



Rocky  
Mountain  
Conservancy

# QUARTERLY

Autumn 2017

## WANDERING INTO THE WILDERNESS

by Sheri Fedorchak

I've been hiking and sauntering in the wilderness and the front country of Rocky Mountain National Park this past summer. I still see the places that I've hiked to in my mind like a photo album: the intense, frothy flows of spring runoff at Calypso Cascades in June, the purple elephant's head flourishing in the lush wetlands at the inlet to Sandbeach Lake in August, a quiet walk at sundown along the accessible trail at Sprague Lake where families with young children fished, catching nothing but memories to take home.

My heart fills with gratitude for places like these where the sure and unstoppable clock of time creates what we see, hear, smell, feel and remember. I have lived and worked with my family in eight national parks during my career in resource management and interpretation with the National Park Service, stretching from Mt. Rainier to Rocky Mountain, with San Antonio Missions, Carlsbad Caverns, Lassen Volcanic, Zion, Grand Teton and Harpers Ferry in between.

I'm often asked for a favorite park, and I don't have one. Each has been special: the red rock canyons of Zion where I studied the Mexican spotted owl, the geothermal springs at Devil's Kitchen in Lassen Volcanic, the bats emerging from Carlsbad Caverns at

dusk, or the first snowstorm of the fall in the Tetons. However, Rocky Mountain National Park with its impossibly blue skies has my heart. As a teenager, I hiked in the park with my family during a tent camping trip. While in graduate school, I worked summers as a counselor and naturalist at a youth camp and environmental education center in southern Colorado, where my love of this state first took a firm hold. Here I had my first backpacking trip, my first rafting trip, my first time sleeping under a sky illuminated with stars and bright planets. Is it any wonder that Colorado became my heart's home? How fortunate I am so many years later to return and call myself a resident with this park so near my doorstep.

Recently, I bought a new pair of hiking boots to replace my worn pair. I see these boots carrying me over many more trails, including ones I've yet to visit, such as the North Inlet Trail and the Colorado River Trail in the Kawuneeche Valley. But no matter where I am in the park, each time I hike in it I cross an unseen and unmarked boundary, traveling from the developed front country of the park, with its roads and other facilities, into the designated wilderness of the park.

As early as 1974, when I was a teenager hiking in the park with my family, President Nixon recommended to Congress that much of the park become official wilderness, affording

*(Wilderness continued on page 12)*



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Dear Members,

It feels like I just arrived here at the Conservancy, but somehow six months have already flown by! I've had the opportunity to meet with many of you during this time, but I still feel like I have so much to learn from all of you. The reasons that that you feel so passionate about our public lands, and are motivated to join us in supporting Rocky Mountain National Park and other public lands, are unique to each individual, and everyone has a story to tell about what drew them to the Rockies. I hope that you'll continue to share your thoughts and passions with me. And I hope this spring, when we begin to develop the strategic plan for the Conservancy's next five years that you will know, as a member, your voice matters.

While some families have multigenerational stories of their connections to the park, I first set foot in the park in December, 2013. My husband, our toddler and I arrived for an afternoon visit. Like so many tourists do, after a quick stop at the visitor center, we headed straight to Bear Lake, in spite of the deep snow on the ground and full-on blizzard conditions. We didn't see a soul once we left the parking lot and hit the trail. (See family selfie from that hike, dressed as Arizonans out of their element in the snow.)

Fast-forward four years, and 2017 visitation in the park is up 169% from 2013. You'd be hard-pressed to find yourself alone on the Bear Lake Trail any time of the year these days. (Of special note: Visitation was uniquely depressed in 2013, a direct result of the government shutdown and flood of Estes Park, when road closures and flood recovery efforts were a big factor.) Undoubtedly, the visitor experience has drastically changed in a very short time period as the pressures on the park — from increased visitation, climate change, and decreased funding — have increased every day since then. Yet, as the park manages this onslaught of visitors, we also want to make sure those that haven't yet been exposed to the wonders of the park and its wild places have the same opportunities to fall in love with the Rockies, just like you have.

The mission of the Conservancy is to promote stewardship of Rocky Mountain National Park and similar lands through education and philanthropy — so what is OUR role in helping the park to deal with this new reality of 4.5 million visitors a year? What is YOUR role in protecting the park and helping to educate others to be stewards of our public lands? As we look toward answering these questions, I hope that you'll stay engaged in these conversations as Conservancy members, park visitors and neighbors, and park supporters. The Conservancy has been here as the park's primary partner since 1931, and we're in it for the long haul. We plan to continue working together with the park, as well as our other partners, and you, our members, to make sure that the public lands we know and love will be protected to inspire and be enjoyed by countless generations to come. Enjoy these quieter winter months— I hope that you'll find some beautiful moments with your loved ones in Rocky, too.



Best,

*Estee*

Esther Rivera Murdock  
Executive Director



Photo: Jim Ward



## Ask Nancy

Quarterly Editor Nancy Wilson attempts to unearth answers to any questions asked by Conservancy members and park visitors. If you are curious about something in or about the park, email [nancy.wilson@RMConservancy.org](mailto:nancy.wilson@RMConservancy.org) or write: Nancy Wilson, Rocky Mountain Conservancy, PO Box 3100, Estes Park, CO 80517.

**I heard there was a mountain goat that was identified in the park in late July. Do these wayward goats come from Mount Evans? What causes the goats to travel so far from home? What does the park do with them when they find them?** All mountain goats that enter the park are believed to be descendants from mountain goats introduced into the state beginning in 1948 on Mount Shavano, by the Colorado Department of Game, Fish and Parks (now known as the Colorado Division of Parks and Wildlife). The introduced mountain goats have established and expanded their range, and may be moving in search of additional habitat or simply exploring an extended area during the summer months before returning to their herds. Mountain goats are not native to Rocky Mountain National Park, and research has found no evidence that mountain goats were in Colorado prior to their introduction in 1948. Mountain goats pose a threat to native bighorn sheep through competition and introduction of disease. Mountain goats could also compete with elk and mule deer to a lesser extent, and impact native vegetation, particularly in steep and cliffy areas. For these reasons, mountain goats are actively removed from the park. — *RMNP Wildlife Biologist Mary Kay Watry*

**I know that the Conservancy was a major player in the funding procurement for the park greenhouse. What is the greenhouse doing at this time of year?** The RMNP greenhouse staff, with assistance from the vegetation crew, individual volunteers and volunteer groups, are working on an important job at this time of year — seed collection. This crucial step in continuing operations for a year-round greenhouse has a lot of thought put into the source of the seeds; looking for good, viable seeds from healthy patches located all over the park. In order to stay on top of their inventory, prepare for known upcoming projects, and attempt to prepare for unknown needs, the timing of seed collection is also important. Every project and area that is collected for has a different application in the park, and some species go to seed in the spring while others just before the onset of autumn. Most recently, seed was collected for RMNP's Headquarters East water system improvement project. This large restoration effort requires a lot of different plant species, as it covers the area from Moraine Park down into the Beaver Meadows/Park Headquarters area. Volunteers and staff gathered grasses and forbs like sulphur-flower buckwheat, mountain muhly and mountain rush. In early September, the seed collection effort was assisted by a group of volunteers from the Sierra Club. — *RMNP Wildlife Technician Logan Reese*

