College and university campuses are often defined by their canopy of trees, including unusual specimens and stately old landmark trees that remain in memory long after students graduate. The Century Oak at Texas A&M University (TX) is one such example. This sprawling evergreen live oak is one of the best known of the 10,000 trees on the university’s 5,200-acre campus. Another notable tree is a large-diameter post oak at Harding University (AR), which sports a massive burl around its trunk and is known by all as the Pregnant Tree. Unfortunately, many campus icon trees only make the news when diseased or dying. The Old Main Oak at Eastern Illinois University (IL), a huge bur oak estimated to be 300 years old, was in decline for a decade and had to be taken down in 2014. In 2012, two students and a professor attempted to clone the tree to preserve its genetics, and published a poster describing their research. At Purdue University (IN), an ailing horse chestnut tree—for decades a campus landmark and popular resting place—was cut down in 2009. Art objects were carved from its wood and sold as mementos.

Squirrels on Campus Take Steps to Avoid Sharing Nuts

For most of the past 19 years, biology professor Sylvia Halkin and her students at Central Connecticut State University (CT) have studied the entertaining behavior of eastern gray squirrels on campus. A key finding: Squirrels apparently try to deceive other animals, including humans, when they conceal locations of nuts they cache to eat later, by digging and covering fake burying spots when hiding them. When students were observed (by the squirrels) looking for the nuts the animals had just buried, the familiar rodents shifted to craftier methods and hiding places. For example, they began hiding nuts under bushes where they would be difficult for students to find and access. More than 50 students have been partners with Halkin in squirrel studies over the years and most have presented their findings at regional and national scientific conferences. Two were co-authors of a 2008 article in Animal Behaviour, a prominent peer-reviewed professional journal. Also in 2008, Halkin was featured in NWF’s National Wildlife magazine for her on-campus research. Three students appeared with Halkin and collaborators Professor Michael Steele and his students from Wilkes University (PA) in a 2006 episode of Animal Planet’s The Most Extreme show entitled “Pirates.” Lately, Halkin’s students are looking into how individual squirrels foraging together in the same area distribute their food caches around campus. In a recent interview, she commented, “Using the CCSU campus for wildlife studies makes it convenient for students to participate in original scientific research, and they have fun sharing the information they learn with fellow students as well as in formal scientific presentations. Answering questions from passers-by helps to educate the entire campus community about local wildlife.”
In this section, the ecological role of campus landscape trees and other woody plants (shrubs, vines) is explored. For wildlife—such as birds, gray squirrels, flying squirrels, tree-climbing lizards, and more—trees are essential. They offer shelter and rest, escape from predators, foliage and fruits for food, and places to build nests. While native species are the preferred food for native insects (and by way of insects, sustenance for baby birds), non-native species of trees and shrubs still can provide much for wildlife.

Flying squirrels are nocturnal and rarely seen. They prefer mature trees with cavities for nesting and shelter. Photo: Jean Scaraglino

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Many colleges and universities regard their trees as more than improvements to campus aesthetics. Trees are sometimes labeled, used for field portions of biology labs, planted by students, and clustered into on-campus arboretums. Some schools even consider their entire campus to be an arboretum, usually with educational outreach efforts provided to showcase their tree “collection.”

Insects Prefer Native Fare

As summarized by University of Delaware (DE) entomologist Doug Tallamy, extensive research has demonstrated that the vast majority—around 90%—of insect herbivores (plant-eaters) are specialists, meaning they limit their host plants to a narrow range of species—primarily natives. Certain woody plants are champions among native food sources. The numbers here refer to species of butterflies and moths (primarily their caterpillars) supported by different types of trees and shrubs.

