



# Field Notes

Cedar Creek's Education and Community Engagement Newsletter

## Plant diversity and water usage

### Contents

- New Plant/Water Research..... 1
- Coordinator's Corner ..... 2
- Climate and Family History ..... 2
- Adventures at Fish Lake, 1 ..... 3
- Meet the Bison!..... 5
- Adventures at Fish Lake, 2 ..... 6
- Caught on Camera! ..... 7
- Upcoming Events ..... 8

by Kim O'Keefe. Dr. O'Keefe is a Postdoctoral Research Associate at the University of Wisconsin-Madison, studying plant ecophysiology. She strives to understand the physiological processes that structure natural ecosystems. She conducts some of her field work at Cedar Creek.

Previous work in grasslands, including at Cedar Creek Ecosystem Science Reserve, has shown that plant communities with more species (higher biodiversity) grow more than plant communities containing fewer species. This phenomenon is often attributed to "niche complementarity" or "niche partitioning." Niche complementarity occurs when species in a community have unique traits that result in differential resource use. As a result, plant communities that have many species are able to use resources more completely and, as a result, are more productive. To date, scientists have assessed niche complementarity indirectly by measuring the plant growth in biodiversity experiments; it is clear that more direct evidence is needed

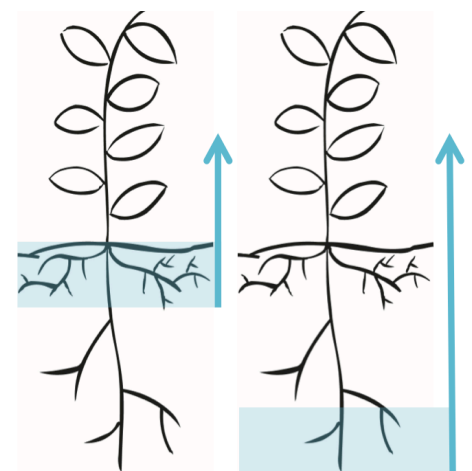


photo by K. O'Keefe

A gas analyzer, used by Dr. O'Keefe's team to assess plant performance.

to fully understand the relationship between complementarity, diversity, and plant growth.

Water is an essential resource that influences many processes in grasslands, so understanding the niche complementarity of water use is particularly important. The idea that different types of plants use water from unique locations in the soil is not a new one. Previous research has shown that shallow and deep-rooted species utilize water from contrasting soil depths in natural ecosystems. Additionally, we know that plants can shift where they use water from in the soil as water availability changes. However, whether niche partitioning of water influences plant growth in diverse grasslands is not yet known.



**Shallow Water**

**Deep Water**

Complementarity of water use

We're currently addressing this gap in knowledge at Cedar Creek, in a long-term experiment that manipulates the number of

(continued on page 4)



## Coordinator's Corner

Sandhill cranes, snow fleas, slushy snow, and school groups: spring is springing on the Sand Plain! Before long, chilly days and wintry mixes will be a thing of the past (though this weekend's 6 inches of snow at Cedar Creek and Monday's forecast haven't been too promising!). With a new season comes new adventures, and the transition from winter to spring is always an exciting one here at Cedar Creek.

As the weather starts to warm up and the plants begin to grow, our scientists and students are gearing up for their field seasons (though some never stopped, like Dr. Kim O'Keefe on pg. 1). Birds are migrating through and pulling visitors like Ryan Humphrey (p. 3) and Ian Westray (p. 6) out to the Fish Lake Nature Trails to look for signs of life. The cold and snowy March we just experienced has given folks like Dr. Ethan Butler a chance to reflect on winters past and how our climate might be changing (p. 2, and read about his April talk in the Upcoming Events section!). Our education team is preparing to welcome K-12 school groups, and our grounds staff is preparing to welcome our new bison herd (p. 5). How is your life changing now that spring is on the horizon?

