



Amphibian and Wetland Monitoring

Yellowstone and Grand Teton National Parks, 2014–2016



Overview

Globally, wetlands are among the habitats most threatened by climate change. In Yellowstone and Grand Teton national parks, the drying of wetlands adds to other stressors affecting amphibians, like disease caused by Ranavirus and chytrid fungus, predation from nonnative fishes, and potential impacts to amphibian habitat from visitor service infrastructure in the parks. Beaver (*Castor canadensis*) have a mitigating effect and have been shown to maintain important amphibian breeding habitat in the parks, locally promoting the occurrence of some species¹, such as Western Toads (*Anaxyrus boreas*) and Columbia Spotted Frogs (*Rana luteiventris*).

Because amphibians are measurably sensitive to multiple stressors, we have been monitoring them as vital signs of ecosystem health in both parks since 2006. Our protocol is adapted from, and contributes to, the US Geological Survey's *Amphibian Research and Monitoring Initiative*. Every year we survey for breeding amphibians in a fixed set of randomly established catchments and measure wetland extent (number of sites with standing water). Our crews also make incidental observations on amphibian disease² and on Western Toads, a species of conservation concern in the state of Wyoming.

Monitoring results are available for 2012–2013³, as are analyses of the links between amphibians, climate, and wetlands in this region⁴. This brief summarizes the recently published results of monitoring amphibians between 2014 and 2016⁵ in Yellowstone and Grand Teton national parks.

Key Findings in 2014–2016

Between 2014 and 2016, we sampled 31 catchments in Yellowstone and Grand Teton national parks. We detected all four species targeted for long-term monitoring: Western Tiger Salamander (*Ambystoma mavortium*), Western Toad, Boreal Chorus Frog (*Pseudacris maculata*), and Columbia Spotted Frog.



Amphibian species monitored annually in Grand Teton and Yellowstone national parks. Adults are shown, clockwise from upper left: Western Tiger Salamander (*Ambystoma mavortium*); Western Toad (*Anaxyrus boreas*) mating pair; Columbia Spotted Frog (*Rana luteiventris*), and Boreal Chorus Frog (*Pseudacris maculata*).

The year, 2014, was unusually productive, corresponding with relatively cool and wet weather. Across all four species, the total number of active amphibian breeding sites and the catchment occupancy rates were much higher than in earlier years. The years, 2015 and 2016, were warmer and drier, with correspondingly less available breeding habitat and, generally, lower catchment occupancy rates than 2014.

Western Tiger Salamanders occupied a record number of catchments in 2014, followed by a progressive decline over the next two years. The highest number of breeding sites for this species, however, (always found less often than the frog species), occurred in 2015.

Boreal Chorus Frogs also had record-high catchment occupancy rates in 2014, which declined progressively over the next two years. The highest number of breeding sites was detected in 2014, followed by a decrease in 2015 and partial recovery in 2016.

Columbia Spotted Frogs occupied a record number of catchments in 2014, and declined progressively over the next two years. Like the chorus frog, the number of breeding sites was highest in 2014, declined in 2015, and then partially recovered in 2016.

Western Toads, the least common of the four targeted species, showed little change in breeding in catchments over the three years. Our sample size for this species is scant, however, and we supplement formal surveys with informal monitoring outside our sample frame to increase it.

Plains Spadefoot (*Spea bombifrons*), though not a target monitoring species, is a rare and unique burrowing species that we have monitored informally since its discovery in Yellowstone National Park in 2013. In 2016, we detected 1000+ tadpoles at the only known breeding site.



Plains Spadefoot
(*Spea bombifrons*)

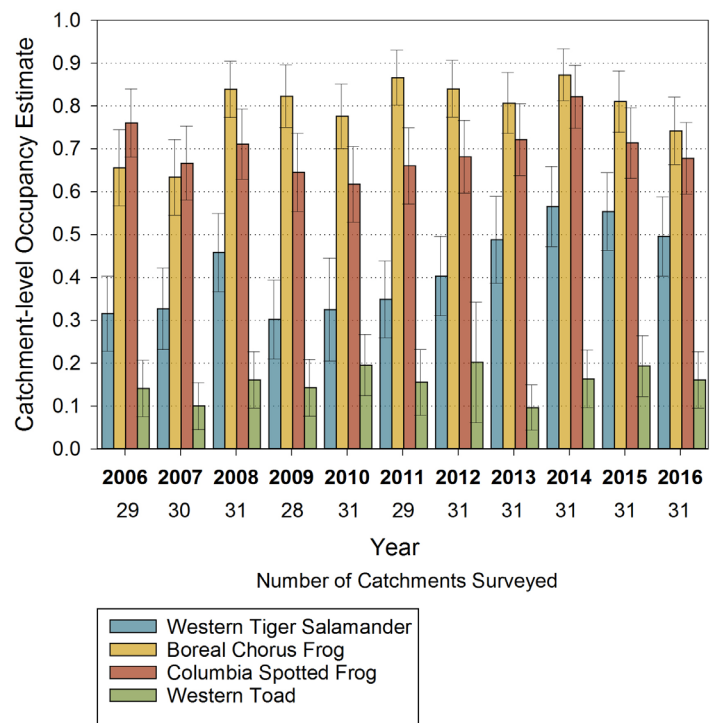
Discussion

We continue long-term monitoring of amphibians in Yellowstone and Grand Teton national parks, embracing partnerships in this effort, and sharing the results in multiple venues. Select analyses of our amphibian monitoring are published in external science journals. What we have learned about amphibian occurrence and wetland flooding status also contributes to local, regional, national, and continental level trend analyses. Combined with historical data, our monitoring results can help park managers and the public understand long-term trends and climate-induced changes to wetlands. We currently partner with universities, agencies, and the Northern Rockies Conservation Cooperative to carry out our monitoring. We are also introducing learners of all ages to our program through a new relationship with the Yellowstone Forever Institute.

Next Steps

Climate-induced wetland drying has already been documented throughout the western US, including in Yellowstone National Park. It is contributing to declines of amphibian populations across the Northern Rockies. To address this challenge, we are developing strategies to anticipate future changes to wetlands and amphibian occupancy based on long-term monitoring data and climate forecasts.

After 13 years of amphibian monitoring, we are in a position to reassess our methods and priorities through a formal science review. For example, Western Toads are declining throughout parts of their range, but sparse data and lack of funding prevent us from carefully analyzing toad trends in Grand Teton and Yellowstone national parks. And, while Plains Spadefoots were recently documented in Yellowstone, little is currently known about their distribution and natural history in Yellowstone's Lower Geyser Basin.



Occupancy rates estimated per amphibian species for high and medium quality habitat catchments in Grand Teton and Yellowstone national parks from 2006 through 2016, with standard errors. The number of catchments surveyed per year is shown beneath the year labels. This graph should not be interpreted as a trend analysis across years.

References

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All monitoring results and datasets are available from the NPS Integrated Resource Management Applications Data Store (irma.nps.gov).

More Information

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