Takoma Park Native Tree Selection Guide

Friends of Native Trees in Takoma

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Purpose of this Guide

This guide has been prepared by the Friends of Native Trees in Takoma, a group of Takoma Park residents who advocate planting native trees and plants to protect biodiversity in Takoma Park and the surrounding areas.

We have *two goals* in writing this guide.

***First*: We want to raise awareness about biodiversity loss and how planting native trees can protect biodiversity as well as address climate change.** Many people are relatively well-informed about climate change but know less about the threat from biodiversity loss and how it is intertwined with the climate crisis.

> The world is waking up to the crisis of climate change …. **But we have yet to give the same level of attention to the biodiversity crisis.** Nature's abundance of plants, insects, birds, fish and other wildlife has immeasurable intrinsic value. It's also our life support system, supporting the food we eat, the water we drink and the air we breathe.
>
> *Tom Kiernan,*
> *President and CEO, American Rivers*

Planting trees tackles climate change through sequestering carbon and mitigating adverse climate effects, such as increased stormwater run-off and high summer ambient temperatures. But planting ***native*** trees does more than address climate change alone. At the same time that native trees help with climate change, they also protect biodiversity through providing habitat to the many species with which the native trees have evolved.

We explain in this guide what biodiversity is, why it is threatened in our area, and how planting a ***native*** tree in your yard can protect and restore local biodiversity (see *Native Trees, Biodiversity, and You*).

***Second*: We want to help you select a native tree for your property.** Towards this end, the guide outlines five steps in selecting a native tree species that suits your needs and preferences (see *Five Steps in Selecting a Native Tree*), and provides information on 69 tree species recommended for Takoma Park (see *Takoma Park Native Trees).*

Native Trees, Biodiversity, and You

Native trees and other native plants are measurably better than non-native flora at providing habitat – specifically food and space to reproduce -- to their fellow native species. This relationship is due to the way in which native species have evolved together.

Evolution's Products: Biodiversity and Native Species

Native species foster biodiversity because they have vital interactions with so many other native species in an ecosystem. Species native to a specific area have evolved over millennia into an interrelated ecological system, an ecosystem. Countless evolutionary interactions among diverse native species underpin how well an ecosystem functions and can sustain itself.

> ***native:*** **a plant or animal that has evolved in a given place over a period of time sufficient to develop complex and essential relationships with the physical environment and other organisms in a given ecological community.**
>
> *Rick Darke & Doug Tallamy*
> *The Living Landscape*

For example, the larvae of the tawny emperor butterfly and the hackberry butterfly only eat the foliage of hackberry trees. The tawny emperor eats older foliage while the hackberry butterfly eats new leaves. If there are no or few hackberry trees, these two butterfly species will no longer be available to contribute to the food web and pollination in our area.

Non-native species have many fewer or no such species interactions. Non-native species are like cogs that don't mesh well with the other gears in the system.

Ecosystems depend on their biodiversity to function, sustain themselves, and deliver the services upon which life depends. "*When we allow one species to die, we erase the web of relationships it maintained in life, with consequences that scientists seldom understand*," wrote the noted biologist, Edmund O. Wilson, "… *we break many threads, and change the ecosystem in ways still impossible to understand*."

> ***Biodiversity*** **refers to the variety of life on Earth, and definitions of biodiversity generally encompass measures of diversity at the genetic, species, and ecosystem levels.**
>
> *Congressional Research Service*

Professor Douglas Tallamy and K.J. Shropshire, both at the University of Delaware, have developed an indicator for species interaction, namely, the number of caterpillar species (Lepidoptera) hosted by a plant. Tallamy's indicator serves to highlight the critical role of insects in supporting biodiversity. The attitude that all insects are pests that should be exterminated is incompatible with a scientific understanding of ecosystem health and the importance of biodiversity. Also, like all good indicators, Tallamy's indicator simplifies a complex reality in order to make biodiversity an easier concept to apply.

Flowering dogwoods illustrate how this indicator makes understanding and measuring the extent of species interactions easier. The native flowering dogwood (*Cornus florida*) and Asian flowering dogwood (*Cornus kousa*) provide many identical ecological functions, such as recycling carbon and water, enriching soil, etc. However, the two species interact with other species in our local ecosystem to markedly different extents. In this respect, the two dogwood species differ in their ecological contributions.

