LESSER SLENDER SALAMANDER

Batrachoseps minor Jockusch, Yanev and Wake 2001

Status Summary

Batrachoseps minor is a Priority 1 Species of Special Concern, receiving a Total Score/Total Possible of 71% (78/110). This taxon had not yet been described at the time of the previous Species of Special Concern revision and was therefore not evaluated.

Identification

Salamanders in the genus *Batrachoseps* are generally characterized as elongate, slender plethodontid salamanders with extremely reduced limbs, elongate, worm-like bodies, and extremely long tails that are often longer than the SVL of the animal. Many species have been identified in the last two decades, many of which are morphologically cryptic and some of which have extremely small ranges. *Batrachoseps minor* is the smallest species of *Batrachoseps* (up to 3.4 cm SVL). The coloration is dark blackish brown on the sides and dorsum, sometimes with a lighter brown or tan dorsal stripe along the back (Stebbins 2003). Dense white speckles are present on the ventral surface (Jockusch et al. 2001).

This species is morphologically similar to the more common and microsympatric black-bellied slender salamander (*B. nigriventris*), though its limbs and feet are relatively more

Lesser Slender Salamander: Risk Factors

Ranking Criteria (Maximum Score)	Score
i. Range size (10)	10
ii. Distribution trend (25)	10
iii. Population concentration/migration (10)	0
iv. Endemism (10)	10
v. Ecological tolerance (10)	3
vi. Population trend (25)	25
vii. Vulnerability to climate change (10)	10
viii. Projected impacts (10)	10
Total Score	78
Total Possible	110
Total Score/Total Possible	0.71

