5-YEAR REVIEW
Kern Primrose Sphinx Moth (*Euproserpinus euterpe*)

GENERAL INFORMATION:

Species: Kern Primrose Sphinx Moth (*Euproserpinus euterpe*)
Date listed: April 8, 1980
FR citation(s): 45 FR 24088
Classification: Threatened

BACKGROUND:

Most recent status review:
The most recent status review of the Kern primrose sphinx moth was a 5-year review completed by the Sacramento Fish and Wildlife Office in 2007 (Service 2007).

FR Notice citation announcing this status review:
A notice announcing the initiation of the 5-year review for this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register on July 26, 2019 (84 FR 36116; Service 2019).

ASSESSMENT:

Information acquired since the last status review:
This 5-year review was conducted by the U.S. Fish and Wildlife Service's (Service) Sacramento Fish and Wildlife Office (SFWO). Data for this review were solicited from interested parties through a Federal Register notice announcing this review on July 26, 2019 (84 FR 36116). We did not receive any information for this species from the public in response to the notice. We used personal communications with species experts, performed a literature search, reviewed information from our own files, including a review of Kern primrose sphinx moth 10(a)(1)(A) recovery permit annual reports, and obtained data from an occurrence search of the California National Diversity Database (CNDDB) maintained by the California Department of Fish and Wildlife. Since the previous 5-year review, new information regarding the Kern primrose sphinx moth has become available. Annual surveys of known populations by various individuals, and additional research on species genetics (Rubinoff *et al.* 2015), pupation depth, larval motility, parasitology and pheromone chemistry (Osborne 2008; Osborne 2011) has been conducted.

Distribution and Abundance:

At the time of listing, the Kern primrose sphinx moth was known only from the northwest portion of the Walker Basin in Kern County, primarily on 4,000 square meters (43,053 square feet) of a sandy wash (45 FR 24088; Service 1980). Prior to the last 5-year review, the known species' distribution expanded to include six populations at the Carrizo Plain National Monument in San Luis Obispo County and five populations in the Cuyama Valley in Santa Barbara and Ventura Counties (Jump *et al.* 2006). Since the last 5-year review, periodic surveys continue to be completed by Bureau of Land Management and species experts with 10(a)(1)(A) recovery permits. In 2015, two new occurrence locations were found within the Carrizo Plain population (BLM 2016) and the latest survey completed in 2019 found an overall average flight season with moths continuing to be observed in known locations (BLM 2020). An artificial pheromone lure that attracts Kern primrose

sphinx moth has been created and tested in the field (Osborne 2011), and the lure has since been used as a survey tool to develop a better understanding of species occupation throughout their range (BLM 2016; BLM 2019). The surveys that have been completed since the previous 5-year review do not alter our understanding of the species' current distribution. Although surveys usually occur annually to determine species presence and local abundance, population estimates or trends have not been determined.

Genetics:

Since the previous 5-year review, new information is available regarding the genetic relationships between the three Kern primrose sphinx moth populations. Genetic analysis of the *Euproserpinus* genus in California shows that the Walker Basin, Carrizo Plain, and Cuyama Valley populations are genetically related (Rubinoff *et al.* 2015). Although genetically related, research shows that there is no recent genetic contact between the individuals found in the sandy washes of the Walker Basin population and individuals at the Carrizo Plain and Cuyama Valley populations, suggesting that the species may have once been more widespread across the southern San Joaquin Valley (Rubinoff *et al.* 2015).

Life History:

Since the previous 5-year review, Osborne (2008) observed mean pupation depth of 7.14 centimeters (2.8 inches) below the ground surface with a range from 5 to 11.5 cm (1.9 to 4.5 in) in captive reared individuals. In these individuals, fully formed adult moths were subsequently observed to emerge from the pupa and excavate to the surface. High humidity is required for this species to undergo adult development in the pupa and once development is completed a combination of high humidity and high temperatures is necessary for the adult to emerge from the pupa (Osborne 2008). The extent to which the interaction of humidity and temperature affect adult development and emergence is currently unknown.

Threats:

Threats to the species identified at time of listing include: habitat loss due to grazing, disking, herbicide and pesticide use, and development; collection of individuals; inadequacy of existing regulatory mechanisms, and non-native plants. At the time of the 2007 5-year review, habitat loss due to grazing, disking, herbicide and pesticide use, and development; collection of individuals, and non-native plants continued to threaten the species. In addition, new threats were identified and include succession of alluvial fans, road kill of basking moths, trampling from grazing, and off-road vehicle use. The threats identified in the previous 5-year review continue to be the primary threats impacting the Kern primrose sphinx moth. The new information discussed above regarding pupation depth better informs that disking in areas where pupae occur likely results in their destruction as the maximum observed pupal depth is only 11.5 cm (4.5 in) (Osborne 2008). While disking areas where Kern primrose sphinx moth occur could result in destruction of underground pupa, the disking of successionally mature fields where moths are not known to occur may be useful in promoting *Camissonia* growth, their primary food plant, thereby benefiting the species (Osborne 2008). In addition, rabbit bush (*Chrysothamnus nausseosus*) has been steadily increasing within the range of Kern primrose sphinx moth, particularly at the Walker Basin population, which is crowding out suitable habitat for the species (Osborne pers. comm. 2019). Parasitology research was also completed for the species since the last 5-year review, but the results came back negative (Osborne, 2011).

