



Oregon Spotted Frog

This endangered amphibian is at risk due to loss of shallow wetland habitat to agriculture and development.





Why are Oregon Spotted Frogs at risk?

Habitat loss is the number one reason for the dramatic decline of the Oregon Spotted Frog throughout its North American range over the past century. There are, however, several other compounding factors, all of them the result of human activity. The Oregon Spotted Frog is a warm-water marsh specialist that lives in shallow wetlands with emergent vegetation. This type of habitat once occurred extensively throughout the Lower Fraser Valley and other parts of the species' range, but it has been largely converted to other uses. Over the past century, most of these wetlands have been drained, ditched, diked and filled to create additional space for raising livestock and crops, establishing homes and businesses, and building roads. Sumas Lake, once a massive complex of marsh and shallow, open water that spread across the Fraser Valley, was converted to agricultural land in the early 1900s. The Fraser River, which historically flooded its banks and replenished the valley's wetlands each spring, has long since been confined within its dikes.

The few remaining patches of suitable Oregon Spotted Frog habitat in the Lower Fraser Valley are fragmented and small. The three known Oregon Spotted Frog populations are isolated from each other, with no connecting corridors of habitat to allow movement of individuals between these areas. Biologists estimate that the minimum habitat size for a viable population is at least two hectares and that populations occupying habitats of less than 25 ha are at risk. British Columbia's three populations presently occupy areas of less than 13 ha.

Besides directly reducing the amount of available wetland habitat, urbanization has also affected the Oregon Spotted Frog indirectly by covering large areas with impervious surfaces, such as asphalt, rooftops and compacted soil. This alters both groundwater storage and surface run-off. The margins of the shallow wetlands used by the Oregon Spotted Frog for breeding are especially susceptible to hydrological changes.

Non-native invasive species, such as reed canarygrass and Bullfrogs, are other risk factors. Reed canarygrass, for example, degrades or eliminates potential breeding habitat in the Fraser Valley and elsewhere, by forming dense rooting mats along the shoreline that make it impassable to Oregon Spotted Frogs.

The non-native Bullfrog and Green Frog may also present serious threats. Bullfrog populations are expanding rapidly and the adults prey on almost any moving object that will fit in their mouths, including other frogs. Bullfrog tadpoles might also be displacing Oregon Spotted Frog tadpoles from the warmer, shallower waters that provide optimal conditions for growth and development.

Natural predators, such as garter snakes, Great Blue Herons, Raccoons and Belted Kingfishers, regularly feed on Oregon Spotted Frog tadpoles, juveniles and adults.

The Oregon Spotted Frog has disappeared from more than 90 percent of its former range.

Oregon Spotted Frogs may also be susceptible to such newly discovered amphibian

diseases as iridoviruses and chytrid fungi.

Because of their permeable skin, all amphibians are very vulnerable to water-carried pollutants. The proximity of surviving Oregon Spotted Frog populations to agricultural areas puts them at high risk from agricultural chemicals that get washed into wetlands, especially nitrogen-based compounds found in crop fertilizers. A recent study of five Pacific Northwest amphibians showed that the Oregon Spotted Frog was the most sensitive to environmental levels of nitrates and nitrites. Levels that government agencies consider safe for human drinking water severely affected Oregon Spotted Frog tadpoles.

What is their status?

Historically, the distribution of the Oregon Spotted Frog extended from the extreme southwest corner of British Columbia to the northeast corner of California. Today, it has disappeared from more than 90 percent of its probable former range. Of the 63 historical populations, only 13 remain – one in Washington State and 12 in Oregon. Recent discoveries of several previously unknown populations – three in British Columbia, three in Washington and 12 in Oregon – bring the number of currently known existing populations to 31. The species is extirpated from California.

The three historic Oregon Spotted Frog populations in British Columbia were all located in the Fraser River Lowlands – on remnant wetlands in the Sumas Prairie area, on Nicomen Island and in an area now encompassed by Campbell Valley Regional Park in Langley. The first two populations were recorded prior to the 1950s, while the third was the subject of intensive study in the late 1960s. By the 1990s, Oregon Spotted Frogs could not be found at any of these sites.

In 1996 and 1997, a survey of 94 potential sites in the Lower Fraser Valley turned up three previously unrecorded Oregon Spotted Frog populations, two near Agassiz and one near Aldergrove. The estimated total of approximately 300 frogs that inhabit these three sites represent British Columbia's,

and Canada's, entire breeding population of Oregon Spotted Frogs.

Acknowledgement of the Oregon Spotted Frog's precarious situation came belatedly and only after it was proven to be a unique species, distinct from the more widely distributed species now called the Columbia Spotted Frog. The two species, once collectively known as the Spotted Frog, are remarkably similar in appearance. Nevertheless, genetic analysis has shown them to be significantly different and on that basis they were given their current names in 1997.

