

*Batrachoseps pacificus* Cope, 1865

CHANNEL ISLANDS SLENDER  
SALAMANDER

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**1. Historical versus Current Distribution.**

Channel Islands slender salamanders (*Batrachoseps pacificus*) are restricted to the northern Channel Islands off the Pacific Coast of south-central California: East Anacapa, Middle Anacapa, West Anacapa, Santa Cruz, Santa Rosa, and San Miguel islands (Van Denburgh and Slevin, 1914; Brame and Murray, 1968; Wake and Jockusch, 2000). The elevational range is from sea level to around 430 m (Mt. Pleasant, Santa Cruz Island). This is the only amphibian endemic to the California islands. There is no indication that the distribution of Channel Islands slender salamanders has changed in historical times.

**2. Historical versus Current Abundance.**

This species appears to occupy all parts of its potential range, and there is no indication of any changes in abundance. Channel Islands slender salamanders can be abundant under surface cover when the substrate is especially wet, but Schoenherr et al. (1999) indicate that *Batrachoseps* on San Miguel Island are never particularly abundant. This is probably because there is less surface cover and because the soils on San Miguel Island are less suitable for salamanders (e.g., too rocky or too sandy) on many parts of the island.

**3. Life History Features.**

**A. Breeding.** Reproduction is terrestrial.

i. Breeding migrations. The life history of Channel Islands slender salamanders is virtually unstudied. Ecological conditions on the northern Channel Islands are generally equivalent to those encountered by their sister species, garden slender salamanders (*B. major*), on the southern California mainland, though summer fogs allow for greatly extended periods of activity. Presumably, courtship occurs after the start of the rainy season, and egg laying is probably associated with the first fall or winter rains.

ii. Breeding habitat. Unknown.

**B. Eggs.**

i. Egg deposition sites. Eggs of Channel Islands slender salamanders have not been discovered in the field. As with garden slender salamanders, Channel Islands slender salamander eggs probably are deposited underground.

ii. Clutch size. Unknown; Stebbins (1954a) reported that one adult female from Santa Rosa Island contained 20 large ova.

**C. Direct Development.** Stebbins (1954a) reported finding a gravid female from Santa Rosa Island on 8 December. Hilton (1945) noted the presence of ovarian eggs (2

mm diameter) in a female from San Miguel Island on 20 May. Timing of hatchling emergence is unknown.

**D. Juvenile Habitat.** Differences in habitat use between juvenile and adult Channel Islands slender salamanders have not been noted.

**E. Adult Habitat.** Channel Islands slender salamanders occur in grassland, coastal sage scrub, chaparral, riparian, oak woodlands, and pine forest communities. They have been found under rocks and logs, especially near streams. Dense populations have been found in open areas near the ocean; in February at the west end of Santa Cruz Island, salamanders were abundant under driftwood on sand within 50–60 m of the ocean. Periods of surface activity correspond generally to the rainy season, especially in drier inland valleys (e.g., Santa Cruz Island). However, the moderating influence of cool, marine air, combined with daily fog, extends activity throughout the summer.

**F. Home Range Size.** Unknown.

**G. Territories.** Unknown.

**H. Aestivation/Avoiding**

**Dessication.** Channel Islands slender salamanders have been collected in every month, a reflection of the mild marine climate that prevails in the northern Channel Islands. Summer fog is not uncommon, especially on San Miguel Island. Unlike other species of *Batrachoseps* occurring at low elevations on the mainland in which surface activity declines following the rainy season, Channel Islands slender salamanders remain surface active at some sites throughout the year. Indeed, some of the largest collections have been made during the summer (e.g., 58 individuals found on 26 August on Anacapa Island). However, in the interior portions of the larger islands (e.g., the Central Valley of Santa Cruz Island), conditions become too warm and dry for activity during the summer, and salamanders retreat into ground cracks or other refuges (Schoenherr et al., 1999).

**I. Seasonal Migrations.** Unknown.

**J. Torpor (Hibernation).** Surface activity of Channel Islands slender salamanders in winter is limited by moisture rather than low temperatures, as freezing conditions are rare on the northern Channel Islands (Schoenherr et al., 1999).

