

DISCOVERY

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SMALL THINGS, LARGE WONDERS

Yellowstone's first BioBlitz inventoried many of the park's lesser known species. Photo: Beth Pratt

By Beth Pratt
Yellowstone Association

"We're coming to realize how terribly important the great population diversity of small organisms are that are the foundation of the ecosystems, and these are the little things that run the earth."

EDWARD O. WILSON

Introduction

Visitors flock to the western national parks to experience grandeur and bigness—the towering granite peaks and cascading waterfalls of Yosemite or the almost infinite expansiveness of the mile-deep Grand Canyon. Yellowstone proves no exception to this rule—people delight in what has been deemed the “charismatic-mega fauna,” the large mammals who

wander the park in numbers seen nowhere else in America. Grizzly bears, wolves, bison, and elk indisputably inhabit the starring roles in Yellowstone.

Yet to simply view Yellowstone as a habitat for bigness is to miss an array

of wonderful life overshadowed by a preference for the showier bison or bear. “Such is nature; it doesn’t have to be large or dangerous to be interesting,” said biologist Donald Streubel. And hidden among Yellowstone’s waters and trees, or under its rocks and snow, live some astonishing creatures with life stories just as fascinating as their larger cousins.

This past summer, the Yellowstone Association—along with the National Park Service, Montana State University, and several other organizations—sponsored the first-ever BioBlitz of Yellowstone National Park. This was a 24-hour biological inventory focused on the lesser-known species in the park. Hundreds of visitors young and old gathered around the BioBlitz tent eagerly peering into microscopes at red water mites or watching a display of

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carnivorous aquatic beetles. Volunteer scientists from across the country, all of whom had just spent an exhausting day counting the flora and fauna in the Mammoth Hot Springs area, enthusiastically related stories of their discoveries.

At the insect table, a microscope revealed dozens of tiny creatures wiggling among leaf litter. Beetle expert Michael Ivie proudly displayed the tiny featherwing beetle, the smallest beetle in Yellowstone and one of the smallest in the world. The size of a pinhead, the beetle had to be viewed through a hand lens. James Halfpenny, a scientist based in Yellowstone, shared photographs of his group's exciting find. While searching for pika, his team encountered a marten scurrying among the rocks. "We must have taken over 400 photos of the marten between us," he said and laughed.

On your next visit to Yellowstone, take the time to peer under rocks, wander in riverbanks, or examine the delicate crystals of snow—explore the world

of smallness. You might discover algae that bring color to winter's monotonous white with a pink bloom that protects the plant against the sun. Or hear the marvelous symphony of a frog that almost doubles his body size in order to sing. Or catch the flash of a river rainbow from a fish with ancestors who swam across the continental divide after the last ice age.

The rewards of curiosity toward the more modest inhabitants of the park are high. As the naturalist and artist Jack Laws notes: "Studying natural history is a way of opening up to the world. The closer you look, the more you slow down and start to carefully observe, the more delighted and full of wonder you become. The lives of some of the smallest creatures hold some of the most astonishing secrets."

In tribute to the small world of Yellowstone, here are six fascinating stories of the more diminutive—but no less important—creatures that inhabit the park.

Don't Eat the Red Snow: *Chlamydomonas nivalis*

"Travelers in mountainous districts and polar regions have often described what is known as red snow, but as yet no very satisfactory account has been given of the plant itself."

JOSEPHINE TILDEN, *The Algae and Their Life Relations*, 1935

The phenomenon of red snow—also referred to as watermelon or pink—has piqued the interest of observers for thousands of years, with the earliest account attributed to Aristotle in his *Meteorologica* in 300 BC. Charles Darwin encountered the startling display when traveling through the mountains of South America and provided the first accurate description for the anomaly, for which explanations have ranged over time from the fantastic (iron-bearing meteorites), to the gruesome (blood stains) to the ordinary (pollen). Recent studies of the red snow—which occurs on every continent in the world—attribute the crimson blooms to a surprising source: sunscreen.

Although snow may appear inhospitable to life, the micro-alga *Chlamydomonas nivalis* (the most common organism responsible for the phenomena) thrives in this extreme habitat. E. Kol, a scientist who extensively studied the snow-loving organisms, inventoried as many as 354 algae species living in a snow environment. The unicellular algae live in a "unique microhabitat, namely the water between snow crystals," writes scientist Daniel Remias. Optimum conditions for the algae include temperatures just above the freezing point accompanied with melt water scattered throughout the snow.

