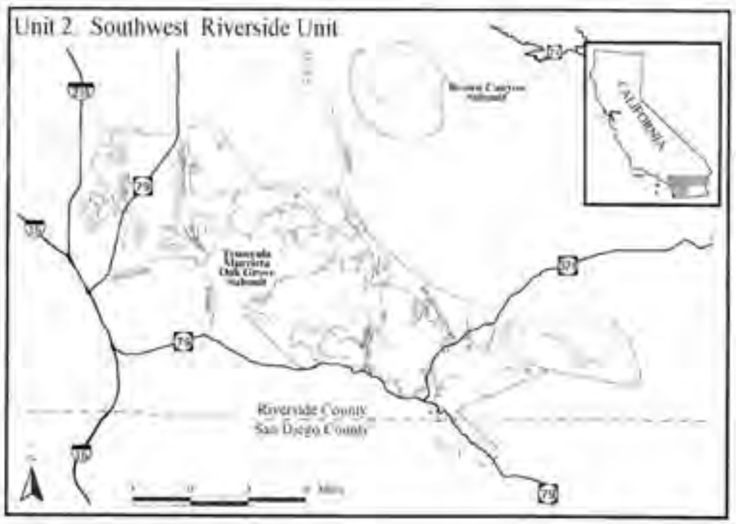
[illegible]

18390 **Federal Register** / Vol. 67, No. 72 / Monday, April 15, 2002 / Rules and Regulations

[illegible]

18392 **Federal Register** / Vol. 67, No. 72 / Monday, April 15, 2002 / Rules and Regulations

(iv) Map Unit 2 follows:



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(8) Unit 3, Otay, San Diego County, California.

(i) From USGS 1:24,000 quadrangle maps Dulzura, Jamul Mountains, Potrero, Tecate, Otay Mountain, Imperial Beach, and Otay Mesa. Beginning at the U.S./Mexico border at UTM NAD27 x-coordinate 507600 thence north along the following UTM NAD27 coordinates (E, N): [illegible]; thence north to the County of San Diego Major Amendment (CSDMA) boundary at UTM x-coordinate [illegible]; thence northwest following the CSDMA boundary to UTM x-coordinate [illegible]; thence south and returning north following UTM coordinates [illegible]; thence east to the CSDMA boundary at UTM y-coordinate [illegible]; thence north along the CSDMA boundary to the Multiple Habitat Planning Area (MHPA) boundary; thence northwestward along the MHPA boundary to CSDMA boundary; thence around the CSDMA boundary to the MHPA boundary; thence northward along the MHPA boundary to UTM y-coordinate [illegible]; thence west to UTM coordinates (E, N) [illegible]; thence north to the City of Chula Vista Preserve Design (CCVPD) boundary at UTM x-coordinate [illegible]; thence southwestward along the CCVPD boundary to the MHPA, thence south to the CSDMA boundary; thence around the CSDMA boundary to the MHPA boundary; thence along the MHPA boundary to UTM y-coordinate [illegible]; thence east following UTM coordinates [illegible]; thence north to the MHPA boundary at UTM x-coordinate [illegible]; thence west along the MHPA boundary and continuing along Federal lands boundaries; thence west and north along the Federal lands boundaries to the MHPA boundary; thence westward along the MHPA boundary to Otay Mesa Road; thence west along Otay Mesa Road to the MHPA boundary; thence northward along the MHPA boundary to UTM x-coordinate [illegible]; thence south and following UTM coordinates [illegible]; thence south to the MHPA boundary at UTM x-coordinate [illegible] [illegible]

[illegible]

[illegible] thence south to the U.S./Mexico border at UTM x-coordinate [illegible] returning to the point of beginning on the U.S./Mexico border at UTM x-coordinate [illegible] excluding the Otay landfill; the planned recreational areas in the Otay River Valley and the university site as illustrated in the City of Chula Vista's


Unit 3. Otay Unit
CALIFORNIA
San Diego County
MEXICO
N
0 1 2 3 4 Miles

3611600; 575800; 3611600; 576600; 3611700; 576700; 3611700; 576700; 3611800; 576600; 3611900; thence north to interstate 8 at UTM x-coordinate 576600; thence west along interstate 8 to UTM x-coordinate 571500; thence southward following UTM coordinates (E, N) 571500, 3613400; 571400, 3613000; 571400, 3613000; 571500, 3613000; 571500, 3613000; 571600, 3613000; 571600, 3613400; 571700, 3613400; 571700, 3613600; 571800, 3613800; 571800, 3614000; 571500, 3612600; 571400, 3612400; 571500, 3612400; 571500, 3612200; 571400, 3612200; 571400, 3612400; 570800, 3612400; 570600, 3612600; 570600, 3612800; 570600, 3614700; 570500, 3611700; 570500, 3611600; 570600, 3611800; 570400, 3611400; 570100, 3611400; 570100, 3611000; 570200, 3610800; 570200, 3610600; 570300, 3610600; 570300, 3610400; 570000, 3610400; 570000, 3610600; 570000, 3610800; 570000, 3610800; 571000, 3610600; 571000, 3610700; 571200, 3610700; 571200, 3610800; 571400, 3610800; 571400, 3610600; 571200, 3610600; 571500, 3610400; 571100, 3610400; 571100, 3610300; 570900, 3610000; 570900, 3610200; 570800, 3610200; 570800, 3610100; 570700, 3610300; 570500, 3609900; 570400, 3609900, 3609800; 570700, 3609800; 571000, 3609800; 571100, 3609800; 571400, 3609800, 571400, 3609600, 571200, 3609600; 571300, 3609400; 571600, 3609400; 571500, 3609000; 571300, 3609000; 571500, 3608900; 571200, 3608900; 571200, 3608800; 571000, 3608800; 571100, 3608500; 571200, 3608500; 571400, 3608300; 571400, 3608200; 571500, 3608200; 571500, 3608100, 571600, 3608100, thence south to the U.S./Mexico border at UTM x-coordinate 571600; returning to the point of beginning on the U.S./Mexico border at UTM x-coordinate 575200.

(ii) Map Unit 4 follows:

BILLING CODE 4310-55-P

Dated: April 2, 2002.

Paul Hoffman,

Acting Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 02-8525 Filed 4-12-02; 8:45 am]

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ORIGINAL PAPER

Sites chosen by diapausing or quiescent stage quino checkerspot butterfly, *Euphydryas editha quino*, (Lepidoptera: Nymphalidae) larvae

Gordon F. Pratt · John F. Emmel

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Abstract This study examines whether in nature endangered quino checkerspot (*Euphydryas editha quino*) larvae will return to diapause and if so where they choose to hide. Multiple years of diapause probably help larvae survive drought years and sites chosen have high survival value to the species. Ninety square meters of habitat were created by removing non native plants and replacing them with natives found at checkerspot occupied sites. During the 2005–2006 winter 1,000 post-diapause larvae were released. From these larvae 31 adults (20 males and 11 females) developed over a 2.5 month period (March 20–June 6) from 41 pupae. One chrysalis was parasitized by a parasitic wasp *Pteromalus pupariorum* (L.) in the family Pteromalidae, one was partially eaten by an animal, while the remaining eight pupae died of unknown causes. Thirty quadrats (1 square meter each) were cleared of vegetation, leaf and branch litter, rocks, and checkerspot larvae from July 5 to August 1, 2006. Forty-nine larvae were found that returned to diapause. Most larvae (31) chose to make shelters on California buckwheat, which is not a checkerspot food plant, two to five cm above the ground. One shelter had 22, another had seven, and two others had single larvae. Five of 10 larvae found in leaf litter below California buckwheat were crawling and not associated with shelters suggesting they had been dislodged from shelters. California buckwheat may be important in habitat restoration for the checkerspot, particularly at sites below 900 meters elevation where summer conditions are hot and dry. No additional larvae were found the following spring, when they should have exited diapause. Therefore 910 (91%) larvae were lost to some undocumented form of mortality.