Oak 534  Birch 413  Pine 203
Willow 455  Blueberry 288  Rose 139

“Sometimes I tell myself, I may only be planting a tree here, but just imagine what’s happening if there are billions of people out there doing something. Just imagine the power of what we can do…”


University of Delaware
Photo: Rick Darke
**Tree Campus USA**

A program of the Arbor Day Foundation, Tree Campus USA recognizes colleges and universities that effectively manage their trees, engage the campus community in tree maintenance, and educate the campus and broader community on the importance of trees. As of April 2015, 245 campuses in the U.S. were certified. Find out if your school has been recognized at [http://www.arborday.org/programs/treecampususa/campuses.cfm](http://www.arborday.org/programs/treecampususa/campuses.cfm)

**To be recognized as a Tree Campus USA, the following five standards must be met:**

- **Creating a tree advisory committee.** The tree committee represents diverse stakeholders including students, faculty, facilities staff, and a member of the broader community. It is charged with providing guidance for planning, approving a comprehensive tree plan, educating the campus community about trees, and building relationships with the community beyond the campus borders.

- **Developing a campus tree care plan.** The tree plan outlines policy and provides guidance on planting, maintenance, and removal of trees when necessary. It also features education goals for the campus community, and an outreach strategy to educate and to promote the importance of the campus forest.

- **Preparing an annual budget.** Campuses must allocate funds to support the campus tree care plan. The money can be used for purchasing trees, labor, and equipment; for maintenance; for funding education and communication strategies, and a campus tree inventory; or for paying fees to join relevant associations such as the International Society of Arboriculture, the Society of Municipal Arborists, and the state urban forest council.

- **Observing Arbor Day.** National Arbor Day is the last Friday in April each year (though many states observe Arbor Day according to their best tree-planting dates). Campuses are required to host an Arbor Day celebration, engaging students, faculty, and staff. This is a great opportunity to bring attention to the campus tree program, to get more people involved, and to continue to educate about the importance of trees on campus and in the community.

- **Hosting a service learning project.** This engages the student population with projects related to trees and can be part of a campus or community initiative.

**FEATURED CAMPUSES**

**Emory University** (GA)

At Emory University, all campus construction projects must abide by the university’s No Net Loss of Forest Canopy Policy. Whenever a tree is removed, a sufficient number of trees must be planted in its place in order to maintain or exceed the original forest canopy of the campus.

The policy was created in 1999 when then-president William Chace noticed that trees were not being replanted adequately following campus construction. The University Architect, the Committee on the Environment, and Facilities Management joined forces to draft the new policy. It requires that prior to construction, the canopy expected to be lost is measured, and later replaced, if not on the exact construction site then elsewhere on campus. A recent University Hospital expansion led to the removal of 49 trees—many large and mature—which required more than 100 replacement trees to be planted at various campus locations.

If a project under construction is unable to replant the necessary trees on the site of the project, funds are taken from...
the project budget and placed in a “tree bank,” which pays for an annual tree planting. Both Emory’s main campus and its Oxford campus maintain separate tree banks, ensuring that trees are replaced appropriately at each site. Since 2006, campus canopies have been surveyed aerially every two years to track changes in tree cover. In 2012, approximately 58% of the main campus was covered by trees.

This replacement policy is “thought to be one of the most rigorous campus tree plans among universities across the country, providing a precise formula that measures the size of a tree and helps calculate the number of replacement trees that must be planted,” says John Wegner, a member of Emory’s Committee on the Environment and senior lecturer in environmental studies. “Most tree ordinances deal with tree loss and individual tree replacement,” Wegner added, “but our policy looks at it from a long-term forest perspective.”

Emory’s 740-acre main campus contains 306 acres of undeveloped space, including Lullwater Preserve, a 154-acre native Piedmont forest ecosystem. Emory’s canopy features dozens of native species including loblolly pine, chestnut oak, southern catalpa, American holly, tulip poplar, and winged elm. Despite its location in urban Atlanta, Emory harbors much wildlife. The Lullwater Preserve alone is home to about 175 species, including beaver, fox, otter, salamanders, seven turtle species, and more than 100 species of birds. Teams of staff and students regularly survey biodiversity in the preserve and offer suggestions to improve its ecological health. Students also are involved in the Tree Committee, which meets annually to review the No Net Loss Policy.

