Tabitha Schwartz: [00:00:12] Hello and welcome to the ISA Rewind video series. I'm Tabitha Schwartz, Credentialing Partner & Operations Manager at the International Society of Arboriculture. Today, ISA is proud to bring you a presentation by Alexander Martin and Lara Roman on the social-political drivers of urban tree diversity and composition. This presentation was originally given at the 2023 ISA Virtual Conference, so the views seen here are those of the presenters. If you are interested in the history of urban forest development and would like to know how your region can build an urban forest, I expect you will like this presentation. Now, sit back and enjoy.

Hi, everyone. Welcome to our presentation for the ISA virtual event for the 2023 conference. [00:01:00] Socio-political Drivers of Urban Tree Diversity and Composition: Development Symbolism and Stratification. Our presentation talks about two different areas, and so we are two different presenters. Myself, Alexander Martin, Board Certified Master Arborist with the ISA, the director of Ironwood Urban Forestry Consulting Incorporated, a research and consulting company located in Winnipeg, Manitoba, and I'm also a master's student at the University of Toronto. I'm joined by Lara Roman, PhD research ecologist at the United States Forest Service. My presentation touches on building an urban forest from dust to ashes in Winnipeg, Canada. Lara's is the history of London plane tree in Philadelphia, United States.

So, building an urban forest from dust to ashes in Winnipeg, Canada. Winnipeg is located in the center of Canada in the province of Manitoba. It is the capital city of Manitoba, just north of the US-Canada border. [00:02:00] It's located on Treaty 1 territory in the homeland of the Métis nation, and so as much as Winnipeg, we're talking about the history of Winnipeg as a city. The history of the land itself dates back far longer and has been used as a gathering point for generations. Winnipeg as a city began to develop around the fur trade with the Hudson's Bay Company and the voyagers across Canada traveling in search of pelts that could be made into clothing. So, there were large canoes that the traveled down the rivers of Canada and Portage at great lengths to access points where there was sufficient fur—for example, beaver pelts, for hats largely, that were exported back to Europe or into the booming economy of Ontario, Quebec, and east.

[00:03:00] These pelts needed a place to be stored to be treated and dried. That came from the forts that were constructed, the stopping points for the voyagers and the Hudson's Bay Company. As much as these were places to store and prep pelts, they were also places of business. Commercial trade and economic activities were conducted in these forts to sell pelts in exchange for hunting ammunition, for alcohol, for tobacco. That's the history of Winnipeg essentially. So, Winnipeg, former to the city itself, was Fort Garry. Fort Garry was established by the Hudson's Bay Company, and it was a fort that served as both a place of residence and also a place of business, of economic venture in the early history of Canada.

This is just a photo from 1860. [00:04:00] You can see the characteristic Red River cart and most notably a lack of trees, the prairie landscape that comprises Winnipeg. As these forts continue to grow as more people moved into the area, [the city] grew outwards past the walls of the original establishment. We start to see people moving in. Those big walls that characterized the fort are, you know, lost to the backdrop of an expanding soon-to-be city. And again, no trees. Flat prairie. The traditional, ecological landscape of the city of Winnipeg.

These areas emerged over time. The trees were planted into these new landscapes. They're largely brought up from the riverbanks like what we're seeing here. [00:05:00] The city was shaped from empty, you know, snowy landscape to a constructed, more urban, current context as we move through the

history. Again dust, prairie landscape, no trees, then the introduction of street trees. The place that they didn't used to be. These streets were lined predominantly with one specific genus of tree, the elm, most specifically the American elm. They were sourced from the riverbanks and pulled up to line these streets. Because American elm are a hardy cultivar, hardy species, they were well suited for this early establishing city, this city that was going from a prairie landscape into a very urban, novel ecosystem. The trees that lined the streets on an individual street level, but also at the level of the city, we're largely monoculture based. [00:06:00] They were planted by community groups that were early into the history of the city. They were pulled up, planted to try and resemble the European idealism of what a city should look like. This is based largely on literature on landscape planning and land use kind of ideals and values that came out of the Europe mindset, if you will. So, a very Western approach to building a city and also greening a city, because there's no greening, there's no trees previously, and it was meant to resemble what folks would have experienced in Europe, but also experienced in places like Ontario, around Toronto.

