

Attachment E.

Recommended Modifications to Pasadena Street Tree Policy

By

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Introduction

As an organization based and operating primarily in a large urban area, the Pasadena Audubon Society has advocated for more bird-friendly and generally ecosystem-friendly urban design and management practices. One area that Pasadena Audubon has prioritized since 2019 is advocacy for ecologically sound management of the urban forest in Pasadena and other municipalities in the San Gabriel Valley. This initiative has been concentrated in two specific areas: tree trimming practices, and tree planting practices ¹.

After several meetings with city officials in Pasadena, Advocacy Committee members determined that ecologically optimal and wildlife-friendly species selection for tree planting would be of added benefit to the city and its residents. Consequently, Pasadena Audubon has been working with city officials in Pasadena and Arcadia on prioritizing certain tree species, especially native trees, that are either broadly ecologically useful or specifically useful for birds.

In 2019, Pasadena Audubon became aware that Dr. Eric Wood, assistant professor of ecology at Cal State LA, had conducted research concerning patterns of feeding behavior by resident and migratory birds on various street tree species in the Los Angeles urban forest. The presence of these data highlights the possibility of the prioritization of street trees based on ecological benefits.

This document was prepared in fulfillment of a project commissioned by the Pasadena Audubon Society. The goal of this project was to create a published document that:

1. Recommends the planting of certain tree species that are both ecologically beneficial, especially to birds, and can be planted in a typical street setting in the San Gabriel Valley;
2. Justifies the selection of these species using a) data both from Dr. Eric Wood's study and from other literature, as well as by b) explaining the practical importance of supporting birds;
3. Recommends against the planting of certain species that Dr. Wood's study found to offer relatively little ecological value to native birds;
4. Ensures that the socioeconomic aspects of current planting practices are given appropriate attention and are incorporated into recommendations;
5. Identifies a) the most important regulatory obstacles to the planting of the aforementioned species, as well as b) specific strategies the City of Pasadena can undertake to rectify these issues;

¹ Donohue, Kara, et al. 2018. "BMPs and Handouts: Tree Care for Birds." *Tree Care for Birds and Other Wildlife*, treecareforbirds.com/bmps-and-handouts/.

6. Provides the lists of species, the information justifying it, and the list of proposed strategies in a manner comprehensible to a general audience.

This document will begin by enumerating the importance of supporting birds through the urban forest (Goal 2b). It will then provide a list of recommended bird-friendly street trees and explicate the selection process for these trees (Goal 1), and provide detailed justifications for each individual tree species selected (Goal 2a). Then, the document will identify the two largest regulatory obstacles to the planting of these species (Goal 4a). Finally, it will explain in detail two strategies that the City of Pasadena can pursue to increase the prevalence of these species in the urban forest - the first involving a modification of the Procedure to Amend the MSTP, and the second involving community engagement (Goal 4b). This second strategy may also greatly assist in resolving the socioeconomic inequality in the distribution of bird-friendly trees within the urban forest (Goal 3). At the end of the document, a simplified, user-friendly flyer that is pivotal to both of the proposed strategies will be provided in an appendix (Goal 5).

The importance of bird-friendly urban forest management

Street trees planted in a municipality's right of way are valuable public resources that play a critical role in the livability of the community². The benefits they offer are numerous. The most immediate effect that is easily noticeable by everyone is that they improve the aesthetic qualities of the neighborhoods³. A street lined with large, stately, leafy trees is universally preferred to one devoid of vegetation. However, the benefit of street trees extends far beyond aesthetics. Among numerous ecological and societal services offered by a thriving urban forest⁴, planting trees is an excellent way to mitigate the urban heat island (UHI) effect⁵ that is especially of concern with increasing global temperatures. As cities expand and human populations become more urban, the need to ensure that urban spaces are not ecologically sterile has become more urgent. Trees provide an excellent way to attract wildlife, especially birds, into the

² McPherson, E. G., N. van Doorn, and J. de Goede. 2016. Structure, function and value of street trees in California, USA. *Urban Forestry and Urban Greening* 17:104–115.

³ Southworth, M. 2005. Designing the walkable city. *Journal of Urban Planning and Development* 131:246–257.

⁴ Dudek. 2018. First step: Los Angeles urban forest management plan. Prepared for City Plants by Dudek. Pasadena, California, USA.

⁵ Yan, C., Guo, Q., Li, H., Li, L., & Qiu, G. Y. 2020. Quantifying the cooling effect of urban vegetation by mobile traverse method: A local-scale urban heat island study in a subtropical megacity. *Building and Environment*, 169, 106541. doi:10.1016/j.buildenv.2019.106541

urban environment^{6 7 8}. With bird populations under extreme pressure in North America^{9 10}, it is important to ensure that our ever-expanding cities are as much a haven to birds using urban environments as forests and wetlands.

Most countries have undergone rapid urbanization in the last one and half centuries, and the United States is no exception. People living in cities lead busy lives. An unfortunate consequence of living in a concrete jungle is that we are increasingly disconnected from wildlife and nature in urban landscapes with every passing generation. One cosmopolitan component of wildlife, birds, provides numerous essential ecological services¹¹. Perhaps their most important role is to provide an immediate and relatable connection to the broader environment¹². Birds are colorful, vocal, and charismatic. Further, birds are a critical bellwether to urgent environmental issues like pollution, habitat loss, and climate change. Therefore, we must try to sculpt our cities to be as wildlife-friendly as possible.

