

Nature's Civil Engineers

by Michael Kieffer

It is always magical to walk into a meadow. Maybe it is the vigor of new life that seems to pull on all the strings of your soul. After all, meadows seem to elicit a feeling of rebirth, being dominated by various assemblages of early successional vegetation in the form of grasses and sedges. A meadow may persist in an arrested successional state, or a meadow may be a temporary sere. Meadows form where lakes or ponds are drained, lands are grazed, fire is periodic, soils are poor, or beaver dams are abandoned. They are lands once rich in forest diversity that were altered naturally or, more often, by humans.

Beaver meadows can be the most aesthetically pleasing and, in my opinion, the most valuable of all meadow types, if only from the standpoint of how they are created and what they develop into. As spring approaches and the promise of new growth abounds, it is fitting to take a moment to reflect on Earth's most prestigious engineer, the beaver (*Castor canadensis*). No other mammal alters the shape of the landscape and is as opportunistic, excluding humans. Beavers truly define the term "keystone species," having once covered a tenth of the continental United States with beaver-built wetlands. Since wetlands spread behind their dams, beavers provide homes for hundreds of species, including billions of phytoplankton and zooplankton, myriads of insects, frogs, fish, migrating waterfowl, moose, and great blue herons.

Beaver legends have been a part of human culture from the time of pictographs. Cherokee and other eastern tribes shared stories of how the Great Spirit directed the beaver to dive to the bottom of the water-covered earth and carry mud to the surface to form dry land. Flathead Indians believed that beavers were disgraced Indians, changed from their human form by the Great Spirit. Beavers worked laboriously cutting trees and building dams and lodges as

atonement for their misdeeds.

In North America, a 7-foot-long giant beaver, *Castroides*, once graced the waterways. While not a direct ancestor of the modern beaver, *Castroides* did coexist with *Castor* until 10,000 years ago and is believed to have been even more specific to water, minimizing the effort spent moving such bulk on land and avoiding predators. *Castroides* demonstrated the effectiveness of a beaver's life strategy by sheer size, while *Castor* demonstrated the effectiveness of such a life strategy by sheer numbers. It has been estimated that 200 million beavers once inhabited the



continental United States alone. Beavers cloaked the landscape from the Arctic Circle to the Gulf of Mexico, and from the southwest desert to the north woods of Maine, with water and trees the only constants.

A beaver that hears the sound of running water will immediately try to locate the source and to dam it, if at all possible. Beavers make dams to raise the water level of a stream and to maintain this level during dry periods.

Beavers will dig canals, plunge holes, build underwater aqueducts, and construct channels throughout their pond and wetland, creating a safe passage from their home to their food.

Beavers are natural farmers, using nature's system of replenishment to prosper until the time comes to move on. Their primary fall and winter food is tree cambium, and favorite trees include aspens, cottonwoods, and willows, which are all pioneer species that readily colonize logged, flooded, burned, and riparian areas where sunlight is plentiful. As beaver dams slow the water, soil and nutrients from upstream drop out of the water column. Soon natural herbs, such as cattails, arrowhead, pondweed, smartweed, milfoil, pond lily, and a variety of sedges and grasses begin to flourish. Beavers can feed on this higher energy food source in (continued on page 6)

Caddisflies: Case-Builders & Collections

by Anna Ritter

Last June, we welcomed Drs. Oliver Flint and Dave Smith to our Speaker Series to share their latest research results on caddisfly populations in the Bull Run Mountains. As of 2016, Flint and Smith had recorded 371 species statewide, with several state records set by collections from the mountains' sites.



A case-building caddisfly

My first experience with caddisflies was as a thirteen-year-old participant in the Chesapeake Watershed Workshop with BRMC. Sitting on the bank of Catlett's Branch and trying not to go cross-eyed while I sifted through a sample of creek water, I noticed a small clump of pebbles moving slowly across the silt at the bottom of the dishpan. Holding up the tiny thing with a pair of tweezers, I realized to my surprise there was an insect in the middle of the pebbles. It was a case-building caddisfly—an individual of one of several such species found in Virginia that build themselves a “cocoon” out of tiny pebbles and grains of sand from stream beds. The case acts as protection until the larvae are ready for the next stage of their life-cycle.

Caddisflies (Order Trichoptera) are a diverse group of insects whose species play a variety of roles in freshwater ecology during their immature stages. Some species prey on smaller aquatic organisms, others are scrapers that consume the algae growing on rocks and debris in streambeds, and still others are shredders who chew up pieces of leaves and wood that fall into the water. They also serve as food for larger species, including freshwater fish. As adults, caddisflies are terrestrial, moth-like insects that remain near bodies of water in order to lay their eggs.

