SMA ROUNDTABLE

Conifers in the Urban Forest

The predominant mature forest type in many coastal areas of the Pacific Northwest is comprised primarily of coniferous trees such as Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), grand fir (*Abies grandis*), Sitka spruce (*Picea sitchensis*), and western hemlock (*Tsuga heterophylla*). Accordingly, coniferous species are important to Surrey's urban forest. More than 927 hectares (2291 acres) of forested natural areas on City park land are classified as coniferous or mixed forests (both coniferous and deciduous), representing 62% of all natural areas on City park land. In addition to conifers in forested park land, more than 12,500 individually planted coniferous trees are located in park open spaces and along streets, representing 12% of Surrey's shade tree inventory.

Most of the conifers growing in Surrey's forested areas arise from natural regeneration that has occurred over the last 100-plus years post-logging. In the last 15 years, conifers have been purposefully planted in the City's forested natural areas. Conifers are commonly prescribed in the establishment of new forest areas (for example, areas that are converted from grass to forest). They are planted in deciduous forests as a means to give forest succession a head-start towards mixed forests. In addition, conifers are planted each year as replacement trees for trees that are removed through the City's tree risk assessment and abatement program.

Many conifers that are growing in park open spaces as shade trees are naturally regenerated trees from the post-logging era that were retained during park development. In some of Surrey's parks, non-native conifers were planted by early European settlers. For example, the Brown brothers (Peter and David) planted numerous giant sequoia (*Sequoiadendron giganteum*), among numerous other exotic species, in the late 1800s and early 1900s in what is now Redwood Park, creating what is said to be the largest stand of giant sequoias outside of California. Conifers have been a part of Surrey's park shade tree planting efforts since the 1980s. In the early days, plantings were heavily focused on western redcedar as a favourite of park managers of the era.

Today, a wide range of both native and introduced conifers are planted, with an emphasis on planting fewer western redcedar in order to reduce the percentage of the species in the City's inventory to below 20%. It is also worth noting that in recent years some mature western redcedar trees in some areas of the City have died and others are in decline, perhaps because the recent string of long, hot, dry summers is contributing to their ill health. Another possibility is that ground water regimes

Surrey, BC still retains stands of old-growth conifers within its urban areas. Seen here is an old-growth Douglas-fir (*Pseudotsuga menziesii*) growing in a stand where 25 trees are over 55 m (184 feet) in height and the tallest of the trees is 62.1 m (204 feet). The man in front is Surrey Manager of Parks Planning & Design Ted Uhrich. Photo by Owen Croy

may have changed in some areas as a result of development, causing the trees to decline.

Similar to park open spaces, there are many naturally regenerated conifers that were retained along Surrey's streets during subdivision and road development. Surrey's street tree plantings have included conifers for more than 35 years. In the earlier plantings, native conifers were commonly planted along medians in conjunction with smaller native deciduous trees in pockets of native shrubs. In more recent years, conifer plantings in street landscaping have trended towards introduced species; presently, many species from 19 different genera are planted in Surrey, ranging from dawn redwood (*Metasequoia glypstostroboides*) to columnar black pine (*Pinus nigra* 'Arnold Sentinel') to incense cedar (*Calocedrus decurrens*).

Surrey's planning documents further illustrate the importance of conifers in the urban forest. The *Shade Tree Management Plan* sets out targets for species diversity, within which conifers play an important role. The *Arterial Median Landscape Guidelines* emphasize the use of coniferous and evergreen trees with a balanced selection of deciduous species to achieve seasonal and floral effects while retaining visual interest all year. The planting of conifers and evergreens along streets is carefully considered to ensure that sightlines for vehicles and pedestrians are maintained in accordance with traffic planning best management practices.

Cupressus nootkatensis 'Pendula' planted in a narrow median in Surrey, BC. Photo by Neal Aven

When planting conifers along street landscapes and in park open spaces, species selection requires careful consideration. In particularly wide medians, species choice may include giant sequoia, while in narrow medians, species choice may be restricted to trees with narrow crowns such as Serbian spruce (*Picea omorika*) or weeping Nootka cypress (*Cupressus nootkatensis* 'Pendula'). In park spaces, planting large-statured conifers along the north side of parks next to adjacent homes is avoided in order to prevent houses from being completely shaded out during winter months, thus reducing the potential for vandalism of trees by frustrated residents. In these areas, more suitable trees may include deciduous conifers such as dawn redwood or western larch (*Larix occidentalis*).