Cities like Los Angeles saw rapid expansion in the early 20th century. With abundant water diverted from the eastern Sierra Nevada and with a mild climate, early planners of Los Angeles targeted a highly diverse urban forest with trees and plants imported from around the world¹³. As a result, most of the trees currently adorning cities in the Los Angeles metropolitan area are

⁶ Bhullar, S., and J. Majer. 2000. Arthropods on street trees: a food resource for wildlife. *Pacific Conservation Biology* 6:171–173.

⁷ Shackleton, C. 2016. Do indigenous street trees promote more biodiversity than alien ones? Evidence using mistletoes and birds in South Africa. *Forests* 7:1–10.

⁸ Gray, E. R., and Y. van Heezik. 2016. Exotic trees can sustain native birds in urban woodlands. *943 Urban Ecosystems* 19:315–329.

⁹ Soykan, C. U., Sauer, J., Schuetz, J. G. LeBaron, G. S., Dale, K., and Langham, G. M. 2016. Population trends for North American winter birds based on hierarchical models. *Ecosphere* 7(5):e01351. [10.1002/ecs2.1351](https://doi.org/10.1002/ecs2.1351)

¹⁰ Rosenberg, K. V., Dokter, A. M., Blancher, P. J., Sauer, J. R., Smith, A. C., Smith, P. A., . . . Marra, P. P. (2019). Decline of the North American avifauna. *Science*, 366(6461), 120-124. doi:10.1126/science.aaw1313

¹¹ Whelan, C. J., Wenny, D. G., and Marquis, R. J. 2008. Ecosystem services provided by birds. *Annals of the New York academy of sciences*, 1134(1), 25-60.

¹² Belaire, J. A., Westphal, L. M., Whelan, C. J., & Minor, E. S. (2015). Urban residents' perceptions of birds in the neighborhood: Biodiversity, cultural ecosystem services, and disservices. *The Condor*, 117(2), 192-202. doi:10.1650/condor-14-128.1

¹³ Reisner, M. 1987. Cadillac desert: the American West and its disappearing water. Penguin Books, New York, New York, USA.

non-native in origin ^{14 15 16}. Selected for their beauty, urban trees are aesthetically pleasing, but likely provide few resources to wildlife. When considering the street tree population of Greater Los Angeles, 83% of street tree species were underutilized by birds given their prevalence in the urban forest, and these trees were overwhelmingly non-native in origin ¹⁷ (Wood and Esaian, 2020). The inescapable conclusion is that if bird and wildlife conservation is a goal for cities, trees within an urban forest should either be native or carefully chosen non-natives that can support native wildlife ¹⁸.

Selection process for bird-friendly street trees

The project began with the creation of a list of tree species useful for birds. This list was formed by concatenating lists of a) native trees to the Los Angeles Basin, b) near-native tree species found elsewhere in Southern California, c) native/near-native x non-native hybrid varieties, and d) non-native species that are known to be overutilized by bird species relative to their prevalence in the Los Angeles urban forest .

The species were then filtered according to the following criteria:

- **Demonstrated suitability as a Southern California street tree:** In order to meet this criterion, the tree species must be present in either the City of Los Angeles Approved Street Tree List or the book *Street Trees Recommended For Southern California, 3rd Edition* published by Street Tree Seminar, Inc.
- **Non-invasiveness:** the tree species must not be present in the Cal-IPC inventory.
- **Medium to low allergenicity:** the tree species must have a TreePeople Allergy Potential rating of less than 7.
- **Medium to low root damage:** the tree species must have a TreePeople root damage potential rating of M or L.

¹⁴ Clarke, L. W., D. G. Jenerette, A. Davila, G. D. Jenerette, and A. Davila. 2013. The luxury of 904 vegetation and the legacy of tree biodiversity in Los Angeles, CA. *Landscape and Urban Planning* 116:48–59.

¹⁵ Avolio, M. L., D. E. Pataki, T. W. Gillespie, G. D. Jenerette, H. R. McCarthy, S. Pincetl, and L. Weller Clarke. 2015. Tree diversity in southern California's urban forest: the interacting roles of social and environmental variables. *Frontiers in Ecology and Evolution* 3:1–15.

¹⁶ Wood, E. M., and S. Esaian. 2020. The importance of street trees to urban avifauna. *Ecological Applications*. doi:10.1002/eap.2149

¹⁷ Wood, E. M., and S. Esaian. 2020. The importance of street trees to urban avifauna. *Ecological Applications*. doi:10.1002/eap.2149

¹⁸ ibid.

- **Additional undesirable characteristics:** The tree species must not be denoted by TreePeople as possessing any of the following characteristics:
 - Too big for most parkways
 - Hard to establish
 - Not readily available
 - Not suited to LA climate zones
 - Weak branches
 - High water use
 - Major pests/diseases
 - Highly flammable

The list was then divided into the following tiers:

- **Tier 1:** Species that met **all** of the criteria
- **Tier 2:** Species that did not meet all of the criteria, but were nevertheless judged as being either **a) a truly exceptional wildlife tree or b) a species that has been well-documented as a successful street tree in the Los Angeles Basin.**

Species that did not fall within either of these tiers were discarded.