We hope that this new season will bring you up to Cedar Creek. As you'll see, we have a whole list of great programs planned, from lectures to hikes to citizen science projects. There's something in there to meet your personal science and nature needs!

And as always, get in touch if you have Cedar Creek stories or photos to share! They just might end up in the summer newsletter!

Sincerely,  
Dr. Caitlin Barale Potter  
612-301-2602, caitlin@umn.edu

# Climate Change and Family History

by Ethan Butler. Dr. Butler is a postdoctoral scientist in the Department of Forest Resources and the Institute on the Environment at the University of Minnesota.

If you've attended lectures or programs on climate change in the past, you know that climate change and the impact of humans on the climate system is usually discussed over timescales of hundreds, if not thousands, of years. For many of us, it is difficult to relate to such vast expanses of time in the context of our limited individual experience. Shifting from environmental change over fixed time-scales of 50, 100, or 1000 years to changes over human generations can help to ground our discussion of the world we inherit from our ancestors and the world we will bequeath to our children.



Ethan and his grandparents, 1982.  
Atmospheric CO<sub>2</sub>: 341 parts per million.

I put together a short program and discussion called "Generations of Climate Change" to humanize the analysis of shifts in the atmospheric composition of carbon dioxide and changes in global temperature. The span of time from my great-grandfather's birth through the birth of

my daughter encompasses a wide range of developments in the scientific community's understanding of how humanity influences the global environment. To illustrate this, I'll trace the intellectual history relating carbon dioxide to global variations in temperature along with the growing concern and consensus on human-caused global warming.



Ethan in Minnesota, 2017.  
Atmospheric CO<sub>2</sub>: 407 parts per million.

I hope that grounding the vast scale of environmental and intellectual history against the backdrop of my own family's story will generate a lively discussion of other family histories and how the past may inform the future that we are all moving into together. I hope you'll join me in this discussion in the Lindeman Center on April 19th!

**Join Ethan for "Generations of Climate Change" at 6pm on April 19th! Program is free and takes place in the Lindeman Research and Discovery Center.**



# Adventures at Fish Lake, Part 1

Text and images by Ryan Humphrey,  
LightWrite Photography

March 21st was my second time to the Fish Lake Nature Trails in less than a week. And my 2nd time looking for sandhill cranes. Up until this week I had never seen one. I'm very new to the cranes! I just bought a DSLR and a zoom lens and have started to look for wildlife in Minnesota. Being the time of year it is, I'm currently looking to find the migrating birds Minnesota gets back in spring. After reading some articles about sandhill cranes I came across a facebook comment about the noise coming from Cedar Creek Ecosystem Science Reserve and decided to make the trip.



My first visit was exactly as I expected: loud. I found it was quite easy to find the location of the cranes by their loud calls, but also discovered how aware they are of your distance. I didn't get very close. The sound of the snow under my boots kept the cranes at a steady pace in my opposite direction.

The second visit I was patient. After getting close to the calls coming

from the west side of the Fish Lake, I timed taking my steps to when they would call, reducing the possibility of being heard. As soon as I sighted the first one, I sat in the tall brush along side of the trail and waited. Within minutes there were 10-15 grazing, calling, and jumping, all within 50 yards of me. I was able to sit and watch them for 15-20 minutes. It was really cool to see how they stick in pairs and call to

each other from across the field. A few times a couple would take flight, only to land 50 yards away next to another couple. Very cool birds!

I will definitely be back again, mainly to attempt a close up of the cranes, but also because of the kingfisher and other birds I heard along the trail.



More Fish Lake Adventures on page 6!

