As Carleton College celebrated its 150th anniversary, the Arboretum also took some time to look back on its history. When the area was settled, the land that would become the Arboretum was rolling prairie mixed with maple-basswood forest, oak woodland and oak savanna, and wet prairie. Over the years much of the landscape was converted to agriculture. When Donald Cowling was president (1909-1945) he acquired the majority of the land that is now the Arboretum, established the Carleton farm, and developed the Lyman Lakes. In 1926-27, Harvey E. Stork (professor of botany 1920-55) established the Arboretum. He saw the area as a research facility for woody plants, took classes on field trips, and encouraged nature study. The first restoration of the Arboretum was done by Professor Stork and D. Blake Stewart (Superintendent of Grounds) between 1927 and 1955.

The environmental movement of the 1970’s manifested on campus with a push for good land stewardship, and an interest in prairie ecology. In 1978 the first full-time Arb director Ed Buchwald was appointed. From 1990-2007 Myles Bakke and Mark McKone worked together to establish long-term restoration goals, and restoration protocol. This era also lead to a renewed push for academic resources and activities in the Arboretum. Today the Arboretum covers approximately 800 acres and contains a variety of landscapes that are enjoyed and studied by students, faculty, staff, and visitors.

**Arboretum Academics**

*Not all classes are offered each year.*

**Archaeology**
- Archaeological Methods

**Biology**
- Ecosystem Ecology
- Entomology
- Grassland Ecology
- Introductory Biology: Genes, Evolution, and Development
- Plant Biology
- Population Ecology

**Cinema and Media Studies**
- Digital Foundations

**Educational Studies**
- Methods of Teaching Science

**English**
- American Nature Writing

**Environmental and Technology Studies**
- Environmental Ethics
- Introduction to Environmental Studies
- Introduction to Geospatial Analysis

**Geology**
- Introduction to Geology
- Geology in the Field
- Geology of Soils
- Geochemistry of Natural Waters
- Geomorphology

**Math**
- Sample Survey Design and Analysis

**Physical Education**
- Nordic Skiing
- Outdoor Skills for the Backcountry
- Winter Sports Fitness

**Political Science**
- Measuring and Evaluating Social and Ecological Systems

**Religion**
- The Sacred Body

**Sociology/Anthropology**
- Environmental Anthropology

**Studio Art**
- Advanced Ceramics
- Advanced Photography
- Field Drawing
- Intro to Digital and Film Photography
- Sculpture: Form and Context
- Table Making
- The Digital Landscape
- Woodworking

**Cowling Arboretum Mission**

Provide opportunities for education and research.

Preserve and restore native plant and animal communities on College natural lands.

Provide opportunities for outdoor recreation and nature appreciation.

**Special Funding**

In addition to operating support provided by Carleton College, the Arboretum’s programs supported by grants and funds that have been established through generous gifts (listed alphabetically):

- Arboretum Endowed Fund
- Arboretum Restoration Fund
- The Cole Family Memorial Arboretum Fund
- U.S. Department of Agriculture (Conservation Reserve Program and Environmental Quality Incentive Program)
- George W. Megeath Fund for the Cowling Arboretum
- The Louise ‘51 and Frank ‘50 Wright Endowed Arboretum Fund
- The Puzak Family

*We wish to thank the Arboretum’s many benefactors who help make our work possible.*
Environmental Ethics in the Arboretum

Kim Smith, professor of environmental studies and political science, uses the Arboretum as a source of ethical questions, and a way to inspire a connection to the natural world. Students in her Environmental Ethics class assess questions about all aspects of the Arboretum. Examples of recent projects attempt to determine the ethics of management decisions in the Arboretum such as: the deer hunt conducted in the Arboretum during winter break, assisted migration of endangered species into the Arboretum, and pine tree removal. Each of these questions is researched from both ethical and scientific standpoints. Then students compile their findings into reports that can be used by the Arboretum to provide an ethical understanding of management options.

Additionally, students in Professor Smith’s class say that their favorite homework assignment is walks in the Arboretum. For the first walk, they have a guided tour given by staff or the student naturalists. Then they explore the Arboretum on their own, do research into any part of the Arboretum that interests them, and reflect on the experience. The goal is for students to assess how having a relationship with the natural world contributes to the good life, and how knowing about the Arboretum contributes to their experience of nature. While these activities could happen anywhere, the Arboretum has a tradition of supplying moral and ethical education, and Professor Smith feels that her class is a continuation of that tradition at Carleton.