—Neal Aven, Urban Forestry Manager, City of Surrey, British Columbia Parks Division

Taxodium distichum planted in a median in Surrey, BC. Photo by Owen Croy

Volunteers and Tree Pittsburgh Director of Urban Forestry Matt Erb (right) plant a *Cedrus libani* ssp. *stenocoma* in Pittsburgh's Arsenal Park. Several dozen of these hardy cedars of Lebanon have survived the last two polar vortices with little to no needle burn, while Leyland cypress (*Cupressus* x *leylandii*) in the area were wiped out. Photo Courtesy Tree Pittsburgh

Steel City Gymnosperms

Conifers in the Pittsburgh area were targeted by the first settlers for one of the first industries of the Steel City, leather tanning. Hemlock (*Tsuga canadensis*) (Pennsylvania State Tree) and eastern white pine (*Pinus strobus*), which made up around 9% of the presettlement forest, quickly disappeared from the urbanizing landscape as the bark was used for the tanning process. Hemlock only returned to the city as an ornamental planted in yards and cemeteries and in recent years has begun to disappear again due to the pressures of hemlock woolly adelgid and elongate scale. Eastern white pine has been planted where space allows—but no self-reproducing population of any conifer exists within the city.

By far, the most common conifers in Pittsburgh are Colorado blue (*Picea pungens*) and Norway spruce (*P. abies*); the former is being devastated throughout the region by spruce decline. Austrian black pine (*Pinus nigra*), red pine (*P. resinosa*), and Scots pine (*P. sylvestris*) all seem to be on their way out as well due to broad swings in both precipitation and temperatures that favor fungal pathogens.

A few years ago when we started a new campaign to plant 20,000 trees in Pittsburgh, we quickly realized that conifers were absent from many of our plantings. Aware of the local pest and disease pressures as well as rampant conifer theft from parks at Christmas time, we set out to find new species that would survive and thrive. Many local growers focus on the typical spruces and pines that are sold as balled-and-burlapped or cut Christmas trees and that are overplanted and underperforming in the urban forest. We broadened our search and looked for specialty ornamental and conifer growers.

Over the last eight years we have planted over 31 species and numerous cultivars and seedlings from the following 14 conifer genera: *Calocedrus, Cedrus, Chamaecyparis, Cryptomeria, Juniperus, Larix, Metasequoia, Picea, Pinus, Pseudolarix, Sciadopitys, Taxodium, Thuja,* and *Tsuga.* Top performers so far include *Chamaecyparis nootkatensis* and *Metasequoia glyptostroboides,* which includes the largest planted grove of *Metasequoia* in Pennsylvania.

We found growers that didn't shear their trees, we purchased malformed specimens, and we secured weeping and other unusual forms all in an effort to avoid theft during the holiday season. To date, none of our newly planted conifers have been stolen. In 2012 the Pittsburgh Urban Forest Master Plan was released with strong diversity guidelines for tree planting that recommend that 20% of plantings (non-street) be composed of conifers. We have followed this recommendation in parks, cemeteries, greenways, and medians—and the year-round beauty of conifers is now more noticeable in our public spaces.

The Tree Pittsburgh Heritage Nursery, which grows 3-4 feet (.9-1.2 m) tall containerized seedlings for restoration projects

in the region, has increased the number of species of conifers it grows from three in 2010 to over two dozen and counting today. We enlist volunteer arborists to help with fall cone collection from notable specimens throughout the city.

Conifers have also garnered a tremendous amount of interest from our volunteers. We have avid birders and wildlife watchers that genuinely appreciate how conifers contribute to their hobbies and the ecosystem. We have exposed volunteers/residents to many new species of conifers that had not been previously grown in the city, and they are now interested in growing these new species in their gardens. Finally, we have heard from folks who are just excited about a conifer's instant ability to hide a building/dumpster/parking lot, something that improves the aesthetics of a park or neighborhood immensely.