## Plant diversity and water usage

(continued from page 1)

grassland species growing together in different plots (the "Big Biodiversity" experiment). Specifically, we're trying to answer the following questions: Does hydrological niche complementarity exist in a diverse grassland? If so, does this result from inherent species differences in water uptake or from shifting responses to changes in biodiversity? Do water uptake patterns impact plant performance?



photo by J. Miller

Cedar Creek's Big Biodiversity experiment

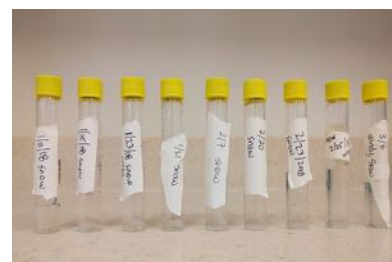
During the 2017 growing season we used the natural abundance of stable isotopes in soil and plant tissue to trace plant water uptake at different levels of species diversity (1 species, 2 species, 16 species, etc planted together in a plot). Stable isotopes are elements that have differing numbers of neutrons, and therefore have differing weights. Water contains two different elements – hydrogen and oxygen – each of which has a "heavy" and "light" version. Interestingly, the proportion of heavy versus light isotopes in soil water varies predictably by depth, and this value is retained in plant tissue when plants absorb water. This means we can use isotope values in plants and soil to trace where plants obtain water from at specific points in time.



photo by K. O'Keefe

Pulling water from plant and soil samples using a cryogenic vacuum extraction line. Nifty!

We collected plant tissue from eight different species, as well as shallow (5 cm deep), intermediate (35 cm deep), and deep (1 m deep) soil, in different diversity plots in the Big Biodiversity experiment (1, 2, 4, and 16 species plots). Because deep-rooted prairie plants can potentially use water from soil deeper than where we can collect (> 1m deep), we also sampled precipitation during the 2017 – 2018 winter. Winter precipitation recharges very deep soil water, and can therefore act as a stand-in for the deep water that plants may use during the summer.



Sampling rain and snow

We then extracted water from all plant and soil samples using a cryogenic

vacuum extraction line, and measured the isotopic values of plant water, soil water, and precipitation with a laser isotope analyzer to find out where plants get their water in different diversity treatments. Preliminary data suggests that niche complementarity does indeed occur in diverse grasslands: plants shift their reliance on water sources as the diversity of their surrounding community changes!



photo by K. O'Keefe

Samples ready for laser isotope analysis!

Learn more about this project and Kim's other research interests on her website: [kimokeefe.weebly.com](http://kimokeefe.weebly.com).



## Be the First to Meet the Bison: Become a Member!

We know that many of you are very anxious to learn when the bison will be onsite at Cedar Creek and when you can come and see them personally. Well - the answers are finally here!

Cedar Creek's staff has been hard at work over the last few months building heavy-duty fences, planning and constructing a viewing gazebo, working with local partners to plan community events (join us for a Q+A about the project on May 19th!), and collecting pre-arrival data on plants, birds and the effects of prescribed burning. Everything is in place for the start of this exciting new project! The bison will be arriving in mid-June, and our first annual Members-Only Event will coincide with the arrival of the herd. Interested in helping us welcome bison back to this part of Minnesota on the day they arrive? Become a member, and receive a personal invitation to an evening wine and cheese event with a tour of the bison enclosure area, herd and viewing gazebo from the lead project researchers!



Bison at Konza Prairie LTER site



Cedar Creek Ecosystem Science Reserve is synonymous with ecosystem ecology -- and for good reason. Since 1942, Cedar Creek has played a critical role in advancing our understanding of how we are affecting the environment and how we might protect it.

The unique convergence of Minnesota's biomes and our world-famous long-term research make Cedar Creek a place unlike any other. It's why researchers and graduate students come here from around the world -- and keep coming back. Cedar Creek also offers the public a unique opportunity to both learn about and experience these ecosystems first hand through education and community engagement programs. Each year, thousands of Minnesotans have their first hands-on encounter with ecology here.

Be part of this incredible legacy by becoming a member! Your membership supports research, education and outreach, including K-12 programs, public events, classes and citizen science initiatives, research opportunities for young scientists, and the conservation and restoration of threatened ecosystems. Enjoy member benefits that keep you connected to Cedar Creek. Memberships are annual. Contributions are 100% tax deductible.