The native dogwood provides habitat for 114 species of caterpillars in Takoma Park, the first link in a chain of species interactions. Caterpillars provide an important contribution to the natural food web because they are an easily consumed and dense source of nutrients for so many species. Most terrestrial birds, for example, are wholly dependent on caterpillars to feed their young. Caterpillars that survive to become butterflies play an additional vital role for many plants through pollination. The pollinated plants have benefited in this way from native trees, as have all the species (including humans) who depend on pollinated plants.

In stark contrast, kousa dogwoods have not been documented as successfully hosting caterpillars native to our area and thus cannot reliably provide the cascade of benefits to other species provided by native dogwoods. Kousa dogwoods have not evolved together with these other species native to our ecosystem and therefore do not interact with other species to the extent necessary to protect native biodiversity.

Threats to Biodiversity in Our Area

Biodiversity loss and climate change are twin threats to the planet's environment and must be addressed together. This is the main message from a joint scientific report issued

in 2021 by the United Nations intergovernmental panels charged respectively with climate change (IPCC) and biodiversity and ecosystem services (IPBES).

Conservation International defines thirty-six global hotspots for biodiversity loss, one of which includes a sliver of Takoma Park. This hotspot is the North American coastal plain. Its western boundary passes for the most part a few miles east and south of Takoma Park but does go through the corner of Ward 3 that borders both the District of Columbia and Prince George's County.

Significant and potentially devastating biodiversity loss is not confined to hotspots. For example, bird populations and insect populations have declined precipitously on a large scale. The North American bird population has declined by thirty percent since 1970. Insect populations have fallen dramatically worldwide. Bird declines can be directly tied to insect declines as 96% of terrestrial breeding birds rely on insects to feed their young.

> **If all mankind were to disappear, the world would regenerate back to the rich state of equilibrium that existed ten thousand years ago. If insects were to vanish, the environment would collapse into chaos.**
>
> *Edmund O. Wilson*

Urbanization is the most obvious factor behind the loss of biodiversity in our area, although climate change plays a role, too. Maryland is the fifth most densely populated state in the nation at 625 people per square mile. In Montgomery County, the population density is 2,543. Buildings, roads, and pavement have dramatically reduced the unbuilt land available for native habitat.

> **Perhaps the greatest threat to biological diversity in Maryland is development.**
>
> *Maryland Department of Natural Resources*

It is not feasible for rural Maryland alone to provide sufficient space for biodiversity. Conventional agriculture practices, such as mono-cropping and pesticide use, limit the land in rural areas where native species can live. As a result, in rural areas as in urban areas, the land available to native species is often fragmented and small. Isolating species in small land parcels reduces their population sizes. A population downswing can easily take a species below the critical population size necessary for survival.

In part, the solution lies in using our urban unbuilt spaces more wisely by planting them with native trees and plants. Native flora, even in urban areas, provides habitat for native fauna. The more unbuilt space we can plant with native plants, the more we connect otherwise fragmented green spaces.

Planting native species provides a cascade of benefits to biodiversity throughout our region. We will not see Maryland native black bears moving into Takoma Park, but we can provide habitat that maintains regional insect populations, which supply a surprising portion of a black bear's diet. We can also give food and shelter to exhausted Central American migratory birds, who land here each year in desperate need of a caterpillar supper.

Your Yard Can Help Protect Biodiversity

If you plant a native tree, it helps to protect biodiversity as well as sequester carbon and mitigate climate change effects. Both native and non-native trees help to address climate change. However, native species generally give a bigger environmental bang for the buck than non-native species of comparable size because the native trees have evolved to provide benefits to other native species. These benefits form the foundation of the natural food web, pollination, and other positive impacts.

Some native trees are superstars at providing other species with benefits, in the sense that these native trees are keystone species in the ecosystem. For example, the majestic native oaks that have historically defined Takoma Park's tree canopy provide habitat to 498 species of native caterpillars (Lepidoptera) in our area. Native willows, cherry and plum trees, and birches host over 300 caterpillar species.