Coast live oak and Western Sycamore

The single most important tree for birds, and wildlife more broadly, in Southern California is without doubt the Coast live oak (*Quercus agrifolia*). It is an extraordinary host species for native beneficial insects, including over a hundred species of lepidopterans, and dozens of bird species. However, in addition to posing some root damage issues and having high allergenicity, Coast live oak is the most abundant tree in the Pasadena urban forest, with just over 10% of trees belonging to this species. Thus, any further planting of Coast live oak would contravene the 10-20 rule (the guideline that no more than 10% of a city's urban forest should belong to a single species, and no more than 20% from a single genus). We strongly urge the City to pursue avenues to protect and plant Coast live oak if possible, but in this document, we focus on other species for whom further planting would not violate the 10-20 rule.

Western sycamore (*Platanus racemosa*) is another widely planted native, bird-friendly tree species in Southern California. However, sycamore poses a number of problems in a street tree setting. It is highly allergenic and is very susceptible to a wide array of common pests, including polyphagous shothole borer, powdery mildew, anthracnose, and Fusarium. For this reason, this species did not pass the criteria for either the Tier 1 or Tier 2 lists.

Chinese Elm and Carrotwood

Chinese Elm (*Ulmus parvifolia*) and Carrotwood (*Cupaniopsis anacardioides*) are two non-native street tree species that are heavily overutilized by native bird species relative to their prevalence in the Los Angeles urban forest, and were therefore considered for inclusion on the Recommended Species List. However, both species have a history of invasiveness in many regions of North America - Chinese Elm is of particular concern, having been nominated as a Cal-IPC invasive species. For this reason, both species were left off the list out of an abundance of caution.

Recommended Species List

Tier 1 species and justifications

Six species met all of the selection criteria and were placed in Tier 1. These species are all tried-and-tested street trees in Southern California with relatively few issues and immense value for native wildlife. Thus, these six species are the most recommended bird-friendly street trees for Pasadena. A table of their characteristics (using information from the CalPoly SelecTree Database, Calscape, and the Chino Basin Water Conservation District Inland Valley Valley Garden Planner), as well as justification for each species, is provided below. Unless otherwise noted, all details provided on bird use of individual species originate either from Calscape or from personal communication with members of Pasadena Audubon and the California Native Plant Society.

	Deodar Cedar (<i>Cedrus deodara</i>)	Desert Museum Palo Verde (<i>Parkinsonia</i> x "Desert Museum")	Chitalpa (<i>x Chitalpa tashkentensis</i>)	Santa Cruz Island Ironwood (<i>Lyonothamnus floribundus asplenifolius</i>)	Torrey Pine (<i>Pinus torreyana</i>)	California Fan Palm (<i>Washingtonia filifera</i>)
Height (ft)	40-80	15-30	20-35	25-60	25-60	50-70
Width (ft)	20-50	20-30	20-30	12-40	15-50	10-20

Spacing (ft)	35-40	25-30	25-30	30-35	35-40	30
Possible forms	Spreading, Weeping	Round, Spreading, Vase	Round, Spreading, Vase	Round, Conical, Columnar	Round, Spreading, Columnar, Pyramidal	Columnar
Growth rate	Fast	Fast	Fast	Fast	Fast	Moderate
Dormancy	Evergreen	Evergreen	Winter deciduous	Evergreen	Evergreen	Evergreen
Fragrance	Pleasant	Pleasant	Pleasant	None	Pleasant	None
Flower color	N/A	Yellow	Pink/Lavender	Cream/White	N/A	White/Yellow
Flowering season	N/A	Spring/summer	Spring/summer/fall	Spring/summer	N/A	Winter/spring
Sun	Full sun, part shade	Full sun	Full sun, Part shade	Full sun	Full sun	Full sun, Part shade
Moisture	Any	Low, Very low	Any	Very low	Very low	Any
Irrigation	Max 3x/month	Max 1x/week once established	Max 2x/month once established	Max 1x/month once established	Max 1x/month once established	Max 1x/month once established
Cold tolerance	To 10 F	To 15 F	To -15 F	To 30 F	To -5 F	To 14 F
Drainage	Fast	Fast	Fast	Fast, Medium	Fast, Medium	Fast
Soil pH	Any	5.5-8.5	Any	5.0-8.0	Any	6.1-9.2
Sunset climate zone	18-24	18-24	3-24	19-24	18-24	11-24
Root damage potential	Medium	Low	Low	Medium	Medium	Medium
Allergy potential	1 (female) to 5 (male)	6	6	4	4	Mild

(1-10)						
Biogenic emissions	High	Medium	None	Low	Medium	Medium
Fire resistance	Unfavorable	Favorable	Favorable	Favorable	Unfavorable	Favorable
Longevity (years)	150+	40-150	40-150	50-150	150+	50-150

Deodar Cedar (*Cedrus deodara*)

Deodar Cedar surely ranks among our most outstanding street trees in every possible category, from aesthetics to compatibility with urban environments to usefulness for birds. Native to the mountains of South Asia, it is perfectly at home, and has become a common street tree, across ping branches and elegant needles ranging from green to blue. Importantly, it has no significant pest problems or invasiveness potential, and generally has low allergy and root damage potential, making it ideal for most street environments with sufficient space.

