Amphibians in the Coal Mine?

How Columbia Spotted Frog are Indicators of Ecosystem Health in the Grande Ronde River Basin

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More than 360 million years ago, amphibians evolved from fish, marking a key evolutionary turning point for vertebrates: the transition from water to land. They are the only class of vertebrates that has no special protective covering on the skin, and they have an astounding ability to regenerate tails and legs that have been lost. They also play a significant role within ecosystems as predators and prey. The term amphibian, from the Greek *amphi* ('double' or 'circular') and *bios* (life), refers to how most frogs, toads, and some salamanders start life in the water in a larval form with gills and later metamorphose into a form that can live on land but must return to water to reproduce. In this way, amphibians are sensitive to changes not only in the water but also to the land and often sound early alarms about ecosystem health.

Since the mid-1980s, herpetologists (scientists who specialize in the study of reptiles and amphibians) have realized that many amphibian populations are in decline and entire species have gone extinct. Causes of these declines are varied and include habitat destruction, climate change, and environmental contamination. The Blue Mountains of Eastern Oregon within the Wallowa-Whitman National Forest are home to amphibian species comprising three native frogs, one native toad, and one native salamander. The largest of these frogs, the Columbia spotted frog (*Rana luteiventris*), is one of many amphibians in the western U.S. experiencing population declines and is considered a sensitive species by the U.S. Forest Service (USFS).

Taking a measurement of a spotted frog for monitoring (courtesy of Laura Navarrete).

Columbia spotted frogs in the Wallowa-Whitman National Forest breed in shallow ponds or slow-moving water and prefer areas with little shade from vegetation. Their breeding season is short, and it is the only time a visitor to the forest can reliably hear the frogs croaking. Depending on elevation, they breed between March and June and lay their eggs communally. It is common to find the gelatinous egg masses from multiple females piled on top of each other. After breeding, the adults disperse into nearby streams and rivers to spend the rest of the year happily eating aquatic and terrestrial invertebrates, rarely moving far from where they were born. These frogs can live for nine to 12 years, and they have high site fidelity, which means that they return to the same breeding pond year after year. These shallow pools of water that are vital for healthy frog populations need to maintain the correct temperature for the eggs to hatch and to retain water long enough for the tadpoles to metamorphose.

Columbia spotted frog (courtesy of Laura Navarrete).

The majority of spotted frog habitat within the La Grande Ranger District of the Wallowa-Whitman National Forest overlaps with an intensive multi-agency, multi-partner stream restoration effort designed to recover Endangered Species Act-listed fish populations. Past practices of heavy logging and intensive grazing have severely damaged riparian habitat, and the current threat of climate change looms large. To combat these