REPTILES & AMPHIBIANS

A Predation Attempt on a Three-spined Stickleback (*Gasterosteus aculeatus*) Fry by a Larval Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*)

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The Santa Cruz Long-toed Salamander (SCLTS) (*Ambystoma macrodactylum croceum*) is an imperiled subspecies of mole salamander endemic to Santa Cruz and Monterey Counties, California, USA (USFWS 2019). These salamanders are thought to have generalist feeding habits, often consuming anything they can fit in their mouths (Ruth 1989). For SCLTS larvae, this includes plankton, small invertebrates like chironomids, and Pacific Chorus Frog tadpoles (Anderson 1968) and larvae also have been observed to be cannibalistic (R. Spranger, pers. comm).

At 1748 h on 27 May 2024, we found a larval SCLTS (34 mm SVL, 70 mm TL, 2.1 g) attempting to consume a Three-spined Stickleback (*Gasterosteus aculeatus*) fry in Monterey County, California (Fig. 1) (GPS points withheld due to endangered status). At the time of capture, the salamander had consumed the entire fish except for the caudal fin. Despite repeated peristaltic motions, the salamander seemed unable to ingest this last segment of the fish. To identify the prey and obtain both the salamander and fish measurements, we carefully removed the prey from the salamander's mouth. The fish (20 mm long, 3 mm wide, 0.08 g) was 3.8% of the salamander's body weight and 59% of its SVL. We do not know if the salamander would have been successful in its attempt to ingest its prey had we not caught it. The salamander was released in apparent good condition.

This observation is of note because normally the presence of fish has a negative influence on salamander presence and abundance (Kenison et al. 2016). Our observation documents that sufficiently large larvae might be able to ingest stickleback fry, which would be only the third documented vertebrate prey of a SCLTS (Anderson 1968). Axolotls (*Ambystoma mexicanum*), Two-toed Amphiumas (*Amphiuma means*), Eastern Hellbenders (*Cryptobranchus alleganiensis*), Neuse River Waterdogs (*Necturus lewisi*), and Mudpuppies (*Necturus*

Figure 1. A larval Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*) eating a Three-spined Stickleback (*Gasterosteus aculeatus*) fry. Photographs by L.R. Stemle.

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maculosus) consume fish as important components of their diets (Nickerson et al. 1983; Peterson et al. 1989; Zambrano et al. 2010; Mitchell 2013; Haines 2021). Additionally, Idaho Giant Salamanders (*Dicamptodon aterrimus*) are known to eat fish to some extent (Sepulveda et al. 2012). Other salamander species such as Spotted and Marbled Salamanders (*Ambystoma maculatum* and *A. opacum*) often are overambitious when consuming prey and might even overload gastric capacities (A.E. O'Brien, pers. obs.; Wright and Wittaker 2001). So, while some salamanders prey on fish, essentially all observations are in species that are substantially larger than larval SCLTS. Five of the six species that we found with records of fish predation are fully aquatic, and therefore are expected to encounter fish more frequently than SCLTS or even most other species of *Ambystoma*, which breed primarily in ephemeral, fishless bodies of water (Anderson 1967; Cook et al. 2023).

Although this predation attempt by a larval SCLTS was on a stickleback fry, adult sticklebacks are much larger and are possible predators of these endangered salamanders or their eggs (Burko 1975). The maximum size of larval SCLTS is ~45 mm SVL (Anderson 1967) compared to 65 mm standard length (tip of the nose to the base of the tail) for adult sticklebacks (DeFaveri and Merilä, 2013).

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