Arboretum Clay and Ceramics

About 10 years ago, professor of ceramics Kelly Connole began working with the geology department and the Arboretum to identify areas where raw clay could be found. Each year ceramics students harvest about 300-400 pounds of raw clay from the Arboretum. Harvesting and processing raw clay allows students in Professor Connole’s classes to connect, in a very hands-on way, to the history of fired clay—a history that reaches back more than 30,000 years. Raw clay is processed by drying it, using water to sort the organic material (e.g. sticks and leaves) and sand from the clay, then drying the clay back to a workable consistency and adding in small amounts of sand and other materials to make the clay less susceptible to crack and easier to work with. Both thrown objects and hand built objects are created using this clay. The wood-fired kiln is another way that Professor Connole connects her class to history and the Arboretum. The technology for the kiln originated in 11th century China, and the kiln is powered to its full 2,300 degrees using just Arboretum wood. The pieces fired in the kiln are made from Arboretum clays or have glazes made from Arboretum clay.

Cole Student Naturalist Program

Student Naturalist Featured Seniors:

Keaton Tremble ’17 grew up in the never ending forests of Northern Idaho. Being surrounded by mountains, his first loves were skiing the gorgeous winters and hiking the endless ridge tops. Keaton got to know the Arb by working with the arboretum crew and spending countless hours pulling the invasive shrub buckthorn. He sees the Arb as a retreat from the endless corn fields and a reminder of the forests back home. Keaton hopes to create more awareness about the Arb, and invites others to discover their own special corner of the Arboretum.

Emma Velis ’17 was raised exploring the beautiful sand dunes, beaches, and forests of northern Michigan and has always loved time spent outside. She has continued her love of the outdoors and excitement for learning about it here at Carleton as a student naturalist in the Arboretum. Being a part of student naturalists has allowed Emma the opportunity to explore and fall in love with the Minnesotan prairie. Emma relishes any time in the Arb, and she is always looking for new ways to enjoy the outdoors.
Environmental Education, Research, and Community Outreach

Community Outreach in the Arb includes field trips, workshops, volunteer opportunities, and cooperative programming. These vital Arboretum experiences are utilized by both the College and Northfield communities. In addition to the programming noted in the accompanying chart, 31 volunteer opportunities were offered in 2016, representing more than 550 total hours of assistance.

Prescribed Burn Education was offered to local landowners and volunteers, attracting 22 community members to learn about this valuable land management tool.

A Minnesota Master Naturalist class was enjoyed by 23 Northfield area residents. The program’s mission is to promote awareness, understanding, and active stewardship of Minnesota’s natural environment.

<table>
<thead>
<tr>
<th>Type of Group</th>
<th>Number of Field Trips, Talks or Workshops</th>
<th>Total Number of Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Related</td>
<td>9</td>
<td>179</td>
</tr>
<tr>
<td>Youth (K–12 or Other)</td>
<td>8</td>
<td>242</td>
</tr>
<tr>
<td>Adult (Local Community)</td>
<td>6</td>
<td>183</td>
</tr>
</tbody>
</table>

Understanding the Role of Dominant Grasses in Prairie Restorations

Tallgrass prairie has a high diversity of plant species, but the dominant species are always the signature tall grasses. Two grass species often dominate: Big bluestem, *Andropogon gerardii*, and Indian grass, *Sorghastrum nutans*. In restored prairies these two grasses are even more dominant, and their high abundance is thought to contribute to the lower overall diversity of restored prairies compared to their native counterparts. The GRASS experiment (Grassland Restoration with *Andropogon Sorghastrum* Subtraction) was established by Dan Hernandez and Mark McKone in 2012. This study is examining the impact of the presence or absence of the dominant species on restored prairie ecosystems by including or subtracting the dominant grass species from the seed mix.

Results show that plots containing the dominant grasses had more biomass and fewer species than plots without the dominant species. In the absence of the dominant grasses, all the other species groups had slightly higher biomass, but these plots could only ever achieve 75% of the total biomass of the plots with the dominant grasses present, thus never fully compensating for the biomass provided by the dominant species. It appears that even early in a restoration, dominant grasses play an important role in the ecosystem. We will continue to monitor this experiment in summer 2017 to see how the grasses continue to shape the plant community and ecosystem processes of restored prairies.