Keywords Insecta · California buckwheat · Pteromalidae · Conservation · Restoration

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Introduction

The quino checkerspot, *Euphydryas editha quino* (Behr), was at one time one of the most abundant southern California butterflies (Mattoni et al. 1997). As recent as 1977 there were quino checkerspot population explosions reaching nearly two orders of magnitude over normal densities (Murphy and White 1984). Checkerspot numbers according to Murphy and White (1984) reached hundreds of thousands at four sites. About 10 years later in the late 1980s when the checkerspot was petitioned for the endangered species list, it was already believed extinct. Fortunately, in the mid 1990s new quino checkerspot populations were discovered in southwestern Riverside County and later in southwestern and southeastern San Diego County (Mattoni et al. 1997).

Quino checkerspots have an interesting life history. They are univoltine with a late winter/early spring emergence and rarely observed at other seasons after high rainfall (Murphy and White 1984). Female checkerspots generally emerge 2–3 days after the first males and mating is immediate upon their emergence. Within a day the females oviposit clusters of one hundred or more eggs at the base of their annual food plants. These clusters are often on the most open exposed food plants. Because of the short life spans of the annual food plants the first clusters to be oviposited are the most likely to survive to diapause (Murphy and White 1984; Pratt

Springer

et al. 2001). The egg clutch hatches within 2 weeks, the larvae create a protective silken shelter over the food plant, and they feed upon it until it dries out or is completely defoliated. The larvae leave the plant and search for additional resources until they are ready to enter diapause as third or fourth instar larvae. Once in diapause they remain until fall and/or winter precipitation brings up their annual food plants and at this time the post-diapause larvae either develop to adults or re-enter diapause a second or more years (Murphy and White 1984).

Despite past quino checkerspot abundance and extensive work on other populations of Edith's Checkerspot, very little was known of the butterfly's field biology. As an example, the checkerspot was believed to be restricted to below 910 m elevation. It is now known to occur continuously up to slightly above 1,515 m elevation (Pratt et al. 2001). Also quino checkerspot larvae were thought restricted to a single food plant, *Plantago erecta* E. Morris (Erect Plantain). Larval clusters were later found feeding upon as many as five new plant species in four genera: *Plantago patagonica* Jacq. (Patagonia plantain), *Antirrhinum coulterianum* Benth. (white snapdragon), *Castilleja exserta* (A. A. Heller) (purple owl's clover), and *Cordylanthus rigidus* (Benth.) Jepson (rigid bird's beak) (Pratt et al. 2001). An additional checkerspot food plant species and genus, *Collinsia corymbosa* E. Greene (southern Chinese houses), was identified during the 2008 season (Pratt and Parker in press).

Most North American butterflies have biological adaptations that allow them to survive periods when there are little to no food resources (Scott 1979, 1986). Butterflies usually go through some quiescent stage (diapause) as eggs, larvae, pupae, or adults during which there is low to no measurable metabolism (Chapman 1971). Quino checkerspots diapause as larvae, but there is some question whether these dormant larvae are actually in diapause since they respond immediately to disturbance by crawling. They also start feeding after being exposed to a 10 day period of high humidity without even a cold period (Pratt personnel observation). Checkerspot larvae generally remain quiescent from May through January or February (Osborne and Redak 2000). This period can be extended when the food plant quality is not sufficient to support larval development (Murphy and White 1984; Manoni et al. 1997; Emmel and Pratt personnel observation). Poor plant quality is usually a result of low precipitation and/or midwinter intervening hot dry periods.

Prolonged or multiple years of diapause is found in many Lepidoptera including the butterfly families: Pieridae, Papilionidae, Nymphalidae, and Lycaenidae (Scott 1979; Powell 1987; Emmel and Pratt personnel observation). The stage of prolonged diapause varies with species and largely ranges from different larval stages to pupae (Scott 1979). Of known moths and butterflies the yucca moth *Prodoxus y-inversus* (Riley), which diapauses as a mature larva, has exhibited the longest diapause period up to 30 years (Powell 2001). Prolonged diapause is most frequent in butterfly species that are adapted to areas with extremely variable precipitation (Scott 1979, 1986). The pupae of small blues in the *Euphilotes* genus, particularly ones adapted to annual buckwheats, can diapause for at least 5 years waiting for presumably the appropriate precipitation (Pratt and Ballmer 1987; Pratt 1988; Pratt and Emmel personnel observation). Even the Icarioides blue *Icaricia icarioides* (Boisduval), which has a number of endangered subspecies, has exhibited multiple years of diapause by entering a second year of diapause as third instar larvae (Emmel personnel observation). This behavior by the quino checkerspot as well as other members of *Euphydryas* checkerspots is used as an adaptation to survive seasons of low rainfall that produce poor plant resources (Singer and Ehrlich 1979; Ehrlich and Murphy 1981; Murphy and White 1984).

Since quino checkerspots spend most of their life in larval diapause, where they choose to hide during this period is extremely important for their survival. If these sites are not available, then quino checkerspots may not survive even a single generation. Despite their importance, very little is known of them other than observed under laboratory conditions. Larvae in captivity enter diapause on soil surface, under leaf litter, and up in plants several centimeters above the soil surface. But the choices made could be due to a smaller number of unnatural sites and temperature differences in captivity compared to field conditions. The purpose of this study was to examine natural habitat choices made by post diapause larvae that return to the dormant stage. There is controversy as to whether larvae will return to dormancy in nature, so this study will also examine the frequency of larvae that return to diapause for two or more seasons.

Materials and methods

A small number of quino checkerspot butterflies were observed on Vista Murrieta High School's property prior to construction. As part of mitigation the school was required to build an endangered butterfly captive breeding facility. An area adjacent to the facility was also provided to grow plants. This area was used to create an experimental habitat, which resembled a natural fragmented site with scattered native bushes, rocks, food plants, and other annuals growing on largely open soils. Quino checkerspot larvae were unlikely to have survived on site prior to habitat construction since it was completely bulldozed and all plants were removed. Also no larvae or adults were observed the following year after the school's construction

in 2004. Some *Plantago erecta* seeds survived the bulldozing and sprouted on the outdoor habitat before any seeds were spread.

Habitat construction

Ninety square meters were cleared and kept clear of weeds, such as *Erodium* L'Hér. sp. (Storksbill), *Brassica* L. sp. (mustards), and non-native grasses and composites from late 2004 to 2006. The soil was compacted, watered, and various sized rocks were scattered. The following potential larval food plant seeds were spread: *Plantago patagonica*, *Antirrhinum coulterianum*, and *Collinsia concolor* from Anza, California, *Plantago erecta* from the Temecula area, *Plantago elongata* Pursh (slender plantain) from San Diego vernal pools, *Castilleja exserta* from Wilson Valley, Riverside County, California, and *Cordylanthus rigidus* from Marrun Valley, San Diego County, California. *Collinsia heterophylla* Graham (purple Chinese houses) seeds from Theodore Payne Foundation, Sun Valley, California, were from an unknown location. *Castilleja exserta* was also hydroseeded nearby during high school construction.