**\$25 level:** Cedar Creek's quarterly newsletter "Field Notes" **and an invitation to the 2018 members-only event, where you will be the first visitors to meet our new bison herd!**

**\$50 level:** all of the above, plus discounts on fee-based outreach programs and a set of Cedar Creek greeting cards.

**\$150 level:** all of the above, plus a personal staff-led tour of Cedar Creek.

**Join online at [z.umn.edu/cedarcreekmembership](http://z.umn.edu/cedarcreekmembership)!**

# Adventures at Fish Lake, Part 2

Text, images and eBird checklist by Ian Westray

In mid-March, I spent more than three hours shuffling around on the Fish Lake Nature Trails, looking guardedly at my footing and generally missing nearly every possible bird. Literally, I fell off the trail at one point because I was watching something and fumbling for the camera... This is my usual performance, though, and gradually I learn over time about how to stay upright and which directions to face at which moments.

Seriously, the variety of little spots along that one trail as it headed out over the under-construction boardwalks around the lake was just lovely. It's easy to picture each little vignette in the different seasons, in a way that makes me smile to anticipate. It made me glad to get my ankles thoroughly wet in such a location. I'm one of those birders who returns to various "patches" again and again, and this has to be a new one.

There were less than 30 pictures on my card, and sometime soon I'll have to go back and relearn how to focus, expose against a sky, and things like that. This first time was a sort of find-the-trail exercise, which I thoroughly enjoyed.



Black-capped chickadee

Location

Fish Lake Nature Trails, Anoka County,  
Minnesota, US ([Map](#)) ([Hotspot](#))

Date and  
Effort

Mon Mar 19, 2018 11:09 AM

Protocol: Traveling

Party Size: 1

Duration: 2 hour(s), 37 minute(s)

Distance: 3.3 mile(s)

Observers: Ian Westray

Submitted from eBird for iOS, version 1.6.36

Species

12 species total

Show Media

5 Canada Goose

10 Trumpeter Swan

2 Bald Eagle

1 Red-tailed Hawk

17 Sandhill Crane

Some "dancing" in wetland off boardwalk area.

Breeding Code

C Courtship, Display, or Copulation (Probable)

3 Red-headed Woodpecker

2 Downy Woodpecker

7 Blue Jay

10 American Crow

2 Horned Lark

12 Black-capped Chickadee

3 White-breasted Nuthatch



White-breasted nuthatch



Adult red-headed woodpecker with an acorn



Downy woodpecker



## Caught on Camera!



Adventuresome fox on a trail camera



photo by L. Giebel

A fallen tamarack cone in the snow



photo by C. Potter

Wolf community event



photos by T. Smith

Quartet of red-headed woodpeckers

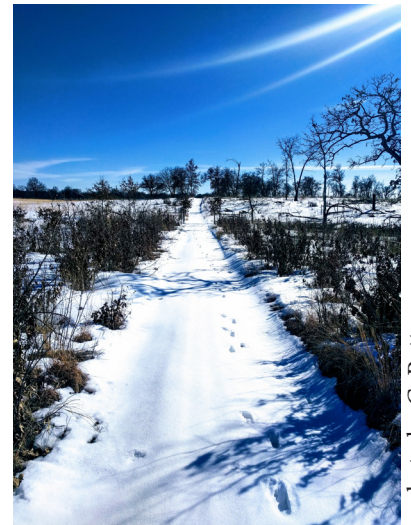


photo by C. Potter

Snowy savanna road



White cedar boundary near Cedar Bog Lake. Photo by 2018 Artist in Residence Frank Meuschke.



