

AN EXOTIC & ENDANGERED SPECIES: The Santa Cruz Long-toed Salamander

by Stacy Fisher

It's slithery, moist-skinned and resembles a slimy lizard without scales or claws. No, it's not the front-runner of the Democratic or Republican parties. It is *Ambystoma macrodactylum croceum*; the Santa Cruz Long-toed Salamander, an amphibian related to frogs and toads—all vestiges of an ancient, pre-reptilian past.

Most long-toed salamanders reside in the Sierra Nevada and Cascade mountains of Northern California. Members of this group are commonly called "mole salamanders" because they are frequently found in small

animal burrows.

The Santa Cruz Long-toed is a special subspecies, discovered only in a few areas of Santa Cruz and northern Monterey Counties.

The coloration differs distinctly from all other North American salamanders. Small irregular spots ranging from yellow-gold to orange are scattered on the salamander's shiny black back. Numerous white flecks decorate its sides and legs.

Like most adult salamanders, the Long-toed typically grow up to five inches long. But one type, the Chinese Giant Salamander, is five feet in length and weighs an astonishing 70 pounds! A traditional food source for the people in western China, the behemoth made a tasty salamander stew.

In Elizabethan England, frogs and salamanders (then called newts) were seen merely as ingredients for witches brew. Or they were symbolized in fairy tales to represent ugliness or bad omens.

Like fish and reptiles, am-

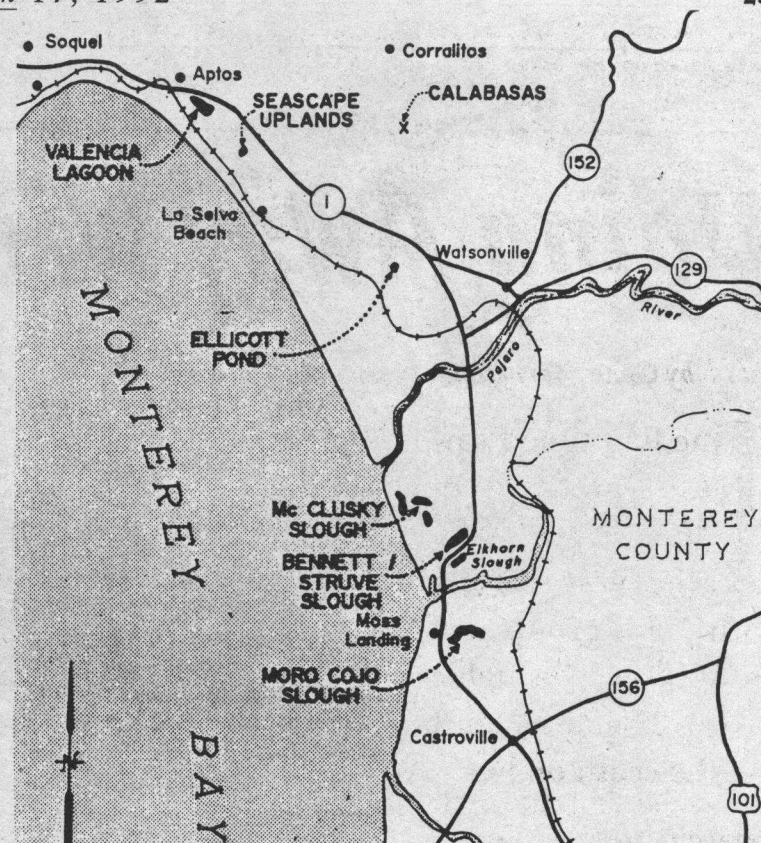
phibians are cold-blooded; they are unable to regulate their body temperature internally. At lower temperatures they become sluggish and susceptible to natural predators. These typically include garter snakes and bullfrogs.

The Santa Cruz Long-toed Salamander, considered a "relic" form of a species that was widespread over much of California during prehistoric times, was first discovered at Valencia Lagoon by James D. Anderson in 1952. Later, a few other pockets of the creatures were found — all between Aptos and Castroville.