As the city grew these trees were protected by groups with socio-political interests. Community groups that were outspoken in support of these tree landscapes. [00:07:00] This is a great example here. These are the women of the community of Wolseley in Winnipeg, a small neighborhood. The city had an interest in removing elm trees, most notably the Wolseley elm. You see here between the two women and the "Keep Right" sign. The function of that removal was to increase the flow of traffic, improve kind of the gray infrastructure of the city, the transit routes, the drivability of the city. Those groups essentially operated in a way to protect certain areas of elm populations, and largely residential neighborhoods, and in largely wealthy neighborhoods as well, because these groups had to have the source of funds and also the notoriety or power to protect those trees from removal. That's often looked at as a benefit, and it's looked at in isolation. [00:08:00] So, they're saying well the community group prevented these trees from being removed at this point in time in history, which is true, but in that specific area. What the city did as true—and you'll see across multiple cities in multiple states and provinces, multiple countries—is the resistance of one socio-political group in one area results in the planned removal of trees being diverted to another area for new infrastructure projects, for alternative land-use planning. So, instead of ceasing that project to exist, it's instead exported elsewhere to a different section of the city or to a different city entirely.

So, interestingly as the city develops, you can see the switch in the planting pallets. That largely came about from Dutch elm disease and emerald ash borer arriving in North America. So, here we can see a georeference map of the history of Winnipeg in terms of its growth patterns. [00:09:00] Up until 1872, very small, the fort, lower Fort Garry. Then the outward expansion (1872 to 1900), you start to see the city moving outwards. 1900 to 1925. 1925 to 1950. That was the shell where we have Dutch elm disease arrive in North America. It becomes a concern for urban foresters. Just south of the border, Frank Coffered, a forester at the University of Minnesota, started publishing and talking about how is the Midwest going to be impacted by Dutch elm disease with this monoculture forests. So, that biodiversity, the planting palette started to become more biodiverse. We see that in little tiny rings just outside of the elm, but not all trees grow everywhere.

There are 26 native tree species in Manitoba. Not all of them are suitable for tree planting or street tree planting. Ash does remarkably well, and so the planting palette gets narrowed down again to ash. [00:10:00] Ash was doing quite well until emerald ash borer showed up in the 1990s. Then we see the diversification of palette again as this ring donut after the 1990s as the city continues to expand outwards in the absence of urban growth boundaries. The result is these clusters of ash populations and elm populations. The elm are largely central around the original areas of the city whereas the ash are

kind of on that periphery, that second ring, before we hit the third ring of biodiversity planting in the new suburban developments that we see on the outside of the city of Winnipeg. This has effects on the populations that live there. So, if you have a street that's entirely lined with elm tree, like you see in this photo a few years later, they all disappear to Dutch elm disease and the city street is left barren of trees. The neighborhood itself is left barren of trees, which as a consequence brings about these new public health issues, [00:11:00] like increased cardiovascular complications, lower respiratory tract infections, standard of living that drops down, the happiness of the people in those neighborhoods drops whether it's with Dutch elm disease or with emerald ash borer, although the emerald ash borer has been the predominant focus of those studies.

This results in an issue of inequality. So, we can look at that inequality using the Gini index and Lorenz curves. So, this red dotted line we see in the middle is perfect equality where in this case the basal area per hectare is perfectly distributed across the proportion of the population living in the city Winnipeg. The blue line is the existing equality. So, what we have right now. We can simulate the loss of all the elm trees over the years, and we see that with the loss of elm, we actually have a more equal distribution in the urban forest. Which isn't to say that Dutch elm disease is good for distributional inequalities. [00:12:00] It just presents how the city is morphed around the elm trees. The elms are quite large obviously, so that's why we see that basal area decrease and become more equitable.

On the other side of things, ash trees are largely placed in areas of difficult growing conditions where elm couldn't be planted because of Dutch elm disease, but also as the early segments of the city where if we look at the distribution of trees, the closer we get to no trees in an area, we kind of see this overlap where the ash start to give way to nothing. The biodiversity is up over here where the higher canopy cover area is. As a result, after emerald ash borer, the inequalities get worse. It's a trend. This image is for Winnipeg, but this is a trend seen across Canada and especially the Canadian prairies and the Midwest of the United States. The large reason for that was because of how the cities developed. [00:13:00] So, we can plot these curves, but our conclusion shouldn't be simply urban foresters aren't planting equitably or aren't planting very good areas, because often the issue is a lack of planting space or the urban policies that influenced the development of the city outwards, but also internally.