photo by C. Potter

Ramsey Rangers studying ice cores

## Upcoming Events

**April 9th, 6:30 - 7:30pm: Nature Talk with Cedar Creek: The Rum River Watershed (OFFSITE).** Come learn about our local watershed! Did you know that scientists have been intensively studying Anoka County's local creeks and lakes since the 1930s? The presenters will discuss our local watershed, how and why scientists study aquatic systems, and the historical and current research conducted in one of the Rum River's tributaries. Explore watersheds yourself in a guided exploration of our stream table. Sponsored by the Anoka County Library: St. Francis branch. Meet at the park building: 23100 Rum River Blvd NW, St. Francis MN. (free, families welcome)

**April 14th, 9am - 3pm: Red-headed Woodpecker Recovery Project annual volunteer training.** Attend the yearly training to become a part of Cedar Creek's longest-running citizen science project! As a member of the project, you'll help monitor and study Cedar Creek's red-headed woodpecker population and contribute to the conservation of this incredible species. During the training, you'll learn about the history of the project, our plans for 2018, and specific projects you can get involved with. Lunch provided by the Red-headed Woodpecker Recovery Project steering committee. Please RSVP to Caitlin ([caitlin@umn.edu](mailto:caitlin@umn.edu)) or Keith ([klbolstad@comcast.net](mailto:klbolstad@comcast.net)). (free, adults recommended)

**April 17th, 12pm - 1pm: The Physiology of Tree Responses to Drought webinar broadcast.** Join your neighbors at Cedar Creek for a live broadcast of this month's Sustainable Forests Education Cooperative webinar, part a monthly seminar series put on by the U of M Extension and the U of M Department of Forest Resources. The webinar will be shown live on the big screen in the Lindeman Research and Discovery Center. April's speaker is Cedar Creek's own Dr. Rebecca Montgomery from the Department of Forest Resources! Bring your lunch. More details will be available on the Facebook page and at [z.umn.edu/18web](http://z.umn.edu/18web) leading up to the event. (free, adults recommended)

**April 19th, 6pm - 7:30pm: Generations of Climate Change.** Join U of M scientist Dr. Ethan Butler for this engaging lecture and discussion of climate change through the lens of family history! He will trace patterns in carbon dioxide, global temperature and the scientific community's understanding of human-caused climate change from this great-grandfather's early life through the recent birth of his daughter. (free, adults recommended)

**April 25th, 5:30 - 8pm: SciSpark 2018 (OFFSITE).** Join us for a celebration of women in science with an evening of fast-paced "lightning talks" on topics relating to life sciences, hands-on science activities by Market Science, and an interactive Q+A panel on gender equity and experiences in STEM. Food and hands-on activities start at 5:30pm and the panel and talks begin at 6:15pm. Program takes place at the St. Paul Student Center Northstar Ballroom. Register at [z.umn.edu/scispark2018](http://z.umn.edu/scispark2018). (free, adults recommended)



## Upcoming Events

**April 25th: 6:30 - 8pm: Ecology Book Club at Cedar Creek.** The Ecology Book Club meets on the 4th Wednesday of each month at Cedar Creek. Our April book is "Conservation on the Northern Plains" edited by Anthony Amato. Join us for a provocative discussion leading up to the May 4th visit by the authors! No need to have finished the book to join in and no science background necessary. If you would like to lead or co-lead the discussion on a particular essay, email [cedarcreekbookclub@gmail.com](mailto:cedarcreekbookclub@gmail.com) or visit our facebook page. (free, adults recommended)

**April 28th, 8:30am - 5pm: Cedar Creek Wildlife Survey, City Nature Challenge Edition.** Join fellow nature nerds to document the diversity of life in urban Minnesota! A coalition of environmental organizations in the greater Metro area is partnering to document urban biodiversity using the free iNaturalist app. Cedar Creek will be participating while simultaneously collecting data for our wildlife tracking citizen science project, the Cedar Creek Wildlife Survey. Experienced survey teams will conduct their regular surveys. You can tag along and learn as you go, or join one of the "training teams" with a focus on track identification and lots of time to document everything you see on iNaturalist. You're also welcome to go for a self-guided hike on the Fish Lake Nature Trail to document even more plant and animal diversity! Similar events are scheduled to take place across the Metro area. Help Minnesota compete for the most observations with other metro areas like Chicago, San Francisco, Berlin and Sydney. (free, families welcome)