Researching the Natural History of the Buffalo Bean, *Astragalus crassicarpus*

In 2015, the Arboretum staff, along with biology department students and faculty, started a project to understand the natural history of the prairie plant, buffalo bean, also known as prairie plum. Found in a natural population at McKnight Prairie, buffalo bean is primarily located near the top of dry, gravelly hills. The plant sprawls across the ground, the many stems of a mature plant forming a dense mat. The pink and purple flowers are one of the earliest flowers on the prairie, blooming in April and May. The fruit is a smooth round pod up to an inch across that ripens to purple and resembles a plum. Little is known about the life history of this plant, including methods of seed dispersal. At McKnight Prairie, young plants have been found close to the mature plants, but dispersal seems to be very limited.

An experimental planting was established in the Arboretum in the fall of 2015 to explore what conditions allow their seeds to germinate and document growth rates of the plant. Volunteers helped hand plant over 750 seeds. Half of these seeds were scarified—their hard seed coats lightly rubbed with sandpaper— to test the importance of scarification to germination. In nature, scarification may happen through freeze cycles, or when the seed moves through the digestive system of an animal. We will monitor this planting into the future for rate of germination, growth rate, and flower and seed production. This summer we found 32 tiny seedlings—a nice start to a long term project.

Recent Publications

Beck, McKone, and McMurtrey (2016) published their paper “Edge Effects and Avian Community Structure in a Restored Tallgrass Prairie” in *The Natural Areas Journal* based on research done in the Arboretum. Mark McKone is the Research Supervisor of the Cowling Arboretum, and Jared Beck (’14) and Owen McMurtrey (’12) are alums of the Arboretum Student Naturalist Program.
Cross-country Racing

Last year the Arboretum completed a trail project in the upper Arboretum to improve the space to host cross country meets. This fall the men’s and women’s cross country teams hosted the NCAA Central Region Championships for the first time. The women’s team claimed a 4th place finish, and the men’s team came in 10th. Coach Donna Ricks stated it was "a tremendous opportunity for our team to be able to compete at home.” Visitors are encouraged to come cheer for the teams on race days in the coming years!

Sesquicentennial Tree Planting

To celebrate Carleton’s sesquicentennial, the Arboretum hosted a tree planting and protection day in October. Volunteers helped to plant trees in the Upper Arboretum, and to place bags on planted trees to protect them from deer browse over the winter. Typically our big tree planting occurs earlier in the fall as a part of Carleton’s New Student Week, however this year was too wet so most of the planting was done by the Arb crew and volunteers.

Management

Restoration projects and education in the Arboretum would not be possible without the support we receive from our student workers and volunteers. Our volunteer base includes both students and residents of Northfield and the surrounding areas. This year volunteers helped us to: conduct prescribed burns, plant trees, protect young trees, collect seeds, remove invasive plants and shrubs, clean up the Cannon River and Spring Creek, mow trails, groom ski trails, and plant and water shrubs.

In addition to the hours put in by volunteers, the Arboretum hires around 45 students annually. The majority of students work on the Arb Crew. This group spends their time working with the Arboretum manager on projects such as invasive species removal, and prairie planting. The next largest group of students are employed as a part of the Cole Student Naturalist Program. Students meet weekly, are trained in natural history and nature interpretation, and lead field trips and other events for the Carleton and Northfield communities. Lastly students are employed to serve in a variety of other jobs such as Arboretum archivist, Arboretum outreach assistant, and Arboretum research assistants.

For additional information, contact the Arboretum director or visit our website or Facebook page:
https://apps.carleton.edu/campus/arb/
www.facebook.com/carletonarboretum

Nancy C. Braker
Puzak Family Director of the Cowling Arboretum
507-222-4543
nbraker@carleton.edu

Photos in report by: Arboretum Staff, Joanne Bouknight, Jack Noble ’17, Nancy Braker ’81, Keaton Tremble ’17, Emma Velis ’17, Kelly Conole, Art and Art History Department, Emily Ross ’17, Emma Grisanzio ’17, and Hannah Marty ’17.