In November 1999, the Oregon Spotted Frog became the first species to receive an emergency listing by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which declared it to be Endangered. Designations are normally made during COSEWIC's annual species status review in late spring, but this takes place after the Oregon Spotted Frog's breeding season. In order to give the newly formed Oregon Spotted Frog Recovery Team a mandate to begin work prior to the 2000 breeding season, the British Columbia Ministry of Environment, Lands and Parks requested this emergency listing.

In British Columbia, the Oregon Spotted Frog is on the provincial Red



The Red-legged Frog (left) has a more upright posture, longer back legs, and more pronounced dorsolateral folds than the Oregon Spotted Frog (right). The Red-legged Frog also has a more pronounced mask, and flecks rather than spots on its back.

List along with other wildlife being considered for legal designation as Endangered or Threatened. In Oregon it has been named as a Sensitive Critical species and in Washington State it is listed as Endangered. The U.S. Fish and Wildlife Service has listed it as a Candidate species for designation under the Federal *Endangered Species Act*.

What do they look like?

The Oregon Spotted Frog (*Rana pretiosa*) is named for the black blotches with light centres that are scattered across the back and head of adult frogs. As a frog grows older, these spots expand in size and become ragged-looking around the edges. The spots stand out against a background body tint of brown or reddish brown, which becomes increasingly ruddy with age. A pair of parallel, light brown to orange ridges (called dorsolateral folds), run part way down the back, starting just behind the eyes.

In 1999, the Oregon Spotted Frog became the first species to receive an emergency listing by COSEWIC.

The adult frog's thighs and abdomen are washed with orange-red pigments and are mottled with brown, grey or tan spots, which

also appear on the white throat and underbelly.

In addition to their distinctive markings, they also have several identifying characteristics that are associated with their highly aquatic lifestyle. One is the full webbing between the toes of the hind feet, which enhances their swimming ability. The

other is the species' upward-turned eyes. By having eyes that are angled upward, instead of outward like the eyes of many other frogs, the Oregon Spotted Frog is able to keep a line of sight above water, even when its head is almost entirely submerged.

The adult Oregon Spotted Frog can grow to a length of 44 to 100 millimetres from snout to rump, although those found in British Columbia seldom exceed 70 mm. Females are typically larger than males. Compared to other frogs, the Oregon Spotted Frog has relatively short legs. When sitting, it maintains a low, "crouching" position, rather than a more upright posture.

Juveniles are light brown or olive-green above, and white or cream below, with the reddish colouring of the underlegs and abdomen developing as the frog matures. Belly mottling also develops with age and is absent in newly metamorphosed frogs.

The Red-legged Frog (*Rana aurora*) has a more upright posture, and although it also has red legs, the red pigment appears to be deep beneath the surface of the skin, rather than appearing "painted on" like the Oregon Spotted Frog.

Oregon Spotted Frog tadpoles are difficult to distinguish from the tadpoles of other species. Dark on top, they have an aluminum-white or slate-coloured underbelly. As the tadpole matures, metallic flecks

appear in clusters on the head, body and tail. However, colouring is not a reliable way to identify the tadpoles of this species. Biologists rely instead on careful measurements of tail and body length, since they know that Oregon Spotted Frog tadpoles have proportionally longer tails than other species that may be found in the same pools.

What makes them unique?

For years, the Oregon Spotted Frog was lumped together with the Columbia Spotted Frog (*Rana luteiventris*) and thought to be a single species. Experienced herpetologists now tell the two apart by the amount of mottling on the belly, and geneticists differentiate them through protein analysis, but it is this species' ecological uniqueness that is easiest to observe and understand.

Oregon Spotted Frogs in British Columbia are at the northern limit of this species' range. These individuals are adapted to living in climatic conditions that can be more extreme than those experienced by individuals in low-lying regions at the centre of the range. Different populations may have subtle differences in their genetic coding that reflect these adaptations. Biologists believe that unique populations at the edge of a species' range, such as the BC populations of Oregon Spotted Frog, may hold the key to species survival in the face of large-scale environmental changes, such as global warming.

How do they reproduce?

The Oregon Spotted Frog's reproductive cycle begins in late February or early March, when males move to traditional breeding sites and begin calling. There is no high-volume chorus. In fact, the faint, low-pitched,

hollow notes carry only 20 to 30 metres and are easily obscured by birdsong or the trilling of the more vociferous Pacific Treefrog. The Oregon Spotted Frog's mating call consists of a series of five to 50 "clucks" that sound like knocking on a log, or someone softly clicking their tongue on the roof of their mouth. Calling continues both night and day, increasing in intensity on sunny afternoons.

