# A Survey Study of University Tree-Care Practices

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CFaR | Center for Facilities Research

Trees and forests play a significant role in the college campus landscape. Many campuses are borne out of a pastoral legacy and are intentionally designed as extroverted, expansive spaces that provide important services to the people who work, study, recreate, and visit campus grounds. Trees help beautify the campus landscape; in fact, many institutions are defined by their canopy of trees, their stately old landmark trees, or their unusual specimens.

Beyond recognition of the aesthetic value of trees, research embedded in the urban forestry discourse demonstrates an ever-expanding portfolio of benefits that trees provide, including carbon sequestration, air pollution abatement, stormwater-runoff mitigation, and building energy conservation. Contact with nature and green infrastructure can also improve one's well-being. For example, it can restore attention, lower blood pressure, reduce aggression associated with mental fatigue, reduce stress, and promote social cohesion; these findings have direct implications for college students and university staff.

The 4,600-plus colleges and universities in the United States and Canada offer ideal places to showcase efforts to beautify and manage landscapes sustainably, but how treed are campus landscapes? Are campus forests being managed sustainably and systematically? Are the campus departments who are responsible for tree care and management adequately staffed and financially supported?

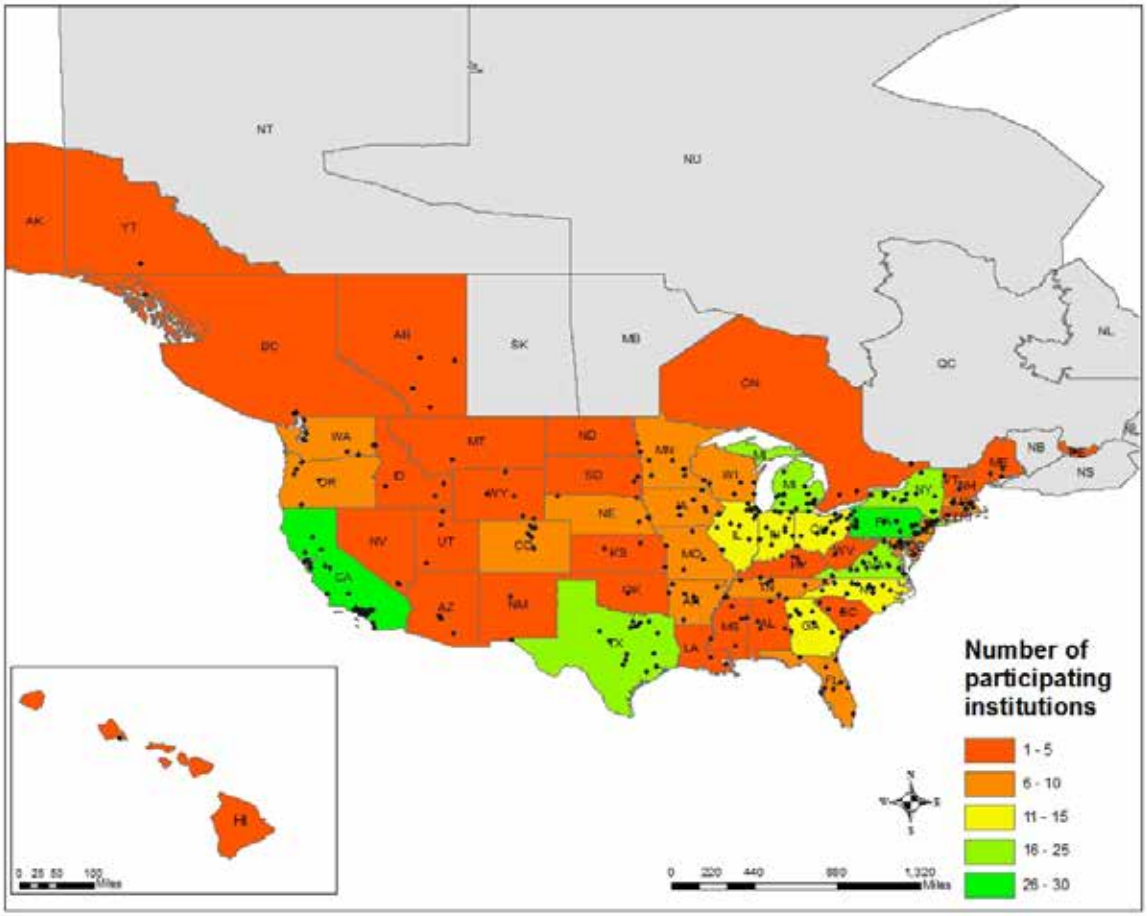
To the author's knowledge, little to no research has been conducted to understand the extent to which college campuses are treed, and the ways in which institutions manage their trees. In contrast, national longitudinal studies that collect information on municipal tree care and management have been conducted since the 1970s; these datasets provide useful data to benchmark and track future progress. As college campuses continue to grow and, in many cases, become more urbanized, there is a need to understand the forest assets that reside on campus, and the ways in which such forests are being managed.