Conservation:

Although habitat loss and fragmentation due to agriculture and development continues to be a threat to the Kern primrose sphinx moth throughout its range, development projects that are subject to Section 7 consultation or result in the issuance of an incidental take permit under the federal Endangered Species Act (Act) typically include habitat compensation, which can reduce the severity of overall habitat loss typically associated with these projects. Habitat compensation can occur via a variety of mechanisms, including the purchase of credits at approved conservation banks, through permittee responsible mitigation, and through the development of habitat conservation plans (HCPs). However, there are currently no conservation banks or HCP's for the Kern primrose sphinx moth. More information about conservation banks within the Sacramento Fish and Wildlife Office's Service area can be found at: https://www.fws.gov/sacramento/es/Conservation-Banking/Banks/In-Area/.

Permittee Responsible Mitigation

Permittee-responsible mitigation, also sometimes referred to as turn-key mitigation, includes activities or projects undertaken by a permittee (or authorized agent) to provide compensatory mitigation to offset impacts from a single project. The permittee retains full responsibility for this mitigation. Ideally, permittee-responsible mitigation projects are established in advance of the project-related impacts they are offsetting. Habitat compensation through permittee responsible mitigation for the benefit of Kern primrose sphinx moth has occurred within the range of the species. Since the last 5-year review, there have been several parcels of land in the Carrizo Plain that have been protected through permittee responsible mitigation, some with known occurrences of Kern primrose sphinx moth. Approximately 1,821 acres have been conserved by the California Valley Solar Ranch Project. One parcel of 320 acres has known occurrences of Kern primrose sphinx moth. In addition, two projects were funded by the Central Valley Project Conservation Program and Central Valley Project Improvement Act Habitat Restoration Program (CVPCP/CVPIA-HRP) for fee title acquisition of land within the Carrizo Plain for the benefit of the Kern primrose sphinx moth. These projects included 1,614 acres in 2012 and 290 acres in 2015 (BOR 2016a; BOR 2016b). Attempts to conserve land in Walker Basin have been unsuccessful due to issues involving road maintenance in the area (Osborne pers. comm. 2019; BOR 2016b).

Recovery Permits

Recovery permits, also referred to as 10(a)(1)(A) permits, allow scientists to take listed species as a means to ultimately contribute to the recovery of the listed species. The data acquired from some actions covered under recovery permits (e.g., occurrence, abundance, distribution, etc.) allow the Service to make informed decisions for the species that will enhance their survival and recovery. Recovery permits can be issued for activities that directly aid the recovery of a species, such as captive breeding, reintroductions, habitat restoration, removal or reduction of threats, and educational programs. The Service's recovery permitting program aids in the conservation of listed species by ensuring permittees have adequate field experience and qualifications for conducting activities with the target listed species and, for most species, ensures that permittees are following standardized protocols while surveying. The recovery permitting application process ensures that scientific proposals are crafted using the recommended actions laid out in the Recovery Plan for the target species. There is currently no protocol survey guidance or minimum qualification to obtain a recovery permit for the Kern primrose sphinx moth. Minimum qualifications and species specific protocols for other species can be found at: https://www.fws.gov/sacramento/es/Permits/.

Conclusion:
After reviewing the best available scientific information, we conclude that the Kern primrose sphinx moth remains a threatened species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Act and analysis of the status of the species in our 2007 5-year review remains an accurate reflection of the species current status.

RECOMMENDATIONS FOR FUTURE ACTIONS:

The following recommendations were included in the previous 5-year review and remain valid:

1. *Protect known Kern primrose sphinx moth populations at Carrizo Plain National Monument and at Cuyama Valley*: Although area has been conserved in the Carrizo Plain since the last status review, known populations that exist at the Carrizo Plain and Cuyama Valley still exist on both private and public land. The public land is managed by BLM (Carrizo Plain) and the U.S. Forest Service (Cuyama Valley). Although measures have been taken to protect these populations through signs and fencing, there exists no means to protect the remaining suitable habitat from being trampled by sheep grazing on private land or from destruction by unauthorized OHV use (A. Kuritsubo *in litt.* 2006; K. Sharum *in litt.* 2006). Possible protective actions for the Kern primrose sphinx moth on private properties need to be discussed and, if appropriate, implemented.

2. *Acquire Kern primrose sphinx moth habitat at Walker Basin and provide protection for Kern primrose sphinx moth*: Protection of known populations of the Kern primrose sphinx moth at the Walker Basin is vital for maintaining a third location for the species. Property acquisition should follow after clear indications of sphinx moth presence results from thorough surveys. Once acquired, the property needs to be protected from trespassing and from any practices adverse to the Kern primrose sphinx moth life history.

3. *Survey suitable habitat for undiscovered Kern primrose sphinx moth populations*: Suitable habitat for the Kern primrose sphinx moth exists in and around the Carrizo Plain, Cuyama Valley, and Walker Basin that has not yet been extensively surveyed for the presence of the Kern primrose sphinx moth. These areas should be surveyed coinciding with the Kern primrose sphinx moth flight period to determine presence/absence as a minimum.

4. *Continue life history, ecology, and genetic studies of Kern primrose sphinx moth*: Jump *et al.* (2006) provided a comprehensive report of the current knowledge of Kern primrose sphinx moth life history. Future research should build upon the current understanding of species life history and ecology as well as provide a better understanding of pupal development and survival.

5. *Revise the Kern primrose sphinx moth recovery plan:* The 1984 recovery plan does not adequately address the current threats to the Kern primrose sphinx moth and no longer conforms to the best available scientific information. A new recovery plan should be based on the findings summarized in the previous and current 5-year reviews. The most important new findings include an expanded population distribution of Kern primrose sphinx moth and the capability of Kern primrose sphinx moth larvae to traverse small distances to find proper host plants.

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Approve JOSHUA HULL Digitally signed by JOSHUA HULL Date: 2020.07.20 09:44:01 -07'00' **Date** _____

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