At the Arnold Arboretum, we continuously strive to increase the health of our plant collections, improve the aesthetics of our landscape, and support and enhance ecosystem health across our 281 acres of urban greenspace. We do this by thinking critically about landscape stewardship and the impact of our activities on the larger environment. From reducing our carbon footprint to recycling green waste into a compost “brew”—yes, even coffee and beer contribute to feeding our plants—inquiring an adaptive management approach reflects our ever-increasing concerns for a changing world.

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A Lighter Footprint

If you have visited the Arboretum over the past year, you may have noticed the addition of new mulched paths, areas of tall grass, a reduction in leaf collection, and the cordonning-off of key specimens. These changes reflect our coordinated strategy to improve the health of the collection by containing or minimizing the physical footprint on our soil—the primary cause of soil compaction. Soil compaction reduces moisture infiltration, soil biodiversity, and the fine root growth that trees depend on for absorbing nutrients and water. As a result, compaction
stresses and weakens the valuable plants in our landscape and increases the cost of care and maintenance required to sustain them.

Some recent steps taken to reduce compaction across the Arboretum include reducing or eliminating mowing with heavy equipment in the linden, maple, zelkova, oak, hornbeam, and pine collections and establishing seasonal “no-mow” areas on Peters Hill, Bussey Hill, and in the conifer collection. In addition, new protocols reduce the off-road use of vehicles, while mulched paths enable ease of access for both visitors and staff into the collections while channeling compaction along managed routes. As a bonus, less machinery in the collections increases the amount of undisturbed habitat for a variety of organisms while also reducing carbon emissions.

Lightening our footprint requires equipment evaluations as well. For example, last year we retired the eighteen-ton bucket truck used by our arborists to access the canopy and replaced it with a smaller, more versatile lift that exerts about a third of the weight, uses battery and diesel power, and extends up to ninety feet in the air. This complements a second, smaller lift acquired in the previous year. Together, these new lifts allow our arborists to get closer to our trees without damaging their vital root systems.

The physical weight of our operations is not the only footprint we care about. Since climate change induced by greenhouse gases presents a major threat to plants in our landscape as well as their wild counterparts, identifying methods to reduce our emissions is increasingly important to our institution. As a result, we are investing in renewable energy to fuel our operations where we can, like utilizing a rooftop solar array to help power our equipment garage and providing our grounds crew with a growing number of electric tools. Along with reducing fuel use and emissions, electric tools are quieter and improve the auditory aesthetic of the landscape. While visitors will likely enjoy a more serene experience here, research suggests that some species of birds and mammals that have difficulty communicating in noisy urban environments may appreciate the change as well.

**Top**, Seasonal Arborist Anthony Lombardo, Gardener Brendan Keegan, and Horticulturist Laura Mele help plant 2,500 plugs of butterfly milkweed (*Asclepias tuberosa*) in a reduced-mowing meadow on Peters Hill, enhancing the value to pollinators. **Bottom right**, mulched pathways like this one through the viburnum collection direct visitors, staff, and maintenance equipment along cushioned routes and reduce damaging traffic on soil. **Bottom left**, Arboretum arborists ascend into the canopy with a new lift that is more versatile, conserves energy, and creates significantly less pressure on root systems. **Left opposite**, the thriving wet meadow in the conifer collection was started in 2016 when Arboretum staff and interns from Norfolk County Agricultural High School planted more than eight-hundred native wildflower plugs including common boneset (*Eupatorium perfoliatum*), whorled milkweed (*Asclepias verticillata*), great blue lobelia (*Lobelia siphilitica*), and short-toothed mountain mint (*Pycnanthemum muticum*).
Progress through Partnership

Our efforts to think critically about our operations and enhance our landscape also rely heavily on collaboration with local businesses, academic institutions, and federal agencies. Take our new compost system, for example. Organic waste from staff breakrooms is combined with spent grains and hops from Turtle Swamp Brewing (Jamaica Plain), coffee grounds from Recreo Coffee (West Roxbury) and mixed with weeds, grass, leaves, and fine woody debris. After weeks of monitoring temperatures, turning piles, adding new ingredients, and letting it rest, the result is 100 percent organic (and very local) compost. We apply this nutrient-rich, biologically active, and pathogen-free product as a soil amendment to feed our plants and improve the physical properties of our soil.

To gain insight into what our soils and plants need in the first place, we rely on a committee of soil specialists drawn from government agencies, public gardens, and universities. Results from our recent soil sampling and compaction-evaluation efforts help the committee provide recommendations for our compaction-prevention protocols, soil treatments, and irrigation initiatives. Managing historically disturbed soils to grow trees from around the world requires constant evaluation, and our work with partners from around New England and beyond plays a key role in this endeavor.

