

Salvaging Native Plants from Sites Slated for Development: Stop Wasting Resources¹

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Benefits of Native Plants for Urban Landscaping

Interest in incorporating native plant species into landscaping has increased over the past few decades (Kauth and Perez 2011). One reason for this increase is greater public awareness regarding the potential benefits native species provide (Brzuszek et al. 2007). Native plants support local biodiversity by providing essential forage and shelter for wildlife and pollinators (Donaldson 2004; Ober and Knox 2013). In addition, once established, native vegetation adapted to dry and sandy soils can help conserve water due to their low water demand, thus decreasing the need for landscaping irrigation (US EPA 2002). Despite these benefits, only 25% of native plant species in Florida are commercially available in the state (Wilson et al. 2017). This low availability is because native plant species are typically sold in small markets and local native nurseries and have limited production (Norcini 2007). Despite these limitations, the number of native plant species being planted in residential landscaping and gardens has steadily increased over the past 30 years (Kauth and Perez 2011).

Organizations, such as Florida Native Plant Society (<https://www.fnps.org>) and the Association of Florida Native Nurseries (<https://www.fann.org/>), provide information on native plant species, as well as their economic and environmental benefits. In addition, these programs provide

information on how native plant species can be used in landscaping and how the proper selection and placement of the correct native plant species can promote water conservation and support wildlife.

Limitations to Incorporating Native Landscape Plantings

There are two major limitations to incorporating native plant species into urban landscaping. The first is plant availability. As stated above, native plant species are not as commercially available as nonnative species, and the diversity of available native plant species certainly lacks in comparison to what one finds in natural environments.

The second is that land development practices such as residential and commercial construction create environmental conditions that are strikingly different from those under which native plant species thrive, thereby hindering plant establishment and growth. During the construction phase, the landscape is altered as the site's elevation is typically raised by using multiple layers of soil fill, which is spread across the site. The soil fill is typically sterile and nutrient-poor sandy soils from different locations and/or dense and water-logged clay soils from onsite excavated stormwater ponds (Hochmuth et al. 2013). Once distributed across a site, fill is usually compressed due to heavy construction equipment (Hochmuth et al.

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2013; Shober et al. 2010). These sterile, nutrient-poor, and compressed soil conditions can prevent many native plant species from establishing and thriving due to the plants not receiving adequate nutrients and/or the root space to grow (Hochmuth et al. 2013). These conditions can even hinder the growth on nonnative species. The incorporation of soil amendments can improve growing conditions by providing essential nutrients, increasing soil water-holding capacity, and promoting healthy microbial communities (Bean and Dukes 2010; Trenholm et al. 1991). Regardless, proper selection of plant species (i.e., following the principle of “right plant, right place”) and using those species that can withstand the environmental changes occurring during residential and commercial land development is important to ensure the successful establishment of, and subsequent benefits from, plants in urban landscapes.

Salvaging Native Plants from Development Sites: Saving an Otherwise Wasted Resource

To promote native plant species for urban landscaping, we need to find strategies to overcome the challenges presented by limited plant material and soil alterations. One such strategy is to salvage from sites slated for development native plant material that would otherwise be destroyed. Salvaging plant species from future development sites could contribute much-needed native plant material. These salvage efforts can prevent the waste of valuable plant material and reduce the resources required to grow new plant materials for these future development sites (e.g., water, fertilizers, pesticides) (Landowner Resource Center 2017). We also point out numerous plant species that can be incorporated successfully into compacted, nutrient-poor soils and other challenging growing conditions found within new urban developments (Bean and Dukes 2010).

This publication presents a case study that demonstrates the feasibility of salvaging plant material from future development sites to use in urban landscaping. This publication is intended for developers, Extension agents, planners, landscape architects, policymakers and landscapers who are interested in using, or promoting the use of, the native plant resources found on sites slated for development.

Case Study

To illustrate the potential to salvage and use native plant species from sites slated for development for urban landscaping, we compiled a list of plant species present on a proposed development site north of Gainesville, FL.