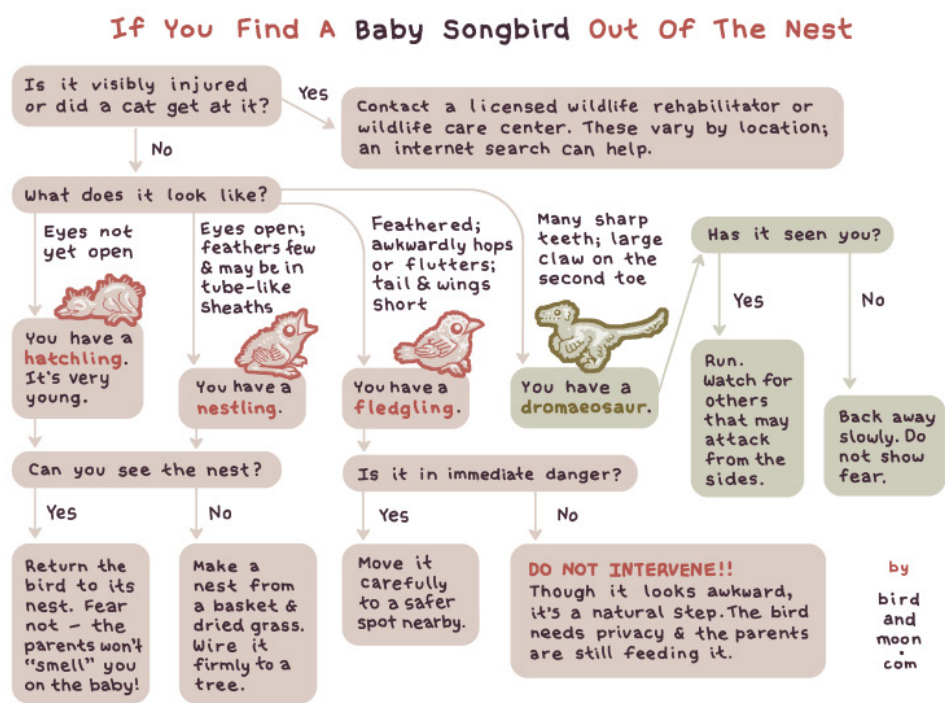
**April 28th, 2:45 - 5:15pm: Plants at the Edge of the Forest hike.** Expert botanist and naturalist Barb Delaney will lead this exploration of her favorite places at Cedar Creek: the wetland edges. Plan for a hike that leads up to Crone's Knoll where you will learn to identify what's emerging in the species-rich zone between dry upland forest and swamp. Of course, we'll soak up the spring panorama from the dock at Cedar Bog Lake, too! Wear water-repellant footwear. Meet at the Lindeman Center: please use side door/conference room. The walk will start promptly at 3pm. SPACE IS LIMITED AND REGISTRATION REQUIRED. Open to all; register on the MN Master Naturalist website under the Advanced Training section. (\$20, adults recommended)

**May 2nd, 3pm - 6pm: Backwoods Adventure with Jim Krueger (EVENT IS FULL).** Cedar Creek's building and grounds supervisor Jim Krueger has spent over a decade exploring the backwoods of Cedar Creek Ecosystem Science Reserve as part of his job. Join him for this extra-special peek behind the scenes at some of his favorite places, plants and animals! Given Jim's extensive natural history and scientific knowledge, superb storytelling skills, and love for Cedar Creek, you're sure to walk away from this adventure with a new appreciation for Minnesota's ecosystems. Wear long pants and sturdy shoes. SPACE IS LIMITED AND REGISTRATION REQUIRED. Open to all; register on the MN Master Naturalist website under the Advanced Training section. (free, adults welcome)