Potential quino checkerspot butterfly nectar source annuals developed on the habitat. *Lasthenia californica* Lindley (slender goldfields) from Wilson Valley, *Chaenactis glabriuscula* DC. (yellow pincushion) from Wilson Valley, and *Phacelia minor* (Harvey) (wild Canterbury bells) from Theodore Payne Foundation grew from hand spread seed. Additional annuals that developed on the habitat were *Calandrinia ciliata* (Ruiz Lopez and Pavón) (red maids), an *Amsinckia* Lehm. sp. (fiddleneck), and a *Cryptantha* Lehm. sp. *Amsinckia menziesii* (Lehm.) (common fiddleneck) and *Lasthenia californica* were hydroseeded near the habitat during school construction. Only the *Cryptantha* sp. which came up in 2005 did not come up in 2006. Other native annuals present at other quino checkerspot occupied sites came up naturally. The annuals that sprouted on the constructed habitat were a *Plagiobothrys* F. & M. sp., two annual *Lotus* L. sp. [one was *L. purshianus* (Benth.)], dove weed (*Eremocarpus setigerus* Benth.), and tarweed (*Hemizonia* DC. sp.). Some dove weed was removed in 2005 to prevent it from becoming dominant. The lives of the food plant and nectar annuals were extended by watering once a week during periods of no rainfall.

California buckwheats (*Eriogonum fasciculatum* Benth.) were sprouted out and planted. Most plants were sprouted 2 years earlier from Lake Skinner seed. One buckwheat was collected as a small bush from south of Anza. Two bushes developed naturally from seed dispersed from hydroseeded plants at the high school. These bushes differed somewhat in height, shade, and cover. The major perennial bushes other than California buckwheat were *Lotus scoparius* (Nutt. in T. & G.) (deerweed) and *Encelia californica* Nutt. (California encelia). The *E. californica* was hydroseeded during school construction. California everlasting (*Gnaphalium californicum* DC.) seeded itself and formed a large annual or biennial.

Field collection of females

A review of the captive breeding methodology is found at *quinocheckerspot.com*. Much information can be learned from rearing endangered butterflies that will help in conservation. In order to reduce the negative effects of collecting upon field populations, female checkerspots were collected late in the season. Since the food plants are dying and desiccating, larvae from these females are unlikely to survive. Development time from freshly oviposited egg to late second instar, the earliest stage to enter diapause, generally takes about 4 weeks (Pratt and Emmel personal observation). Larvae must feed before they can successfully enter diapause, while food plants do not live long due to dry conditions that follow winter/spring rains. So larvae from eggs oviposited first are most likely to enter diapause, while larvae from eggs oviposited last in the season are least likely to make it to diapause (Singer and Ehrlich 1979). Flower nectar is also reduced late in the season so older females usually have less resources to make egg clutches (Ehrlich and Murphy 1981). By feeding these older females a mixture of honey water (one to three), they will in captivity oviposit many more eggs than they would in nature. Survival of those larvae that hatch can be increased by feeding them laboratory grown plants.

Captive breeding

The larvae were reared to diapause, broken from diapause the following season, and reared to adults. Some females were mated to males from different parentage in the lab colony, while others in order to improve the genetics of the captive breed population were mated with field collected males. Adult emergence was timed to field populations and females were taken to the field where the source females were collected and mated with field collected males. For each lab reared female a male was carefully collected to prevent damage to legs, antennae, and wings and mated to the female in a cage. Once mated, the male was released back to the location at which it was collected. Lab reared males mated successfully 5 times in captivity and all matings were fertile, so these released males were probably capable of mating multiple times.

Larval diapause and release

Quino checkerspot larvae were broken from diapause by placing them on wet paper towels within Gladlock storage

containers. The containers, with *Penstemon* Mitch. leaves placed on the bottom as food, were opened twice daily, eight to 16 h apart to reduce mold. The containers were cleaned after extensive feeding by larvae. After 10 days the larvae were put onto the created habitat. Only quino checkerspot larvae originally from Lake Skinner, Riverside County (13 km east of the study habitat) were used for this experiment; this ensured that any escaping adults were from a local checkerspot population. The 1,000 released larvae were as follows: 106 two year old larvae (all remaining larvae are one year old) from one female line released on 12 December, 2005, 85 larvae from a cross of female line 2 mated to a field collected male released on 14 January, 501 larvae (118 larvae from a cross of female line 2 mated to a field collected male, 107 larvae from a cross of female line 3 mated to a field collected male, 152 larvae from a cross of female line 4 mated to a field collected male, and 124 larvae from a 2005 field collected female number 2) released on 6 February, and 308 larvae (107 larvae from a cross of female line 4 mated to a field collected male, 109 larvae from a cross of female line 2 mated to a field collected male, and 92 larvae from a cross of female line 3 mated to a field collected male) released on 7 February, 2006.

The released larvae fed upon annual food plants on the created habitat and were allowed to re-enter diapause. Twice a week, February through April, all but one last instar larvae were found and transferred to a field cage placed over flats of *Plantago erecta*. Once quino checkerspot larvae become last instars they are believed incapable of returning to diapause, therefore isolating last instar larvae minimized escaping adults.

Survey methods (collections from 30 quadrats)

From July 5 to August 1, 2006 leaf litter, wood chips, branches, and rocks were cleared from 30 quadrats. Each quadrat was one square meter in size. Rocks were removed first and carefully checked for diapausing larvae. With pruning sheers branches of all bushes were collected and placed in bags. The reason for collecting the branches was diapausing larvae were small and easily dislodged. Before collecting the main stalk of each bush, it was carefully checked and the leaf litter beneath the bush was collected. We compared with chi-square analysis the numbers of larvae against those expected on substrates if larvae were randomly distributed.

Results

Most larvae did not leave the created habitat. Some larvae (>10) were even observed crawling directly back to the created habitat. On the other hand, one larva was observed over 10 m away on blacktop and was unlikely to find its way back.

A few rocks, wood chips, and leaf litter were searched in early January, 2006. About four or five larvae immediately returned to diapause under rocks and in leaf litter. Approximately a dozen larvae were found hiding while either not feeding or molting to the next instar. Larvae in diapause were identified from hiding larvae by a silken shelter, a characteristic curled "c" shape, and remaining in the same location for several days. The two or three larvae that immediately re-entered diapause under rocks either moved or died sometime before collection of the quadrats in early July to early August.

Larvae in diapause were not distributed on substrates of quadrats randomly (Table 1). Thirty-one larvae were found in shelters on California buckwheat, *Eriogonum fasciculatum*, while five larvae were found wandering in leaf litter below them. All larvae on California buckwheat were within shelters in shaded cavities where branches separated from the main trunk. Four of nine buckwheat cavities had diapausing larvae: one had 22, another had seven, and the other two had one each. No larvae were found on buckwheat branches. The five larvae observed crawling beneath the buckwheat were likely dislodged from branches during sampling, since they were observed beneath bushes after branches were pruned. Forty-six (94%) of the 49 larvae in diapause were found on the nine quadrats which had a California buckwheat plant.