Over the last nine years, BRMC has worked with Drs. Flint and Smith to begin surveying caddisfly populations in the mountains, working to establish the first baseline of these organisms for our area. At several sites across the mountains, they set up malaise traps around this time in early spring, beginning a field season that runs until late October. Malaise traps look like funky-shaped white tents and collect the insects, just as insects that happened into your camping tent would. Insects fly into a central mesh wall, then climb upwards until they run into a central seam. The seam guides them up to an elevated point where they drop into a collection jar.

The Bull Run Mountains collections have produced several species new to Virginia. *Beraea fontana* is one such species, not previously recorded in the state until collected in Jackson Hollow, just north of Hopewell Gap. The Beraeidae family is a small group of case-building caddisflies found in seeps and small streams, often in vegetation-rich habitats (Hamilton 1985). In 2013, the first state record of *Oligostomis ocelligera* was found at both the Beverley Mill and BRMC Mountain House collection sites, with subsequent specimens recorded in 2014, 2015, and 2016, confirming a breeding population. It was also a state record for *Polycentropus colei*, this time recorded at four sites throughout the mountains. All specimens are preserved at the Smithsonian National Museum of Natural History in Washington, D.C.

During our monthly Speaker Series, we work to provide a space for scientific research like Dr. Flint's and Dr. Smith's, as well as local conservation organizations, historians, and archeologists. We hope you will be able to join us for upcoming discussions.

References:

- Flint, Jr., O. S. (2017). More caddisfly species (Insecta: Trichoptera) new to, or noteworthy records from, the state of Virginia. *Proceedings of the Entomological Society of Washington*, 119(Special Issue), 737-740.
- Hamilton, S.W. (1985) The larva and pupa of *Beraea gorteba* Ross (Trichoptera: Beraeidae). *Proceedings of the Entomological Society of Washington*, 87, 783–789.

SHOOTING THE BREEZE
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Public Programs Spring 2018

HIKE WITH A NATURALIST

1st Thursday of Every Month at 9 a.m.

Join a professional naturalist and discover the flora and fauna of the local region. This program is free; all are welcome. Meet at the Mountain House.

MONTHLY SPEAKER SERIES

These programs are free and open to the community!

April TBA, 2018—2pm-4pm

May 19th, 2018—2pm-4pm *Mike Kane, Piedmont Environmental Council*

June TBA, 2018—2pm-4pm

VOLUNTEER DAY: POLLINATOR GARDEN

April 21st, 2018—Saturday, 10:00am-noon

Join us as we start work on a native plant pollinator garden! Bring your muscles and garden gloves, and be willing to get dirty.

Let us know you're coming at info@brmconservancy.org

MIGRATORY BIRD WALK

April 28th, 2018—Saturday, 7a.m. –10a.m.

Join us as George Wallace leads us on a bird walk at North Fork Wetlands. Last year we saw a total of 53 species, including a variety of warblers and newly arrived migrants. George has been active in bird research and conservation for over 30 years, in the past working for American Bird Conservancy and now acting as Chief Conservation Officer at Rainforest Trust.

Pre-registration required.

Members: \$20/non: \$25

FERN WALK

May 20th, 2018—Sunday, 1pm-3pm

We'll learn about ferns and their allies and discuss how our lives relate to these plants as we learn about the developmental processes that spawned terrestrial plant life.

Pre-registration required.

Members: \$10/non: \$15

HERPETOLOGY WORKSHOP & FIELD EXCURSION

June 16th, 2018—Saturday, 10am-2pm

Marty Martin, a premier mid-Atlantic herpetologist, will be leading a workshop and field excursion focusing on the reptiles of the Bull Run Mountains. Marty has spent almost 60 years studying the rattlesnake populations in the mountains, and we are thrilled to have him join us and share that knowledge.

Pre-registration required.

Members: \$25/non: \$30

Leopold's Preserve *Monthly Naturalist Walks*

BRMC & the White House Farm Foundation are partnering to provide monthly naturalist walks on Leopold's Preserve.

Walks are free & open to the community.

Second Quarter Schedule

April 7th, 10am-Noon... Spring Emergence

May 5th, 1pm-3pm...Pond Exploration

June 9th, 10am-Noon...Soil & Invasives

HOMESCHOOL PROGRAMS

Cost: \$5 per participant including adults.