A ★ highlights the keystone superstars in the lists of native trees in this guide (pgs. 12-15). The ***Biodiversity Indicator column*** in these lists gives the number of caterpillar species hosted by each tree species.

Any native tree species provides good ecological value. Many tree species with lower biodiversity indicator numbers support different caterpillar species from those hosted by the superstars. For example, some caterpillar species have evolved to live in the unique habitats provided by various species of pines (*Pinus*) and cannot survive on, say, oaks. Similarly, sycamore, sweetgum, and tulip trees all host many specialist caterpillars found

only on those respective tree species. The bottom line is planting any native tree will contribute to supporting biodiversity.

Planting a diversity of native species, including plenty of superstars, is best for your yard. Having many different species of native trees helps provide food and shelter throughout the year. As a result, your yard thrives because beneficial insects pollinate your plants, help control unwanted insects such as aphids, and enrich the soil.

Planting a diversity of native tree species is also best for Takoma Park. A diversity of native trees provides more opportunities for good climate adapters to emerge. In other words, it is too soon for research to establish how different tree species respond to various climate change scenarios. By planting a diversity of native trees, we hedge our bets that we will have included some good climate adapters. By increasing the number of trees of each species planted, we support evolutionary adjustment to climate change through natural selection.

State legislation adopted in May 2023 underscores how important it is to plant native trees and other native plants, as a matter of state policy. S.B. 836 established the Maryland Native Plants Program "to encourage and promote the use and sale of plants native to Maryland" and also "to educate the public, landscapers, and other plant users on the importance, benefit, and availability of native plants."

Diverse urban forests also provide insurance in case an invasive species or pathogen, like Dutch elm disease, chestnut blight, or most recently the emerald ash borer, kills off a specific tree species in the City's canopy. Diverse urban forests comprising ***native*** trees give this insurance and at the same time protect biodiversity.

Five Steps in Selecting a Native Tree

1. *Get Comfortable with Scientific Names for Species*

The only way to be sure that you are purchasing, or getting information about, a specific native tree species is to verify its scientific name. The seller may not know the actual species or may fail to clarify how the species has been altered by professional growers (see explanation of cultivars and hybrids below). You also cannot rely on sellers to know which are native tree species in the sense defined here. For example, several nurseries put a "native plant" label on species that are native to North America, but not native to our area. You need to check the plant tag or otherwise confirm the species name before purchasing your tree.

An Internet search usually will return partial matches to your search term. "*Cornus florida*," which is the native species, typically will return numerous hits and advertisements for *Cornus kousa*, the non-native species. Verify that you have selected information on the correct species from your search results. (Note that the tree species lists at the end of this guide contain hyperlinks to reliable information on each species.)

A scientific name for a *species* has two parts, both of which are necessary to identify the tree, e.g., *Cornus florida*. *Cornus* is the ***genus***, a group of similar species. A genus may well include both native and non-native species. The genus, *Cornus*, contains both our native dogwood, *Cornus florida*, and the Asian species, *Cornus kousa*. The second word, together with the first word, uniquely identifies the species. The first word can be abbreviated to its first letter, e.g., *C. florida*.

Words in quotation marks after the species name indicate a *cultivar*, e.g., *Cornus florida 'Poinsett'*: A cultivar is a species that has been selectively bred until a particular trait becomes dominant. For example, *C. florida 'Poinsett'* was bred to resemble a poinsettia. The straight species is generally a better bet for protecting biodiversity. In breeding for certain traits, growers may intentionally or unintentionally change the very traits that provide benefits to other species. On the other hand, you may prefer a native cultivar, especially if it has been bred to resist disease. The native elms, particularly *Ulmus americana*, are highly susceptible to Dutch elm disease, whereas its cultivars are now resistant to some degree.

A scientific name that includes an X is a *hybrid* of two or more species, e.g., *Cornus xrutgersensis*: This hybrid is a cross between a native and a kousa dogwood. A cross with a non-native is a poor choice in terms of supporting biodiversity. A hybrid of two native species may have drawbacks like those of a cultivar, namely, that it is difficult to judge how the crossbreeding affects the species interactions of the original two tree species.