Diapausing quino checkerspot larvae were found on two additional plant species: *Gnaphalium californicum* (two on one and three and two on another) and *Antirrhinum* sp. (1) (Table 1). One cluster of three larvae found on the *Gnaphalium* was found 20 cm above the soil surface. The remaining 10 larvae were found in leaf litter. These larvae were found in the shade of bushes, particularly California buckwheats and some California encelia. Five larvae in leaf litter were actively crawling, while the other five larvae were in shelters within curled leaves. The leaves chosen were brown and thick and were likely of *Plantago minor*. The leaves had curled in such a way that they were completely closed. Most leaves silkened in the same way were often inhabited by spiders.

Other quino checkerspot larval behaviors were observed in this study. Post-diapause larvae, though the source population fed exclusively upon *Plantago erecta*, fed readily upon *Antirrhinum coulterianum* (>6), *Plantago patagonica* (>10) and *Plantago elongata* (1). Once *A. coulterianum* and *Plantago patagonica* plants began sending up flower stalks, they became less attractive to feeding by post-diapause larvae. They fed preferentially on freshly sprouted *Plantago erecta* over other food plants. On 2 March, 2006, a larva searched for a pupation site; it stopped at the northeast side of a rock and stretched up and

Table 1 One-way chi-square analysis of substrate use by quino checkerspot larvae

Substrate	# Quads	Proportion with Substrate	Obs.† # Larvae	Exp.‡ # Larvae	Chi-square Obs. vs. Exp.	Dev.
Leaf litter	80	0.170	40	9.23	93	1.9
Rocks	28	0.148	0	7.24	7.2	−7.2
Eriogonum fasciculatum	9	0.083	31	2.51	324.0	28.5
Gnaphalum californicum	3	0.017	7	0.84	35.5	6.2
Corethrogyne canadensis	24	0.136	0	6.68	6.7	−6.3
Chaenactis glabriuscula	26	0.148	0	7.24	7.2	−7.4
Plantago species	17	0.097	0	4.73	4.7	−4.7
Navarretia species	15	0.085	1	4.19	2.9	−2.2
Eschscholzia californica	16	0.091	5	4.45	4.5	−4.5
Lotus scoparius	8	0.054	0	1.67	1.7	−1.9
Phacelia minor	4	0.025	0	1.11	1.1	−1.1
Total	176	1	84	43	405.3*	0.0

$P < 0.001$

† Obs observed

‡ Exp expected

* $df = 10$

down and back and forth. A few moments later it was observed exhibiting the same behavior at a nearby rock shadow, which covered a larger area with more animals. It pupated at this site. Twenty-three days later the pupa was found on the ground near the pupation site; it was divided in half, and left mostly uneaten.

Approximately fifty mature larvae were placed in a field cage, where they were allowed to feed until they pupated. Forty pupae were collected from the field cage 2 days after each one pupated and placed in a cage indoors by a south-facing window where adults were allowed to emerge. This collection minimized escape, since adults that eclose in the field cage could have escaped when opened outdoors. One pupa produced parasites that were identified as *Pteromalus puparum* (L.) which is a parasitic chalcid wasp in the family Pteromalidae. Twenty males and 11 females of quino checkerspots emerged from thirty-nine pupae.

Other larvae found on California buckwheat (*Eriogonum fasciculatum*) were one *Euphilotes bernardino* (Barnes and McDunnough), three *Apodemia virgulti* (*mormo*) *virgulti* (Behr), one geometrid moth, and three or four microlepidoptera. The *Euphilotes bernardino* larva was finished feeding and was searching for a pupation site. The *Apodemia virgulti* larvae were sitting inside shelters on the underside of buckwheat branches. The purplish brown microlepidoptera larvae were probably in diapause (or a quiescent state) and in silken webs at the base of a bush.

Additional plants found on the quadrats not listed in Table 1 because of low numbers and lack of quino checkerspot larvae were: (the number following the plant species in parenthesis is the number of quadrats the plant was found on) *Hemizonia* DC. sp. (4), *Cassiopeia tetiana* Raven (1), *Centaurea* L. sp. (3), *Lotus purshianus* (4), *Rumex salicifolius* J. A. Weinm. (1), *Amsinckia eastwoodiana* (2), *Microseris douglasii* (DC.) (1), *Baccharis salicifolia* (Ruiz Lopez & Pavón) sp. (1), *Lasthenia californica* (2), *Rafinesquia californica* Nutt. (1), *Chenopodium* L. sp. (1), *Eremocarpus setigerus* (15), *Brassica* sp. (1), and grass sp. (8). Most of the annuals were poorly represented because most had dried up and disappeared.

Discussion

Prolonged diapause can add a level of complexity to butterfly conservation. Butterflies can remain in diapause for multiple years as "seed banks" of diapausing larvae or pupae. Therefore observed numbers of adults during monitoring do not necessarily reflect how poorly or how well the species is doing. The endangered Palos Verdes Blue *Glaucopsyche lygdamus palosverdesensis* Perkins and Emmel, for example, which had adult numbers drop dangerously low during monitoring at the Defense Fuel Support Point in San Pedro, California in 2003 (peak of 4), exhibited its highest numbers the following year (peak of 43), indicating that a large number of pupae remained in diapause (Longcore 2003; Pratt 2004). A similar observation was exhibited with the quino checkerspot in the San Diego area. In the winter/spring of 1977 an outbreak of checkerspot larvae completely defoliated the food plant *Plantago erecta* so there was no food for prediapause larvae, yet the following season produced normal levels of

food plants and quino checkerspots (Murphy and White 1984).

Genes involved in prolonged diapause need to be maintained in captive reared populations of endangered butterflies since prolonged diapause is important in long term survival in nature. Without these genes, butterflies released after habitat restoration will not survive through extremely dry winter/springs or other disasters that eliminate all progeny during a single season. Unfortunately preserving genes important in prolonged diapause is not easy in captive rearing since the procedures used to increase butterfly numbers often selects for those that do not diapause multiple years. For instance butterflies that develop the first year of captive rearing are ones that did not go through multiple years of diapause. If these butterflies are mated with each other to increase population numbers this could select for lines that are not adapted to long term diapause. Quino checkerspots that take multiple years to develop in captivity should be selected and mated with those that take 1 year and others that take multiple years to mature.

There has been little research on the dormant stage of quino checkerspots, despite most of their time being spent in this stage in nature (Mattoni et al. 1997; Osborne and Redak 2000). The earliest seasonal observations of quino checkerspot larvae at Lake Skinner were groups of larvae at margins of dense grass and shrub cover, which later separated by random dispersal (Osborne and Redak 2000). These observations suggest larvae diapaused under or within bushes or grass clumps. Larvae of other *Euphydryas editha* subspecies have been field collected but exactly where they were found was not reported (Singer and Ehrlich 1979). The weights of these larvae suggest some diapaused one summer through winter, fed the following spring, grew some, and resumed to a second year of diapause (Singer and Ehrlich 1979).

Dormant stage or diapausing quino checkerspot larvae were found in four different structure sites in the following order: California buckwheat (*Eriogonum fasciculatum*), leaf litter, California everlasting (*Gnaphalium californicum*), and fiddleneck (*Amsinkia* species). Most larvae were observed at the trunk of California buckwheat, which was interesting since buckwheat is not a food plant for the quino checkerspot. The next most frequent site was leaf litter, but half of these larvae were either moving or outside of a shelter, so they were likely not dormant in leaf litter and probably dislodged from shelters on buckwheat branches. The next most frequent site was California everlasting, *Gnaphalium californicum*. Because of low numbers of this plant on the 30 quadrats, its significance is in question. There was only one quino checkerspot larva found in the basal leaves of *Amsinkia*; these leaves were found on 15 of the 30 quadrats.