**Utah State University**

As a graduate student at Utah State University (USU) in 2005, Ben Harris co-led a project to inventory all of the approximately 5,400 trees on campus, pinpointing the locations of each using a GPS device. Each tree was entered into a database and mapped using GIS (Geographic Information System) software. The resulting online, interactive map lets viewers find and click on a tree of interest and learn its common and scientific name, date planted (if known), diameter at breast height (when surveyed), exact geographic coordinates, and whether it’s in Utah’s Big Tree Inventory.

Harris was later hired by USU and worked as campus arborist for several years. Today, he runs a tree care company in the Logan, Utah area. As a student, Harris wondered if the tree inventory would be useful to students as a resource. He completed a Master’s thesis in 2010 on that question, measuring the effectiveness of the online inventory as an educational tool for students in two woody plant courses. He found that it was a valuable supplemental resource not only for students, but also for the course instructors.

“**It’s really important to study real trees in the outdoors, whether in a native or landscape setting. You get a much better appreciation seeing a tree in person than you do looking at it online or in a slideshow or book.**”

– Ben Harris, Owner, Branch to Bud Tree Care and former USU student and employee

The inventory was used by Michael Kuhns, professor and Extension Forestry Specialist for the state, to create the USU Campus Tree Identification Tour which he released in 2012 (see illustration). Available as a printed brochure or online, the tour makes use of the original inventory with an interactive map that highlights 87 tree species. Kuhns published a similar tree tour for the lower campus of the University of Utah in Salt Lake City.

Campus trees at USU are now a big draw for a wide variety of native bird life. Prior to settlement, the area was covered in sagebrush. Frank Howe, University Liaison, Utah Division of Wildlife Resources, uses the campus canopy as an outdoor lab for students in his applied avian ecology course. His students have documented many classic western species including red crossbill, western tanager, red-naped sapsucker, Oregon junco, and bohemian waxwing. Tree-roosting bats have been observed as well.
2A CAMPUS ARBORETUMS AND BOTANICAL GARDENS

Many campuses have designated places for special gardens or arboretums where collections of trees and shrubs are featured. The focus often is on horticultural varieties, but native species are widely planted or conserved.

The Georgeson Botanical Garden at the University of Alaska Fairbanks, perhaps the most northerly campus garden, specializes in plants that can withstand the university’s subarctic climate. UAF staff and students conduct research on native Alaska plants for use in home and commercial landscapes. Woody examples include Sitka alder, Alaska blueberry, shore pine, and northern serviceberry.

The Botanical Gardens at the University of Rhode Island, created in 1940, cover 4.5 acres and showcase many indigenous species and sustainable landscaping practices. The gardens are an educational resource for students, faculty, staff, and the community, hosting about 3,000 visitors each year including school children. Among the plantings is the Rhody Native garden, featuring genetically local native plants, which was designed and planted with help from URI students. Garden natives include rhododendron, azalea, viburnum, blueberries, leatherwood, columbine, spicebush, sweetfern, and more.

Hand weeding, mulching, composting, and diverse plantings eliminate the need for pesticides. Classes using the gardens come from many disciplines, among them horticulture, biology, entomology, and art.

At The Evergreen State College, there are ten Teaching Gardens on campus that follow sustainable themes: no pesticides used, native species preferred, no invasives, wildlife-friendly, and with cross-cultural connections. Students helped design and install many of the gardens, which teach through interpretive signs and plant labels. At least two of the gardens include woody plants. The Basket Garden includes western red cedar, red osier dogwood, willow, and other species that were used by First Peoples in the Pacific Northwest for making baskets. The Post-Glacial Forest Garden contains trees that grew in the centuries following the melting of the last Ice Age glaciers, as evidenced by pollen preserved in lake sediments. Species include silver fir, red alder, paper birch, quaking aspen, dwarf arctic willow, and mountain hemlock.