Quick Guide to Scientific Names for Species

The scientific name verifies which species of tree you are purchasing or researching.

Terminology	Example and Explanation
Genus	***Cornus*** A genus groups together related species.
Species	***Cornus florida.*** Can be abbreviated as ***C. florida*** The scientific name of a species consists of two words in Latin. The first word is always the name of the genus to which the species belongs. Genus + second word = scientific name of species
Cultivar	***C. florida* 'Poinsett'** A cultivar is a species that has been bred for certain traits. The name of a cultivar is the scientific name for the species followed by a name or number in single quotation marks.
Hybrid	***Cornus xrutgersensis*** A hybrid is a cross between two or more species. An X after the genus in the scientific name for a species indicates a hybrid.

2. Decide Your Preference for Tree Height

Most people can quickly decide what height tree they want, so this is an easy way to narrow the number of choices to a more manageable number. The 69 species presented in this guide are divided into three lists, for large trees (well over 50 feet), medium trees (30-60 feet), and small trees (under 40 feet). The numbers represent the estimated heights at maturity for each species.

Note that it may take decades for a tree to reach its mature height. Takoma Park is known for its huge oak trees, but they took well over a hundred years to get so tall. Search for information on ***growth rate*** to judge how quickly a tree will reach its mature height.

3. Know Sun and Water Conditions at Your Planting Site

The microclimate at the site should guide your choice of tree species. The native trees presented in this guide are adapted to the climate of Takoma Park. They are also good candidates for successfully adapting to future climate and environmental conditions. However, all species, including native ones, require certain microclimate conditions. For example, a *Cornus florida* planted in full sun is more likely to die than thrive because this species requires shade for at least part of the day. (See *List of Small Tree Species* for recommended sun exposure for *C. florida*.)

Further hone your options for an appropriate tree species based on the amount of sun and water available at the planting site. It is simple to observe sun and water conditions in a yard. The *Key to Lists,* in the next section of this guide, explains how to judge these conditions at your planting site. The tree lists provide information on the preferred sun exposure and soil moisture for each tree species.

If you happen to know the soil type at your planting site, you can find the preferred soil type for most of the species in our lists in the searchable database at Chesapeake Bay Native Plant Center and in U.S. Fish and Wildlife Service (2005).

4. Consider Your Other Preferences

Once you have identified species compatible with your planting site, focus on other attributes that matter to you. For example, you may want evergreens to provide screening, or trees with beautiful fall foliage. Information on these types of preferences is given through a hyperlink for each species listed: click on the scientific name in the tree list to go to the Missouri Botanical Garden, or other sources, for a fuller description of a species.

There may be negative attributes to consider, too. For example, black locust trees (*Robinia pseudoacacia*) provide spring flowers and are good for wet spots. However, they have thorns, which some people find annoying. If you can't stand thorns but otherwise like this

species, consider a cultivar instead of the straight species (see Step 1). Similarly, the box elder tree (*Acer negundo*) is a superstar with a distinctive appearance that doesn't appeal to all people. Red mulberries (*Morus rubra*) are one of our few native fruit trees, but the species does produce a lot of seedlings that will have to be pulled.

5. Seek Further Information and Advice

You may wish to go beyond the information provided in this guide, once you have homed in on those species that fit your needs and preferences. For example, ask your neighbors for advice—and take the opportunity to explain to them the importance of planting native trees. The **Maryland Extension Service** is a great source of reliable information. Submit questions online and you will quickly get a complete and expert response.

Eventually, you will need to find where to purchase native tree species of interest to you. You can apply for a free shade tree through Montgomery County's Tree Montgomery program. The City of Takoma Park's Plant-A-Tree program offers steep discounts on tree purchase and installation. Maryland offers a $25 discount on tree purchases. This rebate can be combined with one from Montgomery County for $40, a total value of $65. (Of course, we encourage you NOT to select any of the non-native trees offered through any program.)