April 19th, 10am-Noon: Migratory Birds

Join us as we learn about bird migration as we observe the first spring arrivals. *All ages.*

May 17th, 10am-Noon: Ferns & Allies

The life cycle of ferns are remarkably different from those of other vascular plants. We'll be learning more about these fascinating plants and their ecology. *All ages.*

June 14th, 10am-Noon: Stream Ecology

We'll investigate the perennial streams on the mountains, sampling aquatic life and learning about the life cycles and interactions of these creatures and their environment. *All ages.*

HERPETOLOGY CAMP

Session I: June 18th—19th, 9a.m.—4p.m.

Session II: June 21st—22nd, 9 a.m.—4 p.m.

Herpetology is the study of reptiles and amphibians. BRMC invites your child to spend two days hiking and handling, searching, and observing salamanders, frogs, lizards, snakes, and turtles on the Preserve. Marty Martin, a premier mid-Atlantic herpetologist, will be joining both camps. Ages 7-12.

15 participants per session; pre-registration required.

Members: \$100/Non-members: \$150

HERPETOLOGY TEACHER WORKSHOP

June 26th, 2018—Tuesday, 9am-3:30pm

Join BRMC for a teacher workshop focused on Virginia's Piedmont amphibians and reptiles. We will start in the classroom going through the evolutionary history of the classes Amphibia and Reptilia. We will discuss how the Bull Run Mountains came to look as they do today and how this rugged landscape defines the vegetation, water

Public Programs Spring 2018 (*continued*)

cycling, and thus the habitats of our present herp fauna. This will also explain why our most iconic reptile, the timber rattlesnake, still has an active reproductive population on this landscape. Continuing education credit provided.

Pre-registration required.

Cost: \$20 per participant

SUMMER NATURALIST CAMP

Session I: July 16th-20th, 9a.m.—4p.m.

Session II: July 23rd—27th, 9a.m.—4p.m.

BRMC invites your child to spend an adventurous week interacting with the natural world. Each day we will focus on different groups of plants and animals on the Bull Run Mountains. Campers will add to their understanding of natural systems through hikes, stream walks, snake handling (only if desired!), frog and salamander catching, bird watching, butterfly and insect collecting, crafts, and games. Ages 7-12.

Pre-registration required.

Members: \$250/Non-members: \$300.

BUDDING NATURALIST CAMP

July 23rd—27th, 9 a.m.—12 p.m.

At this week-long camp, young children will be exposed to the outdoors and wildlife, as they explore life on the Bull Run Mountains through a series of discovery hikes, frog and salamander searches, snake viewing, stream exploration, nature crafts. Ages 4-6.

Pre-registration required.

Members: \$125/Non-members: \$175.

CHESAPEAKE WATERSHED WORKSHOP

July 30th—August 2nd, 9 a.m.—4 p.m.

Thanks to support from the Chesapeake Bay Restoration Fund, six scholarships are available for this workshop. Please contact us at info@brmconservancy.org to request an application. This workshop will focus on conserving the rivers and streams that flow into the Chesapeake Bay. We will explore headwater streams on the Bull Run Mountains, go downstream on Little Bull Run, and visit Turkey Run National Park. At each location students will perform stream monitoring, vegetation analyses, and stream habitat and riparian buffer evaluations. Ages 13-18.

Pre-registration required.

Members: \$200/Non-members: \$250



**GIVE LOCAL
Piedmont**

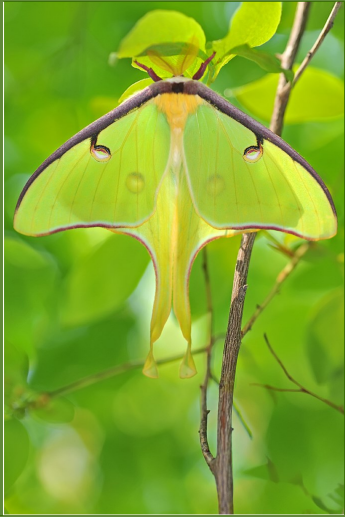
MAY 1 2018 TUESDAY

Last year, we raised enough funds to provide 14 fully funded scholarships for kids to participate in Youth Outdoor Naturalist Camps.

Your gift on May 1st, 2018, will enable children to participate in meaningful outdoor experiences this summer.

Give during the 24 hours of May 1st, www.givelocalpiedmont.org/brmconservancy

Donor Opportunities to Support *BRMC's Core Education Programs*



Halloween Safari

BRMC creates three magical nights of hikes, stories, and music around a bonfire with popcorn roasted over the fire, along with marshmallows and sinfully delicious hot chocolate.

