INVERTEBRATES

Species Accounts

Trinity bristle snail
(*Monadenia setosa*)

Trinity bristle snail

CA - T (1980)
FED - None
General Habitat: Riparian Forest

The Trinity bristle snail is named for the short, fine bristles present on the exterior surface of the shell. The relatively flattened and narrow-shouldered shell is brown to chestnut-colored, with a blackish-brown peripheral band and a lighter, more obscure subperipheral band. The protoconch, or innermost whorls, is usually lighter colored than the rest of the shell. The snail's body is dull-gray to black, and covered with brick-red to salmon colored tubercles. In larger individuals, the shell is one to 1.5 inches in diameter, with six to 6.75 dextral (right-handed) whorls, and the body is about 1.5 inches long. Age at maturity is unknown, but individuals possessing a reflected lip at the shell aperture were observed to have fully developed reproductive organs, and neither the shell diameter nor number of whorls increase after the reflected lip is formed. Both adults and juveniles primarily live on the ground, feeding upon and living among the top layer (up to 3.5 inches depth) of leaf litter. They also climb to feed upon lichens growing on alder trees, petioles of violets, and stalks of other plants. Individuals have limited home ranges, and due to its habitat specificity, the Trinity bristle snail has a restricted distribution.

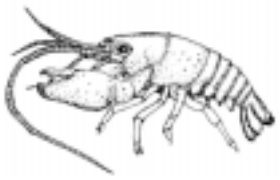
The Trinity bristle snail is believed to be a relict species of the Pleistocene epoch, when the climate was much cooler and moister than that of the present. This species is confined to habitats where there is plenty of shade, fairly low temperature, and fairly high humidity. The snail is most active between May and October and is most likely to be seen between dusk and dawn, when the air tends to be more humid. In summer, the snail retreats into its shell to avoid desiccation. It lives mainly along riparian corridors within Douglas fir-yellow pine forests having a dense, deciduous hardwood understory. Here, the snail is restricted to moist but well-drained, well-shaded canyon slopes or streamside benches covered with a layer of leaf mold at least four inches deep

Activities that alter the character of the cover or exposure, reduce slope stability, increase runoff, or affect stream flow may threaten this species. Activities such as timber harvest, mining, and off-highway vehicle use appear to have negatively affected the Trinity bristle snail.

USFWS considers the Trinity bristle snail a Federal Special Concern Species. However, this designation does not afford the species any special protection under the law. During 1997, the International Union for Conservation of Nature (IUCN) included the Trinity bristle snail in their worldwide Red List of Threatened Species.
Prior to 1999, the Trinity bristle snail's range was believed to be limited to sections of the Trinity River and its tributaries (i.e., Swede, Big, French, Price, Bidden, Limestone, and Little Swede creeks; an unnamed creek south of Big Bar; and the south side of the Trinity River east of Price Creek). These areas are all located west of the town of Junction City, in the northwestern corner of Trinity County. The area is entirely in the southern Klamath Mountains and within the Shasta-Trinity National Forest. The Trinity bristle snail appears to be sparsely distributed within its limited range.

While conducting surveys in spring 1999, staff from Shasta-Trinity National Forest found Trinity bristle snails at four new locations. The new sites were adjacent to Eagle Creek and Sailor Bar creeks (tributaries to the Trinity River), Hayfork Creek (tributary to the South Fork Trinity River), and Olsen Creek (tributary to Hayfork Creek). It appears that the current range of the Trinity bristle snail, while not extensive, may be larger than was formerly believed. Further surveys of these sites and the surrounding areas will be undertaken as funding becomes available.

The status in 1999 of the Trinity bristle snail: *Unknown.*



Shasta crayfish

Shasta crayfish
(*Pacifastacus fortis*)

CA - T (1980)
CA - E (1988)
FED - E (1988)

General Habitat: Sacramento-San Joaquin Province, Permanent Streams with Fishes

The Shasta crayfish is the only extant species of crayfish native solely to California. It is mostly dark brown dorsally and bright orange red ventrally, especially on the underside of the claws. Adult Shasta crayfish are between two and four inches in total length, including the tail. When compared with other crayfishes, the Shasta crayfish is medium-sized, and the body and claws are relatively robust. Like most crayfish, Shasta crayfish are active at night and remain hidden during the day. Unlike other crayfish, this crayfish is primarily herbivorous, feeding upon the periphyton (composed of benthic algae and diatoms, flocculent organic detritus, and small benthic invertebrates) which forms a surface film upon volcanic rock substrates. The Shasta crayfish is relatively sedentary and does not display aggressive behavior when disturbed. They generally live in cool, spring-fed headwaters characterized by clean, volcanic cobbles and boulders overlying sand or gravel substrates. These spring-fed habitats are stable year-round, with almost no change in temperature, flow, or turbidity. In a few areas, small numbers of Shasta crayfishes may be found in altered or degraded habitats, where water temperature and clarity may vary considerably.

The Shasta crayfish is limited to the mid sections of the Pit River drainage, primarily the Fall River and Hat Creek drainages in Shasta County. Its geographic distribution is associated with the presence of volcanic-origin cobbles and boulders of the Modoc Plateau, which apparently has changed very little over time.

Right now, there are seven populations of Shasta crayfish, which range in size from fewer than 50 to about 5,000 individuals. Little or no genetic exchange occurs between these small, disjunct populations. The Shasta crayfish is a relatively long-lived species but has limited reproductive potential; it matures slowly (at age five years) and produces relatively few eggs.