Special considerations:

- Deodar cedar is not fire resistant, so it may be best to avoid planting in the immediate vicinity of the wildland-urban interface.
- Lower branches must be removed in order to ensure compatibility with most street environments.

Bird use:

Wood and Esaian (2020) found that within the Los Angeles urban forest, deodar cedar is disproportionately favored by several migratory species, including Ruby-crowned Kinglet (*Regulus calendula*) and Townsend's Warbler (*Setophaga townsendi*). Given these species are insectivorous, this indicates that the beneficial insects hosted by deodar cedar are of great use to a number of native bird species, although it remains to be determined which specific insect species these are. Additionally, larger species such as Band-tailed Pigeon (*Patagioenas fasciata*) use deodar cedar extensively for roosting.

Desert Museum palo verde (*Parkinsonia x "Desert Museum"*)

Desert Museum palo verde is a spectacular hybrid among three palo verde species (*Parkinsonia aculeata*, *P. microphyllum*, and *P. florida*), two of which (*P. microphyllum* and *P. florida*) are native to southeastern California. Unlike other palo verde species, it is thornless, which, in addition to its sturdy limbs and relatively contained form, makes it a safe and suitable street tree. Desert Museum palo verde is one of the longest blooming palo verde varieties, and is

covered in relatively large yellow flowers throughout spring and summer. In addition to being utility-friendly, palo verde offers filtered shade, making it a good choice for residential areas with plenty of sun.

Special considerations:

- Palo verde is the most allergenic of the Tier 1 species. That said, it releases a relatively small volume of pollen compared to other common street trees and is rarely a major culprit in allergy problems.
- Most photosynthesis occurs on younger branches, so pruning should be performed judiciously and only during winter except in emergency circumstances.

Bird use: Palo verde trees are magnets for a diverse array of birds, due to their utility for supporting beneficial insects and their nectariferous flowers alike. Palo verde is pollinated by numerous beneficial insects, including beetles, flies, and bees, and is known to be a host for at least two Los Angeles Basin lepidopterans (*Melipotis acontioides* and *Forsebia cinis*). In addition to supporting insectivorous birds, palo verde flowers are also directly used by hummingbirds. Finally, the dense branches of the tree provide excellent nesting habitat for smaller bird species, especially hummingbirds.

Chitalpa (*Chitalpa x tashkentensis*)

Chitalpa is a hybrid between desert willow (*Chilopsis linearis*), an attractive Southern California native that is suboptimal as a street tree; and a member of the genus *Catalpa*, usually Northern Catalpa (*Catalpa speciosa*). Chitalpa exhibits beautiful pink or lavender flowers during its extremely long flowering season (from late spring to early fall). While it is winter deciduous, it nonetheless remains attractive throughout dormancy thanks its pale bark. Due to its contained habit, Chitalpa serves as an excellent tree for tight spaces, including under power lines.

Special considerations:

- Chitalpa blooms most profusely in full sun, but grows tallest in part shade.
- Chitalpa branches are sturdy enough for normal street use, but care should be taken not to apply excessive stress that may break the branches.
- Chitalpa naturally grows as a multi-trunk tree. If pruned when young, it can grow well as a single-trunked tree, but should be staked in order to grow straight.

Bird use: Chitalpa offers many of the same ecosystem functions as the native desert willow. It attracts numerous beneficial native insects that naturally use desert willow, and is particularly well-known as an excellent butterfly tree. Like any tree that supports native lepidopterans,

Chitalpa is thus highly useful to insectivorous birds. Additionally, Chitalpa provides a long-lasting and reliable source of nectar for hummingbirds.

Santa Cruz Island Ironwood (*Lyonothamnus floribundus asplenifolius*)

Santa Cruz Island ironwood is a subspecies of island ironwood, an evolutionarily unique tree endemic to the Channel Islands. Santa Cruz Ironwood has been extensively used in horticultural applications on the California mainland. Ironwood grows to be a tall, robust specimen while rarely spreading extensively. Its shiny and verdant foliage is evergreen, and its fern-like leaves are intriguing in appearance. During the spring and the summer, ironwood also boasts spectacular clusters of creamy white flowers. The most attractive feature of this species, however, is its flaky, peeling reddish bark.

Special considerations

- Due to its columnar habit, ironwood generally performs best where there is plenty of available overhead space.
- Preferably, ironwood should be planted in areas with some coastal influence, so we recommend this species for Downtown Pasadena and southwestern areas of the city.
- Soil drainage should be good.

Bird use: Ironwood's massive flower clusters are extremely attractive to a wide array of native pollinator species, especially bees, which in turn support insectivorous birds. Additionally, ironwood trees are known to provide good cover and nesting habitat for a number of native bird species, including orange-crowned warblers (*Vermivora celata*)¹⁹ and scrub-jays (*Aphelocoma* sp.)²⁰ Ironwood bark is also used by scrub-jays (*Aphelocoma* sp.) for caching seeds, and by a number of other species as nesting material.