# Upcoming Events

**May 4th, 6:30 - 8pm (nature walk at 5:45pm): "Conservation on the Northern Plains" lecture and discussion. Co-sponsored by the Cedar Creek Ecology Book Club.** Here's a unique opportunity to learn about plains and prairie conservation from a trio of local authors and scientists! "Conservation on the Northern Plains: New Perspectives" is a compilation of essays that examines the ecology, land use and conservation of one of North America's largest biomes. Raymond Lindeman, an early Cedar Creek scientist, features prominently in one of the opening chapters. Join us for a short walk at 5:45pm, followed by a lecture and discussion at 6:30pm. If you would like to participate in a dissection of the book in advance of this event, please join the Ecology Book Club on April 25th. (free, adults recommended)

**May 5th, 10am - 2pm: 4-H Environmental Fun Fair at Springbrook Nature Center (OFFSITE).** Look for the Cedar Creek table at the 2nd annual 4-H Environmental Fun Fair at Springbrook Nature Center! We're excited to participate in this youth-led event for the second year in a row. Arts and crafts, live animals, youth projects, interpretive hikes, and more. (free, family friendly)



**May 11th, 4:45 - 7pm: Native Trees and Shrubs in Spring hike.** Spring is a great time to learn to distinguish woody plant species: some are in a rush to spread pollen or unfurl their leaf-buds, others are less hasty. Tender parts often have distinctive colors before fully matured. Expert botanist and longtime Cedar Creeker Barb Delaney will lead this leisurely hike to Cedar Bog Lake and around the forest edges near the Lindeman Center. We leave promptly at 4:45 and there is social time from 6:45 to 7:15. Ordinary outdoor footwear unless there's been lots of rain. SPACE IS LIMITED AND REGISTRATION REQUIRED. Open to all; register on the MN Master Naturalist website in the Advanced Training section (\$20, adults recommended)



## Upcoming Events

**May 15th, 12pm - 1pm: Update on Silvicultural Practices and the Logging Sector in Minnesota.** Join your neighbors at Cedar Creek for a live broadcast of this month's Sustainable Forests Education Cooperative webinar, part a monthly seminar series put on by the U of M Extension and the U of M Department of Forest Resources. The webinar will be shown live in the Lindeman Research and Discovery Center conference room. May's speakers are Marcella Windmuller-Campione and Charline Blinn from the Department of Forest Resources! Bring your lunch. More details will be available on the Facebook page and at [z.umn.edu/18web](http://z.umn.edu/18web) leading up to the event. (free, adults recommended)

**May 19th, 1pm - 3pm: Bison Project Q+A.** Join Cedar Creek scientists for a question and answer session about our new project using bison to restore oak savannas. Learn about the research, the bison, the ecosystem, and upcoming opportunities to visit the experiment in person! The program will start indoors at the Lindeman Research and Discovery Center, but may move outdoors to the bison enclosure partway through. Please note: the bison will not be onsite yet, so you will not get to view the animals at this time. (free, family friendly)

**May 23rd: 6:30 - 8pm: Ecology Book Club at Cedar Creek.** The Ecology Book Club meets on the 4th Wednesday of each month at Cedar Creek. Our May book is "The Rambunctious Garden" by Emma Marris. Join us for a provocative discussion! No need to have finished the book to join in and no science background necessary. Questions? Email [cedarcreekbookclub@gmail.com](mailto:cedarcreekbookclub@gmail.com) or visit our facebook page. (free, adults recommended)

