



COPE'S LEOPARD LIZARD

*Gambelia copeii* (Yarrow 1882)

*Status Summary*

*Gambelia copeii* is designated as a Species of Special Concern, although we refrain from assigning a priority score due to a paucity of information. This taxon received a Total Score/ Total Possible of 45% (38/85). It was not designated as a Species of Special Concern during the previous evaluation (Jennings and Hayes 1994a).

*Identification*

*Gambelia copeii* is a large (maximum 14 cm SVL) lizard, with a robust head and limbs, granular body scales, and a long cylindrical tail (Grismer 2002, Stebbins 2003, Lemm 2006, Mahrtdt et al. 2010). The dorsal coloration is variable across the range, changing from dark brown in the north to light golden brown or tan in the south (Grismer 2002, Mahrtdt et al. 2010). California populations of *G. copeii* form the northern edge of the species' overall range and are dark above with pairs of large, dark paravertebral spots on the dorsal surface that usually fade anteriorly, are almost always absent

from the head, and broaden to form transverse bands on the tail (McGuire 1996, Stebbins 2003, Mahrtdt et al. 2010). In many individuals, a lighter cream-colored transverse bar separates each pair of these spots along the trunk

*Cope's Leopard Lizard: Risk Factors*

Ranking Criteria (Maximum Score)	Score
i. Range size (10)	10
ii. Distribution trend (25)	15
iii. Population concentration/ migration (10)	0
iv. Endemism (10)	0
v. Ecological tolerance (10)	0
vi. Population trend (25)	Data deficient
vii. Vulnerability to climate change (10)	3
viii. Projected impacts (10)	10
	Total Score 38
	Total Possible 85
	Total Score/Total Possible 0.45