In this case, this is a photo of the north end of Winnipeg, which was the more impoverished area of Winnipeg. It was separated from the rest of Winnipeg—southern Winnipeg and central Winnipeg—by the rail yards. For years, the city services never crossed those rail yards into the north end, so tree planting was minimal. City transit services were minimal. It was a heavy industrial area. There's very little planting space. As a result, you get this ash tree as you see in this picture here, where it's struggling to survive in the condition that it has been planted within. [00:14:00] As a tree, you're living in a very difficult area with a lot of impervious surfaces, a lot of toxins. They're forcing the species planting lists to be narrower and narrower until you only have a few species left. In this case, ash, because Dutch elm disease is a concern not to plant elm.

At the same time, we see these correlations with populations. So, emerald ash borer is going to have more of an impact on the Filipino population of Winnepeg based on their distribution as a group through the city of Winnepeg. That's largely because of the history of the city and the garment industry was based in the north end, and that's where we saw that immigrant population move after the wave of immigration from the Philippines. As a consequence, that's why you're seeing the correlation, but if we present correlation alone, it makes it seem like the urban foresters, you know, had some planning or ulterior motive, when in this case, it is because of immigration patterns and urban policy and land-use reform. [00:15:00] So, that's why we see those correlations popping up, the immigration waves and the change in a city over time.

The hope naturally over the course of the city is to manage its urban forest well and to understand where the equalities and inequalities exist. You can do that with correlation or with the Lorenz curves. You need the full story which comes from urban policy and land-use planning—the history of a city, where are the difficult areas to plant, and how has it been influenced by the patterns of movement but also the patterns of building and design over time. That's what that is. You kind of look to the future in Manitoba. We're looking at an area that's difficult to plant, that really comes down to re-engineering and changing and land-use policy and landscape planning to facilitate the more diverse species rather than just plopping new trees in the ground in an area where they won't survive more than 4 or 5 years. [00:16:00] So, with that thank you. Happy to answer questions in the chat, and you can send me an email. With that, I'll turn it over to Lara for her presentation.

Lara Roman: [00:16:15] Hello everyone. Thank you, Alex, for that great story about urban forest history. I'm going to be giving an example now of urban forest history from Philadelphia, Pennsylvania, which is my hometown. I'm going to mostly be talking about the London plane tree.

For some context to set things up, Philly is a city currently of about 1.6 million people. It is located in the Mid-Atlantic region of the United States. This whole region was mostly naturally forested prior to colonization. I'm gonna zoom ahead into a the early 1900's to talk about when Philly was really in its heyday of street tree planting and park creation. So, this is when Philadelphia and many other cities in New England and the Mid-Atlantic [00:17:00] parts of the United States were heavily industrialized and were in some ways counteracting that industrial pollution overcrowding through tree planting to reap different health and thermal comfort benefits.

As Alex alluded to, a lot of these early tree plantings in Canadian cities and American cities were monocultures. I have the benefit of these fantastic annual reports from the city parks department at that time. In the 1930s, there were every year these records showing what trees were planted, how many, and by who. So, in the 1930s, the most commonly planted genus was *Platanus*, and those were all London plane trees. There are also quite a lot of maples, mostly Norway maples. By the 1950s, the number of planes planted had dropped dramatically, and the amount of Norway maples planted shot way up. [00:18:00] If we then look at planting records in the early 2000s—and these come from a non-profit partner that does extensive Street tree planting these days in Philadelphia—we see that things have changed quite a lot.

We now have 131 distinct species, and we don't have anywhere near the same dominance of any one genus or species. We still have quite a lot of maples planted but no more Norway maples, because they are deemed invasive, and we have the rise of smaller flowering trees, such as cherries, crabapples, and serviceberries. This graph here shows a breakdown by the size class at maturity of all these different plantings. In the 1930s and 50s, nearly all of the trees that were planted were going to be large if they survived once they reached maturity. These are our large planes, maples, oaks, and so forth. In the 2000s, this is completely changed. We now have the dominance of our small and medium stature species.

[00:19:00] So, what's happening here? Well, part of it is the shift from monocultures to more diverse plantings because of the ways that street tree populations were decimated in the past by things like Dutch elm disease. However, there's also this shift away from large shade trees towards smaller more

diverse plantings. In a lot of cases, that's because modern citing constraints regarding infrastructure conflicts would not allow some of those same large shade trees to be planted. This is the kind of 'right tree right place' language that doesn't just relate to infrastructure conflicts, but is often used on the utility sector to talk about the need to plant smaller stature trees.