**May 25th, 5 - 7pm: Wetland Swales in the New Bison Range hike.** This hike is geared for native plant enthusiasts. Expert naturalist Barb Delaney describe plant micro-habitats within the bison enclosure area before the beasts arrive! Barb's research in Cedar Creek's wetland swales has shown that water level fluctuations from year to year are to be a key disturbance that allow many species to live together in a small zone. Bison will add another kind of disturbance. How will plant populations respond? Hike will run rain or shine: come prepared for damp ground and sandy roads. Please meet at Fish Lake Nature Trail parking lot. SPACE IS LIMITED AND REGISTRATION REQUIRED. Open to all; register on the MN Master Naturalist website . (\$20, adults recommended)

**June 8th, 1 - 5pm: AVID (Assessing Vegetative Impacts by Deer) citizen science training.** Are you interested in deer? Come learn more about the impacts of deer in Minnesota and help University of Minnesota researchers monitor their impacts on vegetation. In this session, you will get the training you need to become a citizen scientists volunteer for the AVID program. You will learn how to recognize signs of deer impacts, how to identify the vegetation deer like to eat, and how to measure tree seedlings and submit your data. SPACE IS LIMITED AND REGISTRATION REQUIRED. Open to all; register on the MN Master Naturalist website. (\$35, adults only)

Let us know if you can attend by contacting Caitlin  
at [caitlin@umn.edu](mailto:caitlin@umn.edu) or 612-301-2602

## Upcoming Events

**June 16th, 10am - 2pm: Red-headed Woodpecker Day. Co-sponsored by the Red-headed Woodpecker Recovery Project.** Come join project members and fellow bird enthusiasts for hikes behind the fences to see the largest known breeding population of red-headed woodpeckers in Minnesota in their natural habitat! Walking tours to a variety of locations in the oak savanna (including the bison viewing platform) will run during the day, citizen scientists will be on hand to discuss their research and monitoring work, and we'll be working on a day-long bird list. Come learn about this incredible community-driven project and see some woodpeckers! (free, families welcome)

**June 18th - 21st, 9am - 4pm: Junior Ecologist Summer Camp.** Cedar Creek is teaming up with Wargo Nature Center to offer this new summer program for budding scientists in grades 6-8! We'll spend the week exploring Cedar Creek and learning about Minnesota's ecosystems through hands-on science activities. Participants will have a chance to collect data, use scientific equipment and meet some of the scientists who do research here! Space is limited, fee is \$155 +tax. Registration is required: call 763-324-3350 or register online at [anokacountyparks.com](http://anokacountyparks.com).

**June 19th, 12pm - 1pm: Urban Forest Inventory and Analysis in Minnesota webinar broadcast.** Join your neighbors at Cedar Creek for a live broadcast of this month's Sustainable Forests Education Cooperative webinar, part a monthly seminar series put on by the U of M Extension and the U of M Department of Forest Resources. The webinar will be shown live on the big screen in the Lindeman Research and Discovery Center. June's speakers are Chris Edgar from the Department of Forest Resources and Mark Majewsky from the USD Forest Service! Bring your lunch. More details will be available on the Facebook page and at [z.umn.edu/18web](http://z.umn.edu/18web) leading up to the event. (free, adults recommended)

**June 22nd, 8pm - 11pm: Universe in the Park at Cedar Creek.** Celebrate the summer solstice with some stargazing! Join astronomers from the Minnesota Institute for Astrophysics at this fun, family event that is part of the Universe in the Park summer series. The scientists will present a short talk about current topics in astronomy, and then (weather and bugs permitting) we'll head out into the darkness of Cedar Creek to look at the stars through telescopes and with sky charts. (free, families welcome)

**June 26th, 9am - 12pm: Growing Up WILD: Exploring Nature with Young Children.** Growing Up WILD is an early childhood education workshop and activity guide offered by Project WILD and the MN DNR. This professional development training is free of charge, though pre-registration is required. Activity guides can be purchased for \$25 and a certificate for 3 Continuing Education credits is available. For more information and to register, email [jan.welsh@state.mn.us](mailto:jan.welsh@state.mn.us) or visit [dnr.state.mn.us/events/event.html?id=55917](http://dnr.state.mn.us/events/event.html?id=55917)