Native Trees for Takoma Park

The trees listed in this section are native to Maryland (Maryland Plant Atlas Working Group 2021). These trees are also native to Montgomery County (Kartesz 2015). We have included one exception to this definition, *Malus coronaria*, which is a Maryland native with significant populations in adjoining counties but not Montgomery County. Other *Malus* species are present in our county in abundance.

All of the tree species listed in this section are on the City of Takoma Park *Approved Tree Species List*.

Key to Lists

Species Name: Two words in Latin constitute the species name. In rare cases, the species has been reclassified and the former or less accepted scientific name is given in parentheses. For more explanation, see Step 1 in *Five Steps in Selecting a Native Tree*.

★ **indicates a keystone species:** We call superstars those tree species that host 200+ Lepidoptera species (exact number given in Biodiversity Indicator column). See the explanation in the section, *Your Yard Can Help Protect Biodiversity*, pages 5-6.

Biodiversity Indicator: The values of this indicator represent the number of Lepidoptera species hosted by the genus for the indicated tree species. The data are for Prince George's County and were provided by Dr. Tallamy. He communicated that the values for Montgomery County would be virtually identical. See the section, *Evolution's Products: Native Species and Biodiversity*, pages 2-3, and Tallamy and Shropshire (2009) for more information.

Height: The figures represent the estimated height range for the species *at maturity*, which may require decades for a tree to reach. The data come from the Missouri Botanical Garden (2022), or if not available there, U.S. Fish and Wildlife Service (2005) or the hyperlink source for that species.

Sun Exposure: Data from U.S. Fish and Wildlife Service (2005); or if not available there, Missouri Botanical Garden (2022) or the hyperlink source for that species.

Su (Full sun) = at least six hours of sunlight

PSh (Part shade) = three to six hours of sunlight

Sh (Shade) = less than three hours of direct or filtered sunlight

Soil Moisture: Data from U.S. Fish and Wildlife Service (2005); or if not available there, Missouri Botanical Garden (2022) or the hyperlink source for that species.

D (Dry) = Water does not remain after rain. Can be used as an indicator of drought tolerance.

M (Moist) = soil is damp and occasionally saturated

W (Wet) = usually saturated except during drought

*** (asterisk)** indicates the species has virtually no tolerance for sun exposure or soil moisture outside the indicated range.

List of Large Tree Species

★ indicates keystone species (*see page 11 for explanation*)

Su=Sun **PSh**=Part Shade **Sh**=Shade **D**=Dry **M**=Moist **W**=Wet

* Species has virtually no tolerance for conditions outside indicated range.

Scientific Name and Hyperlink		Common Name	Biodiversity Indicator	Height in feet	Sun Exposure	Soil Moisture
Acer rubrum	★	red maple	274	40-70	Su, PSh	M*, W*
Acer saccharinum	★	silver maple	274	50-80	Su, PSh	M, W
Acer saccharum	★	sugar maple	274	40-80	Su, PSh, Sh	M
Betula lenta	★	sweet birch	316	50-75	Su, PSh	D, M
Betula nigra	★	river birch	316	40-70	Su, PSh	M, W
Carya cordiformis	★	bitternut hickory	241	50-80	Su	M, W
Carya glabra	★	pignut	241	50-80	Su, PSh	D, M, W
Carya ovata	★	shagbark hickory	241	70-90	Su	M
Carya tomentosa (formerly *Carya alba*)	★	mockernut	241	60-80	PSh, Sh	D, M
Fagus grandifolia		American beech	129	50-80	Su, PSh	M
Gleditsia triacanthos		honey locust	45	60-80	Su	M
Juglans nigra		black walnut	132	75-100	Su	M
Liquidambar styraciflua		sweet gum	36	60-80	Su, PSh	M, W
Liriodendron tulipifera		tulip poplar	21	60-90	Su, PSh	M
Pinus rigida		pitch pine	169	50-75	Su	D
Pinus strobus		eastern white pine	169	50-80	Su	D, M
Pinus taeda		loblolly pine	169	40-90	Su	D, M, W
Platanus occidentalis		American sycamore	45	75-100	Su, PSh	M, W

List of Large Tree Species

★ indicates keystone species (*see page 11 for explanation*)

