



SANTA CRUZ BLACK SALAMANDER

Aneides flavipunctatus niger Myers and Maslin 1948

Status Summary

Aneides flavipunctatus niger is a Priority 3 Species of Special Concern, receiving a Total Score/Total Possible of 48% (53/110). This taxon was not previously considered a Species of Special Concern (Jennings and Hayes 1994a).

Identification

Aneides flavipunctatus niger is a medium-sized plethodontid salamander (5.1–9.5 cm SVL) (Stebbins 2003). The adult dorsal coloration is either solid black or black with a few small white flecks (Myers and Maslin 1948). Juveniles (<4.0 cm SVL) have brassy dorsal pigmentation with white to blue-white spots (Lynch 1981). The ventral coloration is black or dark gray (Myers and Maslin 1948). The nasolabial grooves and costal grooves are well defined, and most individuals (95%) have 17 costal grooves (Lynch 1981, Stebbins 2003). *Aneides flavipunctatus niger* has rounded toe tips, counter to the squared toe tips typical of *Aneides*. Its limbs are short relative to the trunk, with

3–5 costal grooves between adpressed limbs. The heads of males are larger than those of females, and are roughly triangular with prominent, protruding upper jaw teeth (Stebbins 2003).

Santa Cruz Black 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)	7
vi. Population trend (25)	10
vii. Vulnerability to climate change (10)	3
viii. Projected impacts (10)	3
Total Score	53
Total Possible	110
Total Score/Total Possible	0.48

