NATURE'S LABORATORY

"*The frog does not drink up the pond in which it lives.*"
-- Indian Proverb

As spring and summer peek around the corner, the sultry symphony of frogs draws near. This amphibious chorus marks another season of frogs on the march. If you've ever seen them on the move, you would understand why an aggregation of frogs is known as an army.

There are close to 90 species of frogs and toads in the continental United States. Some of those native to California include the northern and California red-legged frog, foothill yellow-legged frog, Pacific chorus frog, and bullfrog.

Frogs are amphibians, creatures that are cold-blooded, have scaleless skin, lay their eggs in water, live both on land and in water, and have adapted to breath underwater with gills as larvae and through lungs as adults. Other amphibians include toads, newts, salamanders, mudpuppies, sirens, and caecilians.

Some characteristics of frogs that help suit their amphibious lifestyle include a nictitating membrane, a third eyelid that keeps the eye moist on dry land and protected underwater; and a mucous covered skin, keeping them moist and allowing them to breath oxygen and absorb drinking water. In fact, if a frog is deprived of water, their skin will dry out and they can suffocate.

One of the most characteristic traits of frogs are their long legs. Those long, exaggerated kickers help them jump to avoid predators. Some frogs, like bullfrogs, have webbed feet to help them swim. Others, like tree frogs, have rounded toe pads that act like suction cups to help them climb.

As early as November, frogs begin to congregate around ponds and streams so they can find mates. After they've mated, known to scientists as amplexus, each pair leaves behind thousands of eggs in a mass of protective jelly. In a short time, those eggs will hatch and tadpoles will emerge.

As tadpoles, the future-frogs have a tail, and gills to help them breath, both of which they'll lose as they mature. Simultaneously, lungs develop inside while their front and hind legs bud and grow. These changes they undergo as they grow are called a

metamorphosis. To fuel this growth and change, they eat everything they can find, including decaying matter, plants, eggs, even fellow tadpoles.

Since amphibians live both on land and in water, they can absorb any number of things through their skin and are particularly sensitive to environmental changes. Scientists consider frogs and other amphibians bio-indicators, signaling to scientists when the natural world is messed up.

Judging by the increasing number of deformities occurring throughout amphibian populations, something is amiss. Frogs and fellow amphibians have been observed with extra or missing limbs, and malformed heads and appendages. Scientists attribute this rash of misshapen amphibians to a number of factors, including climate change, UV radiation, contaminants and pollutants, and disease.

Worse, the remaining populations are experiencing a decline in numbers. This can be attributed to habitat loss and predation by invasive, non-native species.. California's red-legged frog, for instance, was once widespread throughout the state. Following the San Francisco Gold Rush of 1849, the red-legged frog began to suffer as their legs became a popular menu item.

By the early 1900's, locals took to importing east coast bullfrogs, known popularly as "French frogs" and "Jumbo frogs," to supplement the dwindling native frog populations. Those same bullfrogs introduced to augment the frog-leg market now compete with natives like the red-legged frog for food and habitat. Bullfrogs also have an appetite, eating anything unfortunate to pass their way, including small birds and bats, and red-legged frogs.

Apparently, the red-legged frog has yet to recover. Where they once flourished historically throughout California, red-legged frogs are now mostly extinct. Red-legged frogs are a federally Threatened species, and are a Species of Special Concern in California.

***Hands On**:* To watch a frog develop from a tadpole to a full-fledged frog, visit a pond stocked with bullfrogs. The best time to visit is in the spring after the adults have mated, when the eggs are hatching into tadpoles. Fill a large jar with pond water, scum and all, and then collect some tadpoles with a dip net. Bullfrog tadpoles can get as large as half-dollars, so catch some that are fat and healthy.

It's important to keep the water aerated with oxygen -- frogs breath through their skin, but need oxygen to do so. Every day, carefully pour out half of the dirty water and refill the jar with fresh pond water. This will keep the tadpoles supplied with oxygen to breath, and provide them with new food. As long as you keep them healthy, the tadpoles will start their metamorphosis, losing their tails and developing legs.

Make a sketch of the tadpole's development every week. Keep track of any changes you notice. Do some tadpoles grow faster than others? How would that be advantageous in the wild?

Take care not to trap any native frogs -- taking any endangered or threatened species is illegal. Play it safe and take only those tadpoles from ponds infested with bullfrogs. Bullfrog tadpoles grow to great sizes before they undergo metamorphosis, so wait until the tadpoles have grown large or carefully key out each tadpole with a field guide before you bring them home.

At *www.froguts.com* you can perform a virtual frog dissection online and learn all about how a frog works inside and out without getting your hands dirty.

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