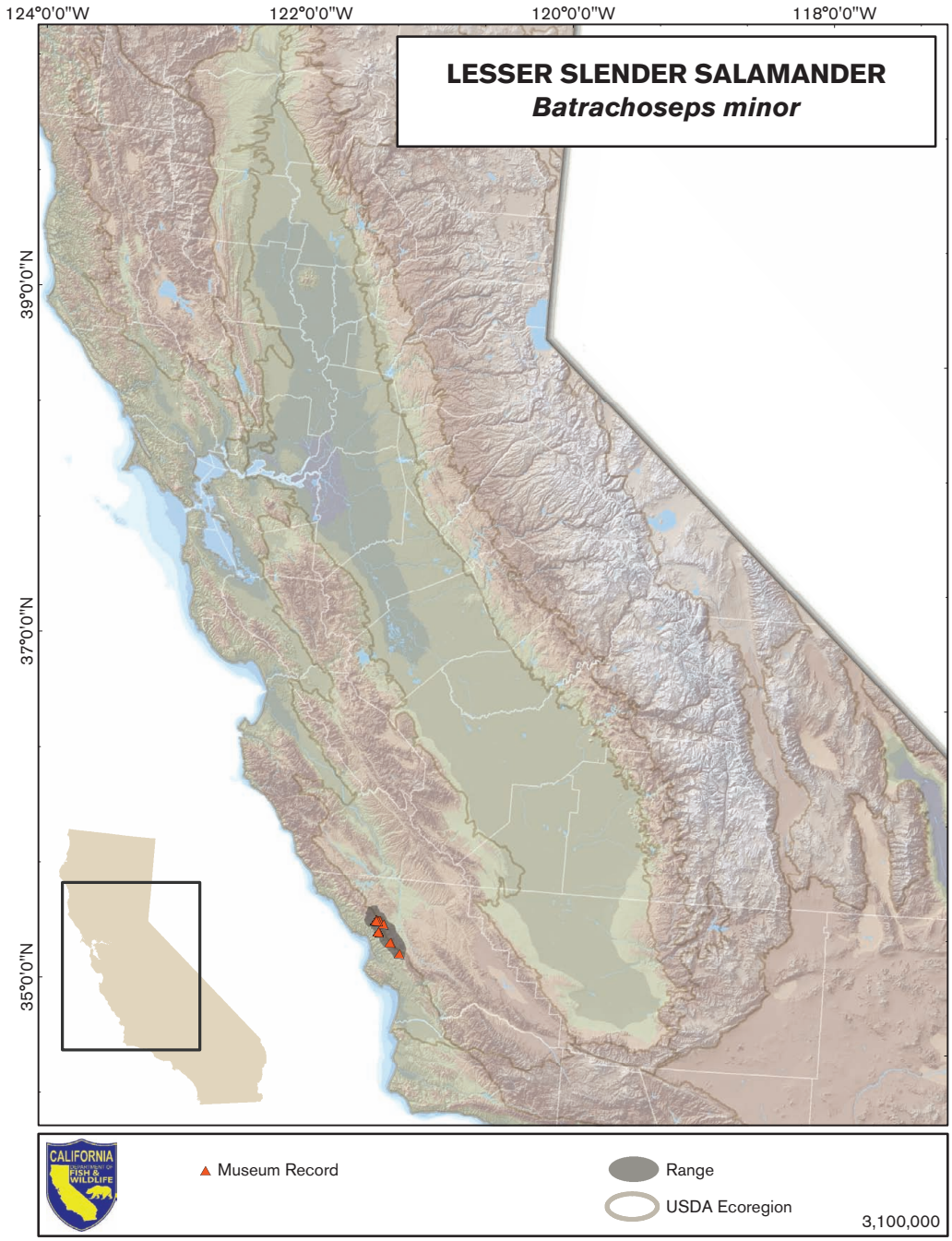

PHOTO ON PREVIOUS PAGE: Lesser slender salamander, San Luis Obispo County, California. Courtesy of William Flaxington.

robust (Hansen and Wake 2005b). Subadults, in particular, can be difficult to tell apart in these species, particularly in some preserved specimens. Molecular identification may be required in some of these cases.

Taxonomic Relationships

Batrachoseps minor was previously included in *B. pacificus* (sensu lato). Populations now regarded as *B. minor* were recognized largely on the basis of mitochondrial DNA and allozymes, though some morphological features distinguish this species from other members of the *B. pacificus* complex (Jockusch et al. 2001). *Batrachoseps minor* is closely related to the San Simeon slender salamander (*B. incognitus*), and the garden slender salamander (*B. major*) (Jockusch et al. 2001, Jockusch and Wake 2002).

Life History

The life history of *Batrachoseps minor* has not been studied. The species presumably feeds on very small insects and other terrestrial invertebrates and exhibits similar ecological characteristics as other members of the *B. pacificus* complex.

The species is microsympatric throughout the entirety of its range with *B. nigriventris,* which is both more widespread and more common than *B. minor* within the range (Hansen and Wake 2005b). It is possible the *B. nigriventris* ecologically replaces *B. minor* at lower elevations (Hansen and Wake 2005b), though the extent or effects of competition between these species has not been studied.

Habitat Requirements

Batrachoseps minor is found on steep north and east-facing mesic slopes within its known range (Jockusch et al. 2001). Known localities have a canopy of oak, tanbark, madrone, and laurel with a poison oak thicket understory (S. Sweet, pers. comm.). These sites remain damp much longer than surrounding slopes, and are 2–3°C cooler at the litter/soil interface (S. Sweet, pers. comm.). Very few localities are known, and habitat requirements need further study.

Distribution (Past and Present)

Batrachoseps minor is found only in north central San Luis Obispo County. It is present in the southern part of the San Lucia Range above 400 m, ranging from the vicinity of Black Mountain south and east into the Paso Robles and Santa Rita drainages (Jockusch et al. 2001). Populations farther south have been assigned to this species based on morphology and molecular information (E. Jockusch, pers. comm.).

Trends in Abundance

This species was apparently once common within its range. Many specimens were collected throughout the 1970s before the species was described, but the species subsequently became much more difficult to find (Jockusch et al. 2001; D. Wake, pers. comm.). Few specimens have been reported in the literature in the last decade, although several unreported sightings are known, and populations may now be increasing to some degree (Hansen and Wake 2005b; E. Jockusch, pers. comm.; D. Wake, pers. comm.; S. Sweet, pers. comm.). During 1971–1975, field crews associated with the Museum of Vertebrate Zoology undertook 10 field trips that collected 265 *Batrachoseps* from sites known to support *B. minor.* This collection comprised 206 *B. minor* (77% of the total) and 59 *B. nigriventris* (S. Sweet, pers. comm.). In 12 surveys conducted since 2011, 27 *B. minor* have been found along with 60 *B. nigriventris* (31% of the total; S. Sweet, pers. comm.), suggesting that the frequency with which *B. minor* is detected relative to *B. nigriventris* has decreased and that the total number of *Batrachoseps* found is smaller today than it was previously. No obvious changes in habitat or plant cover between the early 1970s and the present that might explain these changes have been observed (S. Sweet, pers. comm.).