Against this backdrop, a survey was disseminated to colleges and universities in the United States and Canada to collect information about the ways in which campus trees are managed. Specific objectives of this survey were to:

- Estimate the number of trees and the extent of tree canopies on campuses.
- Characterize the strategies employed by institutions to manage trees on campus.
- Characterize the key personnel involved in setting tree-care rules and strategies, and the stakeholders involved in cooperating in these strategies.
- Examine the perceptions of institutions regarding their strengths and weaknesses as they relate to their tree-management program.

This article briefly describes the survey and provides an overview of the primary results. From institutional responses to this survey, and an extensive review of the urban forest sustainability

**Figure 1. Number of participating institutions per state (*n*=378).**



literature, a set of recommendations for colleges and universities has been developed and will be discussed in the next issue (November/December) of *Facilities Manager*.

## THE SURVEY

A web-based survey was administered to institutions across the United States and Canada in 2017 and 2018, with the assistance of the Arbor Day Foundation and APPA's Center for Facilities Research (CFaR), using three alternative approaches. The first was an email blast from the Arbor Day Foundation to all institutions certified as Tree Campus USA. The second consisted of directed emails to institutions that were identified using a stratified random sampling approach from the Carnegie Classification of Institutions of Higher Education system. The third consisted of an email blast to institutional members of APPA. Use of these three approaches aimed to solicit feedback from as wide of a network of colleges and universities around North America as possible, including institutions with established tree-management plans and institutions that lack a formally recognized tree-management program. Individuals contacted to participate in the survey included campus arborists and facilities staff members who are active in campus tree-management efforts.