From a survey to define characteristics that identify quino checkerspot habitat, one non-food plant California buckwheat (*Eriogonum fasciculatum*) was found at all checkerspot occupied sites in southern California (Pratt 2001). This plant was present at most occupied sites then even the main food plant, *Plantago erecta*. California buckwheat indicating checkerspot habitat was controversial since it was common throughout much of southern California (Hickman 1993) and there was no explanation why this buckwheat would indicate habitat. It was argued that California buckwheat was found at all checkerspot habitats just because it was very common throughout southern California. This buckwheat is not a food plant and flowers of these plants are not important food sources for adults, so there was no reason it would be important for the checkerspot's survival. But even the edges of checkerspot habitat are often better defined by the buckwheat than actual quino checkerspot food plants, particularly since the food plants are small annuals, vary at different sites, and are not visible most of the year.

California buckwheats form a shady somewhat humid habitat by holding their leaves throughout most of the year. As a comparison California encelia (*Encelia californica*) and deerweed (*Lotus scoparius*) leaf out and bloom after fall and winter rains and drop their leaves by mid spring to early summer. In addition California buckwheats grow by branching from a thickened trunk twisting in such a way that creates a shaded cavity deep within the bush. The importance of California buckwheat for quino checkerspot diapausing larvae could be the reason for its presence at all occupied sites below a thousand meters elevation. Higher humidity and cooler temperatures provided by these plants may increase checkerspot larval survival through the hot dry southern California summer.

California everlasting could be a good site for diapausing larvae, but these sites were within the shade of California buckwheat, so buckwheat may have played a greater role in diapause choice. California everlasting is not present at many quino checkerspot occupied sites. Although the everlasting is either an annual or biennial, it has thick leaves that turn dark brown, curl, and are held up above the hot ground. The dead plant also lasts through the summer.

Over 250 *Conyza canadensis* (L.) Cronq. plants were surveyed by this study. This annual remains alive throughout most of the summer and has leaves at the base that could have made a good diapause site for quino checkerspot larvae. In spite of all these surveyed plants, no quino checkerspot larvae were found associated with *C. canadensis*. Perhaps shade is more important and they did not have enough shade or protection for quiescent state larvae as do the everlasting and buckwheat.

Two quino checkerspot larvae were observed entering a quiescent state between overhanging rocks in January. It

was surprising they were not observed in early July to early August beneath or between rocks. During July in Marron Valley (a checkerspot occupied site) soil and rock temperatures were close to 70°C, even though air temperatures were nearly 30 degrees lower. These soil and rock temperatures were rather high for survival and a larva may have to either move to a cooler site such as beneath bushes or die from overheating.

No larvae were observed feeding after early April. Quino checkerspot larvae that were not last instar probably returned to a quiescent state. This was surprising since there were extensive cool rains that came in March and April, yet *Plantago* did not sprout from these rains. Perhaps *Plantago* seeds require a specific photoperiod to sprout. If seed sprouting occurs only during short days, longer day lengths in April may be too long for *Plantago* seeds to sprout.

Laboratory results predict after larval mortality, 50% or more of those surviving should return to a quiescent state, while the remainder will become adults. For instance, from 789 postdiapause larvae from 8 different Lake Skinner female lines in 2007 there was a total mortality of 37%, while 72% of the remaining larvae returned to diapause (Pratt 2007). An experiment of 630 postdiapause larvae from a Lake Skinner female line in 2008 gave 36.5% mortality, while 49% of the remaining larvae returned to diapause (Pratt and Switzer 2008). It is not surprising that field mortality is over double that of laboratory. The 49 larvae found dormant in summer represented about 54% of the remaining larvae, which was close to expected. Since the habitat was watered frequently, larval numbers that return to diapause is probably much higher most seasons in nature due to drier conditions.

The sampled area represented about 33% of the total constructed habitat, so if the whole area had been surveyed the total dormant larvae could have increased to 150. But no larvae were observed the following season, which would be expected if diapausing larvae remained in the habitat. Mortality could have been around 91% considering there were probably many larvae preyed upon, parasitized, and other factors. This mortality was not much higher than expected since mortality for other *Euphydryas editha* populations were 74% (on *Collinsia torreyi* A. Gray) and 91% (on *Pedicularis semibarbata* A. Gray) during post-diapause larval development (Moore 1989).

Secondary *Plantago* sprouting from later precipitation may be important for development of quino checkerspot larvae to adults. These fresh young plants were preferred by later instar quino checkerspot larvae. Larvae that start feeding on food plants that are in the process of blooming may stimulate them to return to a quiescent state. But if a larva reaches the last instar by feeding on freshly sprouted food plants, it may still pupate even though it feeds on plants that are in the process of blooming.

Restoration

Up to this point there has been emphasis on increased annual and reduced perennial plants within quino checkerspot habitat. This is due to quino checkerspots preferring to fly over mainly barren ground and larvae feeding and pupating upon open habitats that favor development of annuals (Osborne and Redak 2000). This larval release suggests shade may be important in their survival. Although this part of the habitat may represent a small portion, bushes or other structures that provide shade throughout the summer may be important for high long term larval survival. California buckwheat could be an important source of shade since this bush keeps its leaves throughout the summer unlike other perennials found in occupied checkerspot sites.

Plantago elongata, which occurs around vernal pools in the San Diego area, could be an important food plant for late instar checkerspot larvae. At least one larva was observed feeding upon this annual even with multiple choices. Greater food plant choices could improve habitat quality at occupied sites. Larvae fed upon multiple annuals, even though they came from a population associated with a single food plant. Although these plants may not naturally occur together, there is now far less checkerspot habitat, so long term survival may depend on improved habitat quality. Food plants may respond to seasons differently, some plants may be favored from early precipitations, while others from later rains. A greater variety of food plants may mean at least one food plant will be available most seasons.

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Quino Checkerspot Butterfly
Survey Protocol

February 2014

U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

The Quino checkerspot butterfly (*Euphydryas editha quino*, "Quino") was listed as an endangered species on January 16, 1997 (62 FR 2313), and is protected under the provisions of the Endangered Species Act of 1973, as amended (Act). This survey protocol provides recommended guidance on survey methodology for biologists possessing a current recovery permit for Quino pursuant to section 10(a)(1)(A) of the Act.

We recommend site assessments be conducted for all projects mapped within the potential range of Quino (see attached map: Recommended Quino Survey Area). Site assessments are used to determine if a project site contains areas where surveying for Quino is recommended. If a site does not contain such areas, (i.e., is comprised solely of "excluded" areas as defined below), surveys would not be recommended.

SITE ASSESSMENTS

- Site assessments involve conducting a general field survey of the site and mapping excluded areas and Quino survey areas on a U.S. Geological Survey 7.5' (1:24,000) topographic quadrangle map that has been enlarged 200 percent.
- The site assessment shall be conducted prior to the first Quino survey.
- Excluded Areas
  - The following areas are not recommended for Quino surveys:
    - Orchards, developed areas, or small in-fill parcels (plots smaller than an acre completely surrounded by urban development) largely dominated by non-native vegetation;
    - Active/in-use agricultural fields without natural or remnant inclusions of native vegetation or that are completely without any fallowed or unplowed areas;
    - Closed-canopy woody vegetation including forests, riparian areas, shrub-lands, and chaparral. "Closed-canopy woody vegetation" describes shrubs or trees growing closely together in which the upper portions of the vegetation converge (are touching) to the point that the open space between two or more plants is not significantly different than the open space within a single plant. Closed canopy shrub-land and chaparral are defined as vegetation so thick that it is inaccessible to humans except by destruction of woody vegetation (branches).
- Quino Survey Areas
  - All areas that are not excluded, regardless of the presence or absence of Quino host plants or nectar sources.