Su=Sun **PSh**=Part Shade **Sh**=Shade **D**=Dry **M**=Moist **W**=Wet

***** Species has virtually no tolerance for conditions outside indicated range.

Scientific Name and Hyperlink		Common Name	Biodiversity Indicator	Height in feet	Sun Exposure	Soil Moisture
Populus deltoides	★	eastern cottonwood	264	50-80	Su	M, W
Populus grandidentata	★	bigtooth aspen	264	50-70	Su, PSh	D, M
Prunus serotina	★	black cherry	378	50-80	Su, PSh	D, M
Quercus alba	★	white oak	498	50-80	Su, PSh	D, M
Quercus bicolor	★	swamp white oak	498	50-60	Su, PSh	W
Quercus coccinea	★	scarlet oak	498	50-70	Su	D, M
Quercus falcata	★	Southern red oak	498	60-80	Su	D, M
Quercus montana (formerly *Q. prinus)*	★	chestnut oak	498	50-70	Su, PSh, Sh	D
Quercus palustris	★	pin oak	498	50-70	Su	M, W
Quercus phellos	★	willow oak	498	40-75	Su, PSh	M, W
Quercus rubra	★	northern red oak	498	50-75	Su, PSh	D, M
Quercus velutina	★	black oak	498	50-60	Su	D, M
Taxodium distichum		bald cypress	17	50-70	Su, PSh	W
Tilia americana		Basswood	144	50-80	PSh, Sh	M
Tsuga canadensis		eastern hemlock	80	40-70	PSh*	M
Ulmus americana		American elm	187	60-80	Su, PSh	M, W

List of Medium Tree Species

★ indicates keystone species (*see page 11 for explanation*)

Su=Sun **PSh**=Part Shade **Sh**=Shade **D**=Dry **M**=Moist **W**=Wet

Scientific Name and Hyperlink		Common Name	Biodiversity Indicator	Height in feet	Sun Exposure	Soil Moisture
Acer negundo	★	box elder	274	30-50	Su, PSh	M, W
Celtis occidentalis		Common hackberry	47	40-60	Su, PSh, Sh	D, M, W
Diospyros virginiana		persimmon	49	35-60	Su, PSh	D, M
Juniperus virginiana		eastern red cedar	29	30-65	Su	D, M
Morus rubra		red mulberry	No data available	35-50	Su, PSh	M
Nyssa sylvatica		black gum	36	30-50	Su, PSh	D, M, W
Ostrya virginiana		eastern hop hornbeam	89	25-40	PSh, Sh	M
Quercus imbricaria	★	shingle oak	498	40-60	Su	M
Quercus lyrata	★	overcup oak	498	40-60	Su	M, W
Quercus michauxii (formerly *Q. montana*)	★	swamp chestnut oak	498	40-60	Su	M, W
Quercus muehlenbergii	★	chinkapin oak	498	40-60	Su	D, M
Quercus stellata	★	post oak	498	35-50	Su	D, M
Robinia pseudoacacia		black locust	67	30-50	Su	D, M
Salix nigra	★	swamp willow	319	30-60	Su, PSh	M, W
Sassafras albidum		sassafras	35	30-60	Su, PSh	D, M
Ulmus rubra		slippery elm	187	40-60	PSh, Sh	D, M

List of Small Tree Species

★ indicates keystone species (*see page 11 for explanation*)