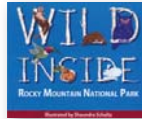
**On page 240 of the Sibley Guide to Trees, it says that the only willow tree in the mountains of Colorado is the crack willow (*Salix fragilis*), which Sibley states is not a native species. If this is true, what was the diet of elk and beaver before this species was introduced? Is Sibley wrong?** It's hard to say without seeing the context of this in Sibley's book, but there are many species of native willow that occur in Rocky Mountain National Park, however, they are usually referred to as shrubs. Sibley may be referring to the willow trees such as those found along Boulder Creek. — *RMNP Wildlife Biologist Mary Kay Watry*

## Holiday Gift Ideas

### From the Rocky Mountain Conservancy

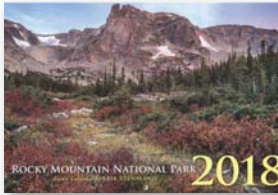


**Park Ranger Dolls**  
These high-quality, soft and squeezable dolls are a playful keepsake of the family's trip to our national parks! 11" tall with a washable surface. \$14.95 each  
**Members: \$12.71**

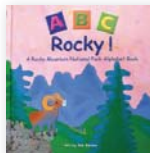


**Wild Inside RMNP Board Book**  
This colorful children's board book features 14 beautifully and playfully rendered wild animals of Rocky Mountain National Park. Hardcover board book, 6" x 5", 16 pages. \$8.95  
**Members: \$7.61**

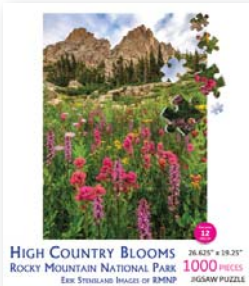
**2018 Erik Stensland Scenic Calendar**  
From tranquil snow-covered forests to the high green meadows of summer, celebrate the beauty of Rocky's wilderness throughout 2018. 12" x 9" \$14.95  
**Members: \$12.71**



**RMNP Etched Pint Glass**  
This pint glass is etched with a map of Rocky Mountain National Park around the entire glass (*dark paper inserted to highlight the design*). Dishwasher safe. 5-3/4" tall and 3-1/4" wide. Made in the USA. \$12.95  
**Members: \$11.01**



**ABC Rocky!**  
Check out this fabulous collection of Rocky-specific scenes rendered in paper collage, pastels and printing inks. Vibrant and playful works of art illustrate the alphabet with fun natural history facts of the park. Artist: Bob Barner. Hardcover, 8.25" x 8.25", 32 pages. \$11.95  
**Members: \$10.16**



**Wild Basin Puzzle**  
Re-create one of the most lovely scenes of wilderness in Rocky with this 1000-piece puzzle. Photographed by Erik Stensland with colorful and fully interlocking pieces. \$18.95  
**Members: \$16.97**

**RMNP Mug**  
This 12-oz-capacity footed mug will keep your hot drinks hot! "Rocky Mountain National Park Established 1915" appears on one side of the mug. Safe for dishwasher, oven, freezer and microwave. \$19.95  
**Members: \$16.96**



Call 970-586-0121,  
or visit our  
website at  
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## Cover photo credits

(Upper) "Persevering Pika" by Conservancy Member Putney Nature Images, Longmont, CO; (Lower) "Longs Peak Memorial" by Nancy Wilson, Estes Park, CO

Please send high-resolution images to [nancy.wilson@RMConservancy.org](mailto:nancy.wilson@RMConservancy.org) by December 1 for publication in the 2018 Winter Quarterly.

Photos are always appreciated! Scenery, wildlife and wildflowers greatly enhance this publication, so get out there and take a hike!

*Thank You!*

# Calling All Citizen Scientists! Climate Change Science is For Everyone!



Participants in the YMCA Play, Learn, Serve, Work Initiative help collect phenology data. Photo: NPS/Aaron Horowitz

*Nina Lagpacan, an NPS Academy intern with the Continental Divide Research Learning Center (CDRLC), spent 12 weeks this summer developing a Citizen Science monitoring project that everyone will be able to participate in. Read on to find out more about this project, Nina's internship, and how you will be able to help with future climate change research at Rocky Mountain National Park (RMNP).*

**Q: What is phenology and why is it important?**

**A:** Simply put, phenology is the study of the seasonal timing of biological events. For example, common phenophases people might observe include birds migrating, flowers blossoming, fruits ripening, and leaves changing color in the fall.

The timing of these events is often closely linked to climate and environmental factors. By recording when these seasonal events occur we can gain a better understanding of how plants and animals in the park are responding to climatic changes.

Changes in phenology can have cascading effects. For example, warming conditions may lead to plants blooming earlier in the season, before pollinators are present. This can mean less nectar

available for pollinators and lower fruit and seed yields, which in turn can affect the persistence of the plant species and the animals that rely on the nectar, fruits and seeds.

**Q: A new Citizen Science project in the park?! Tell us more.**

**A:** I developed a Citizen Science project that focuses on collecting long-term phenology data. We decided to use Lily Lake as a pilot location because it is easily accessible and a great place to take a short walk in the park. The program is still being fine-tuned, but when it is ready, park visitors will be able to record observations using their phone or tablet as they enjoy a stroll around the lake.

**Q: What questions can this research help the park answer?**

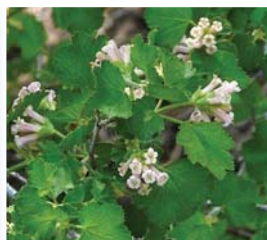
**A:** Visitor observations can help answer questions such as: Is spring coming earlier? Has the best time to collect seeds for park restoration projects or to treat invasive species changed?



Nina Lagpacan

Which species seem to be adapting to a changing climate over time and which species might be in trouble? We already know that climate change is affecting the natural resources at RMNP and at other National Parks. For example, while the extent of the mountain pine beetle outbreak was due to a variety of factors, it includes warming winter temperatures and drought-stressed trees that were unable to suppress the beetle population as in the past. Having a better understanding of how climate change is affecting the phenology of plants and animals can help park resource stewards better predict and take action to mitigate some of the effects of climate change.

This project is a long-term monitoring effort that will add to other climate change-related research happening throughout RMNP. With the help of our park visitors, we will be able to gather a large number of observations over the years. It can take many years to identify climate-



The phenophases of wax currant from flowers to ripe fruit. These are some of the phenophases you might observe during the walk around Lily Lake.



related-changes. By participating as citizen scientists on this project, park visitors can contribute to the knowledge of the park, affect resource stewardship decisions, and get more involved in research that is being conducted in the park.