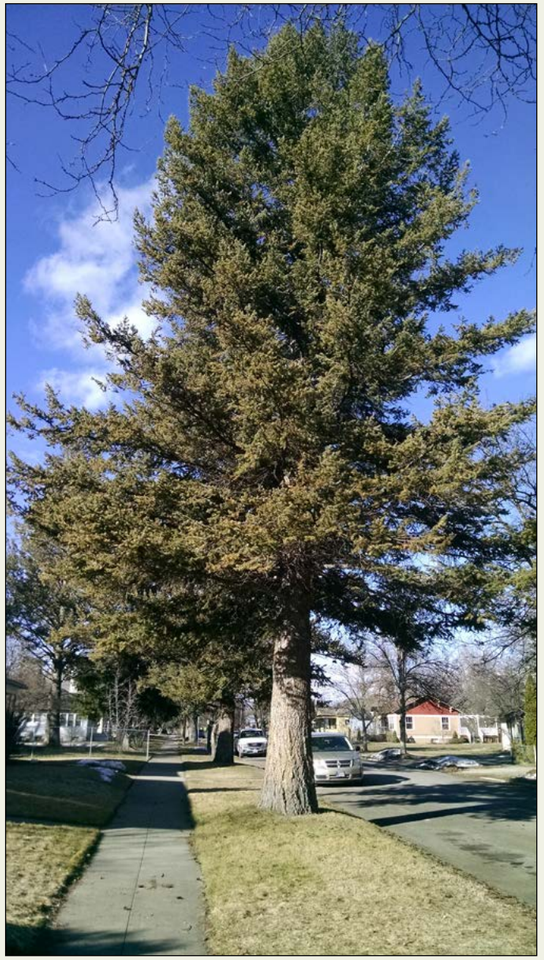
The American Conifer Society and its members are a fantastic resource for learning more about conifers. Many members offer tours of their private gardens and freely share information from their decades of growing experience. They can point you to hardy sources of conifers and very interesting trees that you might not have considered planting otherwise.

—Matt Erb, Director of Urban Forestry, Tree Pittsburgh

Deodar cedar (*Cedrus deodara*) is known to tolerate poor, compacted soils. Photo by Gordon Mann

Evergreens: A Blessing and a Challenge

With Kalispell, Montana Parks Superintendent Fred Bicha



Douglas fir (*Pseudotsuga menziesii*) in Kalispell, Montana. Photo by Fred Bicha

Some Positives

- Serve as a windbreak
- Provide color during a brown-and-white winter
- Add different textures to the landscape
- Require less pruning
- Are high performers in terms of environmental and economic benefits
- Offer pleasant aromas

A Missoula, Montana neighborhood just after a major windstorm of 70 mph (113 kph) wind gusts knocked over several spruce and pine trees into utility lines and across the road. Photo by Jamie Kirby

Some Negatives

- Are often forgotten about on the urban fringe
- May have shallow roots (as with spruces)
- Do not allow for wind to pass through / more subject to snow loads
- Have needles year-round, making visual inspection somewhat problematic
- On boulevards can create vision issues
- In parks can be a nuisance for public safety
- Tend to need more insect and disease treatment / not always as resilient in harsh urban environments
- Icy conditions are heightened in areas shaded by conifers

The conifers are my favorite group of trees. Not only do they give structure to the landscape, they also lend it character and enrich the species diversity of the urban forest. As the evolutionary predecessors to the angiosperms, the conifers offer a more primitive expression of nature. That inspired in me the idea that in the most optimal evolutionary sequence of successful processes, it is first necessary to bring functional order—as do the conifers—and after that comes room for flexibility and adaptability—as we observe in angiosperms.

In Chile, arborists have generally taken for granted that conifers can only be used in places that provide a lot of space, which would preclude their use along streets and avenues. My opinion changed when I saw a picture of large Italian stone pine trees (*Pinus pinea*) dominating the canopy of an urbanized street in Rome. We need a more substantive discussion in this regard, involving the participation of nurserymen, landscapers, and urban designers, and a review of what has been done in more advanced countries. There are smaller conifer species, varieties to suit narrower spaces like *Cupressus sempervirens* var. *Pyramidalis*, and others that can be managed through proper pruning.

Unfortunately, conifers are barely represented in the lists of species recommended for planting in our metropolitan region. For example, among conifers the *Urban Forestation Guide* of the Chilean Association of Landscape Professionals recommends using only three species of the genus *Cedrus*. Where there are conifers planted in private gardens, homeowners sometimes become fearful of how large they will become and either top or remove them. We need more discussion and education about conifers, the benefits they provide, their management, and the wide variety of species and cultivars that we could plant.

The most outstanding representative of the few conifers that are grown in our region is the cedar of Lebanon (*Cedrus libani*). Although its native habitat is the mountain forests of Lebanon, Syria, and Turkey, for me the cedar of Lebanon brings to mind the sea, and I enjoy its long side branches sloping downward with unmatched grace, forming its characteristic horizontal layers. It is a very friendly and modest giant—a wonderful conifer and one of my favorites. In Santiago, it has been used extensively in squares and parks.

In I. Municipalidad de Calera de Tango, in a small patch of earth adjacent to our municipal building, a magnificent specimen of cedar of Lebanon dominates the landscape. We've never paid much attention to the tree, because it has never given any reason to do so, except the very sporadic concern of some official primarily because of its height. The solitary cedar strikes me as proud and unflappable as it silently accompanies the daily work of the municipality. When I encounter the tree each morning, I look upon it with curiosity and then make sure it doesn't represent a danger to anyone so that it doesn't attract unwanted attention that could lead to its removal.

