

## SEASONAL MIGRATION OF COLUMBIA SPOTTED FROGS (*Rana luteiventris*) IN A HIGH MOUNTAIN BASIN



**Keywords:** Columbia spotted frogs, seasonal migration, migration corridors, amphibians, *Rana luteiventris*, complementary resources

### **Background & Management Issues:**

Although recent global concern over widespread amphibian declines has fueled a spate of research on regional amphibian declines, little is known about amphibian natural history. This lack of knowledge hampers efforts to minimize local threats to amphibian populations that stem from habitat modification. Specifically, few studies have identified “complementary” resources – breeding, summer, and winter habitats – within a landscape. As a result, protection efforts tend to focus only on breeding habitat. This study addresses year-round habitat needs for Columbia spotted frogs, and should prove helpful to managers developing conservation plans for this species.

### **Project Objectives:**

- ❖ To characterize breeding, summer foraging, and overwintering habitats of Columbia spotted frogs.
- ❖ To examine the seasonal movements of this species among these different habitats.
- ❖ To identify preferred migration routes.

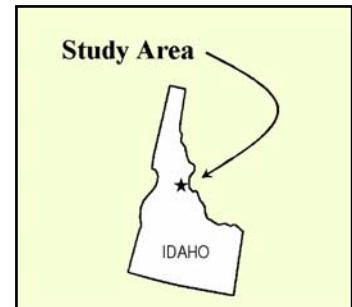
**Project Description:** Surveys were conducted in a large, high-elevation, glacial cirque in the Bighorn Crags region of the Frank Church-River of No Return Wilderness. The lentic water bodies and streams in the area were located, mapped, and surveyed for Columbia spotted frogs using visual and dip-net surveys. An attempt was made

to capture all frogs observed. Breeding, summer foraging, and overwintering habitats were identified using surveys, mark-recapture, and radiotelemetry. Statistical analysis was used to determine qualitative differences among the types of wetland habitats and to compare the distance traveled by recaptured frogs.

**Results:** Five of the water bodies in the study area were used as breeding habitat by the species, 13 as summer foraging habitat, and four as overwintering habitat. Two of the water bodies were used for all of these functions.

Small, shallow, silt-bottomed ponds appeared to be preferred breeding habitat, but larger rocky-bottomed lakes with little emergent vegetation or silt substrate were also used. Breeding habitat was occupied from June to late August, and all sites identified as breeding habitat also doubled as summer foraging habitat. In addition, some sites were used as summer habitat but not for breeding. The summer habitat category encompassed all types of wetland habitats. In mid-August the frogs began to move to overwintering habitat, which the authors classified as large, deep (>3m), rocky lakes with perennially flowing outlets. Individual frogs showed strong preferences for particular overwintering sites.

Habitat use varied among ages and between sexes. Both males and females showed a strong tendency to use the same breeding site every year, but only females tended to annually return to the same summer habitat. After egg deposition in late June, females showed a much greater proclivity to leave breeding habitat to search for separate habitat for summer foraging than did males. At one high-quality site used for breeding, summer habitat, and over-wintering, where the majority of frogs in the study area lived year-round, nearly half the female frogs migrated over 500 m to reach a different summer habitat. The authors hypothesized that females needed higher-quality foraging habitat to regain fat reserves used for egg development.



Travel routes between different habitats were fairly linear and direct. Frogs only followed streams when the streams fell in the migration route and didn't hesitate to cross dry, rocky terrain to go from one habitat to another. Small seeps, springs, or other moist microclimates were used when available en route. Frogs tended to follow the same routes to and



from overwintering habitats.

Migratory distances observed in this study were more than two times longer than previously reported for this species. The longest annual migration observed was 2066 m roundtrip. Frogs traveled up to 708 m per day, and the typical seasonal migration lasted 1-2 days.

### **Management Implications:**

- ❖ Populations of Columbia spotted frogs use spatially separated, specific habitat patches for breeding, foraging, and hibernating within a landscape. Protection of all types of habitat is important for the continuing viability of a ranid population.
- ❖ Individual frogs, especially females, migrate thousands of meters annually among these different habitats.
- ❖ Migration routes are most often linear and direct, and over unlikely terrain. These upland migration routes connecting complementary habitats are as important for ranid conservation as the habitats themselves.
- ❖ The existence of microclimates such as springs or seeps along these migration routes may be critical to a populations' continued survival.
- ❖ In the study area, the existence of suitable overwintering habitat appears to be the main limiting factor for the frog population. The deep rocky lakes that are essential for ranid overwintering are often stocked with trout.

### **Publications / Products:**

- ❖ Pilliod, David S.; Peterson, Charles R.; Ritson, Peter I. 2002. Seasonal migration of Columbia spotted frogs (*Rana luteiventris*) among complementary resources in a high mountain basin. *Canadian Journal of Zoology*. 80: 1849-1862. [Leopold Institute Publication # 561](#)



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