The red algae begin their life as green cells with whip-like tails utilized for swimming to the surface to seek light for photosynthesis. Once near the surface, the cells transform into red spheres that decorate the snow with a reddish-hued color. When the snow melts, the spores dry on the rocks and soil until their revitalization under the next winter's snowfall begins the cycle anew.

The red pigmentation the cells produce acts as a sunscreen that protects the algae from ultra-violet radiation. Even more amazingly, the tiny organisms

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**YELLOWSTONE
ASSOCIATION**

THE MISSION OF THE YELLOWSTONE ASSOCIATION

The Yellowstone Association, in partnership with the National Park Service, fosters the public's understanding, appreciation and enjoyment of Yellowstone National Park and its surrounding ecosystem by funding and providing educational products and services.

P.O. Box 117 • Yellowstone National Park, WY 82190
www.YellowstoneAssociation.org
ya@yellowstoneassociation.org
406-848-2400

Monday - Friday • 8 a.m. - 4:30 p.m. Mountain Time



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also manufacture a strong antioxidant that works to counter damage done by ultraviolet rays. Because of these unique traits, red snow is currently being studied as a source of powerful new medicines that may assist with cancer and other disease.

Look for the red snow in open alpine areas—a distinctive watermelon scent usually accompanies it. And even though it's not yellow, be sure to still heed the advice of the age-old saying, as consuming the colorful red algae would bring extreme digestive discomfort.



Boreal chorus frog. Photo: Beth Pratt

It's Not Easy Being Green: Yellowstone's Frogs

"Kermit!" shouted a high childish voice and we knew the roadside wetland we were scouting held at least one frog. A distant moose was instantly forgotten as the young tourist's family gathered around to share her delight in observing the tiny creature with the fearless wide-eyed gaze and mysterious powers of transformation."

DEBRA PATLA AND CHUCK PETERSON, *Yellowstone Science*

It truly isn't easy being green in Yellowstone. The winters of the Northern Rockies with temperatures hovering near zero Fahrenheit during the day and often dropping below zero at night, don't provide the most amphibian-friendly habitat. Lacking the ability to generate their own body heat, amphibians utilize the temperature of their environment for internal climate control. Perhaps not surprisingly given the challenges, within Yellowstone's borders live only four species of amphibians. These include two species of frogs: the Columbia spotted and the boreal chorus frogs (for comparison,

Yosemite National Park, with its less severe winters, boasts triple the amphibian population).

Yet the intrepid frogs of Yellowstone persevere despite the environment. Making the most of the wintry spring and taking advantage of the small doses of summer sunshine, the boreal chorus frog and Columbia spotted frog hop through numerous wetlands and meadows even at the higher elevations in the park. Indeed, the winters may have produced a hardier breed of frogs in Yellowstone than their more temperate cousins. A study reported in *Yellowstone Science* concluded: "For spotted frogs, Yellowstone winters translate into long lives." Spotted frogs in the park can live up to 10 years as compared with a 3-year average life span of those studied in coastal British Columbia.

Park visitors flock to Yellowstone for the elk, bison, and bighorn sheep ruts, yet the park's annual frog "rut" is an overlooked spectacle not to be missed. After emerging from hibernation in springtime (likely spending the winter in cozy burrows abandoned by other animals) thousands of frogs travel large distances to their breeding grounds. Spotted frogs have been observed traveling 600 to 1400 feet in a few days even over snow to breeding grounds—that's akin to a person traveling almost 6 miles! Park naturalist M.P. Skinner in 1927 described a mass migration he witnessed at Pelican Creek "The whole length of the...causeway was live with

them, every square foot having from one to three tiny frogs on it, and more continually coming up from the marsh."

Once situated at the breeding grounds, the musical courtship of the frog rut resounds at many locations around the park. Instead of locking antlers or ramming horns, the frogs choose a more peaceful method of competing for females: singing.

The frog symphony in Yellowstone is quite an experience to behold, with the music of a gathering of boreal chorus frogs continuing day and night as the animals call for female companions. For such a small animal (adults are usually less than two inches) to serenade so loudly is remarkable. Even more incredible is the singing frog's body almost doubles in size with the expansion of its throat, and in a single minute the frog may give up to 20 calls.

Spotted frogs lack the loud, distinctive call of the boreal chorus frog and instead take a softer approach to courtship with a faint croaking.

Lord of the Flies: Ephydrid Fly

"I have always thought that one of winter's strongest points was its lack of 'bugs'... and yet it was the 'bugless' winter that first introduced me to insects."

DONALD STOKES, *A Guide to Nature in Winter*

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Ephydrid flies on hot spring algae. Photo: NPS