**K. Interspecific Associations/Exclusions.**

Channel Islands slender salamanders are broadly sympatric with black-bellied slender salamanders (*B. nigriventris*) on Santa Cruz Island, where both species tend to occupy similar habitats (Campbell, 1931b; Schoenherr et al., 1999). In one February survey, collectors obtained 155 Channel Islands slender salamanders and 152 black-bellied slender salamanders (Brame and Murray, 1968). During February 1974, both species were abundant, and no microhabitat differences were detected where the species occurred in sympatry. However, only Channel Islands slender salamanders were found under driftwood on a sandy substrate near the ocean

(106 specimens observed, 16 February 1974; air temperature 13 °C, exposed sand temperature 31.8 °C, microhabitat under cover 13.2–17.6 °C, mean 16.4 °C; D.B.W., unpublished data). In general, when only one species is found at a more open site, it is usually Channel Islands slender salamanders. Only Channel Islands slender salamanders were found under dried cow pies in open grassland. In scrub oak habitat, black-bellied slender salamanders seem to be the predominant species.

**L. Age/Size at Reproductive**

**Maturity.** Age and size at sexual maturity are unknown. Considering only animals  $\geq 40$  mm SVL, the average size for males is 50.1 mm SVL (range 43.3–58.9 mm,  $n = 21$ ), and average size for females is 48.8 mm SVL (range 44.0–65.5 mm,  $n = 20$ ; Brame and Murray, 1968; R.W.H., unpublished data). Further restricting this comparison to those specimens  $\geq 50$  mm, average size of 11 males was 52.5 mm SVL; average size of 11 females was 55.5 mm SVL. In a large sample that also included subadults, Goldberg et al. (2000) reported mean sizes of 40.2 mm SVL for males and 40.5 mm SVL for females ( $n = 78, 96$ , respectively). Female-biased sexual size dimorphism is present in most species of *Batrachoseps* for which data are available. Although females may reach a larger maximum size in Channel Islands slender salamanders, it is unclear whether average adult sizes vary significantly between sexes.

**M. Longevity.** Unknown.

**N. Feeding Behavior.** Has not been described in Channel Islands slender salamanders, although all *Batrachoseps* species observed thus far capture prey using a projectile tongue and feed on small invertebrates.

**O. Predators.** Predation is unreported in this species. As with most islands, the northern Channel Islands contain a depauperate terrestrial vertebrate fauna, and it is possible that predation pressures are much reduced here. Southern alligator lizards (*Elgaria multicarinata*) are present on all the northern Channel Islands with *Batrachoseps* and may prey on these salamanders.

**P. Anti-Predator Mechanisms.** Occasionally, individual Channel Islands slender salamanders coil when cover objects are removed. This is a widely observed behavior in the genus.

**Q. Diseases.** Unknown.

**R. Parasites.** Goldberg et al. (2000) reported an infection rate of 57% (99 of 174 animals examined) in Channel Islands slender salamanders and recorded the following helminths: *Mesocostoides* sp. (a cestode) and *Batracholandros salamandrae* and *Oswaldocruzia pipiens* (both nematodes).

**S. Comments.** Wake and Jockusch (2000) restricted *B. pacificus* to the populations occurring on the northern Channel Islands. Thus, all mainland populations, as well as those on more southern islands, formerly included in a more broadly defined *B.*

*pacificus* (Yanev, 1978, 1980) are now placed in other taxa. Among these are *B. major*, an undescribed species from the Sierra San Pedro Martir (Baja California), and four recently described species in coastal central California (Jockusch et al., 2001). Examination of mtDNA sequences and allozymes of *B. pacificus* from different islands reveals significant phylogeographic structure (Jockusch, 1996; D.B.W., unpublished data).

**4. Conservation.** There are no known threats to Channel Islands slender salamanders. Santa Rosa and Santa Cruz Islands have a variety of introduced mammals (e.g., deer, elk, pigs), but there are active programs or plans to eliminate all three species from the islands. Habitat for *Batrachoseps* should improve with the absence of these large ungulates. The other four islands where these salamanders live (East Anacapa, Middle Anacapa, West Anacapa, and San Miguel islands) are managed entirely as natural areas and appear to provide good salamander habitat.

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