Alaska Department of Fish & Game

Frogs and Toads

Alaska is home to one species of toad, the **western toad** (*Bufo boreas*), and two species of frog, the **Columbia spotted frog** (*Rana luteiventris*) and the **wood frog** (*Rana sylvatica*).

The distribution of the **western toad** is restricted to the western United States and Canada. They are common in areas of southeast Alaska and have been found as far north as Prince William Sound. Western toads appear stable in Alaska, but in the contiguous United States they have disappeared throughout broad areas of their historic range, and populations have declined significantly. Western toads are generally terrestrial (land dwelling), and although they have been reported swimming across fiords in Glacier Bay, they are usually found near fresh water in woodlands, meadows, wetlands, or marshes. The western toad is characterized by a stocky body and stout legs, with thick skin that appears dry and bumpy or warty. Toads don't cause warts as was once believed, but glands in the skin do secrete toxins which discourage predation. Predators of adult toads may include coyote, red fox, weasel, mink, marten, black bear, owls, black-billed magpie, raven, crow, Steller's jay, gray jay, American robin, and northern shrike. This chunky toad can be brown, green, or gray, and typically has a pale-colored belly mottled with black, and a light colored stripe down the center of the back. Adults reach lengths of 2.5 to 5 inches (6–12.5 cm).

Western toads are active during the day and night; juveniles are largely diurnal while adults tend to be nocturnal except in spring. Adult toads feed heavily on insects such as flies, spiders, daddy longlegs, ants, beetles, centipedes, slugs, and earthworms. They are often seen walking instead of hopping. Western toads hibernate through the cold winter months in burrows below the frostline, up to 4 feet (1.3 meters) deep. Although they are capable of digging their own burrows in loose soils, they generally shelter in small mammal burrows, root masses, rock crevices, or beneath logs. When they awaken in the spring, they migrate to communal breeding ponds where males attract females with soft clucking calls. Preferred breeding sites are permanent or temporary water bodies that have shallow sandy bottoms. The smaller male grasps the larger female from above and fertilizes the eggs externally as she extrudes them into the water. Western toad eggs look like small black beads laid single file in long strings in the water. Tadpoles are black or charcoal colored, and quickly metamorphose into toadlets just a quarter inch long (6 mm), that resemble miniature adults. Toad tadpoles are herbivores, feeding on aquatic plants, detritus, and algae. Predators of tadpoles include some ducks, spotted sandpipers, fish, wood frog tadpoles, diving beetles and their larvae. Thousands of tiny toadlets may be seen ringing breeding ponds in late summer. Mortality of young toads is high, due primarily to adverse environmental conditions and predation.

The **Columbia spotted frog** ranges from southwestern Wyoming through the Rocky Mountain States and interior British Columbia to Southeast Alaska. Their distribution in Alaska is confined primarily to the coastal trans-boundary river corridors of Southeast, such as the Taku and Stikine rivers, that originate in Canada. Their slightly bumpy skin is smooth, moist, and typically brown, red-brown, or olive, and is covered in irregular black spots. The belly is generally cream colored with a distinctive salmon-red coloring on the undersurface of the legs and stomach. The toes on their short hind legs are fully webbed. Adults may reach a length of 3 to 4 inches (7.5-10 cm).

The spotted frog is an extremely aquatic frog; it is rarely seen far from the water, and often found along grassy margins of lakes, rivers, and streams where they breed and hunt for food. This species is closely associated with deep, permanent water bodies, such as streams, rivers, lakes, beaver ponds, muskeg ponds, springs, and marshes, and the riparian habitat surrounding them. Adults prey on a large variety of terrestrial and aquatic insects, snails, crustaceans, and spiders. Adult Columbia spotted frogs are preyed upon by river otters, herons, and trout, among others.