Conservation Patron, \$5,000

2 Benefactors, \$1,000



Youth Outdoors Program

BRMC's Youth Outdoors Program engages children to show them the outdoors is fun and exciting and teach them that we all have a responsibility to protect and enhance our landscape. Equal opportunity scholarships provided.

Conservation Patron, \$5,000

2 Benefactors, \$1,000



School Ground Programs

BRMC offers school site programs integrated into their curriculum & after school programs that increase schools' opportunities to provide students outdoor activities.

Conservation Patron, \$5,000

2 Benefactors, \$1,000



Speaker Series

BRMC's Speaker Series provides opportunities for scientific researchers, local conservation organizations, historians, and archeologists to share their work with the community.

Conservation Patron, \$5,000

2 Benefactors, \$1,000



Homeschool Programs

BRMC's Homeschool Program focuses on larger concepts, such as evolution, plate tectonics, and how the Bull Run Mountains came to be the home of the plant & animal life that the students explore.

Conservation Patron, \$5,000

2 Benefactors, \$1,000

Nature's Civil Engineers (*continued*)

by Michael Kieffer

continued from page 1) spring and summer, without having to venture far from the safety of water.

Wetlands act as enormous biological filters. When muddy water from streams and rivers rush into the stillness of the wetland and stream velocity diminishes, silt in the water adheres to aquatic vegetation, and larger particles settle to the bottom. Species in the wetland's underwater world, including planktonic bacteria, freshwater fungus, and phytoplankton, use organic and inorganic molecules, including human-developed pollutants, to survive, creating the base of a complex food web. Zooplankton, such as protozoans, rotifers, and tiny crustaceans (*Daphnia*), graze on the phytoplankton. Backswimmers, striders, water boatmen, diving beetles, water scorpions, coiled mosquito larva, mayfly larva, dragonfly larva, and many other insects eat the grazers and together act as the food source for amphibians, fish, and birds.



Beaver-created wetlands clarify water, prevent soil from washing downstream and fashion fertile meadows with a rich blanket of organic matter. On a grander scale, water detained is more likely to percolate down to the groundwater, raising the water table and creating springs and freshets throughout the watershed. Once the dams are gone, land quickly reverts back to a forest, but now with added nutrients that enhance both richness and diversity. Fungal connections are still intact, and intricate soil relationships have progressed.

Ecologically, one could speak of a wetland as an ecotone, a transition between two distinct communities. An ecotone provides niches for organisms associated with both communities, as well as niches unique to the ecotone. This “edge effect,” where there is increased variety and density at community junctions, makes wetlands so productive. Beavers increase the expanse of the edge between waterways and dry land, dramatically increasing the acreage and quality of this productive ecotone. When trapping eliminated almost all the beaver in North America, we in effect lost 300,000 square miles of wetland.

We will never see beavers in the numbers they once obtained on this continent. In their peak there were over 25 subspecies from coast to coast, mainly due to geographic isolation. *Castor canadensis canadensis*, was the “typical beaver,” inhabiting almost all of the forested area of Canada. *Castor canadensis michiganensis* inhabited the Great Lakes region, and had the darkest, most valuable fur. *Castor canadensis subauratus*, the golden beaver, inhabited Central California. Today, we cannot differentiate subspecies. Most present populations are products of reintroduction efforts. All geographic variances have been lost.

Clean water is a leading concern for all life. In order to promote healthy waterways, it seems prudent for all citizens to have a general understanding of what once made North America's water so pristine. Knowledge of beavers and the wetlands they create can only aid us in our quest to develop in a more ecologically sound manner. Imagine if we worked with a “natural common sense” how much richer all of our lives would be.

Volunteer Project: Spring Pollinator Garden by Holly Geary

This spring BRMC is seeking volunteers as we begin work on a pollinator garden at the Mountain House. This native plant garden will be a haven for pollinators and a place of beauty, and will also serve as an ideal location for education program participants to observe the ecology and lives of the local insect population.

We are looking to invigorate an area of approximately 600 square feet and transform it into a colorful sanctuary for all to enjoy.



Native bee species and other pollinators have suffered extreme declines in population numbers over the past few years, and environmentalists, concerned citizens, and farmers understand the key role these pollinators play in the perpetuation of plant life as integral parts of local ecosystems. Many conservation organizations and private citizens are taking up the cause to provide habitats for the pollinators.