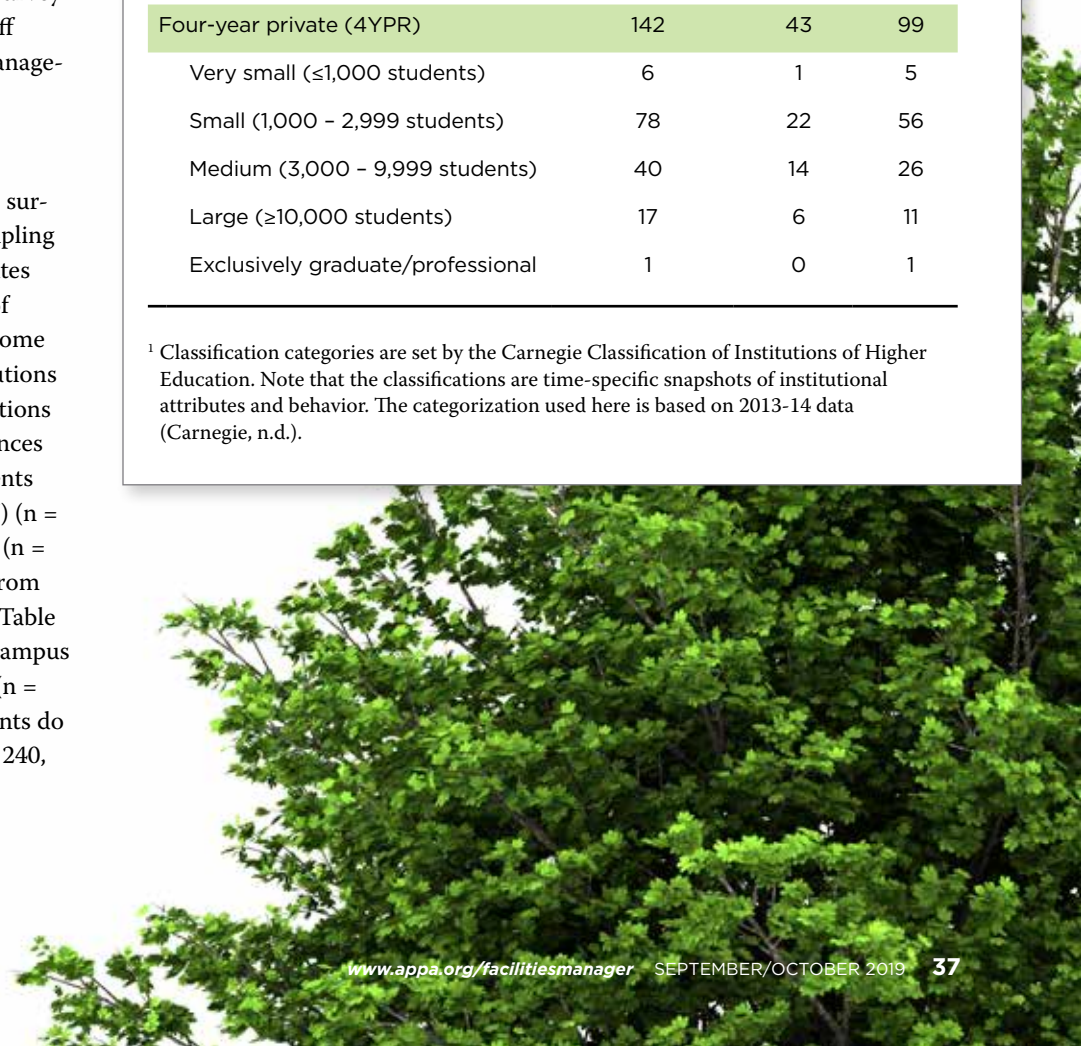
## SURVEY RESPONSE

The author received 378 responses to the survey (response rate indeterminate given sampling approach). Institutions in each of the 50 states and Washington, D.C., with the exclusion of Delaware, participated in the survey, with some states having almost 30 participating institutions (Figure 1). Twelve of the responding institutions were from Canada, representing four provinces and one territory. The majority of respondents were from 4-year public institutions (4YPU) (n = 200) and 4-year private institutions (4YPR) (n = 142), with a small number of respondents from 2-year public institutions (2YPU) (n = 36) (Table 1). A number of colleges with active Tree Campus USA certification responded to the survey (n = 138, 36%), though the majority of respondents do not currently take part in the program (n = 240, 64%) (Table 1).

**Table 1. Participating institutions by control, level, and enrollment size, determined by the number of full-time equivalent students enrolled.**

| Classification[1] | Respondents (n) | Tree Campus USA certified: Yes | Tree Campus USA certified: No |
|---|---|---|---|
| Total, all institutions | 378 | 138 | 240 |
| Two-year public (2YPU) | 36 | 7 | 29 |
| Small (500 – 1,999 students) | 3 | 0 | 3 |
| Medium (2,000 – 4,999 students) | 13 | 2 | 11 |
| Large (5,000 – 9,999 students) | 14 | 4 | 10 |
| Very large (≥10,000 students) | 6 | 1 | 5 |
| Four-year public (4YPU) | 200 | 88 | 113 |
| Very small (≤1,000 students) | 1 | 0 | 1 |
| Small (1,000 – 2,999 students) | 13 | 4 | 9 |
| Medium (3,000 – 9,999 students) | 63 | 20 | 43 |
| Large (≥10,000 students) | 122 | 64 | 58 |
| Exclusively graduate/professional | 1 | 0 | 1 |
| Four-year private (4YPR) | 142 | 43 | 99 |
| Very small (≤1,000 students) | 6 | 1 | 5 |
| Small (1,000 – 2,999 students) | 78 | 22 | 56 |
| Medium (3,000 – 9,999 students) | 40 | 14 | 26 |
| Large (≥10,000 students) | 17 | 6 | 11 |
| Exclusively graduate/professional | 1 | 0 | 1 |