Like all ranids (frogs and toads) in Alaska, the spotted frog hibernates during the winter and becomes active and ready to mate when warm spring weather arrives. However, unlike the wood frog and the western toad which hibernate on land, the spotted frog hibernates in the mud beneath water bodies too deep to freeze to the bottom. In the spring, adults congregate in breeding waters, and the males call to attract females with a weak series of clucking noises, similar to clicking your tongue against the roof of your mouth. The eggs are deposited in large, free floating, spherical clusters which are fertilized by the male as the female releases them into the water. The masses of large eggs hatch into aquatic gill-breathing tadpoles which undergo metamorphosis (transformation) into lung-breathing frogs by the end of the first summer. Some tadpoles may overwinter before completing metamorphosis. Tadpoles feed on algae and organic debris, and in turn provide an important food source for hungry dragonflies, diving beetles, and fish. The Columbia spotted frog has disappeared from many areas in its range, and is a candidate for listing under the Endangered Species Act. The species is still considered common in British Columbia, but their current status in Alaska is unknown.

The **wood frog** is widespread throughout northern North America, and is the only amphibian that lives north of the Arctic Circle. This abundant frog is the most widely distributed amphibian in Alaska, ranging from the mainland of Southeast Alaska north to the Brooks Range, and is the sole amphibian found north of Prince William Sound. They inhabit a variety of habitats including mixed forests, open meadows, muskeg, tundra, and even landscaped spaces in urban and suburban areas. Wood frogs are highly terrestrial, and are only found in water during breeding and early development. Although adults can be as long as 3 inches (7.6 cm), they are frequently smaller. This smooth skinned frog may be brown, tan, grey, or green above, with a uniformly cream colored underside. Distinguishing characteristics generally include a prominent dark eye mask and a contrasting light colored lip line running from the snout tip to the rear edge of the mask. Their toes are incompletely webbed.

The wood frog is capable of surviving the frigid Arctic winter because it is one of the most freeze tolerant species on Earth; it has the amazing ability to freeze solid and thaw out as temperatures warm in the spring. Wood frogs hibernate in shallow bowl-shaped depressions under a layer of dead vegetation (duff), with snow cover providing additional insulation. At the onset of freezing temperatures, wood frogs begin pumping much of the water out their cells and organs and into extracellular spaces and body cavities. At the same time, they pump large amounts of glucose (a sugar created in the liver) into their cells. The syrupy glucose solution inside the cells serves as a cryoprotectant (antifreeze), protecting the cells themselves from freezing and from desiccation. Within a few hours, ice fills the abdominal cavity and encases all internal organs. Flat ice crystals form between layers of skin and muscle, and the eyes turn white because the lens and fluids freeze. Nearly 70% of the frog's total body water is converted to ice. The blood freezes, the heart stops beating, all breathing and muscle movements cease, and the wood frog remains in a virtual state of suspended animation until it thaws.

In early spring (April and May in Alaska), as ice begins to melt along the shores of ponds or lakes, wood frogs thaw and re-animate. Within hours, male wood frogs make their way to shallow breeding ponds where they begin attracting females with loud, staccato calls that sound like duck quacking. Wood frogs will breed virtually anywhere that has standing water for at least part of the summer, including ponds, bogs, marshes, temporary pools, tire tracks, or roadside ditches. Calling and breeding are explosive and last only a few weeks. The globular masses of hundreds or

thousands of eggs are fertilized externally, and are usually found attached to vegetation just below the surface. After fertilization, adults abandon the eggs and disperse over land, where they feed on insects, worms, and other invertebrates and, in turn, are preyed upon by birds and larger animals. Development from egg to tadpole to frog occurs very rapidly to ensure complete metamorphosis before the water body either dries out or freezes over. Although development and growth rate depend on water temperature and food availability, eggs generally hatch in about a week, and tadpoles metamorphose into little froglets in about eight weeks. In Alaska, look for masses of nickel-sized froglets emerging from their watery nurseries late July and August. Recent studies of wood frogs in National Wildlife Refuges in Alaska have found some of the highest rates of physical abnormalities (missing, shrunken, or misshaped limbs, or abnormal eyes) documented in the published literature. The cause for the high prevalence of abnormalities is unknown, but hypotheses include chemical contaminants, parasites, ultraviolet radiation, predators, extreme temperatures during development, or a combination of these factors.

For more information on Alaska's amphibians, please see:

The ADF&G amphibian curriculum, "It's not easy being green."

www.sf.adfg.state.ak.us/region1/amphib/amphib.cfm

The Alaska Wood Frog Monitoring Project

www.akfrogs.net

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