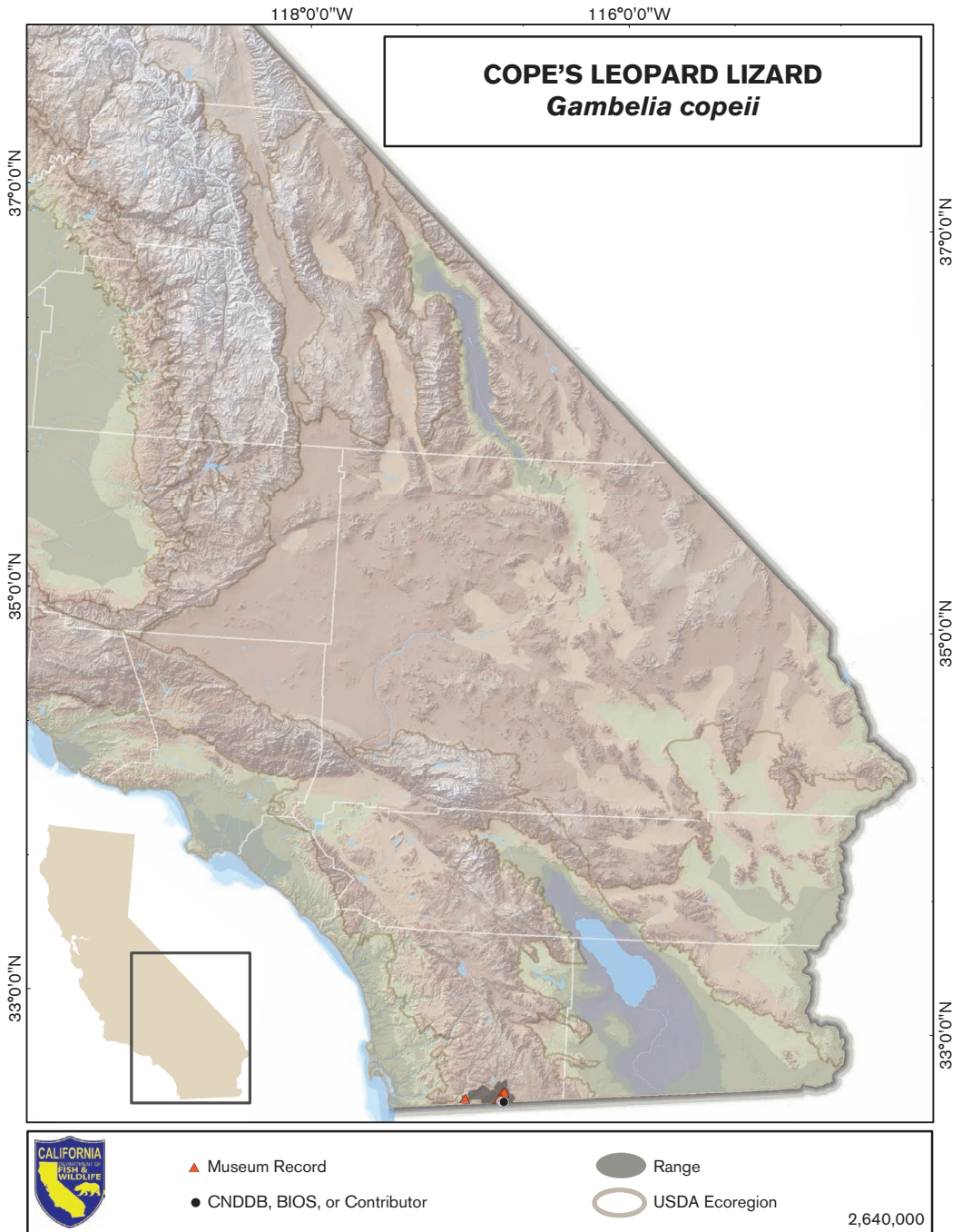


PHOTO ON PREVIOUS PAGE: Cope's leopard lizard, San Diego County, California. Courtesy of Rob Schell Photography.

(Mahrtdt et al. 2010). Flecking is generally present on the sides, and females in breeding condition develop bright orange or red spots on the sides and underside of the tail (Stebbins 2003). In addition, there is pronounced sexual size dimorphism, with females averaging 6.5 mm larger in SVL and 1.3 mm in head length than males (Lappin and Swinney 1999, Goldberg et al. 2010).

In California, *G. copeii* is unlikely to be confused with other lizards within its range. However, it is found immediately adjacent to the range of the more widely distributed long-nosed leopard lizard (*G. wislizenii*), within which *G. copeii* appears to be phylogenetically nested (McGuire et al. 2007). *Gambelia wislizenii* populations that are adjacent to *G. copeii* are generally paler, with dorsal coloration ranging from off-white to tan and many moderately sized spots asymmetrically scattered along the dorsal surface (McGuire 1996, Grismer 2002). The spotting in *G. wislizenii* does not fade anteriorly, and small spots generally occur on the head (McGuire 1996, Stebbins 2003, Mahrtdt et al. 2010).

#### *Taxonomic Relationships*

Though it was described over a century ago, *Gambelia copeii* was not widely recognized as a distinct species until recently. Morphologically and genetically, *G. copeii* is similar to *G. wislizenii*, which led many authors either to consider the two as conspecifics or to recognize them at the subspecific level. McGuire (1996) provided a comprehensive systematic analysis of the Crotophytidae (the family in which *Gambelia* is included) and argued for the recognition of *G. copeii* as a distinct species, based in large part on the presence of a narrow zone of sympatry between the two species in Baja California, Mexico. Following McGuire's monographic review, the species became widely accepted.

Phylogenetically, *G. copeii* appears to form a monophyletic group that is nested within *G. wislizenii* (McGuire et al. 2007), although this result is based on an analysis of mitochondrial data alone and requires further verification.

Rates of potential gene flow and/or hybridization within the zone of sympatry have not been measured.

#### *Life History*

Little is known about the natural history of *Gambelia copeii*, and the limited information that is available comes from populations that occur farther south in Baja California, Mexico. We assume that the California populations are similar in most aspects of their life history to populations from the northern regions of Baja California.

*Gambelia copeii* emerges from hibernation as early as mid-March in northern Baja California, with adults remaining active at least until September (Grismer 2002). The breeding season begins in March or April and lasts at least until July (Fitch 1970, McGuire 1996, Grismer 2002, Goldberg et al. 2010). Grismer (2002) reported a single female in breeding coloration in August at the southern end of the species' range near Todos Santos, Baja California Sur, suggesting that the breeding season could extend much later in the north. Gravid females have been documented in both March and June, providing some evidence that *G. copeii* may produce multiple clutches in optimal years (Fitch 1970, Goldberg et al. 2010). In a sample of 10 museum specimens, the mean clutch size was 5 and did not appear to depend on female body size (Goldberg et al. 2010).