[1] Classification categories are set by the Carnegie Classification of Institutions of Higher Education. Note that the classifications are time-specific snapshots of institutional attributes and behavior. The categorization used here is based on 2013-14 data (Carnegie, n.d.).



## HIGHLIGHT OF SURVEY RESULTS

A detailed review of survey results is available in the full report (see *https://www.appa.org/cfar-completed-projects*). Provided here are a few highlights from this study.

### *Campus Tree Cover and Goals*

- Respondents of this survey study were diverse in their stated tree abundance. The majority of respondents indicated having somewhere between 1,000 to 5,000 trees, though estimates ranged from 10 trees to 50,000 trees. Most respondents indicated their tree abundance value was an estimate rather than an accurate account.
- Currently, 36% of responding institutions either have a tree planting goal (20%) or are developing one (16%). The frequency was higher for 4YPU institutions (43%) than for 4YPR (31%) and 2YPU institutions (22%) (Figure 2A); however, for all institutional groups, the majority have not identified a planting goal.
- In this study, 76% of responding institutions provided a canopy estimate for their campus, with values ranging from 1% to 95%. The wide variability in canopy cover across institutions can be attributed to a number of factors (e.g., location, local environmental conditions, size of campus, historical legacy); from a purely methodological standpoint, the wide range may simply be the result of incomplete or absent canopy data. Just under 10% of those that provided a canopy estimate cited it was an "accurate record."
- 21% of responding institutions either have a tree canopy goal (9%) or are in the process of identifying one (12%). Again, the frequency was higher for 4YPU institutions than for 4YPR and 2YPU institutions (Figure 2B); however, for all institutional groups, the majority have not identified a canopy goal.

### *Tree Inventory Efforts*

- Two-thirds of the responding institutions (67%) indicated they have some level of a tree inventory, with just over 50% of these computerized. The software used to collect and track inventory data varied; the most common responses included Microsoft Excel, ArcGIS, ArborPro, and ArborScope.
- Tree inventories regularly included information about tree species (99%), tree location (97%), tree diameter (69%), and tree condition (69%). Other information, such as insect/disease problems, tree conflicts, height, tree risks, year planted, and tree value were also collected by some institutions.
- Inventories were commonly used to identify tree planting locations (72%), select tree species to plant (69%), remove trees (62%), and schedule tree pruning (55%).

### *Tree Planting and Removal Decisions*

- In terms of the major expenditures associated with tree care and maintenance, three major work activities dominate: planting, pruning, and tree removal, including the disposal of trees. Closely following these three was the cleanup of tree debris associated with storm damage.

**Figure 2. (A) Does your institution currently have a tree planting goal? (*n* = 370). (B) Does your institution currently have a tree canopy goal? (*n* = 360).**