Now I'm going to start talking about the plane tree, because this was the dominant, monoculture, large shade tree in Philadelphia. Unlike other cities that went more all in on elm, Philly went all in on plane trees. [00:20:00] This is an image of plane trees that are quite old lining the Germantown neighborhood of Philadelphia. Then we have some trees in northeast Philly, including one that got knocked over in a storm. Then we also see quite a few of the planes in park settings in Philadelphia, some in lawn, some in more patio hardscape settings. One of my favorite places in the city, the Rodin museum, which is along the Benjamin Franklin Parkway—which is itself modelled after the Champs-Elysees in Paris—also has a whole bunch of plane trees. This ends up becoming important because of the way in which people planning the city's vast street tree plantings at that time were really looking to Paris for inspiration.

It's important in talking about the plane tree story to actually get into well, what is this tree? Because there was a lot of confusion in those days about what species was even being planted. [00:21:00] The London plane is a cross between the American sycamore (*Platanus occidentalis*) and the Oriental plane (*Platanus orientalis*). The accidental hybridization occurred roughly in the 1600s. Botanists have argued over the years about where exactly it occurred, and that relates to what name it's given. My understanding is that the botanists currently are saying that *Platanus × hispanica* is the name to use that the hybridization first occurred in Spain, but *Platanus × acerifolia* is still widely used in practice. These other names also do come up quite a bit.

So, the critical piece of this story is actually that the hybrid London plane tree was sold and mistakenly labeled as the Oriental plane in the early 1900s. Even though the literature from botany started identifying this as a hybrid in the early 1900s, it didn't really permeate into urban forestry and arboriculture practice until way late in the 1900s. [00:22:00] The nursery records, the books, and catalog, and so forth all talk about the Oriental plane. This ends up being very important, because the Oriental plane entries in books by foresters and by arborists and in nursery catalogs would talk at length about Greek and Persian history, about ancient kings planting this tree. There was also many, many, many references to Paris and to the wonderfully maintained street trees there. I also want to give a shout-out to this book, *The Politics of Street Trees*, in which a co-author and I outlined the story of the planes in Philadelphia, and there's a lot of other great stories about how politics and culture and so forth shape street tree systems.

Another desirable quality of the London plane tree or when it was mistakenly called Oriental plane is that it gets tall and its fast-growing. These were things that were deemed really critical in the late 1800s, early 1900s, this heyday of the first giant wave of street tree plantings in American cities, [00:23:00] because we didn't have air conditioning yet and because again thermal comfort was deemed one of the primary reasons for doing these plantings. Also, the plane tree had then and still has today this reputation for being a tough species, something that can tolerate urban stresses, including poorly drained soils and air pollution. Now those several characteristics relating to being tall, fast-growing, tolerating stresses, those could also be ascribed to the American elm. Where things start differing is that the plane had a reputation of being inexpensive to purchase and especially low maintenance. Even before the elm had the problem of Dutch elm disease, there was an elm leaf beetle. It was known to cause municipal foresters to do quite a lot of treatment to deal with this beetle whereas the plane had this reputation of almost being a super tree that was pests and disease free. Now, that may not be

entirely true anymore or really for many decades, but this was the reputation built up in the literature in the nursery industry and by other kinds of allied tree professionals.

[00:24:00] I want to read to you a quote that actually is all the way back from 1842 from an English botanist who was updating a French forester's book about North American trees. Crucially, these various leading botanists and foresters from Europe were well-connected in Philadelphia. Philly at that time was the leading center in all of North America for horticulture and the study of plants. So, this quote says, "The Oriental plane deserves to be planted in the United States... It makes a noble shade tree in front of the houses where it has room to develop itself... It is beginning to be considerably planted as a shade tree on the sidewalks of streets of several large towns of the United States, and being seldom attacked by insects, and rarely elevating pavements, it is exceedingly well calculated for this useful purpose in a climate subject to such ardent heats."

[00:25:00] That same kind of language continued as other writers were talking specifically about street tree plantings in the region. So, this next quote comes from a small town in New Jersey. "The Oriental plane combines, to a greater degree than any other tree, the characteristics of rapid growth with everything that is desirable in shade trees... the Oriental plane makes such an admirable street tree that there is a temptation to plant it to the exclusion of other trees. For the last few years, it has been extensively used in cities of Washington and Philadelphia—in greater numbers, in fact, than any other single species of tree. Of the 86,000 trees in Paris, over 26,000 are Oriental planes." So, here we see several of the themes I've already mentioned, including the near to non-misuse of shade tree and street tree at that time, and also the repeated mention of Paris.