The proposed development site is managed for timber, has sandy soils with higher organic material closer to the soil surface (i.e., spodosol), and is dominated by pine trees (*Pinus* spp.) and bayberry shrubs (*Myrica cerifera*). The list of documented plant species was compiled by the authors of this publication and a consultant who assisted in the environmental assessment of the initial development plan. From this species list, we created a database listing each native species and their traits. The plant traits provided are broken up into three major categories: aesthetics, habitat, and function, where aesthetic traits describe what the plant looks like, habitat traits describe the plant’s growing conditions, and functional traits describe how the plant affects the environment in which it grows. We used these attributes and general knowledge of current utility in urban landscapes to determine which species are well-suited for urban landscapes, and which of those are well-suited for the poor growing conditions typically found in new residential developments. This database can be downloaded from the Institutional Data Repository at the University of Florida from this link: <https://ufdc.ufl.edu/IR00011318/00001>.

What We Found

A total of 273 plant species, both nonnative and native, were documented in the proposed development site with 80 of these species being native species already found in urban landscapes (Table 1). The number of native landscaping plant species found illustrates the potential waste of plant materials if these species are not salvaged. In addition, we found these species varied considerably in their current landscaping usage, further illustrating the potential for salvaged plant materials to fit most landscaping functions. Examples of these species include red maple (*Acer rubrum*), dahoon holly (*Ilex cassine*), American holly (*Ilex opaca*), highbush blueberry (*Vaccinium corymbosum*), winged sumac (*Rhus copallina*), Leavenworth’s tickseed (*Coreopsis leavenworthii*), Elliott’s lovegrass (*Eragrostis elliottii*), and fine leaf blazing-star (*Liatris tenuifolia*) (Figure 1A–H). Red maple serves as a shade tree that provides habitat to birds and pollinators (Gilman et al. 2018a). The dahoon and American holly are both a small tree/large shrub species that can provide privacy (Gilman et al. 2018b; Gilman et al. 2018c), while highbush blueberry is a lower-growing shrub species that can function as a shorter perimeter hedge (Florida Native Plant Society website 2020). Winged sumac is a small tree/large shrub that serves as an ornamental in places where large trees are not appropriate, such as along the roadsides and up against patios (Gilman and Watson 2014a). In contrast to species that provide boundaries and shade, Leavenworth’s tickseed, Elliott’s lovegrass, and fine leaf blazing-star are species that are best used as

lower-growing ornamental species (Gilman et al. 2014; e.g., Florida Native Plant Society website 2020).



Figure 1. Examples of eight species common in urban landscapes that provide a diversity of landscaping functions, including (A) red maple, which provides shade, (B) dahoon and (C) American holly, which function as screens around landscaping perimeters, (D) highbush blueberry, which provides hedging, (E) winged sumac, which contributes as an ornamental tree/shrub in places not well-suited for large trees, and (F) Leavenworth's tickseed, (G) Elliot's lovegrass Credits: A. Kayla Hess; B. Steven Katovich, USDA Forest Service, Wikimedia Commons; C. David J. Stang, Wikimedia Commons; D. Bruce Kirchoff, Wikimedia Commons; E. Scott Zona, Flickr; F. Raul654, Wikimedia Commons; G. Bob Peterson, Wikimedia Commons; H. Annika Lindqvist, Wikimedia Commons

Not only did we find a suite of useful native landscaping species, 31 of these species are potentially well-suited for the harsh soil conditions found in newer residential developments (see Table 1). Examples of these species are longleaf pine (*Pinus palustris*), green ash (*Fraxinus pennsylvanica*), eastern red cedar (*Juniperus virginiana*), sand live oak (*Quercus geminata*), gopher apple (*Licania michauxii*), shiny blueberry (*Vaccinium myrsinites*), blueheart (*Buchnera americana*), and Texas vervain (*Verbena halei*) (Figure 2A–H). We selected these species because they are able to grow in dry, sandy soils, which is an important trait, given that soils in new residential landscapes tend to be well-drained, sterile sandy fill. These species, like the prior listed examples, also provide a diversity of landscaping functions. Longleaf pine and green ash are both tree species that serve as shade trees in urban landscaping (Gilman et al. 2018d, Gilman et al. 2018e), while eastern red cedar, a smaller tree, serves as a privacy screen along landscaping perimeters (Gilman and Watson 2014b). Sand live oak serves as an ornamental tree in urban landscaping and is highly used by birds and pollinators (Florida Native Plant Society website 2020). Gopher apple is a shrub that serves as a groundcover, while shiny blueberry, also a shrub, can serve as an ornamental plant within a garden or as a hedge (Florida Native Plant Society website 2020). Finally, both blueheart and Texas vervain are good examples of herbaceous ornamental plant species (Florida Native Plant Society website 2020).