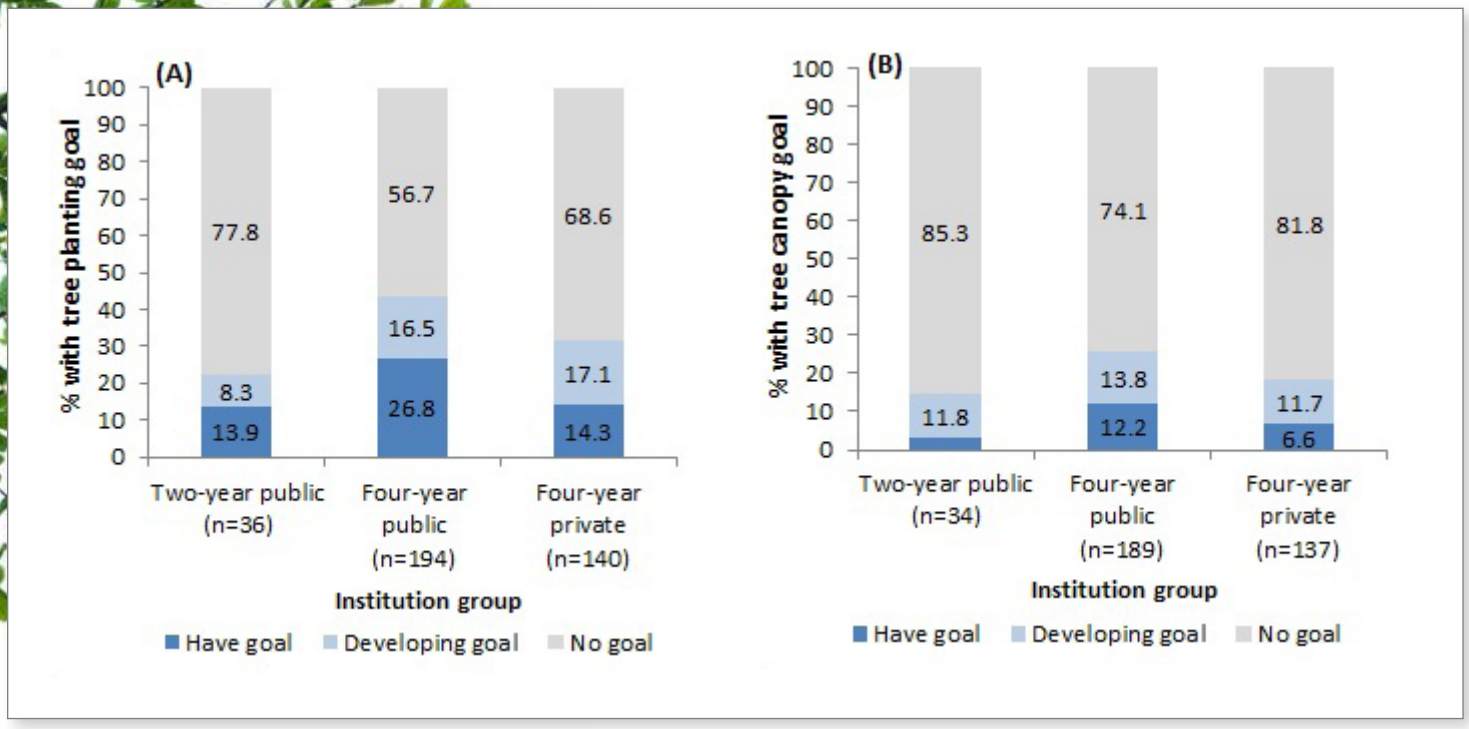


**Figure 3. Which of the following are *formally* considered in the decision to plant trees on campus property? (*n*=365), though some of the categories had fewer responses (minimum *n* equaled 347).**