At a number of colleges and universities, the entire campus is considered an arboretum due to an extensive and diverse tree canopy. Often the trees are labeled and used for education. The 92-acre lower campus of the California University of Pennsylvania is regarded as a whole-campus arboretum, with a map of tree locations available in print and online. The collection, which is used for a variety of courses, features more than 100 species including representatives of most indigenous Pennsylvania trees.
FEATURED CAMPUSES

Agnes Scott College (GA)

Agnes Scott College’s 100-acre campus is located in Decatur, about six miles from downtown Atlanta. Home to around 900 students and some of the state’s oldest trees, the entire campus is a nationally recognized arboretum with a canopy of more than 2,000 trees made up of 40 species. These include many native Georgia species such as sassafras, persimmon, overcup oak, water oak, American hornbeam, southern sugar maple, American holly, and longleaf pine. In 2013, the arboretum was accredited through the Morton Arboretum Register of Arboreta, earning a Level 1 certification.

An educational walking tour, developed by student Kimberley Reeves in 2012, integrates the arboretum into the college’s liberal arts curriculum. Featuring trees at 19 locations across campus, each stop on the tour highlights a tree-related topic such as biodiversity, historical relevance, diseases, evolution, role in the arts, and psychological benefits. QR codes on plaques at each location (readable by smart phones and tablets) allow students, staff, and visitors to access the written and recorded information via their mobile devices. Audio portions were recorded by staff, students, and even the college president. All parts of the tour also can be accessed through the Agnes Scott Arboretum website.

“The Agnes Scott urban forest is an important aspect of the college; it supports the college’s core mission and its sustainability goals, as well as contributing to its widely recognized aesthetic appeal. In addition to the ecosystem services it provides and the educational opportunities furnished by its expansiveness and ecological diversity, the campus forest is a historic and enduring part of the Agnes Scott community.”

– Claudia Mitchell, Office of Sustainability intern

Agnes Scott has received Tree Campus USA certification annually since 2012. Among the criteria for certification is implementation of a tree care plan and creation of a tree care advisory committee. This committee, made up of students, faculty, staff, and community members, advises the college on maintenance and management of its urban forest canopy.

Aligned with 2014 rules set by the City of Decatur Tree Ordinance, the college aims to ensure no net loss of tree canopy on campus. The most recent data collected June 2014 using the U.S. Forest Service iTree Canopy tool determined that Agnes Scott’s tree canopy currently covers 53.6% of the 100-acre campus. This canopy provides habitat linkages for species such as red-tailed hawks, Cooper’s hawks, red-shouldered hawks, great blue heron, American egrets, various songbirds, squirrels, muskrats, oppossums, gopher tortoises, and snapping turtles. In addition to the tree canopy with its varying heights and “edge” habitat, the college’s retention pond and its surrounding natural forest provide shelter for wildlife.
In 2014, the George G. Willis Jr. Arboretum at Furman University was accredited as a Level I arboretum through The Morton Register of Arboreta. The 745-acre, on-campus arboretum was recognized for exemplary tree conservation, species diversity, and educational resources and events. It features mostly native trees including American sycamore, southern red oak, bald cypress, eastern hemlock, and American elm. The arboretum is home to many wildlife species such as the American and southern toads, eastern mud turtle, green anole lizard, northern water snake, copperhead snake, beaver, southern flying squirrel, white-footed mouse, and several bird species including the belted kingfisher, great blue heron, and green heron. Its rarest resident is the state and federally endangered wetland plant, the bunched arrowhead (Sagittaria fasciculata).

Kylie Stackis, a 2014 Furman graduate and fellow at the Shi Center for Sustainability is quoted in a press release about the accreditation: “Furman’s designation as an arboretum speaks to our commitment to the landscape as a means whereby people may learn and appreciate the value and services trees impart. Landscapes have the power to shape the identity of a place, and Furman would not be the same institution without its trees.”

Faculty and staff on campus use the Willis Arboretum as an outdoor classroom for several courses including Empirical Methods in Economics, Environmental Science, Biology and the Environment, and Remote Sensing. The arboretum is managed by the Furman Trees Committee comprised of students, faculty, grounds staff, and community partners. The committee follows a management plan to monitor and maintain tree health and safety, and to increase species diversity with a focus on local species. Highlights of the plan include ideas for expansion, the creation of a website, the implementation of new trails, and the installation of interpretive signs to encourage guided “tree walks” for the campus and local community.

