



Glacier Toads and Frozen Frogs: Alaska's Surprising Amphibian Diversity

by Blain Anderson

Whenever I mention that I am working on an amphibian study, people's eyes light up and many smile. Some tell me a story, recalling the first frog they caught in a pond one summer in their youth. Others share their fascination of how a tiny egg transforms into a tadpole, then into a little hopping toad in just a few weeks. Regardless of the reason, amphibians are interesting to people: they all have a certain slimy mystique.

Some people have even asked, "Do we have any amphibians up here?" This question is not surprising, because so little is known about the amphibian species in this state. Many Alaskans have lived here their entire life and have never seen one. Researchers have only recently begun to study Alaska's

frogs, toads, newts, and salamanders. Very little work has been done to date to assess population trends, distribution, and threats (MacDonald 2003). On the bright side, this is changing, as a small but growing group of herpetologists, biologists, geneticists, toxicologists, and naturalists begin to study this enigmatic and unusual group of Alaska's fauna.

Not surprisingly, most of Alaska's amphib-

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ians are found in the warmer and wetter southeast coastal rainforest, but one species, the wood frog (*Rana sylvatica*), is found throughout the interior and high above the Arctic Circle in the Brooks Range. This hardy species produces an abundance of glucose, which acts as an antifreeze in its blood and tissues to survive the frigid winters (Storey and Storey 1992). Western toads (*Bufo boreas*), can tolerate a swim through the frigid saltwater in Glacier Bay. They are regularly found in areas



Left: Earlier this spring, Klondike Gold Rush National Historical Park temporarily fenced off this western toad breeding pond in the Dyea Townsite area that was being used by off-road vehicles.

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Right: Western toads (*Bufo boreas*), also known as boreal toads, were found in some very marginal habitats in both the Dyea area and in Glacier Bay. This toad was spotted near Gustavus on a road between the woods and a flooded gravel pit.

National Park Service photograph



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As a first step, 250 sets of field-worthy flashcards were printed and distributed to employees and volunteers, to be used as an identification aid. This western toad (*Bufo boreas*) was found by Håken Sätvedt, a helicopter pilot, while working for the I&M Landcover Program in Glacier Bay.



National Park Service photograph

Tiny western toadlets (*Bufo boreas*) emerge from ponds in late July to September and must find food and shelter for the winter.

that, until very recently, were covered by glaciers (Taylor 1983). Rough-skinned newts (*Taricha granulosa*) are one of the most toxic creatures on the planet. Ingesting a single individual can kill a full-sized adult human. Individuals of this species have lived 10–20 years, and in their natural habitat travel long distances through the forest to lay their eggs in their natal pond (Hodge 1976, Stebbins 1995).

Amphibians are, indeed, very interesting. But they may be in trouble. Even in Alaska.

Opportunistic Amphibian Inventory

In April 2000, at the Biological Inventory Scoping Meeting held in Anchorage, the National Park Service (NPS) identified amphibians as a taxonomic group to inventory. At that time, few species of amphibians had been confirmed for Alaska's national parks and most were listed as "probably present" by the NPS

(Lenz et al. 2001).

Because basic information on species distribution, population status, and habitat requirements was significantly inadequate, staff from the National Parks in southeast Alaska chose to develop an opportunistic inventory to learn about their amphibian species. This project recorded observations reported by field staff and volunteers, and was re-designed to track sightings in all of the national parks in Alaska through the Inventory and Monitoring Program, for the years 2001–03 (Sharman and Furbish 2000).

The first step of this inventory project was to research the amphibian species in Alaska, and to create a set of 'flashcards' to aid species identification in the field. Observation field forms were sent to field staff, researchers, volunteers, and others who might encounter amphibians in the parks. Finally, a tracking database was built to house information on the submitted field forms.

As a direct result of the inventory, five of the six native species of Alaska amphibians were documented in, or near, national parks. By far, the majority of observations came from southeast Alaska: Glacier Bay National Park and Preserve (n = 40) and Klondike Gold Rush National Historical Park (n = 24). In total, 79 observations were recorded by 40 observers (Anderson 2004).

A few sites had more than one individual, and a couple of ponds had hundreds of tadpoles. Observers encountered and documented approximately 1,600 individual amphibians in three years at 65 different sites throughout ten of the 16 national park units in Alaska. The opportunistic inventory project also led to the extension of the



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Another surprising find was a rough-skinned newt (*Taricha granulosa*) off the coast of Sitka on Rockwell Island. Though outside of Sitka National Historical Park, this newt extends the known range of the species and has led to speculation by researchers that this population may have been transplanted, possibly by Alaska Natives.

known geographic ranges of wood frogs, western toads, rough-skinned newts, and northwestern salamanders (*Ambystoma gracile*).

The inventory confirmed the presence of wood frogs in Katmai National Park and Preserve, Lake Clark National Park and Preserve, Yukon-Charley Rivers National Preserve, Kobuk Valley National Park, and Gates of the Arctic National Park and Preserve. Interestingly, wood frogs have been documented numerous times in the upper and lower Kobuk River drainage, but have not been found to the north in the Noatak River or its tributaries.

Columbia spotted frogs (Rana luteiventris) were a surprising addition to this project. Several were located by hikers on the Canadian side of Chilkoot Pass.



National Park Service photograph

Additionally, Columbia spotted frogs (*Rana luteiventris*) were encountered nearby, but not in, Klondike Gold Rush National Historical Park.