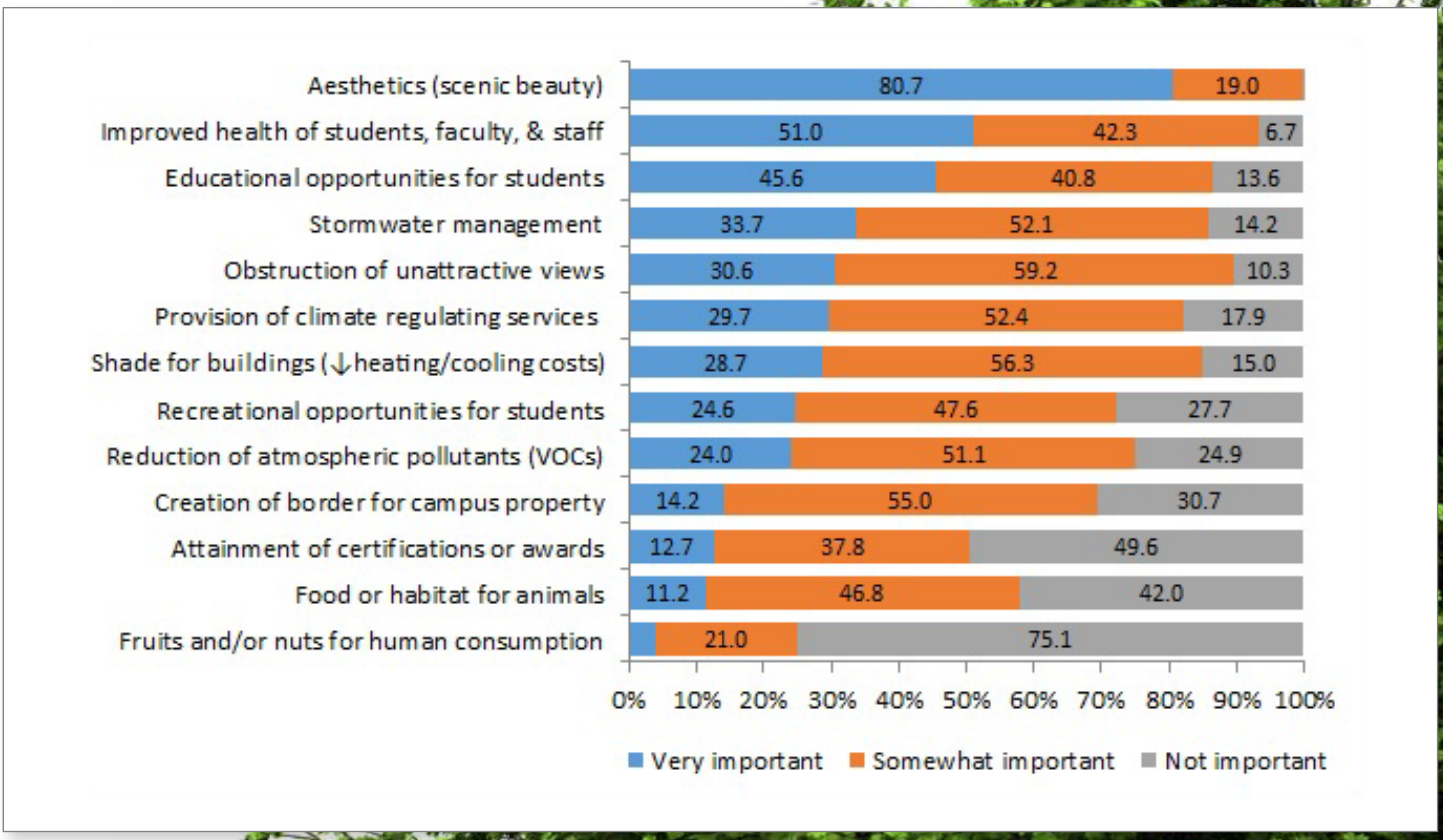



**Figure 4. What training and/or credentials are held by staff responsible for tree activities and/or management of trees? (*n*=357).**