The animals became segregated from one another during the end of the last ice age 12 to 20 thousand years ago as the climate turned wetter and runoff from mountain glaciers in the north created pools which served as breeding ponds.

California, studded with deserts, lakes and rivers, became a host to a bountiful number of rare and beautiful species of salamanders.

Eventually, several varieties



became stranded in small oases, and, with the onset of drying weather conditions, the long-toed salamander was isolated, eventually evolving into a separate subspecies.

It managed to adapt in the Santa Cruz area where, in 1966, it was classified as an endangered species by the federal government. The amphibian is also included on California's list of rare and endangered fish and wildlife. It is, therefore, a violation of

state and federal law to take, possess, harm or sell these salamanders.

Many of the wetlands of the major continents have been destroyed over the last century, usually for agriculture or for economic interests.

At present, at least 40 species of amphibians are threatened with extinction.

Only recently has the significance of wetlands been appreciated for their highly

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SALAMANDER

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The Santa Cruz Long-toed Salamander struggles against the drought.

diverse ecosystems and the value they have for flood control and as fish nurseries.

Just a few breeding populations of Long-toed Salamanders are found in the county.

One is at Ellicott Pond, located a half mile northwest of the old Ellicott Railroad station along the San Andreas Road, just four miles west of Watsonville.

Two other threatened amphibians, the rare California Tiger Salamander and the Red-Legged Frog, have also established their niche at Ellicott.

It takes \$60,000 to do the studies necessary to have an animal listed as endangered. That means there's a backlog of threatened, yet unprotected species.

Other main populations of the Long-toed Salamander are found in Valencia Lagoon in the Rio del Mar area between Bonita Drive on the south and Highway 1 to the north and in the Seascap Uplands pond.

After highway construction in the 1960's jeopardized the salamander's habitat, the original lagoon at Valencia was replaced by a man-made pond which, although artificial, may provide the tiny creatures a protected place to breed. The land adjacent to the pond is ideally suited to the animal's needs with oak trees (which make for good leaf mold), thickets and rotting wood.

The salamander's habitats are integral links in the creature's life cycle and any disturbance of these areas poses a serious threat to the survival of these unique animals.

Pete Parkinson, Super-

visor of Environmental Planning, is overseeing a proposal under consideration to build 142 residential lots in the Seascap Uplands area.

"The builders will have to come up with a Habitat Conservation Plan that will assure that the salamanders at the Upland site will thrive even after development," Parkinson said. "Some of the central features of the plan is the creation of two additional breeding ponds, enhancement of previously degraded habitats, revegetation, a \$300,000 endowment for a permanent management strategy of the ponds, and installation of migration tunnels under the main road that would serve the new Seascap Uplands subdivision."

Homeowners in the Seascap subdivision would be assessed \$120 per year to contribute to the preservation of the salamander.

The Fish & Wildlife Service must act on the draft proposal which is expected to be released in the next six weeks.

The breeding ponds at Ellicott and Valencia are administered by the California Department of Fish and Game. Penalties for interfering with these delicate animals can be severe.

Dr. Stephen B. Ruth, a specialist in Herpetology, has spent many years studying the Santa Cruz Long-toed Salamander. He's deeply concerned about the effect the drought has had on the fragile creatures as well as the danger of human encroachment. "We haven't any hard evidence the drought will have a disastrous effect, but

common sense tells us that the animals need plenty of water to survive," Ruth said. "Some of the ponds haven't even held water the last few years."

Nearby grasslands usually have enough sub-surface water to keep the salamanders moist. But the lack of substantial rainfall over the past winter seasons has taken a toll on the endangered amphibian.

During years of drought, the salamanders may not be able to reproduce. But because of their long life span, estimated at from 10 to 25 years, the creatures are able to withstand dry periods when insufficient rainfall fails to keep the spawning pools filled.

Ruth said the creatures have a "boom or bust" reproductive strategy. This means the salamanders come back year after year until there's a good distribution of rainfall. Then, "You have a mini-population explosion."

The recent heavy rains that have fallen this winter offer hope that the salamander will make a successful comeback.