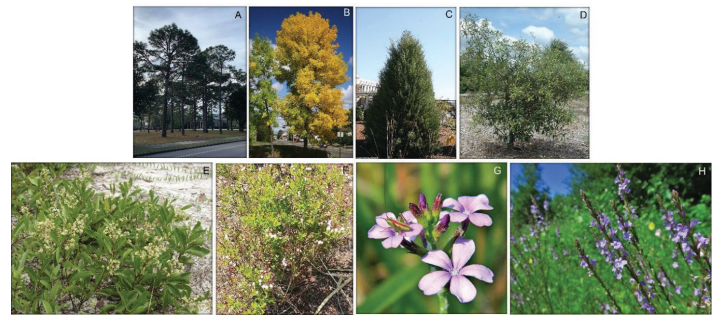


Figure 2. Examples of eight plant species native to Florida that are well-suited for the harsh growing conditions often found in new urban development sites, including (A) longleaf pine and (B) green ash, which both provide shade, (C) eastern red cedar, which functions as a screen around landscaping perimeters, (D) sand live oak, which serves as an ornamental species, (E) gopher apple, which functions as groundcover, (F) shiny blueberry, which is used as Credits: A. Willow Gallery, Wikimedia Commons; B. Stephen B. Calvert Clariosophic, Wikimedia Commons; C. David J. Stang, Wikimedia Commons; D. Derek Ramsey, Wikimedia Commons; E. Magnus Manske, Wikimedia Commons; F. and G. Kayla Hess; H. Mary Keim, Flickr

Salvaging Strategies

Using plant species from a site that is slated for development is not a new practice. The Native Plant Salvage Foundation and other organizations across the United States have been using native plants from development sites by harvesting and then transplanting them into restoration sites (Dorner 2002) and/or into landscapes of public facilities (Taft 2015). For instance, Pima County, AZ, established a nursery for plants salvaged from development sites that are then re-planted in restoration sites or sold to the public (Taft 2015). There are three likely strategies for using plants found onsite at development projects. All three strategies described below can be employed separately or in combination, depending on developer needs and economic feasibility.

First, developers can harvest the material before clearing the land to incorporate into the development plan. Harvesting these species and using them in landscaping can cost less money and energy than growing new plants and transporting them from other locations (ADOT 2019). For instance, developers can harvest the plants from the proposed development site and either re-plant them into the landscapes of newly developed sites nearby (e.g., phased development) or use an on-site nursery to store the salvaged plants. The use of on-site nurseries is described below. Despite harvesting typically being able to offset costs of transportation from nearby nurseries, larger trees are an exception. The costs to harvesting, relocating, and preventing loss of larger trees is higher than that for younger trees because of the stress on the more established root systems of older, larger trees (Garcia Chance et al. 2017).

There are likely situations where the abundance of suitable landscaping plants is too low to warrant the costs and effort required by developers to harvest them. Therefore, a second salvage option for these situations would be for the developer to allow others to harvest the materials to use elsewhere, e.g., in other commercial and/or residential developments, municipal lands, or nursery operations. Allowing others to harvest plants can offset the demolition cost to remove them. However, an exception to this rule is, again, the harvesting of larger trees. The costs of harvesting and re-locating larger trees and preventing their loss is higher than the cost for harvesting younger trees, again because of the stress that moving large trees causes to their more established root systems (Garcia Chance et al. 2017).

Third, if there is a limited amount of initial plant material but the species present are of great utility/value, or if the development is occurring over longer periods in multiple development phases, setting up an on-site nursery can be an effective plant salvaging strategy. This strategy, much like direct harvesting, can reduce project costs by limiting the need to grow and transport new plant material from elsewhere (Keeley 2000; Maiti 2013). However, as stated previously, the type of plant form matters for cost-efficiency. For example, older, larger trees requiring larger above-ground containers can cost more to harvest and maintain than younger trees requiring smaller containers (Garcia Chance 2017). In addition, the irrigation, fertilization, and staff required to set up and maintain an on-site nursery can make this strategy costly, but costs will vary depending on several factors, among them structural material, tools, and number of staff required (Ashby et al. 2016). Therefore, it is encouraged to first estimate operating costs before choosing this strategy. Onsite nurseries are not only good for storing native plant species until the time of installation, but they also provide opportunity for propagation of new plants. These new plants can again offset costs of purchasing and transporting plants from elsewhere. Propagated plant material can also be incorporated into future development phases (Keeley 2000), making developing an onsite nursery a good option for developments occurring over longer periods of time. In addition, this strategy can generate revenue if there is a surplus of propagated plant material. Nevertheless, this third strategy will require developers to hire horticultural professionals capable of leading such an operation.