The arboretum is named for George G. Willis Jr., a 1948 Furman graduate whose enthusiasm for the campus landscape led to a financial commitment to ensure the arboretum’s future. Furman has been recognized as a Tree Campus USA by The Arbor Day Foundation each year since 2008. Recently, Furman’s sustainability coordinator, Yancey Fouche, expressed her hope that “guests will come to walk our campus to explore the forests and tagged trees, and take advantage of outreach opportunities as they are developed.”

The University of Delaware’s Botanic Gardens, administered through the College of Agriculture and Natural Resources, is composed of twelve distinct gardens totaling 15 acres on the 2,011-acre main Newark campus. Clark Garden, the first to be established in 1973, is located in front of Townsend Hall, the college’s home. Others, including a native garden and a grassland restoration research site, were added over the years, with formal designation of the Botanic Gardens occurring in 1992. As far back as the 1950s, specimen trees and other plantings were used to support coursework, and today’s gardens serve as experiential learning labs for students in more than 45 different courses, including botany, plant pathology, landscape design, insect field taxonomy, wildlife research techniques, ornithology, herpetology, and drawing. The gardens also host workshops and provide information to community members on native gardening, sustainable landscaping and related topics.

“...It’s fantastic to be able to see the actual plants we’re studying in class out in the gardens, as they reveal so much more than an image. The gardens also provide a great place to teach about and collect insects in an outdoor lab setting.”

– Melinda Zoehrer, Assistant Director, University of Delaware Botanic Gardens
The gardens feature many native tree species including pawpaw, persimmon, American yellowwood, blackgum, American hickory, white ash, sweet birch, river birch, and pitch pine. A wide variety of birds and “herps” have been sighted there: woodcocks, Virginia rails, northern waterthrush, green frogs, bullfrogs, garter snakes, black snakes, and Eastern painted turtles. Numerous butterflies and moths also have been documented including Eastern swallowtail, American lady, painted lady, and cloudless sulphur.

Located close to the Botanic Gardens is a 35-acre pristine natural area called Ecology Woods. There, where access is restricted, students study the effects of habitat fragmentation and other stresses on threatened species. Ecology Woods is the site of the longest (more than 35 years) continuous ecological field study in North America on the population health of forest songbirds, including the wood thrush. Research by more than 100 undergraduate and graduate students over the last three decades has provided important insights on the relationship between habitat size and change in songbird populations over time. A recent graduate student project looked at nestling parasitism of wood thrush nests in Ecology Woods (with 20 birds) and elsewhere in Newark, finding that wood thrush nest success was heavily affected by cowbirds, which lay their eggs in the nests of other birds. Other research efforts include determining if insects are more attracted to native plant cultivars or to wild native plants, and which native plants provide pollinators with the most nutritious pollen and nectar.

The Botanic Gardens and Ecology Woods offer year-round internship opportunities for students to gain hands-on research experience and skills for working in public gardens. Internships not only help the university maintain the gardens and advance research on native plant and animal species, they also provide the experience needed for students to be successful in their careers.

**Michigan State University**

For decades, Michigan State University (MSU) has considered its entire campus an arboretum. Besides an extensive canopy of trees, the 2,100-acre East Lansing campus features five curated gardens and landscapes, including the W.J. Beal Botanical Garden, the Horticulture Gardens, and a seven-acre plot of land managed by the Fisheries and Wildlife Student Club.

MSU has been preserving tree and plant species and adding new trees since the campus was founded in 1855. When Professor William James Beal came to MSU in 1874, he began a small nursery with seeds from around the world. MSU has dated some of these still-living original trees, along with a gingko that was given to the campus in 1863 by Professor Asa Gray of Harvard University. Past MSU presidents have valued green space and preservation of campus natural places, a tradition that continues to the present day.
Recently, MSU has undertaken a tree and woody plant identification program. So far, 25,000 trees from 1,900 different species across campus have been identified and mapped, with a major emphasis on native Michigan tree and plant species. The university has started a heritage tree program, collecting seeds to preserve the genetics of native trees growing on campus and throughout Michigan. A tree nursery is dedicated to propagating these important species.