Torrey Pine (*Pinus torreyana*)

Torrey pine is coastal Southern California's signature native coniferous species. Widespread across the region during the Pleistocene, this endangered tree's wild distribution is now restricted to a few groves in coastal San Diego County and on the Channel Islands. Luckily, thanks to its excellent performance in horticultural applications, Torrey pines are being restored across Southern California. Torrey pine grows to great size, taking on a number of forms ranging from spreading to columnar, but nevertheless a manageable and attractive ornamental street

¹⁹ Gilbert, W. M., M. K. Sogge, and C. van Riper (2020). Orange-crowned Warbler (*Leiothlypis celata*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.orcwar.01>

²⁰ Collins, P. W. 2009. Historic and Prehistoric Record for the Occurrence of Island Scrub-Jays (*Aphelocoma insularis*) on the Northern Channel Islands, Santa Barbara County, California. Santa Barbara Museum of Natural History Technical Reports – No. 5.

tree. If managed well, Torrey pines can also reach great size in a relatively short amount of time.

Special considerations:

- Due to their size, Torrey pines should be given plenty of space, and should never be planted under any overhead structures.
- Pine cone litter may be a concern, but is generally easy to clear.

Bird use:

Over millions of years, Torrey pine has evolved symbiotically with California avifauna, remaining one of Southern California's best wildlife trees today despite its rarity. Serving as a host for numerous native insects, including some twenty lepidopterans, Torrey pine is perhaps best documented as a host for the pine white butterfly (*Neophasia menapia*). In addition to hosting larval lepidopterans, Torrey pines provide pine nuts, which are directly useful to a number of native seed-eating birds, especially California Scrub Jay (*Aphelocoma californica*).

California Fan Palm (*Washingtonia filifera*)

California fan palm, while less optimal than other trees in this document (see Special Considerations), is nevertheless a perfectly manageable and highly attractive species that serves as an excellent native replacement for the extremely culturally important yet highly invasive Mexican fan palm (*Washingtonia robusta*), one of Pasadena's most widespread street trees. Much like other cultivated palm trees, California fan palm grows tall in a columnar fashion, showcasing an impressive and attractive evergreen crest in addition to a shaggy petticoat of dead leaves.

Special considerations:

- California fan palm is known to be susceptible to the South American palm weevil (*Rhynchophorus palmarum*), and should be surveyed regularly for pest damage.
- Fan palms may drop fronds or fruit.
- Fan palms are too tall for homeowners to maintain, so the city must take on upkeep costs.
- Fan palms only provide limited shade.

Bird use:

The flowers of the California fan palm attract about 20 species of native arthropod, including bees, beetles, and lepidopterans. In addition to supporting healthy insect populations, California fan palm has developed such a close relationship with the hooded oriole (*Icterus cucullatus*), which nests on the underside of palm fronds, that the bird is sometimes nicknamed the "palm-leaf oriole." Finally, the fruit is useful for several native frugivorous birds, including orioles.

Tier 2 species and justifications

Five species met the vast majority of the selection criteria and were judged to be exceptional either aesthetically, culturally, or ecologically, but were deficient in a few areas. These species were placed in Tier 2. They can serve as excellent bird-friendly street trees in certain situations within Pasadena, but care must be taken to avoid planting them in situations where they would not perform well. These species, along with their characteristics and justification for their selection, is provided below.

the world in Southern California. It is a straight and very tall tree, sporting a unique pyramidal shape with long wee

	California Laurel (<i>Umbellularia californica</i>)	Engelmann Oak (<i>Quercus engelmanni</i>)	Southern Live Oak	Ray Hartman Ceanothus	Western Redbud (<i>Cercis occidentalis</i>)
Height (ft)	25-75	30-65	40-80	12-30	10-25
Width (ft)	20-75	80-120	60-100	5-20	10-25
Spacing (ft)	35-40	35-40	35-40	12-20	25-30
Possible forms	Round, Spreading	Round, Spreading	Round, Spreading	Round	Round, Spreading
Growth rate	Moderate	Moderate	Moderate	Fast	Moderate
Dormancy	Evergreen	Evergreen or summer deciduous	Evergreen	Evergreen	Winter deciduous
Fragrance	Pleasance	None	None	Slight	Slight
Flower color	White/Yellow/Cream/Green	Cream/Green	Tan	Blue	Pink
Flowering	Spring	Spring	Spring	Spring	Winter/spring

season					
Sun	Full sun, part shade	Full sun, part shade	Full sun, part shade	Full sun, part shade	Full sun, Part shade
Moisture	Low	Low	Any	Low	Low
Irrigation	Max 3x/month	Max 2x/month	Max 1x/week	Max 1x/week	Max 1x/week once established
Cold tolerance	To 10 F	To 30 F	To 10 F	To 15 F	To 20 F
Drainage	Medium, Slow	Any	Any (preferably Fast)	Fast	Any
Soil pH	5.0-8.0	6.0-8.0	Any	5.0-8.0	5.0-8.0
Sunset climate zone	18-24	18-21	18-24	18-24	18-24
Root damage potential	Medium	Medium	Medium	Low	Low
Allergy potential (1-10)	8	8	9	6	5
Biogenic emissions	High	High	High	Moderate	Low
Fire resistance	Conflicting	Favorable	Favorable	Favorable	Favorable
Longevity (years)	150+	150+	150+	25-30	40-150

Western Redbud (*Cercis occidentalis*)

General description: https://plants.usda.gov/plantguide/pdf/cs_ceor9.pdf

Western redbud is a small deciduous tree native to foothill and montane riparian areas in the U.S. Southwest. Since 1886, redbud has been used in managed landscapes in California, and is renowned by horticulturalists as one of California's most spectacular native trees. During the winter and spring, this tree explodes into bloom, coated by pinkish flowers. Redbud is relatively small, contained, and round in form, making it utility-friendly and excellent for tight spaces.