**Q: Citizen Science sounds like I need to be a scientist. Do I need a science background to get involved?**

**A:** Not at all. When the project is ready for public participation, visitors will be asked to walk to specific plants along the Lily Lake trail and answer specific questions about them, such as “Do you see leaves?” or “Do you see ripe fruits?” The questions are meant to be simple, so anyone and all ages can participate. In fact, this will be a great activity for families who are visiting the park because it’s something the entire family can engage in and enjoy. There will also be pictures and descriptions of the plant parts available to help guide the answers.

The observations will go beyond plant phenology, and also ask visitors to record the natural and human-related sounds they hear. Visitors will also be asked to record visibility data by comparing photos to their view of Longs Peak.

**Q: This sounds like such an interesting project! How did you get involved? Did you study phenology?**

**A:** I didn’t know much about phenology before this internship, and never formally studied the subject in school. I worked in the park four years ago as an interpretation intern, and I was excited to have an opportunity to work at Rocky again. In my previous internship I actually led an interpretive walk around Lily Lake so I was excited to be

working in a very familiar part of the park.

I think my background in biology and forestry certainly helped, and my familiarity with the flora around Lily Lake gave me a head start. Working with the interpretation team at Rocky in the past was also really helpful, since they are the ones who have a lot of contact with park visitors and have a better sense of effective strategies we can use to engage visitors in this new Citizen Science project.

Changes in phenology can have cascading effects. For example, warming conditions may lead to plants blooming earlier in the season, before pollinators are present. This can mean less nectar available for pollinators and lower fruit and seed yields, which in turn can affect the persistence of the plant species and the animals that rely on the nectar, fruits and seeds.

**Q: What did you gain from this most recent experience as an intern in the park?**

**A:** This was definitely a unique opportunity to work on an individual project where I was responsible for managing my own project timeline, and had the freedom to make project decisions.

Most of my past experience involved working

with a project partner, which comes with its own set of challenges, and it was a rewarding experience to develop a project on my own. That’s not



*Observing phenophases on a quaking aspen tree at Lily Lake. Photo: NPS/Dave King*

to say that I haven’t had to work with a lot of people to make this project successful.

I’m definitely more comfortable reaching out to people who have the expertise and resources that are needed to move a project forward, and I’ve learned that it takes buy-in from many stakeholders to pilot a project like this, where building and maintaining relationships with different partners is a crucial factor in making a new project successful.

Stay tuned for more information this spring about how you can support climate change research at Rocky Mountain National Park.



*Visitors are asked to listen and record sounds they hear at the soundscape stop at Lily Lake. Photo: NPS/Nina Lagapacan*





## Conservancy Fellows Conclude a Meaningful Educational Season

Morgan Lawrence  
2017 Olson Family Fellow

As autumn twilight blankets the many peaks of Rocky Mountain National Park, I reflect on my time as the Olson Family Education Fellow and am naturally drawn to the words of Enos Mills. On the park's opening day in 1915, naturalist-turned-activist Mills emotionally proclaimed that the "proudest moment of [his] life" was upon him. Pride — a feeling I share deeply.

I am proud to educate for an organization that places the interests of the next generation above our own. Whether teaching the Conservancy's Kids' Classes, or with the park's environmental education program, or with the After School Program at Estes Park School District, I have experienced the importance and efficacy of critically thinking, engaged, outdoor learning. I have been blessed with the opportunity to teach students about the tumultuous origins of mica schist at the base of the Alluvial Fan, and watch as children sniff the aromatic bark of the ponderosa pine as if they've made a new friend. And while I have traveled to thirty countries solo and fought flame fronts so hot I couldn't even look at them as a wildland firefighter, true gratitude never struck me quite as deeply as the first time I watched a child fall in love with the world. Education was the backbone of my experience as the Olson Family Fellow, and I am happy to say I learned just as much as I taught.

During this fellowship, I also have had the opportunity to pursue a personal project that is of great interest to me. This September, I attended the "Indigenous Histories and Contemporary Connections in RMNP" workshop which explored the histories of the indigenous people who recognize this sacred space as their ancestral homeland. Having spoken with tribal representatives who are moved to tears by the sight of a medicinal plant, or an archaeological site, I can say definitively that this land is living and breathing. It has so much to give, and asks nothing from us but our love and respect.

My time with the Rocky Mountain Conservancy has opened my eyes to the possibilities of education and activism in defense of the land we all take so much pride in. Thank you!



Rachel Donebedian  
2017 Bailey Education Fellow

As the Bailey Education Fellow, I have had the opportunity to wear many hats in the past five months. Throughout the summer, I designed and led a variety of kids' classes in Rocky Mountain National Park on topics ranging from art to animal tracking. This fall, I have been leading (along with the Olson Fellow, Morgan) an after-school program at Estes Park Elementary which focused on natural history. I have also been working with the Environmental Education division assisting the park to provide educational field trips to Rocky Mountain National Park for school groups of all ages. A highlight of each week is giving my "Elk to Aspen" bus tour in which I am able to educate park visitors of all ages about Rocky's history, wildlife, geology and so much more! When I am not teaching in the field, I stay busy in the Field Institute office designing lesson plans, registering visitors for tours and classes, and doing ad hoc jobs that help make things run smoothly.

Having received my undergraduate degree in ecology and evolutionary biology, I also wanted to tie my love for science and research into my fellowship. In addition to my program duties, I spent several days this summer assisting the "Pikas in Peril" project, a citizen science initiative run by the NPS, with data collection. This work involved going out into potential pika territories and recording data on pika habitat suitability as well as any evidence of pika activity. Doing this work reaffirmed my passion for field research, and led me in making the decision to begin a graduate degree in biology next year. Overall, working as the Bailey Fellow has made for an exciting, educational, inspiring, and crazy season where no two days are ever the same!

## Rocky's Volunteers Highlights

RMNP's VIPs serve in nearly every aspect of the park. You've probably seen them greeting people at the visitor centers, directing traffic in parking lots, answering questions at trailheads, helping the fire crews stack slash piles for burning, and helping out in a hundred other ways. Here at Rocky Mountain National Park, more than 2,300 people gave nearly 117,500 hours of their time during the 2017 season. We call these folks Volunteers in Parks, or "VIPs" for short. It's a fitting title — they truly are Very Important People, and the significance of their contributions cannot be overstated.

Case-in-point: On the west side of the park, volunteers keep the Holzwarth Historic Site running all summer. With only one NPS staff member on-site, the park would be unable to keep it open to the public without this dedicated cadre of VIPs. In 2017, volunteers donated over 3,500 hours to provide interpre-

tive tours to visitors. And thanks to a Rocky Mountain Conservancy donation box located at the cabins, the park was able to purchase a golf cart, making the site accessible to those unable to walk the one half mile from the parking lot to the main cabins.