The calling males cluster in shallow water along the edge of the breeding pond, often sitting only a few centimetres apart from each other. Females approach the group when they are ready to lay their eggs. When a male encounters a receptive female he clutches her from behind with his forelegs in a tight embrace called amplexus, and fertilizes the eggs as she lays them. Each female's egg mass is deposited in a communal egg-laying site, clustered with 10 to 75 other egg masses, some of which may end up piled on top of others. The egg-laying sites are areas of still or slow-moving water, usually less than 10 cm deep, where shoreline vegetation is sparse. Egg masses are not attached to plants or other objects.

After laying her eggs, the female goes back to leading a fairly solitary life until the next spring. The males remain together at the breeding site until the end of the month-long breeding season and then disperse to other areas of the wetland.

The shallow egg-laying sites chosen by the Oregon Spotted Frog represent a delicate compromise

between risk and advantage. The risks are predation, desiccation and freezing. The frogs do not provide parental care for their eggs, so avoiding predation is simply a matter of

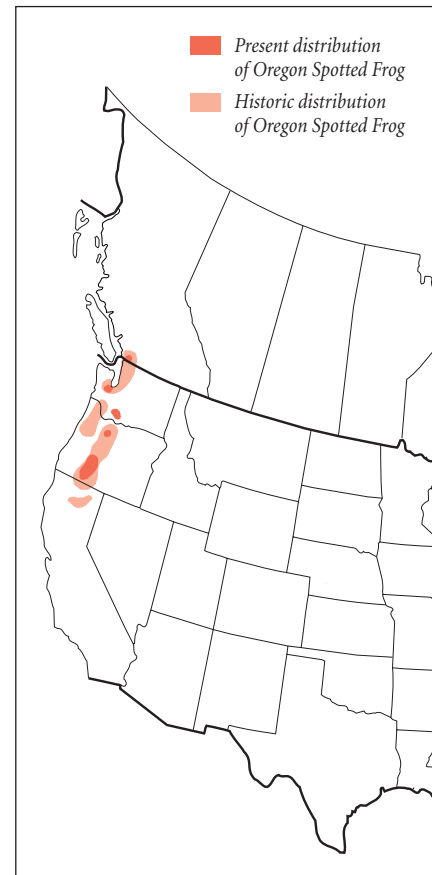
Each female's egg mass is deposited in a communal egg-laying site.

luck. Desiccation, which is fatal to the eggs, can result from only a small drop in the water level, but this risk is minimized as long as spring rainfalls are normal and

natural run-off is unimpeded. Freezing means death for exposed eggs, but sub-zero temperatures do not typically occur at this time of year. Developing embryos can survive temperatures as low as 1°C for at least eight hours, which is usually sufficient hardiness for this region.

The advantage of the shallow sites is a warm-water environment that speeds embryonic development.

The few remaining patches of suitable habitat are fragmented and small.



The higher the water temperature (up to the maximum tolerance limit of 28°C), the faster the embryos will develop into free-swimming larvae. Shallow water at the edge of a pond is consistently warmer than deeper water farther out, except when temperatures drop down near freezing. As well, in such shallow water, a great amount of the jelly that surrounds the eggs is exposed to sunlight and considerable heat is accumulated by the egg mass, so that it may be much warmer than the surrounding air temperature. Clustering the egg masses in one place also helps raise egg temperatures by reducing the flow of water around and through the masses.

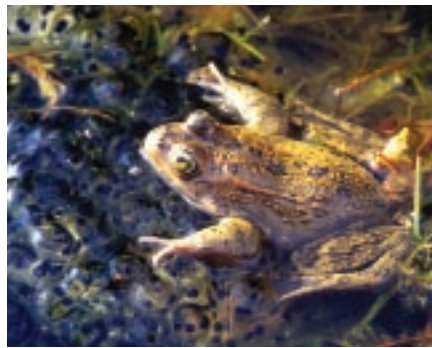
Depending on the water temperature, the eggs hatch in 18 to 30 days. After 13 to 16 weeks, the tadpoles metamorphose into miniature frogs, about half the size of full-grown adults. Oregon Spotted Frogs do not breed until two or three years of age. The life span is not known, but may be as short as 5 years.

What do they eat?

As tadpoles, Oregon Spotted Frogs are grazers, their mouths equipped with rows of rough teeth. They feed on decaying vegetation, algae and detritus. Carrion may also form part of their diet.

Adults and juveniles eat spiders and a wide variety of insects, including leaf beetles, ground beetles, rove beetles, syrphid flies, long-legged flies, ants and water striders. Most of their hunting is done from the water, but during and after rain showers they sometimes venture a few metres onto land and feed among wet vegetation.