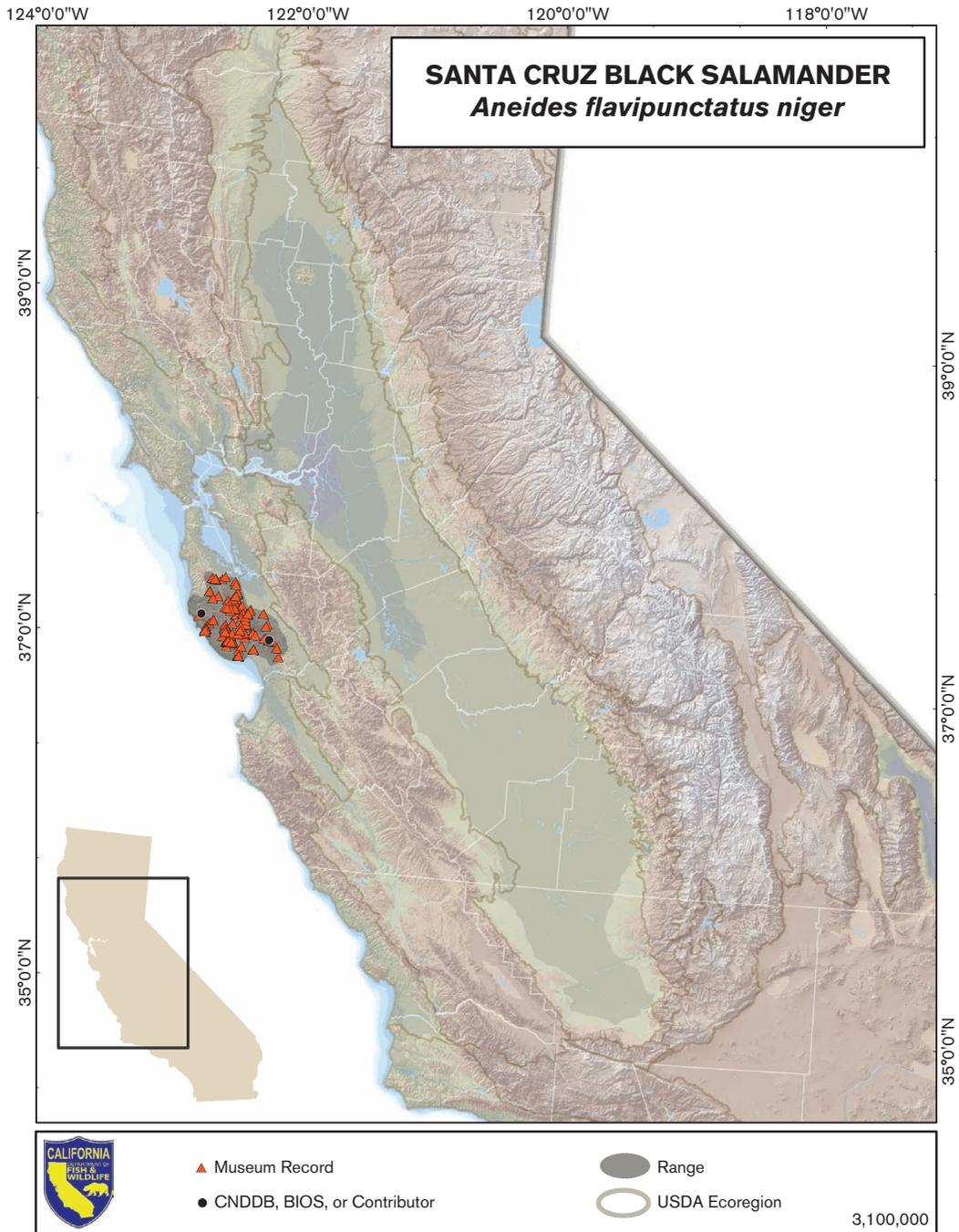


PHOTO ON PREVIOUS PAGE: Santa Cruz black salamander, Santa Cruz County, California. Courtesy of William Flaxington.

Aneides flavipunctatus niger could be confused with the co-occurring arboreal salamander (*A. lugubris*). Adult *A. lugubris* are grayish to brownish above with yellow flecks that are often concentrated on the sides, squarish toe-tips, and a pale whitish venter (Stebbins 2003). Juvenile *A. f. niger* have green pigmentation, while *A. lugubris* juveniles do not.

Taxonomic Relationships

Aneides flavipunctatus niger is recognized as a subspecies based on geographic isolation from other populations, morphological and color variation, and ecology (Myers and Maslin 1948). Allozyme studies by Larson (1980) and subsequent reanalysis by Highton (2000) suggested that *A. f. niger* is a distinct lineage. More recent analyses of mitochondrial DNA data supported the allozyme analyses and identified another potentially distinct lineage of *A. flavipunctatus* in the Mount Shasta Region (Rissler and Apodaca 2007). Further genetic studies are ongoing and should help resolve these taxonomic issues. Current work is expanding sampling throughout the range of *A. f. niger* and includes both mitochondrial and nuclear markers (S. Reilly, pers. comm.).

Life History

Little is published on the life history of *Aneides flavipunctatus niger*, and we therefore rely on information from the northern subspecies, the specked black salamander (*A. f. flavipunctatus*) when data from *A. f. niger* are lacking (see the "Distribution" section). *Aneides flavipunctatus niger* is a terrestrial salamander that can be active year-round in streamside microhabitats (Lynch 1974). Like the majority of salamanders, it is most active on the surface at night, and more so during rain events. Females lay eggs in July or early August (Petranka 1998). In the laboratory, field-collected *A. f. flavipunctatus* from Mendocino County stayed with clutches until the young hatched (N. Staub, pers. obs. in Staub and Wake 2005), but it is unknown whether *A. f. niger* females also attend eggs in the field. Lynch (1981) examined 112 adult

females across the range of *A. flavipunctatus* (including *A. f. niger* populations) and found that females carried 5–25 enlarged ovarian follicles, with fecundity increasing with body size. In the southern populations sampled in this study (which would contain *A. f. niger* samples), an average-sized female was 63 mm SVL, with an estimated clutch size of 9 (Lynch 1981). One record of a natural clutch of *A. f. niger* eggs was found more than 20 cm belowground (Van Denburgh 1895). Like many plethodontid salamanders, eggs undergo direct development, and fully formed, small juveniles appear at the surface shortly after the onset of fall rains, often in October or November (Lynch 1981).

No diet information has been published on *A. f. niger*. We presume that it is a generalized predator of small arthropods and other invertebrates. *Aneides flavipunctatus flavipunctatus* in northern coastal California are generalized predators that eat small invertebrates, including millipedes, beetles, termites, hymenoptera, flies, and collembolans (Lynch 1985).

Habitat Requirements

Aneides flavipunctatus niger is restricted to mesic forests in the fog belt of the outer Coast Range (Myers and Maslin 1948). While salamanders in the genus *Aneides* are sometimes quite arboreal, *A. f. niger* is a ground-dweller (Myers and Maslin 1948). *Aneides flavipunctatus niger* occurs in moist streamside microhabitats and is frequently found in shallow standing water or seeps (Myers and Maslin 1948, Lynch 1974; S. Barry pers., comm.). In these moist microhabitats, *A. f. niger* has been found under stones along stream edges and under boards near creeks (Myers and Maslin 1948). *Aneides flavipunctatus niger* also occurs in talus formations or rock rubble (S. Reilly, pers. comm.).