My most favorite conifer is one that is quite adapted to our Mediterranean climate, the elegant cypress. My first emotional encounter with this tree happened in front of some paintings of Van Gogh that depict dark, fastigiate cypresses. Since then, I have dreamt of seeing the slim silhouette of those mystical cypresses throughout my city.

I have tried out several different conifer species in Cumberland. Because we have soils that tend to be alkaline, I have had better success with trees that are high-pH tolerant. Serbian spruce (*Picea omorika*), Norway spruce (*P. abies*), Japanese larch (*Larix kaempferi*), Chinese juniper (*Juniperus chinensis*), eastern red cedar (*Juniperus virginiana*), and eastern white pine (*Pinus strobus*) are the species that have been somewhat successful. The cedars/junipers and spruces tend to be less browsed by deer but they can see some damage from antler rubbing. Last year I planted a dawn redwood (*Metasequoia glyptostroboides*) to see how it would do here. I have tried planting eastern hemlock (*Tsuga canadensis*) but have been unsuccessful in getting it established, and the older hemlock trees here tend to get hit with hemlock woolly adelgid. Recently, we have been seeing decline of some of the spruce species such as Colorado blue spruce (*Picea pungens*) and Norway spruce. I think it may be related to the spruce decline that has been seen in other states around us that is thought to be caused by some combination of environmental changes and pathogens.

—Paul Eriksson, Natural Resources Specialist, Engineering Division, City of Cumberland, MD

The showy, slow-growing araucaria or monkey puzzle tree (*Araucaria araucana*) is native to parts of Chile. Despite being quite far from its biotope of origin, in our region it has frequently been planted in gardens, perhaps for the curious effect produced by its wide branches (see photo). It's considered a source of pride to have it within a private tree collection. For its historic, ecosystem, and cultural importance, it was declared a natural monument by the Chilean Ministry of Agriculture nearly 40 years ago, and in our community it is prohibited to take it down. We want future generations to enjoy it in the state of maturity that we do.

In my municipality there is a courtyard that houses large trees. Among them, two imposing Parana pines (*Araucaria angustifolia*) with their bare trunks as straight as two columns frame an outdoor amphitheater. These araucarias steal attention from performances when, by the capricious mood swings that our climate has had lately, an unusually strong wind picks up, scattering countless dead and live branches below. Despite this, and the fact that the needles are extremely sharp-tipped, no one dares complain about these beautiful specimens.

Recently the governing council of Calera de Tango approved an urban tree ordinance, which constitutes the first of its kind in the metropolitan region and the second nationally. Hopefully it will be a tool to transform our urban forest. For now, it will help us preserve the large specimens, among them giant cedars of Lebanon and Parana pines, from the indiscriminate and voracious advance of the inhospitable "concrete jungle."

—Felipe Fuentes Ramírez, Municipal Arborist, I. Municipalidad de Calera de Tango, Chile

Chileans prize both their native and cultivated monkey puzzle trees (*Araucaria araucana*). Photo by Michelle Sutton

In Nashville, using conifers in the urban environment has gone in and out of style. Most recently, arborvitaes (*Thuja*) have been used as an evergreen screen; however, after snow their branches tend to flop over from the weight. If they do not correct themselves, we will cable them. Yews (*Taxus*) continue to do well here though are mostly used as a foundation shrub. Often when cypress (*Cupressus*), pines (*Pinus*), or cryptomerias (*Cryptomeria*) are used, they may grow well for years and then in a drought will quickly die. (An old local saying is, "There are no native pines in Nashville.") Also, the availability of conifers is a consideration. On average, Nashville's climate tends to be a little too hot for conifers which has reduced the demand and therefore, the area nurseries tend not to stock them.

—Jennifer Pine Smith, Horticulturist, Metro Landscape Coordination Program, Metro Nashville Public Works

Unfortunately, city foresters must avoid using hemlocks like this weeping variety (*Tsuga canadensis* 'Pendula') in areas with hemlock woolly adelgid infestations. Photo by Michelle Sutton

Outside Their Comfort Zones

Nearly ten years ago, the University of Missouri, where I worked as campus arborist, decided to increase the conifer collection at the Mizzou Botanic Garden. A number of unusual species were brought in and planted in various locations around campus. My initial thought was that many of these species, especially the western species, would not be too happy growing in heavy midwestern clay soils. As it turned out, that was the case as one by one, each of them died. Campus soils are not only very heavy and slow draining, but are also very compacted due to heavy foot traffic.