Conclusion

An increased awareness of native plant species and their benefits (e.g., supporting wildlife and water conservation) is leading an increased presence of native plant species

in urban landscaping (Kauth and Perez 2011). However, limitations such as plant availability and soil alterations can hinder the wide adoption of landscaping with native plants. Salvaging native plants from sites slated for development can be one approach to overcoming these limitations within the context of expanding residential landscapes. From one such site, we found plenty of native species that could be salvaged, that are staples of urban and residential landscaping, and that can survive harsh post-development soil conditions.

The amount of plant material and number of species we found in this case study are important to reflect upon, given that the proposed development site was managed primarily for timber production and not conservation. Thus, it is likely that similar, or even greater, amounts of native plant resources are being wasted in other development sites, even those having histories of extractive uses such as ranching and forestry. We also provided examples of three different salvaging strategies that can be cost-effective and logistically feasible when applied strategically, including harvesting for on-site use, selling plant materials for others to use, and setting up an onsite nursery for long-term propagation. Of course, the economic feasibility of each strategy will need to be determined for each individual development project.

Given the projected development for Florida, salvaging plant material for landscaping use in proposed development sites can contribute to making development more sustainable. It will do so by contributing to the conservation of native plants, and through a reduction in resources needed for growing and transporting other species. It can also contribute to sustainability by helping to overcome plant supply barriers to the adoption of native landscaping. Salvaging native plants could also limit the need for irrigation and fertilizers and increase native biodiversity in urban and residential landscapes.

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Table 1. Plant species documented in a proposed development site north of Gainesville, FL, suited for, or used in, residential landscaping. Shown are scientific species names, common names, growth form (i.e., tree, shrub, herbaceous flower, grass, graminoid [grass-like plant], or fern), and whether the species is well-suited for soil conditions found in new developments (specified as a “Y”).

Common name	Scientific name	Growth form	Potential suitability for new development
Red maple	<i>Acer rubrum</i>	Tree	Y
Eastern redbud	<i>Cercis canadensis</i>	Tree	Y
Common persimmon	<i>Diospyros virginiana</i>	Tree	Y
Green ash	<i>Fraxinus pennsylvatica</i>	Tree	Y
American holly	<i>Ilex opaca</i>	Tree	Y
Yaupon	<i>Ilex vomitoria</i>	Tree	Y
Red cedar	<i>Juniperus virginiana</i>	Tree	Y
Slash pine	<i>Pinus elliottii</i>	Tree	Y
Sand live oak	<i>Quercus geminata</i>	Tree	Y
Live oak	<i>Quercus myrtifolia</i>	Tree	Y
Pond cypress	<i>Taxodium ascendens</i>	Tree	Y
Bald cypress	<i>Taxodium distichum</i>	Tree	Y
American elm	<i>Ulmus Americana</i>	Tree	Y
Sparkleberry	<i>Vaccinium arboreum</i>	Tree	Y
American hornbeam	<i>Carpinus caroliniana</i>	Tree	--
Common buttonbush	<i>Cephalanthus occidentalis</i>	Tree	--
Swamp dogwood	<i>Cornus foemina</i>	Tree	--
Loblolly bay	<i>Gordonia lasianthes</i>	Tree	--
Dahoon holly	<i>Ilex cassine</i>	Tree	--
Sweetgum	<i>Liquidamber styraciflua</i>	Tree	--
Southern magnolia	<i>Magnolia grandiflora</i>	Tree	--
Sweetbay	<i>Magnolia virginiana</i>	Tree	--
Swamp blackgum	<i>Nyssa sylvatica</i> var. <i>biflora</i>	Tree	--
Blackgum	<i>Nyssa sylvatica</i> var. <i>sylvatica</i>	Tree	--
Spruce pine	<i>Pinus glabra</i>	Tree	--
Longleaf pine	<i>Pinus palustris</i>	Tree	--
Loblolly pine	<i>Pinus taeda</i>	Tree	--
Laurel oak	<i>Quercus hemispherica</i>	Tree	--
Swamp laurel oak	<i>Quercus laurifolia</i>	Tree	--
Water oak	<i>Quercus nigra</i>	Tree	--
Virginia live oak	<i>Quercus virginiana</i>	Tree	--
Slimleaf pawpaw	<i>Asimina angustifolia</i>	Shrub	Y
Beautybush	<i>Callicarpa americana</i>	Shrub	Y
Sandweed	<i>Hypericum fasciculatum</i>	Shrub	Y
Gopher apple	<i>Licania michauxii</i>	Shrub	Y
Dwarf live oak	<i>Quercus minima</i>	Shrub	Y
Running oak	<i>Quercus pumila</i>	Shrub	Y
Winged sumac	<i>Rhus copallina</i>	Shrub	Y
Saw palmetto	<i>Serenoa repens</i>	Shrub	Y
Highbush blueberry	<i>Vaccinium corymbosum</i>	Shrub	Y
Mayberry	<i>Vaccinium elliottii</i>	Shrub	Y
Shiny blueberry	<i>Vaccinium myrsinites</i>	Shrub	Y