Oregon Spotted Frogs are best described as sit-and-wait predators. Often remaining motionless for an hour or more, they will float in a pond, half-hidden by aquatic plants



OREGON SPOTTED FROG WITH EGG MASS.
Russ Haycock photo

with only their eyes protruding above the surface, or crouch on the muddy shoreline, waiting for prey to approach. As soon as the prey moves within range, the frog lunges forward, thrusting out its sticky tongue to trap its victim. Then, just as quickly, the frog flicks its tongue back into its mouth and swallows its meal.

Where do they live?

Oregon Spotted Frogs are even more closely tied to aquatic habitats than most of our frogs and toads. On dry days, they are found in or near the water. Even wet weather will not entice them far from water. This frog is very easily disturbed and, if startled on land, will head straight to the nearest pool and dive in. If disturbed in water, it will dive or slowly sink below the surface and seek refuge within vegetation or in the mucky bottom substrate.

In general, the Oregon Spotted Frog's preferred habitat is warm, very shallow water with both floating and emergent vegetation. Floodplain wetlands connected to permanent water are ideal habitats. Lakes, ponds and slow-moving streams may be used if warm shallows and emergent vegetation, such as grasses, sedges and rushes, are present.

Within the preferred habitat, different microhabitats are required at different times of year. Egg-laying

sites are located in ankle-deep water along the shoreline, where vegetation is low or sparse. Adequate water levels – with no sudden flooding and, especially, no rapid drying – are critical for egg and tadpole survival. Deep pools are important for juveniles and adults during the dry season. Mats of floating plants within these pools are used as basking platforms in summer and provide cover to avoid predators. Wetlands with abundant aquatic and emergent vegetation also support a rich community of invertebrates, which provide a ready source of food for these frogs.

Preferred habitat is warm, very shallow water with both floating and emergent vegetation.

To date, there is little information on hibernation sites, but some Oregon Spotted Frogs are believed to overwinter in ice-free seeps, low-flow channels or in the vicinity of springs.

Since Oregon Spotted Frogs are not known to travel overland, their different seasonal microhabitats must be connected by water, at least through late winter and spring, and again in the fall. Roads or berms that cut through wetlands may seriously affect population size and distribution by hindering access to critical habitats.

What can we do?

Oregon Spotted Frogs are protected under British Columbia's *Wildlife Act* and may not be collected, kept in captivity or handled, whether as tadpoles or as adults. There are no provisions under the *Wildlife Act* to protect the Oregon Spotted Frog's habitat. Fortunately, the sites where

populations are known to exist in the Fraser Valley are relatively secure at this time.

In the winter of 1999, the Oregon Spotted Frog Recovery Team was formed to coordinate efforts to protect this species. The team has members from provincial, federal and regional district agencies, First Nations, universities, and conservation organizations. The team's first priority was to begin monitoring breeding sites in the Fraser Valley, and, if necessary, move egg masses to keep them from drying out before hatching. Field surveys are also being continued, in hopes of discovering populations that are not yet known or locating other potential breeding areas. The Recovery Team is also considering reintroduction of the Oregon Spotted Frog into parts of its former breeding habitat. Team members are rearing some frogs in captivity, to provide a genetic reservoir and animals for future reintroductions.

Long-term recovery of this species will require public support and cooperation with municipalities and regional governments, private land-owners and First Nations.

There are many ways you can help amphibians. Please don't move frogs, tadpoles, or fish from pond to pond. Control non-native plant species in wetlands. Set up fish-free ponds as part of your landscaping. Support programs to remove non-native fish and frogs from wetlands. Be careful not to let pesticides or fertilizers run into wetlands.

Let local politicians and municipal planners know that endangered species are important to you. By educating yourself and then speaking up for wetland protection at municipal and regional district planning meetings, you can help ensure that Oregon Spotted Frogs will always have a place to call home in British Columbia.



OREGON SPOTTED FROGS LAY THEIR EGGS IN A COMMUNAL SITE.


Russ Haycock photo



INTRODUCED SPECIES LIKE THIS BULLFROG MAY BE IMPACTING THE OREGON SPOTTED FROG.

Russ Haycock photo

You can learn more about frogs and their habitats through BC Frogwatch, Naturescape, Wetlandkeepers and Wild BC. Contact information for these programs is available through your local Ministry of Water, Land and Air Protection office, or check the BC Frogwatch website at wlapwww.gov.bc.ca/wld/frogwatch or the Stewardship Centre at www.stewardshipcentre.org.

You can learn more about the Oregon Spotted Frog by visiting the Recovery Team's website at www.oregonspottedfrog.com. 



SHALLOW WETLANDS WITH EMERGENT VEGETATION ARE PREFERRED HABITAT.

Russ Haycock photo

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