In addition to the more public positions, we'd also like to highlight a few of our VIPs' less-visible contributions. For example, **Stephanie Mason's** day job is as a senior naturalist for the Audubon Naturalist Society. Every year, however, she takes time off to volunteer in Rocky as a butterfly researcher for the Continental Divide Research Learning Center. She, and many other research volunteers, have logged tens of thousands of hours in the park, collecting data that provides park staff with a scientific basis for managing the park's resources.



Computer wizard NPS Volunteer Bud Lester

Another behind-the-scenes contributor is **Bud Lester**, who has been volunteering at Rocky since 2007. In 2010, he brought his computer savvy to the Volunteer Office, developing the database that we use to track more than 1,800 individual volunteers' hours across more than 150 position descriptions. In 2014, Bud developed another database for the Wilderness Office to track backcountry permits. Bud and **Don Widrig**, a fellow VIP and computer program guru, keep these systems functional and up-to-date, allowing us to be incredibly responsive to park needs while protecting individuals' personal information.

# Meet Mary Morgan: Rocky Mountain Conservancy's New Member Coordinator

Hailing from the "Home of the Jackalope," Wyoming, Mary has long been pulled to the mountain west. She is honored to help people make meaningful connections to public lands through advocacy and stewardship, and is excited about working with membership for the opportunity to meet all the members who want to help make our world a little better.



While not her usual office environment, Mary's love for the park is clear.

Along with her sunny disposition, Mary brings a wealth of experience in arts administration, cultural resources and museum curation, programming/events and tourism to her new job with

the Conservancy. She is an animal enthusiast with a cat and two dogs, and her husband, Miles Barger, works for Rocky.

## Park Puzzler

by RM Conservancy Member Joel Kaplow

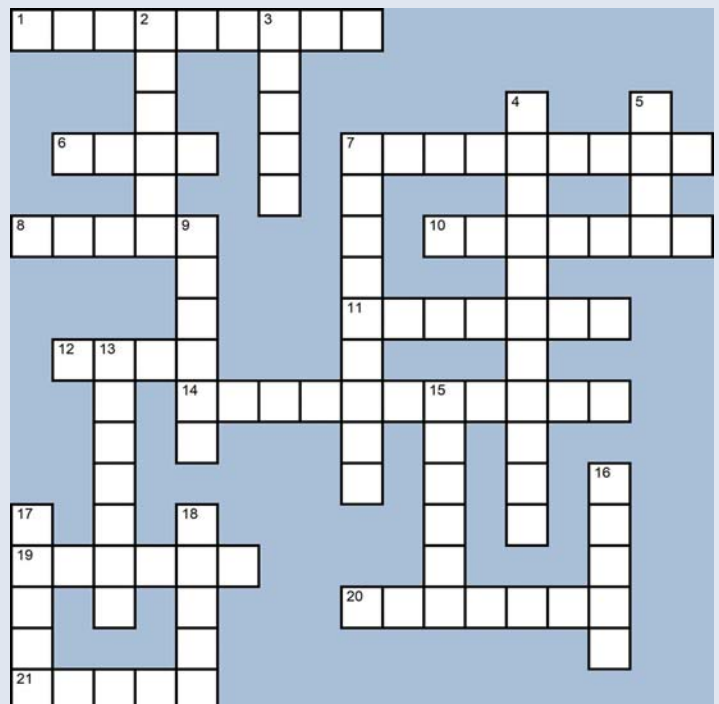
### Across

- 1 Rocky Mountain National Park was signed into existence by Woodrow Wilson in January 1915, but the dedication ceremony happened in warmer weather in \_\_\_ of that year.
- 6 In what month does Rocky see the most visitors?
- 7 Just before sunrise or just after sunset, nearby mountains may take on a striking orange hue. This treat for the eyes is known as what?
- 8 Here's a challenge. You've used these thousands of times, but do you know what the hard little thingie on the end of your hiking boot lace is called?
- 10 *Ursus arctos horribilis* were locally extinct (extirpated) from the area by the time RMNP was established. The last confirmed sighting in Colorado was in 1979, when one was killed, although unofficial sightings persist. The \_\_\_ bear now ranges from Yellowstone N.P. northward.
- 11 \_\_\_ Mountain is found on the southern border of Rocky, east of Twin Peaks. It is named for an Arapaho Indian whose name translates to "black coyote."
- 12 *Alces americanus*, the park's moose, is the largest member of the \_\_\_ family.
- 14 Two of the park's drive-in campgrounds are not reservable, and are on a first-come, first-served basis: Longs Peak, and \_\_\_\_\_. (2 wds.)
- 19 Ready for another challenge? What was Enos Mills' middle name?
- 20 To the west of Sprague Mountain on the Divide are found \_\_\_ Lakes, derived from an Arapaho Indian term for "snow water."
- 21 A short one-half-mile hike from the East Inlet Trailhead leads you to an unusual waterfall. \_\_\_ Falls, named for a cabin resident on Grand Lake's east shore, takes a surprising ninety-degree bend as it tumbles down.

### Down

- 2 RMNP boasts 79 named peaks that are more than \_\_\_-thousand feet above sea level.
- 3 The first documented climb of Longs Peak happened on August 23, 1868. The party was led by John Wesley Powell, and included William N. \_\_\_\_, who founded the Rocky Mountain News nine years earlier.
- 4 Enos Mills wanted a vast area to the south of present-day Rocky to be included in the park, but it was not to be. However, a chunk of it bordering RMNP received protection when it became the \_\_\_ Wilderness by an act of Congress in 1978. (2 wds.)
- 5 High on Trail Ridge Road, there is a large parking area at Rock Cut. Take the half-mile stroll northeast to the Roger \_\_\_ Memorial, placed in honor of the park's third superintendent, from 1921-29.

- 7 Though the National Park Service was established in 1916, its official emblem didn't appear until 1951. A Sequoia tree, bison, lake and mountain are depicted on a brown \_\_\_\_.
- 9 Porcupines prefer that you (as well as your dog) keep your distance. If you get too close, it can spike you with any of the \_\_\_-thousand quills it carries on its back!
- 13 The \_\_\_ Mine was opened in 1905, and gold ore and copper sulfide came out of it until 1912. It's on the east side of RMNP, about a mile and a half from the Longs Peak Trailhead.
- 15 The same term is used for a group of bats, beavers or ants. What is it?
- 16 Mama moose has a gestation period of about \_\_\_ months.
- 17 The current superintendent of Rocky, \_\_\_ Sidles, keeps busy in this much-loved national park.
- 18 Porcupine quills go into flesh very easily, but removing them is a different story. This is due to the hundreds a tiny \_\_\_ on the end of each quill, which flare out when the direction is reversed. If not removed, a quill can burrow itself even deeper with the movements of the victim.