A second round of conifers was purchased to replace the first lot. This time I decided to change tactics and plant higher. All of these trees were B&B stock and some had 44-inch (112 cm) balls and were very tall because of this. The plan was to dig a shallower planting hole and shave off some of the lower root ball where roots were barely present. I then mixed up 1/3 topsoil, 1/3 sand, and 1/3 pea gravel. This mixture was mounded up to the root ball and the trees were staked. These trees received extra watering the first season or two as do all new plantings and then were on their own.

Despite the total failure of the first plantings, the second plantings are all growing well and a few have exploded with new growth. The only difference was the planting height and the super porous mix brought up to the root ball. These second plantings went through the drought of 2012 with little additional watering. Given time, the huge mounds tend to mellow out and settle lower and the lower branches tend to help hide the fact that the balls are sticking 18-24 inches (46-61 cm) up in the air.

I have since used this method with good success to plant other conifer species, such as *Juniperus scopulorum,* that tend to struggle with midwestern soils. I believe that midwestern landscapers and arborists can plant a much wider array of conifers than was once commonly thought.

A partial list of species planted with this method:

Abies homolepis	*Pinus ayacahuite*
Abies koreana	*Pinus flexilis*
Pinus armandii	*Pinus strobiformis*
Pinus monticola	*Pseudotsuga menziesii*

—Ryan Russell, Horticulturist, City of Columbia, Missouri

I recommend conifers for parks but not as street trees because you need to be able to have visual clearance from your street trees. Also, conifers are more prone to insects and diseases than deciduous trees. If you're deciduous, you get rid of your leaves every year, but if you're evergreen, you have to live with some portion of your leaves/needles for two to five years—and that's more time for insects and pathogens to get established and damage the tree. Also, a wider variety of insects and diseases affect conifers than do deciduous trees. Lastly, conifers tend to need cooler temperatures, more moisture, and better soil than deciduous trees.

That said, there are a number of tough conifers for urban use. White fir (*Abies concolor*) can take hotter temps and the full range of soil pH. It's not fast growing but it's beautiful and a good substitute for Colorado blue spruce. When crushed, white fir needles smell like tangerines. Another fir that isn't planted as much as it should be is Nordmann fir (*A. nordmanianna*), which tolerates high pH soils and grows fast. Korean fir (*A. koreana*) needs acid soil but if you have that, you'll be treated to early, upright purple cones that knock your socks off. It needs a pH below 7.0 or will get chlorotic.

Spruces are generally more forgiving than firs. Serbian spruce (*Picea omorika*) is a wonderful, easy-to-grow tree. Norway spruce (*P. abies*) is easy to grow (perhaps the easiest of all spruces) but gets huge and loses its bottom limbs as it matures. Oriental spruce (*P. orientalis*) is a beauty that should be grown more, with its dark green, tiny little leaves.

Korean fir (*Abies koreana*) works well in urban situations so long as soil pH is below 7.0. Photo Courtesy Cornell Woody Plants Database

We're losing a lot of pines, like Austrian pines (*Pinus nigra*) to diplodia tip blight, which is a real shame; the Austrian pines were so tough and salt tolerant. A beautiful alternative is limber pine (*P. flexilis*), which grows fast, matures large, is pH-flexible, and is hardy to Zone 4b. Perhaps the most commonly available cultivar is 'Vanderwolf's Pyramid', which is a little bit narrower. Another pine I really like is Japanese white pine (*P. parviflora*), a five-needled pine with great architectural beauty (has more negative space than the average conifer). One that I like that I'm watching to see how it performs is Himalayan pine (*P. wallichiana*), a five-needled, fine-textured pine where the needles droop in a showy way and sway in the breeze. Hardiness might be an issue—I think of it has hardy to Zone 6 or 5b, but last spring in Ithaca we had a really cold April after a warm March, and that fluctuation seemed to take its toll on some of the Himalayan pines here. But then, seasonal anomaly can affect any trees, not just evergreens.

I'm not a big arborvitae (*Thuja*) fan but 'Green Giant' is a fantastic hybrid of Thuja plicata and T. standishii that grows exceptionally fast and is readily available in the trade. I planted a few out in the deer corridor of my property and they did get eaten but not to the extent that eastern arborvitae (*T. occidentalis*) would. Where most arborvitaes tolerate or embrace semi-shade, the Spring Grove arborvitae (*Thuja plicata*) grows great in the dense shade and is gorgeous there on my property.

—Nina Bassuk, Director of the Urban Horticulture Institute, Cornell University