

## The Elusive California Tiger Salamander

by Rachel Hurt

Slowly I come to a stop, trying not to disturb the large flock of black-necked stilts just rising for the morning. I turn off the engine and climb out of the tall 4x4, slip into my rain pants and slide into my plastic knee boots. The sun gently rises above the East Bay foothills, lighting my path and warming the air. Dew-glistened spider webs entwined in the vegetation sparkle brilliantly. The morning fog hugs the moist ground, giving a surreal feeling.



. California Tiger Salamander / FWS Photo

A loyal volunteer and I quietly walk the grassy berm, enjoying the subtle beauty of an early sunrise, something so many of us miss each morning. We record the air temperature and begin our slow journey around the warm, shallow pond, side by side with only a three-foot fence between us. We lift handmade funnel traps in gleeful anticipation of finding a wet, black, slimy creature. We are in search of the California tiger salamander, *Ambystoma californiense*.

It is a relatively large and stocky salamander. The average adult is 190 mm (7½ inches) in total length with males generally having longer tails than females. They are black with scattered pale yellow spots, each one with a unique pattern like a human fingerprint. But they are not easy to study, for California tiger salamanders are elusive creatures that spend the majority of the year aestivating (a sort of hibernation). They can be found underground up to a mile from their breeding pond in burrows of ground squirrels and other small mammals. They can also be found deep in crevices where the ground stays cool and moist year-round. Traveling to and from their breeding ponds during the winter rainy season is the only exception.

Why study a salamander? California tiger salamander populations are declining throughout their entire historical range of the Central Valley and its bordering foothills, coastal grasslands, and seasonal wetlands. It is listed as a "Species of Special Concern" in California and as a Category I species (on the waiting list to be listed) on the federal Endangered Species List.

Habitat loss of vernal pools, temporary and permanent ponds and lakes, and upland areas all play a large role in this decline. Another factor includes road kills during breeding migrations. A local Stanford University Lagunita population has suffered severe mortality due to road kills in the past. In addition, introduced predators, such as crayfish and bullfrogs, may eat the salamander's eggs and larvae, thereby reducing the

number of young salamanders emerging from the pond. Also, nonnative tiger salamanders are sometimes released by pet owners and fishermen who use them as bait into areas with native California tiger salamanders. These species can mate with each other but they produce sterile offspring, incapable of carrying on a population. This lack of future generations could decimate a whole population.

Romance is in the air and so is the rain. As the rains start to fall in November, or in January as happened this year, the vernal pools start to fill. The male California tiger salamanders head to the breeding pond early in the season, usually after the second big set of storms. They'll travel on rainy or wet nights, conditions which keep their amphibious skin moist. They venture to the pond early, ensuring a prime spot once the females arrive. If the conditions are favorable, meaning lots of rain to fill the pond, females will move into the pond. Otherwise they'll stay put until next year.



*California Tiger Salamander/  
FWS Photo*

Once there, the underwater dancing begins. The male chooses a partner and nudges her head to see if she is interested. If she likes what she sees, they begin to waltz. The male then walks forward as the female follows, head by tail. The female advances and nudges the male, causing him to deposit his spermatophore (sperm). The female will nose it and walk over it, picking it up as she goes. The dance has finished. The now fertilized female will grasp submerged plant stems and deposit her eggs one at a time.

Within a few days of laying her eggs, the female California tiger salamander will head out of the pond and return to her burrow. The males will hang around to see if they can "dance" with more ladies. After all the "dancing" has finished, the remaining females and males will head from the pond to their burrows, preferring the hole they used earlier in the season.

Two to four weeks after deposition, the eggs will hatch into small larvae with feathery external gills. The larvae eat small invertebrates, algae, snails, and tadpoles. They are very secretive, easily darting into bottom pond vegetation when disturbed or threatened. In less than four months, they will grow about three inches in length before metamorphosis.

In late spring or early summer, after losing their gills and developing lungs and legs, the young salamanders will move out of the pond to find burrows. With no prior experience, it may take them several tries to find a burrow fit to call home.

With some knowledge of their life histories and their rather unique breeding patterns, we were able to design a study to obtain a population estimate of about 50 individuals for a local isolated population at Warm Springs Seasonal Wetland Unit of Don Edwards San

Francisco Bay National Wildlife Refuge. The habitat is an assortment of vernal pools, wetlands, salt plains, and upland habitat.

Nestled between railroad tracks and salt ponds lies the study site, a habitat unique to the South Bay. Once a homestead with cattle grazing and duck hunting, Warm Springs Seasonal Wetland Unit (WSSWU), is now home to only creatures of the wild. It is closed to the public to protect these sensitive habitats from human disturbances.

This study site was chosen because of the known presence of salamanders within several of its vernal pools and the need for baseline information on the salamander. One of the largest ponds was chosen for study. It was completely surrounded by a 600- meter (984 feet) drift fence lined with funnel traps on both sides to catch salamanders going in and out. Funnel traps are cylindrical traps made of window screens with two funnels on the ends. The pool cannot be entered unless an animal fly over, climb over, or dig under the fence. The only way an animal can enter the pool, as in the case of the salamander, is to walk into a funnel trap.



*Drift Fence / FWS Photo*

The idea is rather simple. The salamander wants to go to the pond and starts its journey from its burrow or ground crevice. Once it nears the pond, it runs into the fence and can go right, left, or backwards. The salamander *has* to get to the pond. So, it will go either left or right. As a result, it will walk up the funnel and into the trap. A wet sponge is placed in the trap to keep its skin moist until it can be checked and placed on the opposite side of the fence the next morning. When it is ready to leave, it will go through the same procedures to get out of the pond.

Historically prevalent in the Bay Area, vernal pools have all been removed save for this small 255-acre tract of WSSWU acquired by the U.S. Fish and Wildlife Service in 1992. Vernal pools found in the lowland areas of WSSWU are home to a unique biota of plants and animals that have adapted to an ephemeral water regime. These vernal pools are amphibious ecosystems covered by shallow water for extended periods during the cool season but completely dry for most of the warm season drought.

Ducks, geese, American avocets, and American coots can be found feeding on invertebrates and algae within the ponds. Fairy shrimp and endangered tadpole shrimp can be seen gracefully gliding through these temporary ponds. Fairy shrimp and the tadpole shrimp have a short life span that depends on the duration of water in the pond. Their life cycle of egg to larvae to adult to egg occurs while the pools are full of water.

The newly laid eggs remain dormant as the pond dries, waiting for the winter rains of the following year to begin the cycle again. During this drying time, the endangered Contra Costa Goldfields and native Downingia, along with other wildflowers, begin to flower around the ponds.

Overall, WSSWU is a unique habitat with a wealth of diversity. The many endangered and threatened species that thrive there rely on the preservation and proper management supplied by the U.S. Fish and Wildlife Service and Refuge volunteers. By obtaining additional information about the life histories of these rare plants and animals, we can better manage the habitat to protect for future generations.

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