# Together, We're Doing Great Things for Rocky.

## Please make your annual gift today!



**Rocky  
Mountain  
Conservancy**

*Please give what you can  
today using the handy  
envelope attached.*

Dear Friends,

Thank you for being with us every step of the way in 2017 as we worked to support Rocky Mountain National Park (RMNP). I am delighted to be the new Executive Director here at the Rocky Mountain Conservancy. While the park's needs are greater than ever, I'm pleased to report that your generosity has made this another exciting year full of successes. Here are a few highlights:

- With your help, and our partners', the Conservancy purchased a 12.5-acre private parcel in RMNP's Wild Basin area, which is in the process of being restored to a natural state.
- Thanks to you, our Conservation Corps had another stellar year working in Rocky and the Arapaho & Roosevelt National Forests. We also launched a new High School Youth Corps which spent two weeks outside, living, learning, and doing service work in Rocky.
- Your contributions enabled RMNP's Junior Ranger Program to provide 228 activities, including the new Night Sky Explorer program, to 6,071 participants. More than 48,600 booklets were distributed to eager young people, and 18,000 badges and patches were earned!
- The popular accessible trail around Lily Lake was repaired and improved, ensuring that all can enjoy it once again. The badly eroded Bierstadt Lake Trail was also rehabilitated.
- You provided living and housing expenses for RMNP's 18 interns. They assisted visitors at overlooks, trails and visitor centers, and provided environmental education programs.

The Conservancy serves as the conduit for your support, but it is truly you who makes all of this possible. This next year presents exciting new challenges and opportunities for the Rocky Mountain Conservancy and Rocky Mountain National Park.

**Because you are one of Rocky's most dedicated friends,  
we need to hear from you now.**

**Please return your gift in the enclosed envelope today.  
We are counting on your continued generous support!**

Thank you again for being such an important part of the Rocky Mountain Conservancy team. Your generous gift today is vital to our ability to protect, preserve, and enhance Rocky Mountain National Park — for everyone.

With gratitude,

Esther Rivera Murdock  
Executive Director

➤ You also can make  
a gift online at  
**[RMConservancy.org](http://RMConservancy.org)**

**Nature. Pass it on.**



# Your Opportunities to Help in 2018:

Please give what you can today using the handy envelope attached.



## ✓ Best Use

Help the park where it needs it most. Selecting this option allows us the flexibility to respond quickly to greatest needs as they arise. Your gift may be used for trail restoration, youth education, publications and exhibits, land protection, wildlife research, historic preservation and more.



## ✓ Next Generation Fund

Your gift helps to provide learning opportunities in the park and in schools, as well as the Junior Ranger Program, park internships, learning materials in Spanish, engagement with Native American tribes and more. It will also provide tuition-free programs for local youth.



## ✓ Trail Improvement Fund

Trail use continues to increase as more people visit the park, so your contribution is needed more than ever. Some of this year's funds will be used to acquire pack animals for wilderness trail work and to offer new on-the-ground volunteer projects, in which you can participate!



## ✓ Conservation Corps

This summer, the Corps rebuilt sections of trail, restored historic cabins and more in Rocky and the Arapaho & Roosevelt National Forests. With your gift, crews will work on the Longs Peak, Lawn Lake and Alluvial Fan trails. Help inspire the public lands stewards of tomorrow!

Your contributions at work

## Conservation Corps Spotlight



*"Working with the Conservation Corps has definitely been the life-changing experience I craved. I did thousands of things I could not have done in Puerto Rico. Not only did I learn about trail work, but also about leadership and the outdoors. I learned how to assemble a tent, how to get in a lightning position, how to shower only once a week, how to not depend on my parents, and so many things. Thank you for letting me be a part of this."*

— Andrea Rodriguez Villafañe



Female boreal toad, Lost Lake area

Photo: Tim Korpita

Boreal toads (*Anaxryus boreas*) once were a relatively common sight during summers in the southern Rocky Mountains. They could be spotted slowly moving around wetlands or in moist wooded areas from 8,500 to 11,500 feet in elevation.

Although they were really the only toad species that could be found so high up in the mountains here in Colorado, their warty skin with prominent toxin-producing parotoid glands behind the eyes also made them easily recognizable to local hikers. The best time to see them was in the early summer, as they emerged from underground winter hiding spots to breed.

More active at night, they would head to lakes, beaver ponds or wetlands swollen by snowmelt to find some calm, shallow water. The smaller males (averaging 3.75 inches in size) would wait for a chance to mate with females, some of which might be up to four inches long. If mating was successful, the female would leave behind a string of thousands of tiny eggs in shallow water among emergent vegetation. These would hatch a few weeks later as dark black tadpoles barely larger than mosquito larvae. If the water was warm enough, these tadpoles would grow and eventually metamorphose, losing their tail and gaining legs. These

**[Boreal toads] have been listed as endangered in Colorado since 1993, and although captive breeding efforts have been successful, individual wild sites continue to disappear.**

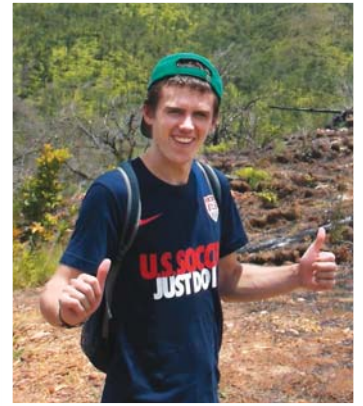
metamorphs were very tiny, easily fitting on a penny, but would leave the water and feed on small invertebrates until they themselves were large enough to mate a few years later.

Unfortunately, the last few decades have not been good for boreal toads in Colorado. Many wetland sites, which would have housed dozens of individuals during mating season, are now completely empty, and others have just a few lonely adults holding on with no mating taking place. In many of the locations where you can still find breeding populations, the number of adults and the egg masses they lay are drastically reduced. They have been listed as endangered in Colorado since 1993, and although captive breeding efforts have been successful, individual wild sites continue to disappear.

So what is the cause of this dramatic decline? While other factors may be involved, the most significant issue facing boreal toads in Colorado is the recently emerged fungal pathogen *Batrachochytrium dendrobatidis*, or Bd for short. Bd causes a skin disease called chytridiomycosis, to which boreal toads are particularly susceptible. However, they are hardly alone. Bd is decimating amphibian species all over the globe, from Australia to

## Boreal Toad Survival in Rocky Mountain National Park and the Microbes That May Help

Tim Korpita, McKenzie Lab, CU Boulder  
2017 Bailey – RMNP Research Fellow



South America. Populations that live in high elevation wetlands seem especially vulnerable to massive outbreaks. The fungus infects the skin of its amphibian host, slowly eating away at the keratin that gives the skin its structure. The skin is a vital organ in amphibians, responsible for much of their gas exchange and electrolyte balance. When the Bd infection becomes dense enough, it prevents the proper functioning of the skin. The host then dies because it can no longer maintain a stable internal environment. Throughout the infection, spores are released from the skin that may find another host to infect, continuing the cycle until all susceptible individuals are gone.