In addition to the all-campus arboretum, the five-acre W.J. Beal Botanical Garden has an important collection of native trees and shrubs, and is a living laboratory for teaching, research, and outreach. Its specialty gardens feature economically important plants and species that are threatened and endangered in Michigan. Another area rich in woody plants is the six-acre Clarence E. Lewis Landscape Arboretum on the south side of campus. Dedicated in 1984 as a “learning experience in the making,” the arboretum is used by students who study landscape development. The late professor Lewis is remembered for saying, “Look up to enjoy what is overhead, look through the foliage ... Remember that trees can do so many things in a garden.”

Within the gardens, MSU also has a Native Bee Hotel, which houses native bees that are critical for pollinating the wide variety of plants on campus. Of the 400 native bee species in Michigan, the bee hotel shelters more than 30 species.

Campus trees are used extensively for research by MSU students and local school children. The state of Michigan requires elementary students to prepare a leaf collection of different species of trees. Thus, in early fall, it is common to see children searching for and pressing a wide variety of leaves.

**University of Idaho**

On the south end of the University of Idaho campus, occupying about 60 acres, are two places dedicated to plant collections. The original 14-acre parcel, now named the Shattuck Arboretum, was begun on a bare hillside in 1909 and today is the largest and densest patch of forest in the city of Moscow. This grove of mature trees is thought to be the oldest university arboretum west of the Mississippi River, notes Paul Warnick, the arboretum horticulturist. Among its native arboreal gems are large specimens of American beech, Canada hemlock, California incense-cedar, and giant sequoia.

A second parcel of 45 acres, the University of Idaho Arboretum and Botanical Garden, is landscaped in a more traditional way, with many native western woody species. Over the years, its plantings and water features have attracted coyotes, squirrels, cottontail rabbits, muskrats, and an occasional wayward moose. Warnick also noted that for a couple of winters a group of river otters visited the ponds for a few days, where they ate lots of fish. Birdlife is abundant. Of 409 bird species in Idaho, 153 have been sighted on campus, mainly in the arboretum and the botanical gardens. Species reported in Fall 2014 include Swainson’s hawk, western bluebird, Wilson’s warbler, and pine siskin. In 2011, a butterfly garden was installed that has attracted a wide range of butterflies and other pollinators, as well as calliope and ruby-throated hummingbirds.

“**In addition to opportunities for plant study and observation, the Arboretum provides a unique site for observing resident and migratory birds. The ever-changing habitats among the maturing ornamental plants provide food, nesting sites and stopping points for common and uncommon songbirds and raptors throughout the year.”**

– “About the UI Arboreta” website

Many academic disciplines use the sites for course work including biology, entomology, landscape architecture, weed science, restoration ecology, and horticulture. Students in a plant pathology course, for example, conduct a population survey of sunburst lichen on trees in the arboretum, using the lichen as a practice organism for field pathology studies. A small corner of the Botanical Garden is being used as a study plot for a future Palouse Prairie restoration, to be planted on an adjacent parcel.
CARBON SEQUESTRATION VALUE OF TREES ON AND OFF CAMPUS

Because living trees are effective long-term repositories for carbon, colleges and universities can increase carbon sequestration on campus by planting trees and protecting existing trees and forests. Trees can be part of an overall strategy for campus greenhouse gas reduction.

Trees convert CO$_2$ from the atmosphere into wood, leaves, and sugars through photosynthesis. Thus, carbon storage is a natural process for trees, along with their ability to provide oxygen. By dry weight, trees are about 50% carbon. The amount of CO$_2$ that a tree can store as wood depends on the species, size, and health of the tree. One method to determine how much carbon trees can sequester is to use i-Tree$^{65}$, a tool created by the U.S. Forest Service for assessing and managing community forests.

The carbon sequestered by a university’s trees, forests, grasslands, or unplowed agricultural lands can be used to offset some of its campus emissions.$^{65}$ In a 2006 report, the University of Michigan$^{44}$ (MI) estimated that its 5,800 hectares of forests and natural areas statewide can sequester 15,000 metric tons of CO$_2$ per year—a small percentage of its annual campus total—based on a per-hectare average of sequestration. At Auburn University$^{10}$ (AL), a graduate student conducted an inventory of trees on campus in 2010. He calculated that the 8,236 trees on campus hold 2,000 tons of carbon and can sequester 86 additional tons of carbon per year. While several other U.S. colleges and universities have supported projects to measure the capacity of campus trees to serve as carbon sinks, the percentage of total campus emissions mitigated by the trees is relatively small.