21 February 2014

QUINO SURVEYS

- Quino protocol surveys shall not be conducted concurrently with any other focused survey (e.g. a coastal California gnatcatcher or Quino host plant survey).
- The entire Quino Survey Area of a site shall be surveyed for Quino each week.
- The first weekly survey for Quino shall begin during the third week of February.
- The survey season will end the second Saturday in May.
- Surveys shall be conducted weekly and spaced no closer than 4 days apart (see WEATHER-RELATED CONDITIONS below).
- At a minimum, surveys shall be conducted for 5 continuous weeks, beginning during the third week of February.
  - If no Quino are detected during the first 5 weeks, surveys will continue to the end of the survey season or until a Quino is detected;
  - If a Quino is detected during any survey within the first 5 weeks, surveys do not need to be conducted after the fifth week;
  - If surveys continue past the fifth week, surveys may stop if during any survey a Quino is detected.
- Surveys should be conducted at an average rate of 10-15 acres (4-6 hectares) per hour.
- Survey routes shall be roughly parallel to each other and spaced approximately 30 feet (10 meters) apart.
- Survey routes shall be within 15 feet (5 meters) of site boundaries and/or the perimeter of excluded areas.

WEATHER-RELATED CONDITIONS

Permitted biologists are expected to assess weather conditions during the survey period, and to also assess seasonal weather patterns (e.g. drought) that could lead to inaccurate conclusions regarding the species' presence/absence.

- Surveys will not be conducted when the following weather conditions exist:
  - Fog, drizzle, or rain;
  - Sustained or gusting winds that average greater than 15 miles (24 kilometers) per hour measured over a 30 second period at a height of 4-6 feet (1.2-1.8 meters) above ground level;
  - Temperature in the shade at ground level is less than 60° F (15.5° C) on a clear, sunny day with less than 50 percent cloud cover, or less than 70° F (21° C) on days with 50 percent or more cloud cover;
  - A weekly survey should only be missed because of week-long adverse weather;
  - If a weekly survey is missed due to weather conditions, two surveys should be conducted on non-consecutive days the following week.

SURVEY MAPS

- Locations of all Quino adults and larvae observed shall be mapped on a non-enlarged 7.5' USGS topographic map.
- Locations of all Quino adult and larvae shall also be recorded on data sheets using Universal Transverse Mercator (UTM) coordinates, with accuracy of +/- 15 feet (5 meters).

21 February 2014

- All areas of Quino larval host plants shall be mapped on a 7.5' USGS topographic map. Host plants shall be mapped for relative abundance (i.e., less than 10 individuals in this patch vs. more than 100 individuals and less than 500 individuals in this patch) (see attached example: Map showing plant species distribution and relative abundance). As of 2014, the list of larval host plants include: *Plantago erecta*, *Plantago patagonica*, *Antirrhinum coulterianum*, *Cordylanthus rigidus*, *Castilleja exserta*, and *Collinsia* spp. If other larval host plants are observed, they should be noted and mapped accordingly.
- Areas with suitable nectar plants shall also be mapped on a 7.5' USGS topographic map. It is not necessary to provide relative abundances of nectar plants.

REPORTING TERMS AND CONDITIONS FOR PERMITTED BIOLOGISTS

- Within 45 days of the final survey, permitted biologists are to send a written report signed by all biologists who conducted surveys (i.e., pursuant to the terms and conditions of their section 10(a)1(A) Recovery Permit).
- Survey reports shall include:
  - Name, permit number, and legible copies of field notes of the permitted biologist(s) who conducted the surveys;
  - Non-enlarged 7.5' USGS topographic map (and aerial photo if available) with Quino larvae and/or adult locations marked;
  - Site assessment map with larval host plant locations marked;
  - Site assessment map with plant communities delineated;
  - Dates and times of each weekly survey;
  - Air temperature, wind speed, and weather conditions at the start and end of each survey;
  - A list of all butterflies observed during each weekly survey;
  - A list of larval potential host and/or nectar plants and plant communities observed on the site.

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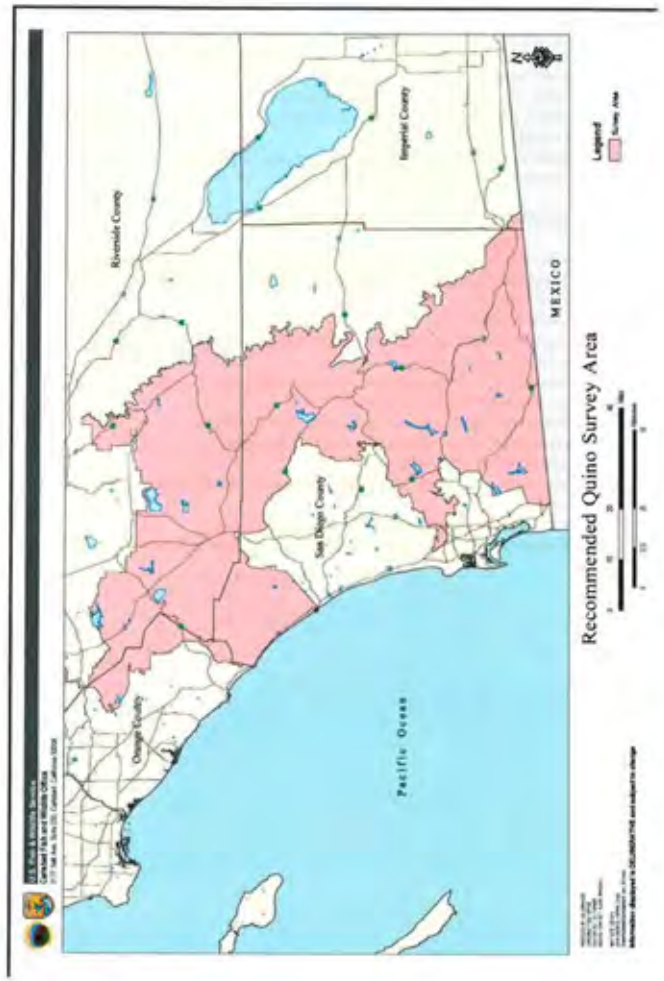
Recommended Quino Survey Area
Legend
Riverside County
Imperial County
San Diego County
Orange County
Pacific Ocean
MEXICO
21 February 2014

Map showing plant species distribution and relative abundance.

▲ QCB

Low Density Host Plant (Define by plants per square meter)

Medium Density Host Plant (Define by plants per square meter)

High Density Host Plant (Define by plants per square meter)

21 February 2014

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Southwest Region
2800 Cottage Way, Suite W-2606
Sacramento, California 95825

JUN 22 2012

Memorandum

To: Regional Director, Pacific Region, Bureau of Indian Affairs
Sacramento, California

From: Regional Director, Pacific Southwest Region
Sacramento, California

Subject: Draft Avian and Bat Protection Plan for the Tule Reduced Ridgeline Wind Project

We are writing in response to your request for our evaluation of the draft Project-Specific Avian and Bat Protection Plan (ABPP) for the Tule Reduced Ridgeline Wind Project. The U.S. Fish and Wildlife Service (Service) has reviewed this document and determined that construction and operation of Phase II of the Tule Wind facility has a high potential to result in injury or mortality of golden eagles (*Aquila chrysaetos*), and the loss of golden eagle breeding territories. If your agency moves forward with approving this project, mortality estimates will need to be refined in order to determine the effects to the golden eagle population.