Unexpected Sightings

Of note, Glacier Bay's first observation of a northwestern salamander was reported in 2000 on the outer coast in Graves Harbor. This area of the park was probably spared from the last glacial advance and is one of few areas in the park described by researchers as "glacial refugia" (Manley and Kaufman 2002). Northern

Chichagof Island, near Pelican, is the nearest known verified location of this species (MacDonald 2003).

Another species, the Columbia spotted frog, was reported from the Canadian side of the Chilkoot Trail, within 5 miles (8 km) of the borders of Klondike Gold Rush National Historical Park.

Western toads were observed in the marine intertidal area of Glacier Bay in several locations throughout the bay. This species was surprisingly abundant in recently de-glaciated areas that have been free of ice for 30–100 years (American

Geographical Society 1966). Characteristically, these areas offer little in the way of vegetative cover or other resources for survival. How toads utilize this habitat remains undocumented.


Additionally, a single observation of two wood frogs was submitted from the Tatshenshini River, 12.5 miles (20 km) upstream of Dry Bay, just upriver from Glacier Bay National Park and Preserve.

In another notable find for southeastern parks, an NPS volunteer came across a single rough-skinned newt on tiny Rockwell Island in Sitka Sound. Interestingly, no

species record exists from the nearby Baranof Island (Whitman 2004). Rockwell Island is not previously known to have this species and lies one kilometer from Sitka National Historical Park. Researchers have speculated that this population of newts, and those of nearby islands, may have been transplanted, perhaps long ago, by Alaska Native peoples. The Tlingit, Haida, and other peoples of the Pacific Northwest have many amphibians in their legends, and one group, the frog house of the Raven moiety, uses frog symbology for its cultural traditions and identity (Post 2004).

This is a Western Toad breeding pond.

If you look closely, you will see strings of very small black eggs floating in the water. Tiny tadpoles have already started to emerge from the eggs and swim freely in search of food such as algae and detritus. Please be careful not to disturb these fragile eggs and tiny tadpoles. In a few short months, they will metamorphose and begin their adult lives on land where they can live up to 11 years!



Sign, explaining the temporary closure of a breeding pond.

As a part of this inventory project, 58 specimens were identified in the holdings of the University of Alaska Museum of the North, which had been collected in national parks in Alaska. This holding is a small but significant collection and could be a resource for further research into genetics, phenology, biodiversity, and other studies (*Arctos Database 2003*).

Are Western Toads Declining?

Probably the most important tangential information discovered during this project were the comments and observations received from the public. Long-term resi-

dents reported a significant decline from the 1970s to today in the once abundant western toad populations in the Gustavus and Skagway areas. These reports suggest that something in the local areas may be causing the decline.

One plausible theory is that localized drying of wetlands is affecting toad numbers. Post-glacial rebound, which happens after the weight of the glaciers is removed from the landscape, may be exacerbating this situation (*Sharman 2002*). Much of the land surrounding Glacier Bay is rebounding upward approximately 0.8 inches (2 cm) per year (*Larsen et al. 2003*). The land sheds

water as it rises, thus reducing available aquatic habitat.

Basic inventories like this one provide valuable baseline information for longer term ecological monitoring. This project was a useful first step toward understanding the poorly known distribution of amphibians in Alaska's national parks. More research on Alaska's amphibians, including long-term monitoring, may be warranted since this group of animals may serve as possible indicators of our parks' ecological health. Only through additional study can we better understand the roles of amphibians in the ecosystem, their spatial distribution, habitat requirements, population trends, and the possible causes of these trends.

Yes — Alaska does have amphibians

The answer to the question "Are there any amphibians in Alaska?" is a resounding Yes! We do have amphibians in the state, and, in fact, we have six native species. This is certainly a small number compared to the tropics, or even British Columbia, but Alaska can honestly claim amphibian biodiversity.

Our amphibians live in some very inhospitable habitats. Wood frogs, in particular, are nothing short of amazing. It is astonishing to find frogs above the Arctic Circle in a place where, in the summer, temperatures may be as hot as 90°F (32°C) and the winter temperature can drop to -70°F (-57°C). Also remarkable are western toads, glacial pioneers, living and swimming in the newly exposed landscapes of Glacier Bay.

Unfortunately, at least three non-native species new to the state have been recently introduced to lakes and ponds near Juneau, Pelican, Ketchikan, and Palmer. Often these

releases are unwanted pets. These releases, though well-meaning, can spread diseases and the newcomers can often out-compete native species for food and shelter. Non-native species may also become a pest in short order, as has happened elsewhere (*MacDonald 2003*). Fortunately, no introduced species have been found in Alaska's national parks to date.

Recently, researchers from across the state met in Juneau at the first Conference on Amphibians of Alaska. Although many topics were discussed, it became clear to the participants that the state is beginning to see many of the same unexplained declines and problems that have been documented in amphibian populations worldwide. Many commented that there is much to do before we can understand how these threats are affecting our amphibians.

At this conference, Richard Carstensen of Discovery Southeast suggested that the reason people can relate to amphibians might be because they are one of the few animals that we can actually catch. Who can resist holding a frog? Especially in the proximity of a squealing youngster, if only to prove there's nothing to fear.

Yes, frogs are interesting, mysterious, and fun. In Alaska, though, we are just beginning to get acquainted with ours.

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More information on Alaska's interesting amphibians, and the final report for this project, can be found at http://www.nature.nps.gov/im/units/AKRO/Amphibians/ak_amphibs.htm.

Wood frogs (Rana sylvatica) were found near large lakes and rivers at several parks. The abundance of sightings near lakes and rivers may be due to thermal "lake effects" that keep the areas warm longer than surrounding areas, or because the areas are more accessible to potential observers.



National Park Service photograph

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