Su=Sun **PSh**=Part Shade **Sh**=Shade **D**=Dry **M**=Moist **W**=Wet

*Species has virtually no tolerance for conditions outside indicated range

Scientific Name and Hyperlink		Common Name	Biodiversity Indicator	Height in feet	Sun Exposure	Soil Moisture
Amelanchier arborea		downy serviceberry	102	15-25	PSh, Sh	D, M
Amelanchier canadensis		shadblow serviceberry	102	25-30	PSh, Sh	M, W
Amelanchier laevis		Allegheny serviceberry	102	15-40	Su, PSh	M
Asimina triloba		pawpaw	14	15-30	Su	M
Carpinus caroliniana		American hornbeam	73	20-35	PSh, Sh	M
Cercis canadensis		eastern redbud	25	20-30	PSh, Sh	D, M
Chionanthus virginicus		fringe tree	12	12-20	Su, PSh, Sh	D, M
Cornus alternifolia		pagoda dogwood	114	15-25	PSh, Sh	M
Cornus florida		flowering dogwood	114	15-30	PSh*	D, M
Crataegus crus-galli		cockspur hawthorn	136	25-35	Su, PSh	D, M
Crataegus phaenopyrum		Washington hawthorn	136	25-30	Su	M
Hamamelis virginiana		witch hazel	72	15-20	PSh, Sh	D, M
Ilex opaca		American holly	47	15-30	Su, PSh, Sh	M
Magnolia virginiana		sweet bay magnolia	22	10-35	Su, PSh, Sh	M, W
Malus coronaria	★	American crabapple	251	10-30	Su	M
Pinus virginiana		Virginia pine	169	15-40	Su	D, M
Prunus americana	★	American plum	378	15-25	Su, PSh	D, M
Quercus marilandica	★	blackjack oak	498	20-40	PSh	D
Rhus typhina		staghorn sumac	56	15-25	Su	D, M

Sources

Axelson, Gustave. 2019. "Vanishing: More than 1 in 4 Birds Has Vanished." *Living Bird*. Cornell Lab of Ornithology. Cornell University. Autumn 2019. https://www.allaboutbirds.org/news/vanishing-1-in-4-birds-gone/

Burghardt, Karin. 2022. Personal Communication. Assistant Professor. Department of Entomology. University of Maryland, College Park. March 7, 2022.

CEPF. 2022. "North American Coastal Plain." Critical Ecosystem Partnership Fund. https://www.cepf.net/our-work/biodiversity-hotspots/north-american-coastal-plain

Chesapeake Bay Native Plant Center. Supported by the Alliance for the Chesapeake Bay and the U.S. Fish and Wildlife Service. https://www.nativeplantcenter.net/

Conservation International. 2022. "Biodiversity Hotspots." https://www.conservation.org/priorities/biodiversity-hotspots

Congressional Research Service. 2021. "Biodiversity." In Focus Series. IF11871. July 8. Washington D.C.: Library of Congress. https://crsreports.congress.gov/product/pdf/IF/IF11871

Darke, Rick and Doug Tallamy. 2014. *The Living Landscape: Designing for beauty and biodiversity in the home garden.* Portland OR: Timber Press, Inc.

Dirr, Michael A. 2009. *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses.* Revised edition. Champaign IL: Stipes Publishing LLC.

Hall, Donald W. 2016. "Tawny Emperor Butterfly *Asterocampa clyton.*" EENY-528. University of Florida/IFAS Extension. https://edis.ifas.ufl.edu/pdf/IN/IN93300.pdf

IPBES-IPCC (International Panel on Biodiversity and Ecosystem Services-International Panel on Climate Change). 2021. "Scientific Outcome of the IPBES-IPCC Co-sponsored Workshop on Biodiversity and Climate Change". Hans-Otto Pörtner, Robert J Scholes, John Agard, Emma Archer, Almut Arneth, Xuemei Bai, David Barnes *et al*. June 24, 2021. https://doi.org/10.5281/zenodo.4659158.

Kartesz, J.T. 2015. *The Biota of North America Program (BONAP): North American Plant Atlas*. Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)]. http://bonap.net/napa

Kays, Jonathan S. 2022. Personal Communication. Forestry Specialist, University of Maryland Extension. January 5.

Kiernan, Tom. 2021. *An Emergency for American Rivers*. October 27, 2021. American Rivers.org. https://www.americanrivers.org/2021/10/an-emergency-for-river-wildlife/

Ladybird Johnson Wildflower Center. "*Malus coronaria*." Plant database. Austin TX. https://www.wildflower.org/plants/result.php?id_plant=MACO5

Maryland Geological Survey. Interactive map of the physiographic provinces of Maryland. Maryland Department of Natural Resources. Baltimore: Maryland Geological Survey. https://maryland.maps.arcgis.com/apps/Profile/index.html?appid=718eeb497d0e4c269be52500f09d3c8a

Maryland Department of Natural Resources Forest Service. 2020. *2020 Forest Action Plan Part I: Forest Resource Assessment*. Annapolis MD: Maryland Department of Natural Resources. September. https://dnr.maryland.gov/forests/Documents/Maryland%20Forest%20Action%20Plan%20Assessment%202020%20Public%20Comment%20Draft%20-%20Jack%20Perdue%20-DNR-.pdf

Maryland Department of Natural Resources. "Marylanders Plant Trees." https://dnr.maryland.gov/forests/Pages/MarylandersPlantTrees/Print-Your-Coupon.aspx.