Special considerations:

- Redbud requires relatively cool winters in order to exit dormancy. Thus, planting should be focused at higher elevation localities away from coastal influence. For this reason and due to its resistance to fire, we especially recommend redbud for foothill neighborhoods.
- Redbud can tolerate regular to heavy pruning, which should be performed after leaf drop in the fall, winter, or early spring.
- Redbud can suffer leaf scorching during the summer due to reflected heat from pavement, so this species should preferably be used where a lawn or larger trees are present.

Bird use: Western redbud is a highly well-rounded bird tree, useful to insect-eating, seed-eating, and nectar-eating birds alike. It is pollinated by bumblebees (*Bombus* sp.) and orchard mason bees (*Osmia lignaria*), but is also highly attractive to other native insects. For instance, redbud is thought to host up to 11 species of native lepidopterans. These insects, especially the larval lepidopterans, serve as important food for resident and migratory bird species. Additionally, redbud seed pods are known to be useful to certain native birds such as goldfinches (*Spinus* sp.). Finally, hummingbirds (*Trochilidae* sp.) feed extensively on nectar in redbud flowers.

California Laurel (*Umbellularia californica*)

California Laurel, or California Bay Laurel, is a medium-to-large, robust, and verdant tree native to wooded groves throughout coastal California, including in the foothills around Pasadena. Named for the similar Bay Laurel (*Laurus nobilis*) from Europe, it is actually highly evolutionarily distinct, being the only member of the laurel family native to California and one of the few native to temperate North America. It is a highly versatile species that can be used in a variety of horticultural settings, and due to its variable size and shape, it can serve as an excellent species for small and large parkway spaces alike. Wherever it is planted, its thick green foliage

will provide ample shade as well as a strong but very pleasant fragrance.

Special considerations:

- California Laurel is a fairly allergenic species, so homeowners should be consulted prior to planting, and streets around schools should be avoided.
- While root damage potential is lower than for many common street trees, California Laurel roots may be more invasive than other species in this document.
- California Laurel has a tendency to basal sprout, so pruning should be regular.
- California Laurel is a well-known host for *Phytophthora ramorum*, the pathogen responsible for Sudden Oak Death (SOD). While SOD generally does not seriously impact laurel health, it can easily spread to nearby oaks, where its impact is more grave. Thus, laurel should be planted away from oaks if possible. If this is not possible, the area should be regularly monitored, and if SOD is detected within 1,000 feet of the oak, the oak should be treated preventatively even if all surrounding laurels are healthy.

Bird use:

California Laurel is a species of extremely high ecological importance in wooded environments throughout coastal California, especially for birds. The tree's inconspicuous green berries, as well as the nuts within, are consumed by a wide array of birds, and its dense foliage provides cover for a broad range of birds of various sizes.

Engelmann Oak (*Quercus engelmanni*)

Obviously, no list of recommended street trees for Pasadena would be complete without Engelmann Oak, a tree so intricately tied to the city's natural history that it is alternatively known as the "Pasadena Oak." This endangered tree is endemic to a narrow strip of upland habitat in coastal Southern California, including the San Gabriel Valley where it has been all but extirpated in the wild, but has become quite popular in horticultural applications, for good reason. It embodies all the characteristics generally sought for in oaks, including a broad, spreading, gnarled structure and verdant foliage that provides excellent shade.

Special considerations:

- Engelmann Oak is a fairly allergenic species, so homeowners should be consulted prior to planting, and streets around schools should be avoided.
- Engelmann Oak has the broadest canopy of any oak species, and thus should only be planted where there is ample horizontal space.
- Engelmann Oak is a known host for polyphagous shothole borer (*Euwallacia sp.*), so it should be checked regularly for signs of infestation.
- Acorn litter may be an issue in certain circumstances.

Bird use:

In the wild, Engelmann Oak undoubtedly ranks among the most useful Southern California

native plants for wildlife, especially birds. The beneficial insects thought to be hosted by Engelmann Oak include a staggering 112 species of lepidopteran, demonstrating this tree's incredible potential to produce food for insectivorous birds. Additionally, the tree's acorns are consumed by a vast array of native birds, including Acorn Woodpecker (*Melanerpes formicivorus*), Oak Titmouse (*Baeolophus inornatus*), Bushtit (*Psaltriparus minimus*) and California Scrub-Jay. Given its size and complex structure, Engelmann Oak is also used for cover and nesting by a wide range of species.