While the skin of the toads may be their weakness, it may also harbor the key to overcoming Bd. Like all amphibians, toad skin is a mucosal surface. Similar to our throat and nasal passages, mucus is constantly being secreted to keep the skin moist and protect it from irritation. This mucus also provides a rich environment for bacteria to grow and reproduce. In fact, most amphibians, including boreal toads, have rich microbial communities consisting of hundreds of unique bacterial taxa living on their skin. While many of these bac-



teria are likely just commensalists, and, as such, along for the ride, some have been shown to help amphibians defeat fungal skin pathogens. One of these bacteria that has been found on amphibian skin, *Janthinobacterium lividum* (*J liv.*), has been shown to be particularly effective at inhibiting Bd. It does this by producing a deep purple pigment, called violacein which is quite toxic to the fungus.

After reading this, you may be thinking, “Why not try and add extra *J liv.* to the skin of amphibians to protect them from Bd?” In fact, that is exactly what we are attempting in the lab of Dr. Valerie McKenzie at CU Boulder, where I am a graduate student. Over the last few years, the McKenzie lab, along with collaborators around the country, have been working on developing probiotic treatments that could help amphibians in areas suffering Bd outbreaks.

The primary current treatment consists of soaking the toads in a bath with millions of *J liv.* with the hope that the bacteria will colonize the skin in high enough abundance to produce Bd-inhibiting-levels of violacein. With experiments on captive boreal toads, we saw that this bath treatment improved survival of adult toads exposed to Bd by 40 percent. The last two years have seen the first field trials of this treatment on toads that have just completed metamorphosis. This life stage was chosen both because toads are particularly susceptible to Bd before their adult immune system fully develops, and because the skin microbial community undergoes a large restructuring at metamorphosis that may increase the likelihood of successful *J liv.* colonization.

The downside to this treatment is that it is quite labor intensive. Lab work conducted elsewhere on other amphibians affected by Bd suggests that it may be possible to add *J liv.* to the soil, and have it transmit to the amphibian skin. This may be a more practical way to perform a probiotic inoculation than soaking individual toads in tubs. If elevated *J liv.* levels could be maintained in soil for the period of time when metamorphs would be emerging from the water, then capturing individuals may not even be necessary.

This idea formed the basis for my work supported by the Rocky Mountain Conservancy’s Bailey – RMNP Research Fellowship this summer. My projects were designed to lay the ground work for future *J liv.* soil probiotic experiments by learning about its distribution and habitat preferences around boreal toad sites in Rocky Mountain National Park.

This summer, I worked at five wetland field sites within RMNP, all of which at one point had actively breeding boreal toad populations: Kettle Tarn and Lost Lake, both off the North Fork of the Big Thompson in the northeast area of the park; a wetland near Fay Lakes, on the east slope of the Mummy Range; Spruce Lake, just off of the Fern Lake trail; and a wetland in Big Meadows, on the west side of the park. Of these, Lost Lake, Fay Lakes and Spruce Lake had active breeding, but the Big Meadows and Kettle Tarn sites only had a few individual nonbreeding adults. Boreal toads within the park have tested positive for Bd many times, though there is variation in how fast sub-populations are declining.

At each of these sites within the park, I collected soil samples along gradients away from the water. The goal was to first isolate a strain of *J liv.* native to RMNP, which could be used in the future if probiotic trials were to be conducted on park toads. On this front, we have been quite successful, isolating four *J liv.* strains from toad habitats.

In future projects, we will study how different these strains are to determine if we need to be finding a strain from every site in which we conduct a trial. If they are similar enough, we can just use a single isolate for all treatments.

I also have collected soil from Big Meadows to conduct a

lab experiment to determine in what microenvironments elevated levels of *J liv.* can persist the longest. At the time of writing, this experiment is ongoing, but preliminary results suggest that *J liv.* abundance and persistence after a probiotic treatment will be highest in soil

that is rich in organic matter, and not completely saturated with water. This information will help us plan our future soil probiotic treatments.

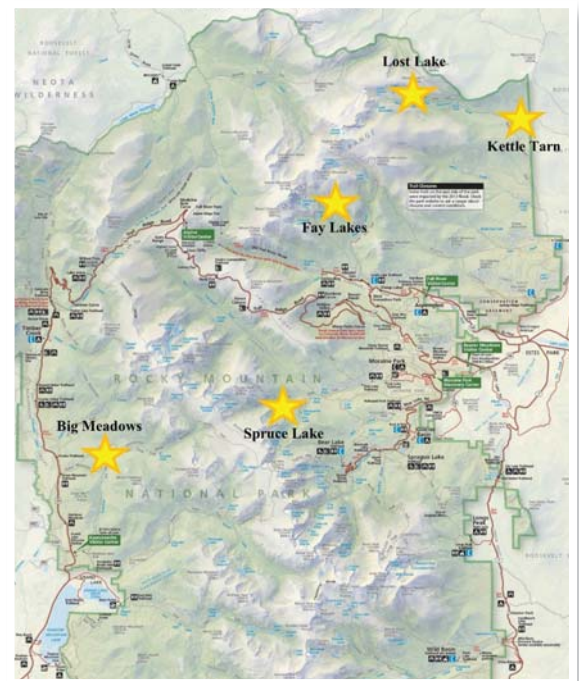
In addition to my work in the park, our lab, in collaboration with Colorado Parks and Wildlife, will be conducting a preliminary field probiotic soil trial at a boreal toad breeding site currently undergoing a Bd outbreak in Chaffee County, Colorado.

The reality is that we are in the beginning stages of developing *J liv.* probiotic treatments as an effective tool against Bd. Stay tuned, and remember: It is important that park visitors do their best to not spread Bd anywhere it has not already reached. Keep a lookout for wetland areas that park biologists have closed as toad habitat, and be sure to disinfect any equipment that gets near water when moving between lakes or drainages.



*J Liv* growing on agar in the lab

Photo: Tim Korpita



RMNP boreal toad research sites

*(Wilderness continued from page 1)*

it special protection and management considerations. However, it wasn't until 2009 that designation of the Rocky Mountain National Park Wilderness Area occurred through the Omnibus Public Lands Management Act. Prior to this, fewer than 3,000 acres of the park had official wilderness designation. Today, more than 95% of the park, or 250,000 acres-plus, is classified as designated wilderness.

Wilderness, according to the 1964 Wilderness Act, "... in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are *untrammelled* (emphasis added) by man, where man himself is a visitor who does not remain." Howard Zahniser, the principal author of the Wilderness Act, carefully chose the use of the phrase, "an area where the earth and its community of life are untrammelled (emphasis added) by man." Zahniser intended that wilderness be characterized by places that are free or unrestrained. Qualities of wilderness character include a lack of modern development, and opportunities to experience quiet and solitude. In Rocky Mountain National Park, appropriate uses of wilderness may include hiking, fishing, backpacking, photography and climbing; however, bicycles and motorized vehicles are not allowed.