Competition with and predation by signal crayfish, an invasive nonnative species, is one factor contributing to the Shasta crayfish's decline. The largest population of Shasta crayfish is found in upper Spring Creek, a tributary to the Fall River. Until recently, this population has been protected from nonnative signal crayfish invasions via a series of four culverts that convey the creek waters under the road. The velocity of water passing through the culverts prevents signal crayfish from migrating upstream. When the Fall River flooded in January 1997, the road crossing was inundated for several hours, causing a temporary flow reversal in the culverts, which allowed signal crayfish to migrate through the culverts. Between June and August 1997, two collection efforts resulted in the capture of four adult and 18 juveniles. All of the signal crayfish were collected within 25 feet of the culverts on the upstream side. The DFG searched the area farther upstream of the culverts, but no additional signal crayfish were found. The DFG is currently funding (using Cantara Chemical Spill Restoration funds) a project that will replace the aging culverts and maintain them as a barrier to signal crayfish invasion.

In 1997, the DFG closed its Pit River Hatchery at Sucker Springs Creek to protect the Shasta crayfish. The DFG operated the trout-rearing facility for more than 30 years. The hatchery ponds supported the largest known population of Shasta crayfish in the midreaches of the Pit River. Fortunately, while the hatchery was in operation, the pond weirs functioned as barriers against signal crayfish. The DFG is currently restoring Sucker Springs Creek to a more natural state, incorporating improvements that would further protect the Sucker Springs Creek population from signal crayfish invasions.

The DFG is using 1997 Endangered Species Act Section 6 funds to conduct a signal crayfish eradication program in Sucker Springs Creek. To date, the DFG has trapped and removed hundreds of signal crayfishes. We will be evaluating the effectiveness of this removal method. The DFG is also using those funds to contract a pathological study. This study is investigating whether signal crayfish may be transmitting

viruses to Shasta crayfish in areas where they co-occur. The results of this study will be available by April 2000.

In August 1998, the USFWS completed the Recovery Plan for the Shasta crayfish. Recovery actions include: 1) protecting Shasta crayfish through eradication of, or preventing nonnative crayfish invasions, restoring habitat, and eliminating adverse impacts of land management practices; 2) determining the status, distribution, and relative abundance of Shasta crayfish in the mainstem of the Pit River; 3) conducting research on the ecology, behavior, and pathology (i.e., viral and bacterial infectious agents) of Shasta crayfish; 4) monitoring and assessing Shasta crayfish populations; 5) developing effective watershed and ecosystem management plans for all drainages supporting Shasta crayfish populations; and 6) providing public education on Shasta crayfish.

The status in 1999 of the Shasta crayfish: *Declining.*

California freshwater shrimp
(*Syncaris pacifica*)

CA - E (1980)
FED - E (1988)

General Habitat: Klamath-North Coast Province, Permanent Streams with Fishes

California freshwater shrimp

The California freshwater shrimp is the State's only native, stream-dwelling shrimp. This species resembles its marine relatives but rarely attains a carapace length (measured from the eye socket to tip of the tail) of more than two inches. The California freshwater shrimp feeds on decomposing plants and other detrital material. Juveniles are nearly transparent, whereas adults are mostly translucent with small, diffuse, dark spots that clutter the body outline. When disturbed, they can change their color, from translucent to entirely dark brown or purple, to blend in with their surroundings. Females can darken their bodies to a greater degree and are also generally larger and deeper bodied than males.

The California freshwater shrimp is found in pool areas of low-elevation, low-gradient streams, among exposed live tree roots (e.g., willows and alders) of undercut banks, overhanging woody debris, or overhanging vegetation. These streams have low summer flows but may transport heavy runoff during the rainy season. The historic distribution of the California freshwater shrimp is unknown, as geologic and climatic changes since the early Quaternary Period have greatly altered drainage and river courses along the central coast of California. However, currently the California freshwater shrimp is found in 17 stream segments within Marin, Napa and Sonoma counties. Many of these stream segments are isolated from the others by barriers, dewatered areas and low quality habitat.

In 1997, another stream, Olema Creek, a tributary to Lagunitas Creek, Marin County, was added to the list of streams supporting California freshwater shrimp. This range extension is probably not a new population.

Since 1996, no new threats to California freshwater shrimp have been identified. Nevertheless, some factors that led to its listing (i.e., degradation and loss of habitat due to increased urbanization, instream gravel mining, overgrazing, agricultural development, agricultural practices, timber harvesting, impoundments, water diversion, and water pollution, and introduced predators) continue to adversely affect the species within its current range. As of 1996, U.S. Army Corps of Engineers no longer allows the construction of summer dams in the Austin Creek drainage in Sonoma County. Summer dam construction resulted in substantial turbidity and sedimentation and caused damage to undercut banks, an important habitat for this species.

USFWS completed its Recovery Plan for the California Freshwater Shrimp in August 1998. This plan included the following recommended recovery actions: 1) remove existing threats to known populations of California freshwater shrimp; 2) restore habitat conditions favorable to California freshwater shrimp and associated native aquatic species; 3) protect and manage California freshwater shrimp populations and habitat once the threats are removed and restoration has been completed; 4) moni-

tor and evaluate California freshwater shrimp habitat conditions and populations; 5) assess effectiveness of various conservation efforts; 6) conduct research on the biology of the species; 7) restore and maintain viable California freshwater shrimp populations at extirpated locations; 8) increase public awareness and involvement in the protection of California freshwater shrimp and native cohabiting species; 9) assess effects of various conservation efforts on cohabiting native species; and 10) assemble a California freshwater shrimp recovery team.

In late 1999, a new population of California freshwater shrimp was confirmed by DFG biologists in Franz Creek. Franz Creek is a tributary to the Russian River in Sonoma County east of Healdsburg. This population is distant from the nearest previously known population and is located at an elevation of about 540 feet, considerably higher than any previously known population.

The status in 1999 of the California freshwater shrimp: ***Stable***