We also rely on regional expertise to help reduce herbicide and pesticide applications and to stay on the leading edge of bio-control research. In the past, Arboretum horticulturists worked with local organizations to rear and release populations of the purple loosestrife beetle (Galerucella pusilla) to contain the invasive purple loosestrife (Lythrum salicaria) in our wet meadows. Since 2015, we have partnered with University of Massachusetts–Amherst Professor Joe Elkinton and contributed to the release and study of Cyzenis albicans, a parasitic fly that specializes on the larvae of winter moth (Operophtera brumata)—one of New England’s most prolific and challenging plant pests. Regular surveys on our grounds, and a remarkable decline of the moths since this work began, is a hopeful indication of success.

Recent collaborations with Richard Casagrande (Professor Emeritus, University of Rhode Island) led us to plant and study Canadian hemlock (Tsuga canadensis) that are showing promise for resistance to hemlock woolly adelgid (Adelges tsugae), and in 2019 we hope to release a newly approved bio-control for black swallowwort (Cynanchum louisea). Along with being a highly invasive vine, swallowwort is also correlated with declining populations of monarch butterflies, which confuse it with their native host plants. As a whole, these partnerships lead to a better understanding of our environment and inform a holistic approach to its management.

Supporting Wildlife

As these initiatives illustrate, a holistic approach to the health of our plants also improves wildlife habitat on the grounds. While one purpose of reduced mowing pressures is soil-compaction mitigation, another is increasing the amount and diversity of flowering plants. This is a boon for pollinators and other insects that depend on herbaceous annuals and perennials for summer forage and winter dormancy. Mass milkweed plantings on Peters Hill, pollinator-friendly plantings in the open wet-meadow of the conifer collection, and the steady installation of herbaceous plants throughout the landscape continue to enhance the ecological value of these areas as habitat.

Another example is our decision to “leave the leaves” on most of our 281 acres this past fall. Naturally-deteriorating leaves increase nutrient cycling, insulate roots, protect against
soil erosion, and reduce the impact of mowers and leaf clean-up equipment on the landscape. Leaves provide essential habitat as well, supporting many species of butterflies and moths whose pupae depend on leaf litter to survive the winter. In addition, many amphibians, such as adult salamanders and toads, rely on leaf litter for camouflage, habitat, and hunting, while birds such as the American robin and American woodcock flip through them in search of invertebrate prey.

However, since often problematic mammals like rabbits, mice, and voles also enjoy inhabiting these environments, making the landscape appealing to natural predators is important, too. Our arborists recently installed several nest platforms designed to attract great horned owls and red-tailed hawks, carnivorous species whose diets consist mostly of rodents. Nest boxes suitable for screech owls and the much less common barred owl also hang throughout the landscape. Although these birds are common in New England, increasing available nest sites may provide us with a chance to gain insight on their populations at the Arboretum, as well as free and effective pest control.

In addition, our nest boxes for cavity nesting birds successfully attracted black-capped chickadees, tree swallows, great crested flycatchers, and house wrens during their first year. As a bonus, we even have a colony of chimney swifts living in the inactive Hunnewell Building chimney. Given appropriate nesting habitat, all of these species play a role in regulating insect populations, from tree swallows elegantly catching mosquitos along Blackwell Path to black-capped chickadees feeding their young with leaf-eating caterpillars.

Moving Forward

Overall, our approach to landscape management at the Arboretum focuses on the principles of plant care, soil health, work efficiency, and intelligent aesthetics to make the most sustainable decisions for this urban ecosystem. The decisions we make rely on input from a variety of experts and stakeholders, both in our neighborhood and throughout the region, and the actions we take help inform the effectiveness of horticultural practices beyond our grounds. Taken together, these and other activities increase the value of the Arnold Arboretum as a role model for sustainable practices while highlighting the importance of our landscape to organisms of all types in the City of Boston and beyond.

DIG DEEPER INTO PLANT CARE, URBAN LANDSCAPES, AND SUSTAINABILITY

with Arnold Arboretum experts

Landscape Plant Selection, Planting, and Establishment
Saturday, May 4, 1:00–3:30pm [HB]
Andrew Gapinski, Head of Horticulture
Learn standards and techniques for growing healthier plants, including site selection and preparation, planting, and establishment—and common issues and solutions for balled-and-burlapped and containerized specimens.

Landscape Compost Compendium
Thursday, June 6, 6:00–8:00pm [HB]
Conor Guidarelli, Horticulturist
See what components make the most effective compost, from mixing the right balance of brown to green materials to giving the materials proper moisture and aeration to encourage decomposition.

The Substance of Soil
Wednesday, July 10, 6:00–8:00pm [HB]
Conor Guidarelli, Horticulturist
Gain an overview of soil, from its formation and components to its properties. Learn how to analyze soil quality to determine amendments needed for desired outcomes.

Gardening for Butterflies and Moths
Tuesday, July 16, 5:30–8:00 PM [HB]
Colin McCallum-Cook, Horticultural Technologist
Learn how to attract moths and butterflies to your garden and create habitat with plants that cater to their unique lifecycle requirements.

See details on pages 14–17. Register at arboretum.harvard.edu