Distribution (Past and Present)

Aneides flavipunctatus niger is endemic to California and has a small range in the woodlands of the Santa Cruz Mountains in western Santa Clara, northern Santa Cruz, and southernmost San Mateo Counties. *Aneides flavipunctatus*

flavipunctatus occurs from Sonoma County north along the coast into southwestern Oregon and east to Shasta County (Stebbins 2003). Museum specimens exist for the Santa Lucia Mountains (LACM 141882-141883); however, we are unaware of other records for this region, and recent searches in this area have not been successful (S. Reilly, pers. comm.). Lynch (1981) reported that almost all localities of *A. flavipunctatus* (including sites within the range of *A. f. niger*) occurred below 600 m elevation in mesic forests that do not experience sustained freezes.

Some populations of *A. f. niger* have presumably been lost to development. Such losses are most likely to have occurred along the east slope of the Santa Cruz Range as older ranchland has been converted to subdivisions (S. Barry, pers. comm.). However, there is very little documentation of the historical distribution of this taxon.

Trends in Abundance

As for many plethodontids, documenting abundances is exceedingly difficult because *Aneides flavipunctatus niger* spends the majority of its time underground. No reliable population estimates exist for any sites, and therefore no declines in population abundance have been quantitatively documented. Some declines are likely to have taken place due to development and disturbance within the limited geographic range of this taxon. *Aneides flavipunctatus niger* is reported to have been abundant and easily found in the late 1950s, relatively abundant in the 1970s, and difficult to find in recent years (D. Wake, pers. comm.). Range-wide sampling efforts over the last few years have yielded only a handful of specimens (<15) at a few sites, including the UC Santa Cruz campus (S. Reilly, pers. comm.). This anecdotal evidence suggests that declines may have occurred and are possibly ongoing.

Nature and Degree of Threat

Aneides flavipunctatus niger habitat is vulnerable to the effects of logging, spring capping,

and roadbuilding. The Peninsula Open Space Trust has acquired some of the vulnerable property in the northern part of the range, but there is still some risk of further ranchland subdivision (<http://www.openspacetrust.org>; S. Barry, pers. comm.). Climate change may pose some threats to this taxon, particularly given its small range and habitat specificity. Within the range of *A. f. niger*, mean annual temperatures are predicted to increase, though little change is expected in precipitation (reviewed in PRBO 2011). If conditions become significantly warmer and drier, this may affect opportunities for surface activity, although use of moist streamside microhabitats may minimize this effect. The frequency and size of fires in the Coast Ranges is expected to increase up to 50% by the end of the century, although impacts on the forested habitats used by *A. f. niger* are likely to be less severe than in more open habitats (Fried et al. 2004, Lenihan et al. 2008, Westering and Bryant 2008). The extent of grassland vegetation is predicted to increase, and forested areas are predicted to decrease within the range of *A. f. niger*, which may negatively affect habitat availability (Lenihan et al. 2008).

Status Determination

Aneides flavipunctatus niger is an endemic salamander with a small geographic range in an area with some risk of additional development. However, ongoing declines and population losses have not been well documented, resulting in a Priority 3 designation.

Management Recommendations

Further protection of habitat is key for managing this taxon. In particular, special attention should be given to preserving forests, streamside and spring microhabitats, and natural talus formations within the Santa Cruz Mountains and to maintaining and enhancing connectivity between habitat patches.

Monitoring, Research, and Survey Needs

Basic ecological and life history information is almost entirely lacking for this taxon, as are

estimates of current population abundances, limiting our ability to make more specific management recommendations. Surveys of microhabitats such as streams and seeps in forested areas should be conducted, though disturbance of microhabitat in order to find animals needs to be balanced with concerns regarding continuing decline. These surveys may be more effective if artificial cover objects are placed in suitable habitat, allowing for more comparable survey efforts among localities and increased detectability. Animals are most likely to be

encountered at night when surface conditions are moist. Surveys are needed to establish estimates of abundance and to monitor population sizes over time. Upland terrestrial habitat usage is poorly known, and upland surveys would be useful for determining whether riparian buffers would be beneficial for *Aneides flavipunctatus niger*. Ecological and/or genetic studies of movement ecology and landscape genetics would be useful for understanding connectivity among populations and the permeability of different vegetation types.