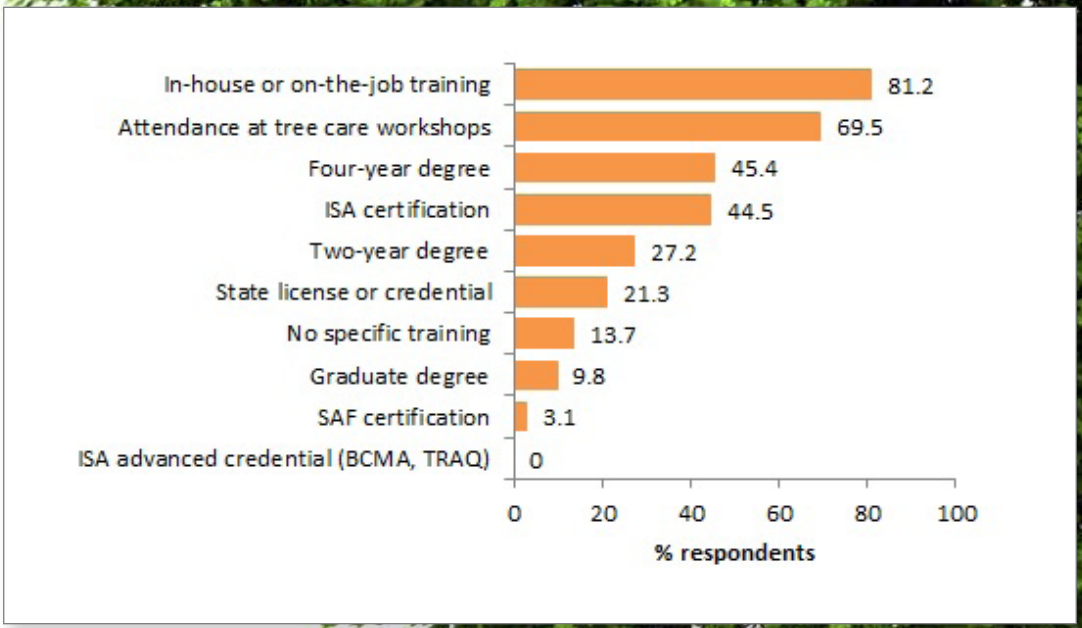
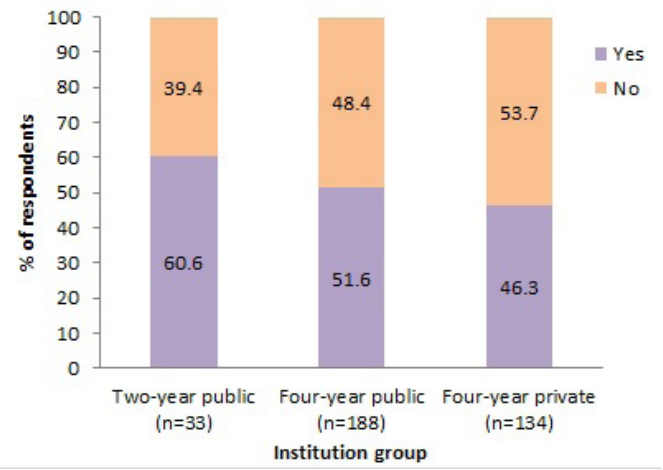


**Figure 5. Is your budget adequate to meet the current needs of your work plan or your future goals for tree-care program activities? (*n* = 355).**




- What influences tree planting decisions? The most commonly cited reason for trees to be planted was aesthetics. Two other common reasons included improved health of students and personnel, and educational opportunities for students (Figure 3).
- Reasons for tree removal included tree death or decline (100%), disease/insect problems (84%), conflict with a development project (82%), and storm damage (79%). About a quarter of respondents identified additional reasons such as utility conflicts, request of a top-level administrator, and damage to sidewalks as reasons for tree removal.
- After removal, trees may be disposed of in many ways. 78% of all respondents create mulch from campus trees. Other common disposal methods included production of firewood (41%), disposal in a landfill (25%), and reuse of lumber for on- or off-campus projects (23%).

### *Personnel and Budgets*

- A large proportion of the training and credentials held by staff at responding institutions were on-the-job (81%) and from attendance at tree-care/management workshops (70%). The most commonly pursued certification among responding institutions was the ISA (International Society of Arboriculture)

Certified Arborist program (45%), followed by a state-specific license or credential program (21%) (Figure 4).

- Is the current budget adequate to meet identified needs of current or projected future tree-care goals? Roughly equal numbers of respondents indicated the budget was adequate (50%) and not adequate (50%). There were small differences by institutional group, with 2YPU institutions viewing their budget more positively than 4YPU and 4YPR institutions (Figure 5).
- When asked to rate their satisfaction with the budget for tree-related work, over half of all respondents indicated they were satisfied (43%) or very satisfied (10%). Just over 30% of all respondents indicated they were unsatisfied (27%) or very unsatisfied (5%) with their budget.

### *Tree-Care Program SWOTs*

Respondents were asked to identify the four most significant strengths, weaknesses, opportunities, and threats (SWOTs) to their institutions' tree-care program. For each SWOT category, respondents were given 9 to 10 potential characteristics. The SWOT categories were defined in the survey as shown on box at right.