Southern Live Oak (*Quercus virginiana*)

The Southern Live Oak is one of the United States' most emblematic trees, the enormous, aged, gnarled specimen adorning the park-like landscape of the American South. While Southern California lies well outside of its typical native habitat, this tree performs excellently here too, and it has become a well-established component of the Pasadena urban forest. Southern Live Oaks growing as street trees in Southern California do not reach the same size as they do further east, but nevertheless contribute lush foliage, majestic structure, and excellent shade to the urban environment.

Special considerations:

- Southern Live Oak is known to be susceptible to *Xylella fastidiosa*, a bacterium that causes leaf scorch. Trees should be surveyed regularly for infection.
- Southern Live Oak is a fairly allergenic species, so homeowners should be consulted prior to planting, and streets around schools should be avoided.
- Acorn litter may be an issue in certain circumstances.

Bird use:

Though it is non-native, it was found ²¹ that within the Los Angeles urban forest, southern live oak is disproportionately favored by numerous resident and migratory bird species, especially Ruby-crowned Kinglet, Townsend's Warbler, and Bushtit. While the exact utility of this species to native wildlife is not yet understood, it likely serves as an ecological proxy for native oak species, hosting many of the same beneficial insects as well as providing acorns for birds.

'Ray Hartman' Ceanothus (*Ceanothus x 'Ray Hartman'*)

Ceanothus has gained incredible popularity among horticulturalists as one of the most aesthetically pleasing and versatile genera of California native plants, but the 'Ray Hartman' cultivar - a hybrid between *C. arboreus* and *C. griseus* - is unique among its congeners, as it functions less as a large shrub and more as a small tree. 'Ray Hartman' combines the many features of ceanothus shrubs, such as easy cultivation, low water requirement, very fast growth, and luscious blossoms, with a size that allows it to serve as an excellent street tree for tight

²¹ Wood, E. M., and S. Esaian. 2020. The importance of street trees to urban avifauna. *Ecological Applications*. doi:10.1002/eap.2149

spaces such as beneath utility features.

Special considerations:

- It is crucial to remember that biologically, 'Ray Hartman' shares far more in common with *Ceanothus* shrubs than the other trees described in this brochure. Thus, the maximum lifespan of this cultivar is comparatively somewhat short (under 50 years). 'Ray Hartman' ceanothus should therefore never be used in situations where the tree is desired to survive into the far future.
- Supplemental summer watering should be completely avoided, as it can shorten the plant's lifespan.
- Deer are very attracted to 'Ray Hartman' ceanothus, so planting in the wildland-urban interface should be done carefully.

Bird use:

Ceanothus is a genus of paramount ecological importance in the chaparral of Southern California. This ecological value translates to excellent wildlife utility in ceanothus cultivars, including 'Ray Hartman.' While the beneficial insects hosted this particular cultivar have yet to be comprehensively documented, ceanothus is known to be enormously valuable for native bees, and nearly 100 species of lepidopteran are thought to be hosted by either *C. arboreus* or *C. griseus*, the two contributing species to the hybrid - testifying to the immense potential of this plant to support insectivorous birds. Additionally, hummingbirds feed directly on the nectar in ceanothus flowers, and a number of birds, including goldfinches and bushtits, feed on the plant's seeds.

Species to Avoid

Wood and Esaian (2020) found that the vast majority of non-native street tree species currently utilized in the Los Angeles urban forest are relatively underutilized by birds - that is, their ecological value to native birds is below average. In a city where this average is already quite low, these trees may be considered to be of almost zero value to native birds. Many of these species are also common in the Pasadena urban forest, and a partial list of them is provided below.

Southern magnolia (*Magnolia grandiflora*)
Camphor tree (*Cinnamomum camphora*)
Italian stone pine (*Pinus pinea*)
Common crape myrtle (*Lagerstroemia indica*)
London plane tree (*Platanus x acerifolia*)
Indian laurel fig (*Ficus microcarpa*)
Carob (*Ceratonia siliqua*)

Canary Island date palm (*Phoenix canariensis*)

Issues with Pasadena urban forest management

Native trees comprise only a small portion of Pasadena's urban forest. Only just under 10% of City of Pasadena trees (mostly street trees) are native or near-native, with the quasi-totality of these being Coast Live Oaks. Non-native species found to be bird-friendly by Wood and Esaian (2020) also contribute to the makeup of the urban forest on a minor scale. The most bird-friendly non-native species in the Los Angeles urban forest, namely Chinese Elm, Carrotwood, and Southern Live Oak, only account for about 6%, 2%, and 1% of City of Pasadena trees respectively. The vast majority of street trees in Pasadena are thus not especially useful to most native birds.

The Problem:

There are three significant issues that prevent more bird-friendly species, especially native trees, from being planted.

The first two are major features of the regulatory infrastructure surrounding the Pasadena Urban Forest.

1. **The 10-20 rule.** Urban forests across the United States in the 20th century were devastated by massive infestations and subsequent tree die-offs, such as the famous chestnut blight (*Cryphonectria parasitica*) that virtually wiped out all American chestnut trees (*Castanea dentata*) across the continent. These infestations were severely exacerbated by a lack of diversity within urban forests, which allowed pests to spread in an unabated fashion. In order to prevent the recurrence of similar events, many cities, including Pasadena, have adopted the 10-20 rule, a principle that no individual species should comprise more than 10% of the urban forest, and no genus should comprise more than 20%.

