



Female California freshwater shrimp with eggs, courtesy of Larry Serpa

The California freshwater shrimp is an *endangered species*. Endangered species are plants and animals that are in immediate danger of becoming extinct.

Threatened species are plants, and animals whose population numbers are so low that they may become endangered in the future.

The U.S. Environmental Protection Agency's (EPA) Endangered Species Protection Program (ESPP) will help ensure that pesticide use does not jeopardize the survival of listed species.

Syncaris pacifica

California Freshwater Shrimp *Syncaris pacifica*

Description and Ecology

Status Endangered, listed October 31, 1988.

Critical Habitat Not designated.

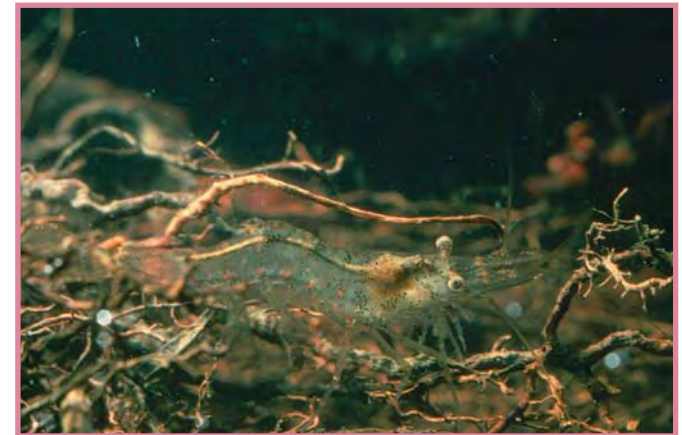
Appearance The California freshwater shrimp is a 10-legged crustacean belonging to the *atyid* family. Of the three other *atyid* members in North America, two are also listed as endangered (Kentucky cave shrimp (*Palaemonias ganteri*) and Alabama cave shrimp (*Palaemonias alabamae*)) and one which once inhabited coastal streams in California is believed to be extinct (Pasadena shrimp (*Syncaris pasadenae*)). These species were believed to have been isolated from a marine environment during the Jurassic period. They are anatomically distinguished from other shrimp by the length of their pincer-like claws (chelae) and the bristles (setae) at the tips of the first two chelae. These bristles are especially useful for sweeping food particles off surfaces and in toward their mouths. California freshwater shrimp are further distinguished by a short spine on the body above the eye and a particular angled articulation of the second chelae with the "wrist" (corpus).

California freshwater shrimp are small. Females are usually deeper bodied and range from 1.3 to 1.8 inches from the eye orbit to the tip of the tail, while males range from 1.2 to 1.5 inches. Coloration varies and works to camouflage these shrimp against their habitat. Male shrimp are transparent or nearly so, with surface and interior chromatophores (pigment holding cells) that cluster into patterns that disguise the outline of the body. As such, they appear to be just more underwater detritus. Females have similar coloration but may be darker brown or almost purple, and might have a broad tan dorsal band. Both males and females have the ability to darken simultaneously or gradually, but the female has a greater range from dark to light and vice versa. The created effect shades their forms into the shadows of roots, branches and the undercut bank. Even the visible internal organs become part of the disguise.

Range California freshwater shrimp may once have been common in the low-elevation perennial freshwater streams

of Marin, Sonoma and Napa counties. They are still found in all three counties but in much fewer numbers and fewer streams. The distribution of the shrimp has been separated into four drainage units: 1) tributary streams of the lower Russian River drainage, that flow westward to the Pacific Ocean, 2) coastal streams flowing westward directly into the Pacific Ocean, 3) streams draining into Tomales Bay, and 4) streams flowing southward into San Pablo Bay. While California freshwater shrimp in laboratories can tolerate brackish waters, they are unable to tolerate ocean salinities. It is thought that the isolated streams that harbor these shrimp were once connected, but later separated by geologic uplift and rising sea level.

Habitat Within the low elevation-low gradient streams inhabited by the California freshwater shrimp, the most suitable reaches are characterized by submerged undercut banks, overhanging plants such as blackberry, woody debris, and the exposed live root systems of willow or alder. The shrimp uses microhabitat variations depending on the season. In the winter, rainy season, when stream flow is high and fast and laden with suspended sediment, California freshwater shrimp find protection beneath the undercut banks amidst



Courtesy of Larry Serpa

California Freshwater Shrimp

exposed roots or dense, overhanging vegetation. In the summer when flow is low they retreat to isolated pools with minimal cover but more opaque water. Largely absent now, at one time debris dams may have been important feeding and resting places. These dams would have gathered the detritus (shrimp food) and leaf litter that would become more detritus, and would have sheltered the shrimp during high flows. The optimal stream depth for California freshwater shrimp is 1—3 feet.

Biology and Behavior While not everything is known about the reproduction of California freshwater shrimp, insight from the ecology of other freshwater and marine shrimp, and observations suggest that they breed once a year in late summer, immediately following the last molt of the female. Egg-bearing female California freshwater shrimp have been noted in autumn (September–November). Fifty to 120 eggs adhere to the swimming legs on the abdomen (pleopods), and are cared for and protected there through the winter, high-water season. The young are released in May or early June, the most favorable time of the hydrological cycle.

Newly hatched young are only about 0.2 inches long, but grow rapidly to 0.8 inches by early autumn. Growth slows through autumn, winter, and spring, but resumes during their second summer. At this time the size difference between males and females is apparent, and both are sexually mature. They may live more than three years.

California freshwater shrimp are described as collectors. They feed on fine organic material, fecal matter, underwater plants, free-floating algae and algae attached to underwater surfaces, zooplankton, and similar materials. They also scavenge on dead animals and shrimp.

Although these freshwater shrimp are able to remain nearly motionless for large periods of time, a likely survival strategy, they can swim forward and backward and “skip” over the water surface when disturbed. They likely are

prey for a number of native fish, and introduced fish such as the mosquitofish, and green sunfish.

Recovery Plan The U.S. Fish and Wildlife Service (FWS) developed a recovery plan for the California freshwater shrimp in 1998. Recovery plans outline reasonable actions that FWS believes are required to recover or protect listed species. FWS prepares recovery plans, sometimes with the assistance of recovery teams, contractors, state agencies, and others. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than FWS, involved in the plan formulation. Approved recovery plans are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

California Freshwater Shrimp Information Sources

Primary Reference Beacham, Walton, Castronova, Frank F., and Sessine, Suzanne (eds.) 2001. Beacham's Guide to the Endangered Species of North America, Gale Group, New York. Vol. 3, pp. 1413–1418.

Listing Notice US. Fish and Wildlife Service 1988. Federal Register 53, No. 210, pp. 43884-43889. October 31, 1988. http://ecos.fws.gov/docs/federal_register/fr1497.pdf

Recovery Plan U.S. Fish and Wildlife Service, Portland, Oregon. 1998. California Freshwater Shrimp (*Syncaris pacifica* Holmes) Recovery Plan. 94 pp. http://ecos.fws.gov/docs/recovery_plan/980731a.pdf

Species Account U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2007 http://www.fws.gov/sacramento/es/animal_spp_acct/ca_freshwater_shrimp.pdf



Habitat for California freshwater shrimp, Lagunitas Creek/Larry Serpa



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