Nature and Degree of Threat

Little information is available concerning any aspect of the biology of this species, making

threats difficult to characterize with certainty. Some habitat modification resulting from land conversion to vineyards has occurred within the range, and the invasion of exotic plants has caused changes to the understory in some areas (Hansen and Wake 2005b; D. Wake, pers. comm.); both of these factors are presumably detrimental to the species' persistence. That said, the extent to which such land conversion has occurred has been disputed (S. Sweet, pers. comm.) and a large amount of apparently suitable habitat still remains in the general region. The species was formerly detected in large numbers at wineries (Hansen and Wake 2005b; E. Jockusch, pers. comm.; D. Wake, pers. comm.). Other factors contributing to the declines deserve further study. As this species seems to be limited to relatively mesic areas within its range, changing hydrology and temperature associated with climate change has the potential to render much of the current habitat unsuitable for this species. The marked declines in abundance over the last few decades may indicate a degree of sensitivity to habitat or climatic conditions or, alternatively, may simply represent a temporary and cyclical decline associated with moderate-term changes in climate (rainfall specifically; S. Sweet, pers. comm.). Here, we interpret the observed pattern with precaution in mind, treating the documented declines in abundance as real and noncyclical, but acknowledging that an alternative possibility exists and that further study and published data are needed.

Status Determination

Batrachoseps minor is a California endemic and has an exceedingly small geographic range. Large apparent declines have occurred since the 1970s, and the threats to this taxon are poorly understood, leading to a Priority 1 status.

Management Recommendations

Given what is currently known about this species, little can be done in terms of management. Few sites have been confirmed (using molecular data) to support *Batrachoseps minor*, and these sites should be protected from further modification that is likely to be detrimental to salamander populations. Additional information on the range, habitat requirements, and environmental sensitivity of the species is needed to help guide future management.

Monitoring, Research, and Survey Needs

Batrachoseps minor is poorly known biologically, and published accounts of even the most basic habitat and ecological data are largely lacking for the species. Additional and ongoing surveys for this taxon are needed to help determine its range, both geographically and ecologically. However, careful attention needs to be paid to effective identification of specimens that are found. Because *B. minor* is so similar in appearance to *B. nigriventris*, and the two species occur in microsympatry, surveyors need to have extensive experience distinguishing different *Batrachoseps* species from each other. Subadult specimens of *B. minor* may require molecular identification unless and until field-validated morphological characters can be identified. As the status of remaining populations is unknown, a reasonable management policy would be that no *Batrachoseps* from the known or suspected range of *B. minor* be removed from the wild unless the collector has extensive experience identifying these species. Rather, individuals should be photographed and nondestructively sampled, preferably by removing a small portion from the end of the tail (~2 mm) and genotyped to establish identification. If a few replicate DNA sequences from both the nuclear and mitochondrial genomes could be established as reliable barcoding genes, DNA typing could be accomplished quickly and inexpensively. Surveys should take place when surface conditions are appropriately moist to enhance the likelihood of finding populations of this elusive salamander. The chances of finding *B. minor* without disturbing its natural habitat would likely be increased by establishing a transect of artificial cover objects

(plywood boards) throughout the known range. Nighttime surveys during rain events might also be productive. In addition, nearby areas should continue to be surveyed for this species, as its distribution could potentially be larger, both ecologically and geographically, than is presently known. Higher-elevation areas, such as those in the vicinity of Santa Rita and Old Creek Road, San Luis Obispo County, should be surveyed if access to private land in these areas can be established. It is possible that the known localities occur near the lower elevational range of the species, and larger populations exist at higher elevations (E. Jockusch, pers. comm.). Recent and repeated surveys in some of these areas have failed to detect this species, which suggests elevation may not be an important factor (S. Sweet, pers. comm.). Nevertheless, the species is clearly less detectable than it was decades ago and additional published data are needed to better characterize the known distribution and abundance. Additional research into potential causes of the declines in detectability should also be pursued. In particular, screens of museum specimens for the presence of pathogenic fungi might be fruitful (D. Wake, pers. comm.), as could study of decadal scale climate and rainfall patterns within the species known range (S. Sweet, pers. comm.).