While sensible, this rule essentially prohibits the planting of any additional coast live oaks in Pasadena, as that species already accounts for around 10% of city trees - a major obstacle to efforts to increase the ecological value of the urban forest, as coast live oak is possibly the single most important plant species for Southern California wildlife, especially birds.

2. **Procedure to process amendments to the Master Street Tree Plan (MSTP).** In order to ensure aesthetic uniformity, the Pasadena MSTP dictates which tree species may be planted on each block of each street in the city, with a maximum of five species authorized for each street. However, most streets have only been assigned one or two

tree species. The only way for the list of species authorized for any individual street to be changed (for example, for an additional species to be authorized for a street) is for a resident to petition the Department of Public Works to amend the MSTP.

What follows is an incredibly byzantine process, which begins, upon the resident submitting the petition to amend the MSTP, with the city providing the street coordinator with a flowchart to the amendment process and information on the incredibly detailed Cal Poly SelecTree guide. The street coordinator is tasked with meeting with the petitioner and also getting the concurrence of at least 50% of residents on the street and finally working with Public Works to submit a letter detailing the specific amendment proposal to decide which species to add to the street.

A major problem with this process is the overwhelming size and detail of the Cal Poly guide, with the vast majority of the species in the guide being non-native, as a result of which the residents are very unlikely to select a bird-friendly species if it is not their primary intention. Moreover, the undue burden placed on the street coordinator to sort through the thousands of species in this database as well as to share the database with other residents makes the entire process so onerous as to strongly dissuade residents from submitting requests to modify the MSTP, or the street coordinators from appropriately researching the wildlife-friendliness of the suggested trees.

The third problem is that of a general lack of knowledge on the part of the homeowner who, in the current process, is tasked with the responsibility of initiating the process to modify the MSTP.

3. The homeowner is generally unaware of not just the process to modify the MSTP to increase the diversity of street trees in his or her neighborhood, but the very existence of a problem relating to the deleterious impact of non-native trees on urban wildlife!

These three problems have led to the current situation where lack of information combined with a complicated process to amend the MSTP make it incredibly difficult to increase the ecological value of the urban forest.

The Solution:

One of the primary goals of this report is to provide solutions to these three problems.

To solve Problems 1 and partially solve Problem 2, the following strategy is proposed:

A. The City of Pasadena should include the flyer in Appendix A as one of the resources provided to the street tree coordinator in the Procedure to Process Amendments to the Master Street Tree Plan.

The overall MSTP amendment process, while laborious, can be left relatively intact if the city prefers it that way, although reducing the level of complexity would be desirable. However, the most important thing is to prioritize the list of bird-friendly trees that has been generated as part of this effort over the Cal Poly Selectree guide. The bird-friendly tree list has been thoroughly researched and is presented as part of the work in two formats: an easily digestible tabular format, or in the form of an illustrated flyer (Appendix A). The bird-friendly tree list does two important things: a) It highlights the importance of these trees for urban wildlife, and b) makes the task of finding suitable trees much easier than having to pore through the voluminous Cal Poly tree guide.

It is recommended that the bird-friendly tree guide in both the tabular and flyer format should reside on either the City of Pasadena website, or on the Pasadena Audubon website and be appropriately linked to in the MSTP modification flowchart. The homeowner or the street coordinator will then have the correct starting list of bird-friendly trees to choose from. Since the list that has been generated as part of this study is shorter, more focused, and in a more user-friendly format, it is expected to greatly simplify the process for the homeowner or street coordinator.

In order to solve Problem 3 and partially solve Problem 2, the following strategy is proposed:

- B. The City of Pasadena should begin a community-oriented campaign to encourage Pasadena residents to submit amendments to modify the MSTP for their streets, focusing this campaign on lower-income neighborhoods of the city.**

We must address a lack of knowledge about both the City policy on street trees and the importance of careful species selection. Since the process of initiating the effort to amend the MSTP falls on the resident, it is imperative that they are educated on not just the importance of bird-friendly trees, but on the process of amending the MSTP. To address this, it is recommended that the City initiate a community-oriented campaign to impress on the residents of the city the need for diverse native flora to allow native fauna to thrive.

The simplification of the tree selection process, in addition to the grassroots campaign will have another hugely beneficial effect. One of the great problems of the lack of native biodiversity in the urban forest is that this is highly influenced by socio-economics. Wood and Esaian (2020) find that within Los Angeles, affluent neighborhoods are more biodiverse, largely due to the fact that the prevalence of bird-friendly and native trees is positively correlated with neighborhood affluence. This pattern holds in Pasadena - the urban forest is much more biodiverse, and hence

much more friendly to urban wildlife, in affluent areas of the city than in socioeconomically depressed ones. The proposed solutions will go a long way in democratizing not just the knowledge and information needed by the residents to make good decisions regarding the trees on their streets, but to simplify the amendment process and make it more accessible to them.

Appendix A

Downloadable flyer:

<https://drive.google.com/file/d/1ZNp4Vf6r-5kPiFQo3IZ-18lstTHmu8q7/view>