*Gambelia copeii* is primarily an ambush predator that preys upon other lizards, including whiptail lizards (*Aspidoscelis*), zebra-tailed lizards (*Callisaurus*), and side-blotched lizards (*Uta*), as well as arthropods (McGuire 1996, Grismer 2002).

#### *Habitat Requirements*

*Gambelia copeii* occurs across a wide latitudinal gradient and tolerates a variety of ecological conditions throughout its range. Little published information exists for California populations, although the species appears to prefer open habitat in mixed chaparral and sage scrub (R. Fisher, pers. comm., C. Mahrtdt, pers.

comm.). In Baja California, the species occurs across a wider variety of habitat types, although this likely reflects habitat availability throughout the Baja California peninsula rather than specialization of California populations.

In northern Baja California, *G. copeii* occurs on mesas and foothills in scattered patches of chaparral and inland sage scrub with coarse sandy soils (C. Mahrtdt, pers. comm.) and in an increasingly wide variety of habitat types farther south in Baja California (Grismer 2002). *Gambelia copeii* apparently prefers relatively open habitat throughout the diversity of plant communities in which it is found.

#### *Distribution (Past and Present)*

In California, *Gambelia copeii* is restricted to an approximately 70 km<sup>2</sup> area centered around Campo and Potrero Valleys in extreme southern San Diego County (Mahrtdt et al. 2010; C. Mahrtdt, pers. comm.). However, recent field surveys have failed to reconfirm this species at several sites in both Potrero and Campo Valleys, and the species may be locally extirpated at some of these sites particularly along the western edge of its range (R. Fisher, pers. comm.).

Outside of California, *G. copeii* occurs from the California border throughout much of the Baja California peninsula south at least as far as Todos Santos (Grismer 2002). Few data exist on changes in distribution, although agricultural expansion and development in northern Baja California are likely to cause declines (R. Fisher, pers. comm.).

#### *Trends in Abundance*

Few data exist regarding historical or present abundance in California. Unpublished pitfall trapping data collected over a 2-year period indicate that the species occurs at very low densities. Between March 1970 and December 1971, pitfall trapping at a 60 × 60 m study site 2.7 km north-east of Cameron Corners, San Diego County, California, yielded many captures of other lizard species in the area but only a single capture of

*Gambelia* (C. Mahrtdt, unpublished data). A second individual was captured near this site 3 years later (C. Mahrtdt, unpublished data).

#### *Nature and Degree of Threat*

The principal threat facing *Gambelia copeii* is habitat loss due to development. The species is able to persist in a wide variety of habitats farther south, so long as the habitat remains relatively open and, presumably, abundant prey (primarily arthropods and smaller lizards) remains available. However, the species occurs at the extreme northern limit of its range in California, so even minor changes in environmental conditions could have large impacts here. Development, including habitat degradation and fragmentation, and climate-change-associated increases in wildfire frequency and intensity have the potential to cause these changes. Invasion of exotic grasses may also lead to further habitat degradation by reducing the availability of open habitat that this species prefers.

#### *Status Determination*

*Gambelia copeii* has an extremely small range in California, which makes it inherently sensitive to any declines. Ongoing habitat loss and potential impacts from climate change may negatively impact the species, but we have relatively few data to assess risk beyond these broad measures of sensitivity, so we refrain from assigning a priority score at this time.

#### *Management Recommendations*

Within its very limited California range, remaining large blocks of habitat require protection from further development to prevent future declines. In the absence of information to the contrary, we assume that grazing, wood clearing, and activities that might negatively impact the density of prey (including the presence of feral or pet cats) are all threats to *Gambelia copeii*. Frequent high-intensity wildfire should also be prevented, to the extent possible, within the species range.

*Monitoring, Research, and Survey Needs*

As no population density data are available, presence/absence surveys followed by mark-recapture monitoring programs should be undertaken throughout the species' range in California to establish baseline information. Loss of habitat across the United States–Mexico border has the potential to isolate the California populations. To begin studying the potential for this to occur, field studies of migration rates and patterns through disturbed and fragmented habitats should be conducted with the

aim of identifying and protecting remaining habitat corridors, as well as characterizing this taxon's sensitivity to various sources of habitat disturbance. Such information will also be useful for developing models of the effects of future climate change scenarios on *Gambelia copeii*. Additional genetic data from nuclear markers should help confirm the species status of this taxon as well as quantify whether, and to what extent, hybridization occurs between it and *G. wislizenii*.