The Draft ABPP states that Tule Wind LLC has agreed to apply for a programmatic eagle take permit prior to operation of the Reduced Ridgeline Project consistent with current Service guidance and to abide by the terms and conditions of such take permit when issued. Permit applications must meet the conservation standard of the Eagle Act (maintaining stable or increasing breeding populations), as well as the permit issuance criteria outlined in our 2009 take permit rule in order to qualify for a permit.

Due to the Service's concerns about uncertainty with regards to the status of the population of golden eagles, the take threshold for this species is currently set at zero; take cannot be authorized unless advanced conservation practices (ACPs) and compensation measures are implemented that meet the "no net loss" permit standard of the Bald and Golden Eagle Protection Act. Activities that risk loss or abandonment of a nesting territory have a much greater impact on eagle populations than the intermittent loss of individuals. We addressed this in our 2009 Final Environmental Assessment (FEA) for the take permit rule and determined that an activity that resulted in (or was likely to result in) permanent loss of production from a golden eagle territory would be the equivalent of taking 4 individuals per year. Any take from the loss of an eagle territory, along with the predicted fatalities would need to be compensated to meet the Services permit issuance criteria.

As you are aware, the Service and Bureau of Land Management have been heavily involved in the development of the Desert Renewable Energy Conservation Plan (DRECP), and discussions are underway to address the impacts to eagles from renewable energy development in southern

California as part of this planning effort. In the DRECP area, the loss of a territory would be very costly to the Department's goal of maximizing energy production while maintaining sustainable populations of eagles.

In addition to developing an Eagle Conservation Plan for eagles, we recommend that project proponents develop Bird and Bat Conservation Strategies (formerly ABPPs) to address and reduce potential risk to other species of birds protected under the Migratory Bird Treaty Act (MBTA), as well as bats. The MBTA has no provision for allowing unauthorized take of migratory birds that may be killed or injured by otherwise lawful activities. Project proponents and other agencies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or avian (and bat) protection plans, and to implement those measures during construction and operation of facilities and equipment. While it is not possible to absolve individuals or companies from MBTA or BGEPA liability, the Office of Law Enforcement focuses its resources on investigating and prosecuting those who take migratory birds without identifying and implementing reasonable and effective measures to avoid the take.

Specific to the Tule Wind Project, the Service appreciates the Bureau of Indian Affairs and the project proponent's efforts in coordinating with the Service and in conducting studies during 2011 and 2012 in an effort to address potential impacts to eagles. The Service does not agree with the project proponent's assertion that risk of taking eagles from project operations of Phase II would be low to moderate, based on the data presented to date.

The conditions outlined in the Draft ABPP as presented would not likely meet the conservation standard of the Bald and Golden Eagle Protection Act. We recommend the Bureau of Indian Affairs and the project proponent considers a different turbine siting design or moving the project to another location to minimize and avoid eagle take. Our detailed comments on the Draft ABPP are attached for your review. If requested, we will reconsider a comprehensive re-assessment of risks to eagles posed by the project, when the additional biological data being collected in 2012 have been incorporated into an ECP and provided to the Service.

If you have any questions regarding this project, please contact myself or Deputy Regional Director, Alexandra Pitts at (916) 414-6467.

Attachment: ABPP Review

cc: Chairman, Ewiiaapaayp Band of Kumeyaay Indians, Alpine, CA
Jeffrey Durocher, Iberdrola Renewables, Portland, OR
Bill Condon, California Department of Fish and Game, Sacramento, CA
Scott Sobiech, FWS, Carlsbad, CA

Attachment 1: Fish and Wildlife Service Review of Draft ABPP for Phase II Tule Wind Project

Below is a summary of our comments and concerns on the Tule Phase II Draft ABPP.

- Phase II of this project represents a high risk for golden eagle mortality and "disturbance" based on the known number of golden eagle territories within a 10-mile radius of the project site.
- The proximity (495 ft) of the active Cane Brake nest site to proposed turbine locations has great potential to cause the loss of a territory and would likely cause ongoing mortality of breeding eagles and their offspring. The options proposed in the draft ABPP to curtail up to 4 turbines near this nest site, would not alleviate the potential loss of this territory. The curtailment options presented do not span enough of the golden eagle breeding season and fledgling period to avoid loss of the Cane Brake nest territory.
- A range of options to minimize risk to eagles are proposed, including curtailment of some turbines during a portion of the breeding season and the elimination of all turbines with the exception of the six turbines proposed on State lands. The option of moving forward with only six turbines near the base of the ridgeline warrants further consideration. However, the Draft ABPP does not clearly state what data was included in the fatality estimate for this option. Additional analysis of the data will likely be needed to refine mortality estimates for these 6 turbines.
- In February 2012, we recommend BIA and the applicant use the eagle observational data collected in 2011 and the juvenile eagle telemetry data to assess risk. We also recommend use of the Bayesian risk model the Service utilized to assess risk on the proposed West Butte Wind Project in Oregon. Neither of these two recommendations were incorporated into the Draft ABPP submitted for our review. Therefore, we request that all the raw eagle use data collected for this project to date, including the telemetry data, be provided to the Service for our review and use in developing a mortality estimate using the Bayesian risk model.

Specific Comments

1. Introduction. Pages 1-1 – 1-2
The introduction states, "This PSABPP will be adopted by the applicable State and Federal agencies and the Tribe as a controlling document for the protection of avian and bat resources during the construction, operation and decommissioning of the Reduced Ridgeline Project." The State of California has laws and regulations administered by the California Department of Fish and Game that provide protection for golden eagles and other species of birds potentially affected by this project. We would like to coordinate our review of this document with the State. Please provide a contact for each State agency who is reviewing this document to facilitate a joint review.

2. Avian Point Counts. Page 2-6
The point locations used between 2005 and 2008 for both Phase I and Phase II (Figures 2-1) do not appear to provide good visual coverage of the known golden eagle nest site at the north end of the project (i.e., Cane Brake). These surveys were limited to 30-minute fixed observation distance point count surveys for which comprehensive avian data was being collected. We acknowledge the project proponents efforts, in 2011, to update the prior surveys with ground-based survey information for golden eagle territories closest to the Phase II turbine locations using the preferred long-sit count observations. However, the potential lack of information

gathered specific to golden eagles during the 2005 -2008 timeframe may underestimate the exposure minutes used to calculate the fatality rates for golden eagles on page 2-16.

3. Golden Eagle Telemetry Study. Pages 2-12 – 2-13
Please include the most current telemetry study data, including maps, within the ABPP. The discussion and assumptions about the Cane Break point locations and use of the ridgeline area are confusing and contradictory. Please clarify this section.

4. USFWS Fatality Model. Pages 2-16 – 2-20
The proximity of Cane Break eagle nest site classifies the project as a Category 1/High Risk Project in the Service's Draft Eagle Conservation Plan Guidance as it poses a high risk to eagles and the potential to avoid or mitigate impacts is low. There are two major concerns: 1) the project is in close proximity of eagle nests or cluster of nests in an occupied territory, and 2) the project footprint is visited regularly by eagles occupying a proximate nesting territory.