In the past, however, even when the ponds had water, mosquito abatement districts often had programs that introduced Mosquito Fish into the ponds. That not only controlled the growth of mosquito populations, but the fish also fed off salamander larvae as well.

Ruth spent many hours searching the Seascap pond and found a very low density of larvae. "Someone dumped the Mosquito Fish into the pond and it practically wiped out the creatures' breeding effort in 1991," he said.

There are three critical elements for habitat protec-

tion, Ruth acknowledged. "Once you have protection [of the salamander], you need a program to eradicate non-native plants that displace the plants that the salamander use. This also includes exotic animals that prey upon the salamander such as bullfrogs and mosquito fish that were introduced later into their environment.

"In addition, over long periods of time, silt tends to fill in the ponds and must be extracted. And off-road vehicles can cause erosion when vegetation that holds soil in place is destroyed."

Maintaining water in the ponds at optimum levels is a serious problem at Ellicott.

Ruth is working on a plan to install a pump and a rehabilitation well so that enough water can be pumped into Ellicott pond to enable the creatures to use it. But there never seems to be enough money.

"It's largely politics," Ruth claimed. "The endangered species funds go to creatures with a lot of public support like whales, sea otters and condors."

Because of the lack of funds and manpower, the present conditions of the ponds are unknown. "They threw a fence around Valencia Lagoon," Ruth continued, "but there's no management and no monitoring to see what the status of the total population is." Ruth hopes to conduct his own population studies soon, but again, money is always a problem.

The salamanders are difficult to find and are rarely seen, spending most of their lives underground, beneath rocks, plants or rotting logs, protecting themselves from the drying effects of the sun. And since they are voiceless, the elusive critters attract little attention even when they venture out at night to eat or breed.

Vital to the reproductive needs of the Santa Cruz Long-toed is the availability of plenty of water. Mating takes place in the usually rainy months of January and February when the salamanders seek refuge in the ponds.

The male salamander will clasp the female during mating, using his tail to stimulate her enough that she will allow him to climb on top of her back.

Once positioned, he wiggles his tail across the top of her tail while a gland located under his chin, called the hedonic gland, gives off chemicals that soothes the female.

He then climbs off and the female follows him

around in a courtship ritual with her nose close to his cloacae vent, a cavity in which the genito-urinary tract is found.

Finally, the male lays a mound of jelly and secretes a sperm-filled capsule on top of the mound. The female moves over the capsule, opens the lips to her vent and takes the capsule into her cloacae.

Gelatinous envelopes of slimy eggs are laid on aquatic plants. The female lays an average of 250 eggs, which can take a month to hatch.

The dark brown larvae emerge and develop in their pond habitat for 90 to 140 days, where they will transform into juvenile salamanders. In the absence of their preferred food—insect larvae—the voracious salamander larvae will also dine on the developing legs of tadpoles.

By early summer, the juvenile salamanders migrate to the adjacent upland woods to live under vegetation or beneath ground in animal burrows. Sometimes they may be found nestling near tree roots. Moisture is essential to their survival during the long, hot summer months.

They feed upon a variety of insects such as sowbugs, crickets, worms and slugs.

Not until they are sexually mature, in two to four years, will the salamanders return to the ponds, usually in late fall and early winter during rainy nights.

Amphibians are highly susceptible to pollution of their habitats by toxic chemicals that have a tendency to leach into breeding ponds from runaway industrial and residential development. Some chemicals may interfere with the animal's ability to assimilate oxygen.

Like all amphibians, the salamander extracts oxygen in three different ways. Gills are present in the young and some adult varieties. Most adults also have lungs; and all amphibians have skins that are richly supplied with blood vessels that absorb oxygen from air and water.

The Long-toed salamander is not as appealing as an American eagle or an African cheetah, nor as cute as an orangutan or baby seal, but these small creatures contribute to the enormous and necessary diversity of nature.

"So much of what Fish and Game can do depends on people taking an interest," Ruth reflects. "There aren't many biologists with a background in amphibian biology. But we have some really good people coming in and I'm hopeful we'll make good progress in the future." □