Common strengths, identified by more than half of all respondents, included the institution's diversity of campus tree species (72%), quality of tree care (55%), and extent of tree canopy (50%) (Table 2).

The two most common weaknesses included limited staff (66%) and lack of funding/resources (56%), followed by the absence of a proactive management plan (30%) or inventory data (29%) (Table 2). Perhaps in response to these weaknesses, commonly identified

**SWOT Categories**

**Strengths**: *Internal* characteristics that are unique, special, highly valued, and/or positive relative to other institution's tree-care programs.

**Weaknesses**: *Internal* challenges that limit progress or place the institution at a disadvantage relative to other institution's tree-care program successes.

**Opportunities**: *External* elements that could be exploited to accelerate an existing strength of the program, or create and accelerate a new potential strength of the program.

**Threats**: *External* elements that could cause trouble or could reduce the capabilities and effectiveness of the tree-care program.

**Table 2. The top strengths, weaknesses, opportunities, and threats to campus tree-care programs, identified by respondents. For each category, a number of other characteristics were identified as being important (but were collectively identified less frequently so are not included here).**

| | HELPFUL | HARMFUL |
|---|---|---|
| INTERNAL ORIGIN | **STRENGTHS**<br>• Diversity of tree species (71.7%)<br>• Quality of tree care (55.4%)<br>• Extent of tree canopy (50.3%)<br>• Staffing expertise in tree care and management (38.6%)<br>• Contractor performance/relationship (38.0%) | **WEAKNESSES**<br>• Limited staff (66.1%)<br>• Lack of funding/resources (55.5%)<br>• Lack of proactive/planned management (30.0%)<br>• Lack of data, records, and surveys (29.4%)<br>• Lack of technical expertise in tree care (23.6%) |
| EXTERNAL ORIGIN | **OPPORTUNITIES**<br>• Increased funding and resources (61.9%)<br>• Increased staffing (46.2%)<br>• Improved data, records, and surveys (43.8%)<br>• Production of a more proactive tree-management plan (42.6%)<br>• Improved staff skills (37.5%) | **THREATS**<br>• Funding and resources (66.2%)<br>• Spread of pests (53.5%)<br>• Staff numbers (44.7%)<br>• Development conflicts (41.7%)<br>• Climate change (26.3%)<br>• Lack of institutional support (25.1%) |

opportunities for institutions to exploit included increased funding, increased staffing, completion of inventory data, and production of a proactive tree-management plan (Table 2).

A diverse set of external threats to the institution's tree-care programs were identified, including but not limited to lack of funding (66%), spread of pests (54%), limited staff (45%), development conflicts (42%), climate change (26%), and lack of institutional support (25%) (Table 2).

## CONCLUSIONS AND NEXT STEPS

Many universities are making commitments to campus sustainability efforts, and through carbon sequestration, air pollution abatement, reduction of stormwater runoff, provision of habitat for animals, and improved building energy conservation, campus trees can help both the economic and environmental bottom line of universities. As such, creating a culture of campus forest stewardship and sustainability that goes beyond beautification should be encouraged.

Collective responses to this survey point to a strong institutional sentiment for trees and investment in their care,[1] but many opportunities remain to strengthen and enhance efforts that promote campus forest stewardship and conservation. As such, results from this survey and an extensive review of the urban forest sustainability literature have informed development of a set of seven recommendations for colleges and universities. These recommendations aim to promote effective management and stewardship of campus trees. An extensive discussion of these recommendations is forthcoming in the November/December 2019 issue of *Facilities Manager*.

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[1] The potential for response biases should be noted. That is, people are inclined to participate in surveys on topics that are familiar to them, interesting to them, or align in some way with their beliefs or values. Therefore, it is possible that survey respondents (and the institutions they represent) were predominantly "tree advocates" and that the survey does not adequately represent viewpoints of people (and institutions) who are less active in, or indifferent to, the management of campus trees. That said, this survey sought feedback from a wide network of universities and provides a good foundation from which future surveys may be developed about tree-care program efforts.