The Draft ABPP bases its risk characterization on 75 total exposure minutes and predicts at least 2.7-6.2 golden eagles may be killed over 20 years, depending on alternative project layouts and turbine curtailment strategies. However, eagle exposure minutes were primarily documented during the 1-year period in 2011 using the recommended long-sit unlimited distance point count observations. We suggest that the data from the recent observations (2011) may better represent eagle presence in the project area and provide a more robust risk characterization. For example, the earlier 30-minute point count data results in an exposure rate of <0.01 eagles per 20 minutes while the 2011 longer sit-count data results in a rate of 0.04 eagles per 20 minutes. Thus, the annual fatality estimates presented based on averaging the results of the 2005 – 2008 survey results with the 2011 result could represent an underestimate of predicted take levels. There is no discussion within the plan that acknowledges this difference or discusses how the fatality rates may be affected by the survey methods used.

The Draft ABPP lacks any discussion of the possibility that project construction and operation may cause abandonment of the Cane Brake nest site and how this overall loss of reproduction would affect the local golden eagle population or the Service's eagle permit regulation goal of maintaining stable or increasing breeding populations.

The proposed plan does not characterize risk to the non-breeding (floater, subadult, and juvenile) segment of the golden eagle population, which may use the proposed project area for dispersal, wintering areas, or migration. The plan should address how floater and subadult segments of the golden eagle population will interact with the project and how exposure minutes may change during years of higher precipitation and/or locally increased prey abundance. Because of the number of golden eagle territories documented within a 10-mile radius of the proposed project and the lack of robust surveys during the fall migration season, additional long-sit count surveys may be warranted at different times of the year.

Management scenario 3 would include turbines on Ewiiaapaayp Tribal lands only and curtail the two northernmost turbines, H1 and H2, during daylight hours between January 1 and June 3. Management scenario 4 is similar in project layout but would curtail turbines H1 and H2 for a shorter seasonal period between February 1 and April 30. Despite the longer seasonal restriction in management scenario 3, the analysis in the document predicts scenario 3 results in more golden eagle mortality than in management scenario 4, which has a shorter seasonal restriction. Likewise, under management scenarios 6 and 7, the four northernmost turbines, H1-H4, are curtailed. Again, the analysis in the document predicts curtailment during the longer seasonal restriction between January 1 and June 3 as proposed under scenario 6 results in higher mortality

rates than curtailment for the shorter timeframe proposed under scenario 7. Even if higher activity was documented during surveys between February and April, this result is perplexing since the curtailment period between January and June is inclusive of the curtailment period between February and April. Please provide further explanation of these analysis results.

5. Comparison to Eagle Activity at Existing Wind Energy Projects. Pages 2-20 – 2-21
Information from multiple projects located in the United States is used to draw the conclusion that the proposed project would have minimal impact to golden eagles and other raptors. The plan assumes an estimated mean use of 0.03 eagles per 20 minutes to determine this use "is at the low end of those for wind projects of comparable scale in California, Oregon and Washington." However, the specifics of the survey techniques, landscapes where the surveys were completed, golden eagle density at and near those project locations was not specifically identified to provide the reader with the context of the comparable work and its applicability to characterize risk to golden eagles and other raptors within the project area.

6. Risk Summary. Page 2-21 – 2-27
The plan presents results of fatality modeling and telemetry monitoring of juvenile golden eagles to conclude an overall "moderate" risk to golden eagles for development of wind energy on the Ewiiaapaayp Tribal lands and a "low" risk to golden eagles for development of wind energy on the California State lands. After examining the limited data provided in the document, and the inferences drawn from those data, the Draft ABPP lacked or did not present robust data to support these conclusions. The Draft ABPP lacked information on chronology of nest sites and other detailed behavioral, ecological and biological data collected during the additional observation of the Cane Brake territory, which would apply to this project. The ABPP also states that "the patterns of flights recorded to date suggests the collision risk is primarily to the Cane Brake nest (and primarily to fledglings)," but also acknowledges that " a small area of the Glen Cliff fledgling's 50 percent fixed kernel home range overlapped the [project] boundary." While the Glen Cliff fledgling was killed by a vehicle during the telemetry study, the potential collision risk to future fledglings produced from the Glen Cliff territory cannot be discounted.

In addition, there is no assessment of potential impacts to the Thing Valley golden eagle territory. This territory was active in 2010 prior to the initiation of construction on the Sunrise Powerlink Transmission Project. We are still assessing whether construction disturbance may have resulted in temporary abandonment of this territory despite implementation measures deemed adequate to prevent this result. Nonetheless, it is likely that this territory will be re-occupied in the future. Assessment of risk to this territory (adults, juveniles, and competing floaters) by extrapolating data from the other known territories could be included to improve the overall impact assessment. The plan suggests that surveys and telemetry work are ongoing to refine the estimate and detect overflights by resident and non-resident migrating golden eagles. Please provide this information when it becomes available.

We also recommend providing more detailed discussion regarding the cumulative effects to golden eagle populations within the 10-mile survey radius and 140-mile 'natal dispersal' distance from the project. There are numerous proposed and ongoing alternative energy projects in the vicinity, including Phase I of the Tule Wind Project, that have the potential to take golden eagles. The Draft ABPP needs to address the possible cumulative effects the proposed project, in conjunction with other ongoing projects on the golden eagle population in the project area (electrocution hazards, lead, rodenticide, car collisions, recreational disturbances, etc.).

7. Impact Assessment – Birds. Pages 2-28 – 2-32
The project proponent presents little data to analyze the impact of the project to other species of birds, including passerines and raptors. Turkey vultures and red-tailed hawks were noted to be present and other raptors such as owls likely occur near or within the project area. The Draft ABPP does not include an evaluation of potential rates of mortality for other avifauna, specific advanced conservation practices and/or propose any adaptive management measures, which can be used to lessen impacts to migratory birds.

8. Cumulative Impacts. Pages 2-34 – 2-35
The Draft ABPP does not adequately address cumulative impacts from habitat loss, habitat fragmentation, etc., resulting from this project, and other projects within the area. See additional comments above under "Risk Summary".

9. Post-Construction Fatality Studies. Pages 4-1 – 4-5
Post-construction monitoring is proposed to include 30% of the planned turbines. Monitoring should include representatives samples of all lethal project infrastructure (transmission lines, met towers, etc.), in addition to the turbines.

10. Monitoring and Surveys. Page 5-9
The Draft ABPP needs to clarify how prey base surveys will be conducted and how the resulting data will be used to inform adaptive management decisions. We also suggest the document include information reflecting how El Nino-Southern Oscillation, climate change, and prey population cycles will impact management decisions and long-term eagle presence at and near the project footprint. Eagle surveys should continue during project construction and post-construction to determine impacts to nesting eagles surrounding the project and eagle use of the project area.

11. Adaptive Management Plan. Pages 6-1 – 6-2
The proposed plan does not offer a specific strategy to mitigate golden eagle losses. The proposed plan instead defers this strategy to be developed by a Technical Advisory Council. We recommend identifying specific measures to be implemented in case the expected numbers of golden eagle fatalities occur. It is not clear how the Technical Advisory Council will operate or make decisions. Also, the proposed plan does not provide a specific explanation of how California Energy Commission guidance will be implemented.

Table 6-1. While the more intensive post-construction monitoring occurs over 3 years, Table 6-1 uses certain golden eagle mortalities over a 5 year period as the trigger for mitigation decisions. The more intensive monitoring should occur for at least 5 years to be consistent with Table 6-1.

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