The untrammelled nature of wilderness provides opportunities for research into various aspects of natural, cultural and social resources. One of these ongoing research projects explores ice-patch archeology. A team of archeologists, led by Dr. Jason LaBelle of Colorado State University, documents signs of past life preserved in the ice patches of the tundra. They look for ancient trees and other plant

material, bones of animals we no longer have in the park, such as bison, and signs of hunting and other forms of human use by Utes and other Native Americans. Today's warming climate adds a sense of urgency to this research. As the ice melts, the ancient wood, plant fibers, bone and other items are exposed to the sun and wind, decomposing at a faster rate, taking with them the information and stories we might learn about life across this landscape in ages past, in some cases, more than 10,000 years ago.

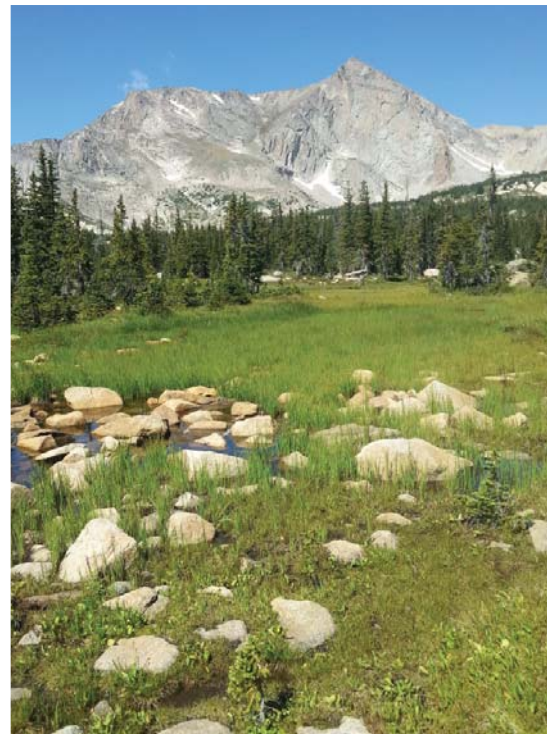
Each of us has the potential to impact the wilderness in the park in the way we visit it. The park's Wilderness Office educates park users on the ethics of "Leave No Trace" to help all of us enjoy the outdoors responsibly through the use of minimum-impact techniques, such as planning ahead and preparing, respecting wildlife, and disposing of human waste properly.

*The untrammelled nature of wilderness provides opportunities for research into various aspects of natural, cultural and social resources.*

Children participating in the park's Junior Ranger program are taught to "Explore, Learn, Protect."

I end where I began, saving up the memories from my summer hikes in the wilderness for the months ahead when

snow falls over the landscape. One clear morning in July, I scurried over the large ridge behind McGraw Ranch to West Creek Falls. Signs of the 2013 flood were abundant, and I shortened my hike to stop at the pools below the head of the falls, not wanting to scale the eroding slopes for a better view. As I sat on the hard cobbles eating my lunch, several American dippers (aka water ouzels) flew up- and down-stream, pausing briefly to bob in the



*Pilot Mountain (left) and Mount Alice (right),  
Lion Lakes area*  
Photo: Sheri

cold water, foraging for food. I think I spotted their nest site in the rock face across the stream by the waterfall, but I'm not sure. I don't mind a mystery or two. As a visitor to their home, I was content to pause and observe. Content to know that American dippers survive cold winters by lowering their metabolic rate, increasing the oxygen-carrying capacity in their blood, and growing a thick coat of feathers, I will spend my winter feasting on memories of summer visits to the wilderness of Rocky Mountain National Park.

I conclude my memories of sojourns into the wilderness with a quote from John Muir, who wrote about the American dipper, or water ouzel, in his 1901 book, *Our National Parks*:

*Bird and stream are inseparable, songful and wild, gentle and strong—the bird ever in danger in the midst of the stream's mad whirlpools, yet seemingly immortal. And so I might go on, writing words, words, words; but to what purpose? Go see him and love him, and through him as through a window look into Nature's warm heart.*

*Sheri Fedorchak works in the Resource Stew-*





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383 gifts ~ total donations \$104,945

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 Julie Kaminski, Omaha, NE  
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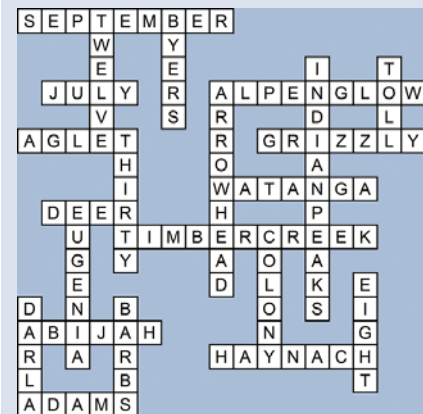
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**Rocky  
 Mountain  
 Conservancy**  
 RMConservancy.org

**PARK PUZZLER SOLUTION**



**Quick Fix Science**

**Population Genetics  
 of Bighorn Sheep**

**The Question:** *Is the Mummy Range bighorn sheep population subject to negative effects from inbreeding after a recent pneumonia-induced population die-off?*

Bighorn sheep (*Ovis canadensis canadensis*) of the park's Mummy Range suffered a population size reduction associated with a pneumonia die-off in the 1990s. Some managers wondered if the event was enough to induce a "population bottleneck," an evolutionary event that reduces genetic variation, and results in increased inbreeding due to the reduced pool of possible mates. The smaller gene pool can subsequently reduce fitness (e.g., lamb survival, reproduction) and the ability to adapt to future environmental changes (e.g., disease, environmental stress). If a severe bottleneck was detected in the Mummy Range band, management actions could be undertaken to supplement the population numbers as a way to improve genetic fitness and bolster the probability of the band's survival.

**The Project:** *Collect bighorn sheep pellets and test for genetic variation and parasite load.*

In 2005 Researcher Gordon Luikart of the University of Montana, and park volunteers collected fecal pellets near the Sheep Lakes mineral lick area and in the Mummy Range. Great care at the sampling locations minimized wildlife disturbance. In the lab, Luikart extracted DNA, the material inside the nucleus of cells that carries genetic information,

from the fecal pellets and analyzed it for genetic variation. Scientists used statistical approaches to test for population bottlenecks and to determine if the herd has received recent immigrant individuals that might increase genetic variation. Parasite analysis in feces determined the presence of lungworm larvae, of which a high load may predispose bighorn to pneumonia outbreaks.