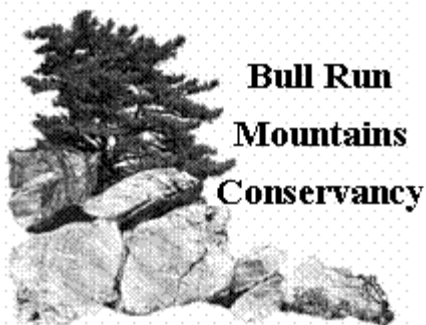
The garden will provide opportunities for visitors to engage with and learn about native plant care, soil ecology, life-cycles of insects, including butterflies, and even migratory patterns.

Please join us as we get started—we're looking for volunteers and contributions to get this project off the ground. Bring your muscles and garden gloves!

Volunteer Day, April 21st, 10am-12pm.
Contact us at info@brmconservancy.org.

To register for a program, fill out the form below and mail with your payment to:
Bull Run Mountains Conservancy, P.O. Box 210, Broad Run, VA 20137
Program registration is also now available online at www.brmconservancy.org/calendar.html.
For more information, call us at (703) 753-2631 or visit our web site at www.brmconservancy.org.

Name _____	Homeschool Programs \$5 per participant	Members: \$25, non: \$30
Address _____	Migratory Birds, April 19	Herpetology Camp June 18-19, 21-22
City/ZIP _____	Ferns & Allies, May 17	Members: \$100, non: \$150
Home phone _____	Stream Ecology, June 14	Herpetology Teacher Workshop June 26
Work phone _____	Volunteer Day April 21 info@brmconservancy.org	\$20/participant
E-mail _____	Migratory Bird Walk April 28 Members: \$20, non: \$25	Summer Naturalist Camp July 16-20, 23-27 Members: \$250, non: \$300
Are you a BRMC member? _____	Fern Walk May 20 Members: \$10, non: \$15	Budding Naturalist Camp July 23-27 Members: \$125, non: \$175
No. of people registering _____	Herpetology Workshop & Field Excursion June 16	Chesapeake Watershed Workshop July 30-August 2 Members: \$200, non: \$250
Fee _____		
Amount enclosed _____		
Name of child[ren] if registering for youth camp _____		



Bull Run Mountains Conservancy

Education · Research · Stewardship

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Yes, I would like to become a member of Bull Run Mountains Conservancy.

Name _____

Organization _____

Address _____

Phone _____ E-mail _____

Referred by _____

- | | | |
|---|--|---|
| <input type="checkbox"/> \$15 Student | <input type="checkbox"/> \$20 Senior | <input type="checkbox"/> \$25 Individual |
| <input type="checkbox"/> \$35 Family | <input type="checkbox"/> \$75 Group | <input type="checkbox"/> \$100 Sustainer |
| <input type="checkbox"/> \$300+ Leadership | <input type="checkbox"/> \$1,000+ Benefactor | <input type="checkbox"/> \$1,000+ Corporate |
| <input type="checkbox"/> \$5,000+ Conservation Patron | <input type="checkbox"/> Other _____ | |

Please make your tax-deductible contribution to:
Bull Run Mountains Conservancy, Inc., P.O. Box 210, Broad Run, VA 20137

Bull Run Mountains Conservancy is a membership driven organization.

Become a member today and support our programs and support the public preserve. Your membership provides BRMC necessary funds to operate and shows our foundation and corporate supporters that the public values and appreciates the resource.

Membership Benefits:

- Support environmental and historical programs for all ages
- Support research and management of the natural area
- Discounts on all public programs and camps
- Quarterly newsletter including our program calendar

Bull Run Mountains Conservancy	2018 Calendar of Events	
April 21	Volunteer Day	
April 28	Migratory Bird Walk	
May 20	Fern Walk	
June 16	Herpetology Workshop	
June 18-19 & 21- 22	Herpetology Camp	
June 26	Herpetology Teacher Workshop	
July 16-20 & 23-27	Summer Naturalist Camp	
July 23-27	Budding Naturalist Camp	
July 30-August 2	Chesapeake Watershed Workshop	
<p>Unless otherwise noted, all programs and events will meet at the BRMC Mountain House at 17405 Beverley Mill Drive in Broad Run, VA, across from the Bull Run Mountains State Natural Area Preserve trailhead.</p> <p>Directions: Take I-66 to Haymarket exit. Go south on Rt. 15. Go west on Rt. 55 for 2.7 miles. Turn right on Turner Rd., then left on Beverley Mill Dr. to the Mountain House 3/4 mi. on left.</p>		