Common name	Scientific name	Growth form	Potential suitability for new development
Deerberry	<i>Vaccinium stamineum</i>	Shrub	Y
Rabbit-eye blueberry	<i>Vaccinium virgatum</i>	Shrub	Y
Texas vervain	<i>Verbena halei</i>	Shrub	Y
Groundsel tree	<i>Baccharis glomeruliflora</i>	Shrub	--
Round-pod St. John's-wort	<i>Hypericum cistifolium</i>	Shrub	--
Heart-leaved St. Peter's-wort	<i>Hypericum tetrapetalum</i>	Shrub	--
Myrtle dahoon	<i>Ilex cassine</i> var. <i>myrtifolia</i>	Shrub	--
Sweet gallberry	<i>Ilex coriacea</i>	Shrub	--
Gallberry	<i>Ilex glabra</i>	Shrub	--
Virginia willow	<i>Itea virginica</i>	Shrub	--
Fetterbush	<i>Lyonia lucida</i>	Shrub	--
Wax myrtle	<i>Myrica cerifera</i>	Shrub	--
Swamp azalea	<i>Rhododendron viscosum</i>	Shrub	--
St. Andrew's-cross	<i>Hypericum hypericoides</i>	Herbaceous flower/subshrub	--
Myrtle-leaf St. John's-wort	<i>Hypericum myrtifolium</i>	Herbaceous flower /subshrub	--
Elliot's aster	<i>Symphotrichum elliotii</i>	Herbaceous flower /subshrub	--
Blueheart	<i>Buchnera Americana</i>	Herbaceous flower	Y
Leavenworth's tickseed	<i>Coreopsis leavenworthii</i>	Herbaceous flower	Y
Swamp milkweed	<i>Asclepias perennis</i>	Herbaceous flower	--
Coastalplain St. John's-wort	<i>Hypericum brachyphyllum</i>	Herbaceous flower	--
Pineweeds	<i>Hypericum gentianoides</i>	Herbaceous flower	--
Cardinalflower	<i>Lobelia cardinalis</i>	Herbaceous flower	--
Frog-fruit	<i>Phyla nodiflora</i>	Herbaceous flower	--
Lizard's tail	<i>Saururus cernuus</i>	Herbaceous flower	--
Canada goldenrod	<i>Solidago altissima</i>	Herbaceous flower	--
Leavenworth's goldenrod	<i>Solidago leavenworthii</i>	Herbaceous flower	--
Sweet goldenrod	<i>Solidago odora</i> var. <i>odora</i>	Herbaceous flower	--
Fine leaf blazing-star	<i>Liatris tenuifolia</i>	Herbaceous flower	Y
Bromelike sedge	<i>Carex bromoides</i>	Graminoid (grass-like plant)	--
Clustered sedge	<i>Carex glaucescens</i>	Graminoid (grass-like plant)	--
Greater bladder sedge	<i>Carex intumescens</i>	Graminoid (grass-like plant)	--
Walter's sedge	<i>Carex striata</i>	Graminoid (grass-like plant)	--
Elliot lovegrass	<i>Eragrostis elliotii</i>	Graminoid (grass-like plant)	--
Florida paspalum	<i>Paspalum floridanum</i>	Graminoid (grass-like plant)	--
Eastern gamagrass	<i>Tripsacum dactyloides</i>	Graminoid (grass-like plant)	--
Cinnamon fern	<i>Osmunda cinnamomea</i>	Fern	--
Bracken	<i>Pteridium aquilinum</i>	Fern	--
Southern shield fern	<i>Thelypteris kunthii</i>	Fern	--