**The Results:** *The Mummy herd has not suffered a severe reduction of genetic variation, yet the data suggest that reduced variation in genes associated with immune system function can lead to reduced parasite resistance.*

The test for distribution of genes in the Mummy Range band of bighorn sheep yielded results consistent with a non-bottlenecked population. However, tests did not identify any genotypes from outside the population, providing evidence that no recent immigrants exist in the Mummy band, thus reducing the gene pool. Scientists detected lungworm larvae (which likely contribute to pneumonia die-offs) in more than half the fecal samples. Heterozygosity, which is the presence of two different alleles or minor variations of the same gene at a given position on a chromosome, apparently benefits the herd. Individuals with more heterozygosity (variation) had fewer parasites. Though the sample size was small, this data suggests that reduced genetic variation (inbreeding) can lead to reduced parasite resistance.

Through this noninvasive type of project, investigators can study some aspects of wildlife populations that previously involved intensive capture operations. For instance, in the future the park may be able to track populations through sampling of fecal pellets rather than through collaring.



**SUPPORT THE CONSERVANCY  
 AND RMNP ON COLORADO  
 GIVES DAY, DECEMBER 5**

Colorado's largest one-day online giving movement, presented by Community First Foundation and FirstBank, is coming up and we need your support.

On Tuesday, December 5, 2017, thousands of donors will come together to support Colorado nonprofits like ours. Last year we raised more than \$30,000. This year, our goal is to raise \$35,000, which we hope to exceed! Your gift will provide support to Rocky Mountain National Park.

**About Colorado Gives Day**

Colorado Gives Day is powered by ColoradoGives.org, a year-round website featuring more than 1,900 nonprofits. ColoradoGives.org encourages

charitable giving by providing comprehensive, objective and up-to-date information about Colorado nonprofits and an easy way to support them online.

**\$1 Million Incentive Fund**

Thanks to Community First Foundation and FirstBank, Colorado Gives Day features a \$1 Million Incentive Fund, one of the largest gives-day incentive funds in the country. Every nonprofit receiving a donation on Colorado Gives Day receives a portion of the Incentive Fund, which increases the value of every dollar donated.

To donate to us on Colorado Gives Day, go to [coloradogives.org](http://coloradogives.org) and search for Rocky Mountain Conservancy.



# Rocky Mountain Conservancy

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*The elk's bugle is an iconic sign of fall in the high country.*

*Photo: Putney Nature Images*

## Nature Notes

Ah, fall — a season of stunning beauty and wildlife watching in Rocky Mountain National Park, and loved by millions, as it turns out. Be sure to look into ways to reduce impact in your favorite public lands — and be sure to share this important message with all your friends! 🐾 Estes Park photographer **Erik Stensland** was delighted to discover that this rainy summer resulted in a huge variety of fungi that were popping up everywhere. Sizes varied from tiny little mushrooms to some that were 9 inches across or more. Some were fantastical, seemingly sprouted from a Disney movie, with a miniature city of spires, or like marshmallows that had been roasted in a fire, with a few that even looked like pizzas. They came in browns, reds, whites and oranges, and he even found some growing on the tundra this year. 🐾 In early August, Conservancy Financial Director **Sarah Rhode** and her family were treated to the sight of a mother bear meandering around her yard in Estes Park while her two cubs played on the deck of their tree house. They wrestled around and then finally rolled partway down the bike ramp before running away. Later that week, their 9-pound dog, Annie, ran up to the same mother bear and two cubs. Luckily, this scenario ended well and the Rhode's learned to be more mindful of keeping their dog on a leash at all times. 🐾 In mid-August, late in the day, seasonal Park Interpreter **Marilyn Irwin** and her husband were driving up Old Fall River Road and hoping to catch site of some wildlife. They spotted a young snowshoe hare hop across the road that was already beginning to change into its winter whites. As they drove farther they saw another hare along the road. Marilyn also noted that earlier this summer, a big, black bear and her two, also black, cubs were in her driveway. It was comical to watch as mom lumbered down the drive and the two little ones bounced here and there, sometimes close to her and sometimes not. Sadly, the bears were rewarded with a sack of garbage from a neighboring construction site. 🐾 Conservancy Warehouse Guy, **Brian Desmond** was struck by the appearance of a two-toned bear on the Estes Park 18-hole golf course in late August as it meandered across the green, taking its time. Its body was black and its chest a warm cinnamon brown. 🐾 In August, spotting a dark form on the side of the Big Thompson River as he was driving into Estes Park from Beaver Point and thinking it was a small cat, RMNP Woodcrafter **Cory Johnson** quickly revised his assessment when he realized he was looking at a mink hanging out on the banks of the river. 🐾 Retired RMNP Wildlife Biologist **Gary Miller** also spotted a beautiful female mink — sadly, this one as roadkill on the Marys Lake Road bridge. 🐾 Conservancy Conservation Corps Manager **Geoff Elliot** was leading a fly fishing class along Glacier Creek when the group noticed that they had some unique assistance: A mink was scurrying back and forth across the opposing riverbank helping them locate fish. 🐾 Former Seasonal Colorado District Ranger **Mandy Cluck** relayed a co-worker's observation about a moose that walked into a pasture in Grand Lake that happened to be populated with both horses and elk. The ensuing scene was hilarious as all were running and prancing around, acting



*RMNP plows clearing 4-foot drifts on Trail Ridge Road, October 4, 2017.*

*Photo: NPS*

spooked. 🐾 While on duty as a VIP in the Junior Ranger Program at Hidden Valley, Conservancy Member **Marlene Borneman** was talking to kids about what chipmunks like to eat and how common they are, especially around picnic areas. As she was sharing the idea that keeping them safe means a no-feed policy, a chipmunk came scurrying by with a baby chipmunk (called a pup) in its mouth. Marlene talked about why the mother would be carrying the pup, including the ideas that she could have been moving the nest to a safer place, or perhaps she was gathering a wayward pup to bring back to the nest. In any case, it was a unique and fun “teachable moment”. 🐾 Park VIP **Carol Hillerson** noted that while she often finds hummingbird nests long after they are abandoned, this summer, she was treated to an active hummingbird nest made in a wax currant shrub right outside the door of their house in Estes Park. She checked the nest often using a long camera lens so as not to disturb the hummingbirds until the day she saw one of the chicks on a branch — the next moment the chick flew and was gone! 🐾 Seasonal Avian Update! courtesy of RMNP Wildlife Technician **Logan Reese** who reported that the late summer transition period is the time avian fledglings of this year strengthen their wings in preparation for migration. Keep an eye out as the eastern edge of the Rockies is a great flyway providing winds and direction to overwintering habitats far to the south. The park's nesting raptors, such as the peregrine falcons and golden eagles, might not leave until October; each individual is different and sets out at a different time. In late August, Logan observed a juvenile golden eagle cruising low over the alpine tundra. Other neotropical bird species, like the black swift that breeds in summer near waterfalls, will have an entire colony depart all together, including the maiden voyage of fledglings that stay twice as long in nests than other swifts to prepare for the long flight south in early September. Of course, some birds remain year round in the park, such as the Clark's nutcracker, a specialist of pine seed caching. These birds will move down from sub-alpine forests in autumn to prepare multiple winter caches for the long winter. 🐾 Winter is coming!