Here are some of the nursery catalog entries. Andorra Nurseries actually claimed to have even introduced the [00:26:00] Oriental plane to the United States, a claim that I find dubious at best, but it goes to show their marketing instincts to really claim a stake over having introduced this now very popular tree. The image shows a river embankment in London. Then from another nursery catalog in 1920, it really stressed that this tree was not bothered by insect pests. This nursery catalog from the Philadelphia suburbs is really critical for the next point that I want to make. It mentions that these trees were planted to improve property values, kind of implying that they would be of interest to the real estate trade.

This brings me to whose decision really was it to plant these trees in Philadelphia and potentially to plant the street trees in a great many other cities in the US and Canada around this time? Literature today seems to treat street trees as being under the purview of municipal arborists, [00:27:00] and formally, there can be the understanding that roadside right-of-way trees are under municipal jurisdiction. However, that's not necessarily who's actually making decisions about what to plant, currently and in the past. There's a huge influence of botanists, foresters, and landscape architects in development and redevelopment projects and in kind of setting the tone for what species are deemed acceptable. There's another huge role of the nursery tree in terms of what species are available to purchase, particularly in large numbers, and also, what kind of marketing messaging is coming out of the nursery industry.

But then a piece of the puzzle that I think is really underappreciated is real estate developers. Going back to those planting records I showed from the 1930s, it did not say who exactly got each and every planting permit, but it explained which portion of trees were planted by the city versus which ones were planted by owner. So, in the 1930s, three-quarters of the planes were planted by owner with permit. [00:28:00] The 1930s was also the height of the Great Depression. The average Philadelphia citizens

were not paying for these permits, but there was a real estate boom, even at the height of the depression, in some of the expanding neighborhoods, kind of just passed Philadelphia's center city and historic core.

So, this is in the lower northeast part of Philadelphia, an area that was developed in the 1930s. These houses were marketed as being kind of pseudo suburban in style, so they're not the same tightly packed row houses with really no lawn that a lot of the much older neighborhoods of Philadelphia have. Rather these are attached twins. They have a bit of front lawn, so a little more spacious at least by Philadelphia norms. Today here is a block of Glenview Street that shows all of these old London planes that are, just sort of by casual observation, roughly the same age as the houses. Through a lot of digging, I found actual photographic evidence of some of those trees going in back when the houses were first built. [00:29:00] You can sort of just barely make out in that photo from a newspaper story about new housing the silhouette of the tree.

Moving forward, the London plane has really dropped in its popularity. It's widely infected with anthracnose today, which can be problematic but is usually not fatal. Then there also is the canker stain, which is native to the US. It was actually first reported in Pennsylvania in the 1930s. Although it naturally exists in our forested ecosystems, it doesn't usually spread on its own quite so easily. It spreads through pruning equipment. Arborists did figure out by the 1950s that if you carefully clean and sterilize your pruning equipment, you will avoid spreading this disease. Canker stain is actually now threatening the native Oriental planes over in Europe. So, even though a lot of our planes have endured today, this history of canker stain really led to a sort of informal moratorium, at least in Philadelphia, on continuing to plant these trees.

[00:30:00] Some have continued to be planted in the decades since but nowhere near their original numbers. So, in the 1940s, the current park commission, which was then the parks department responsible for city trees, they reported over 7,000 trees dying from canker stain. The commission ceased to report supporting plane trees. There were, however, instances—and this gets back to the tension over whose decision is really going on here with species selection. There were instances in the 1970s where developers, landscape architects, were planting plane trees, even though the city staff did not want them to.

Then despite this kind of challenging history of canker stain and some resistance to plantings, there seems to be this kind of continued praise in horticultural magazines, popular press, and the nursery industry of the plane tree being kind of the super tree that has no pesticide problems, even though canker stain continues to be a challenge. [00:31:00] As I mentioned previously, there are some plane trees planted today. Here are some images of those planted in the downtown core of Philadelphia. Just nowhere near their original numbers. A lot of plane trees are in locations in residential communities where they would no longer be approved.

To kind of summarize my take-home messages, first species selection is influenced by a great many factors. We have horticultural suitability, cultural symbolism, easy maintenance, inexpensive. Also that many stakeholders are shaping street tree composition and diversities, far more than just municipal arborists. There's a really underappreciated role for housing developers. Also that we have this massive shift underway. Today's plantings are more diverse and smaller stature, and this does have ramifications for the ecosystem services. So, we'll have potentially more beauty in a certain way from the smaller stature trees, which may have some important psychosocial benefits, but we're going to be losing some of the shade and other benefits that you can really best achieve through tall species.

[00:32:00] With that, I just want to acknowledge the many folks who helped make this research possible. There's a lot of digging into archival resources. Here's my contact information if anyone wants to be in touch. Thank you.