FEATURED CAMPUSES

Warren Wilson College$^{70}$ (NC)

With a mix of urban-style canopy and wild forests on the edge of the Blue Ridge Mountains, Warren Wilson College includes carbon sequestration in its long-term mitigation strategy to reduce campus greenhouse gas (GHG) emissions. The college’s 2009 Climate Action Plan calls for sustainable forestry practices on its contiguous 700 acres of mostly forested lands, of which 59 acres form the central campus. One action item, completed in 2013, was to assess the carbon sequestration capacity of the central campus canopy. With support from the North Carolina Forest Service, Warren Wilson’s landscaping crew of staff and students conducted an inventory of trees in the central campus, which is composed of two land types—landscaped/built grounds (39 acres) and semi-intact forest (20 acres).

In the landscaped areas around buildings, 1,153 trees were surveyed and 135 different species identified. Among the most common species were eastern hemlock and flowering dogwood, both natives. In the 20 acres of intact forest, trees in 20 representative sample plots were measured, showing an estimated 8,760 trees in the parcel. The most common were eastern white pine and tulip tree. The species, size, location, and overall health of each surveyed tree were noted. Using iTree software and the Tree Carbon Calculator of the U.S. Forest Service, students estimated carbon storage and sequestration potential as well as the overall value of the forest. In all, more than 50 students participated in the effort, logging more than 600 hours. Faculty from geographic information systems (GIS) and sustainable forestry programs consulted on the project and presented the results in their courses.

Aggie Replant: Students Plant Thousands of Trees in Texas$^{66}$

The nation’s largest student-run tree planting project, at Texas A&M University (TX), has been reforesting parts of the state for more than 20 years. Aggie Replant began in 1991 with 40 volunteers who planted a few hundred trees in parks and public places in the surrounding cities of Bryan and College Station. Today, Aggie Replant has become so popular it has to turn away volunteers for its annual Replant Day held in October. And since 2013, it has added a February planting event to help reforest Bastrop State Park, 80 miles away, which was decimated by a forest fire in 2011. In February 2014, 600 volunteers helped plant over 11,000 trees at the park, primarily loblolly pine. While no calculations have yet been done, the tens of thousands of trees planted by the students sequester an increasing number of tons of carbon every year.
in perspective, the annual sequestration on the 59-acre central campus is equivalent to the carbon emissions of the college for 6 days, or about 1.6% of its annual total. This does not include, of course, the adjacent 630-plus acres of campus lands that are primarily forest-covered.

The tree inventory has been used to create a campus tree management plan focused on increasing sequestration value and helping the college reach its goal of an 80% reduction in greenhouse gas emissions by 2020. “The inventory,” notes Tom LaMuraglia, Landscaping Supervisor, “has opened our eyes to the value of a relatively intact forest canopy in a semi-urban situation.”

As a charter signatory of the American College and University Presidents’ Climate Commitment, Allegheny conducts periodic greenhouse gas inventories. The first inventory was done in 2001, and the inventories include the carbon storage capacity of the Bousson Reserve. To find how much carbon the reserve’s forest can store, Allegheny’s environmental science students divided the acreage into vegetation types and calculated how much carbon each type can sequester. Trees were measured (diameter at breast height) and cored (a method for extracting a sample of the growth rings) to quantify growth. The data were used to calculate biomass changes over time. In the reserve, an estimated 627 metric tons of carbon dioxide equivalent is stored annually by the trees (equaling about 170 tons of carbon or 4% of annual campus emissions). As noted by Professor of Environmental Science Richard Bowden, “Students learned that forests can play an important role in reducing atmospheric CO₂ pollution, but also that reliance on natural ecosystems alone cannot solve the climate change problem.”