Maryland Plant Atlas Working Group. 2021. Digital Atlas of the Maryland Flora. MarylandPlantAtlas.org.

Maryland Senate. 2023. Maryland Native Plants Program. Senate Bill 836. Signed May 8. https://mgaleg.maryland.gov/2023RS/Chapters_noln/CH_490_sb0836e.pdf

Missouri Botanical Gardens. Plant Finder. St. Louis MO. http://www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx

Montgomery County Planning Department. "Native Tree Discount." Montgomery County. Rockville MD. https://montgomeryplanning.org/planning/environment/forest-conservation-and-trees/reforest-montgomery/native-trees-discount/.

North Carolina Cooperative Extension. "*Pinus virginiana.*" https://plants.ces.ncsu.edu/plants/pinus-virginiana/

Karen Petroff. 2022. Personal Communication. Assistant Director, Arboretum/Horticultural Services. University of Maryland, College Park. January 25.

Plastrik, Peter and John Cleveland. 2019. *The City Within a Garden: How some cities are restoring nature and tapping the power of ecosystem to enhance and protect urban life*. Next City. Nextcity.org. https://nextcity.org/features/the-city-within-a-garden

Sánchez-Bayo, Francisco and Kris A.G. Wyckhuys. 2019. "Worldwide decline of the entomofauna: A review of its drivers." *Biological Conservation.* Volume 232. doi.org/10.1016/j.biocon.2019.01.020. https://www.sciencedirect.com/science/article/abs/pii/S0006320718313636?via%3Dihub

Tallamy, Douglas W. 2009. *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants*. First edition published 2002. Portland OR: Timber Press.

Tallamy, Douglas W. 2019. *Nature's Best Hope: A New Approach to Conservation That Starts in Your Yard.* Portland OR: Timber Press.

Tallamy, Douglas W. 2021. Personal communication regarding the Prince George's County database on plant genera and number of Lepidoptera species hosted. December 31.

Tallamy, D. W. and K.J. Shropshire. 2009. "Ranking Lepidopteran Use of Native versus Introduced Plants." *Conservation Biology*, *23*(4), 941–947. http://www.jstor.org/stable/29738829

TreeMontgomery. Department of Environmental Protection. Montgomery County. Rockville MD. https://treemontgomery.org/

Urban Forestry Outreach and Extension. "Bigtooth Aspen -- *Populus grandidentata.*" University of Minnesota. https://trees.umn.edu/bigtooth-aspen-populus-grandidentata

University of Maryland Extension. "Ask Extension." College of Agriculture and Natural Resources. College Park MD: University of Maryland. https://extension.umd.edu/ask-extension.

U.S. Fish & Wildlife Service. 2005. "Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed." Prepared by Britt E. Slattery, Kathryn Reshetiloff, and Susan Zwicker. Annapolis MD: Chesapeake Bay Field Office, 2003, 2005. https://www.nativeplantcenter.net/wp-content/uploads/2016/05/chesapeakenatives.pdf

U.S. Forest Service. "*Betula lenta* L. Sweet Birch." Southern Research Station. https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_2/betula/lenta.htm

U.S. Forest Service. "*Pinus rigida* Mill. Pitch Pine." Southern Research Station. https://www.srs.fs.usda.gov/pubs/misc/ag_654/volume_1/pinus/rigida.htm

Wilson, Shari. "Where to Buy Native Plants." *Nuts for Natives: Gardening for the Chesapeake* website. https://www.nutsfornatives.com/where-to-buy-native-plants.

Publisher: Friends of Native Trees in Takoma. Takoma Park MD. Htpps://fontt.org

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