



# **URBAN BIODIVERSITY: CULTIVATING SUPPORT THROUGH MUNICIPAL CODES**

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## **FINAL REPORT**

Prepared for the Biophilic Cities Network, Winter 2021

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# TABLE OF CONTENTS

## 4 EXECUTIVE SUMMARY

## 6 INTRODUCTION

## 8 CONTEXT

- 9 Lawns in North America
- 10 The benefits of naturalized yards
- 11 The legal barriers to naturalized yards
- 11 About the Biophilic Cities Network

## 12 APPROACH

- 13 Methodology

## 14 CODE ANALYSIS

- 15 Code analysis summary
- 16 Height limits
- 17 Vagueness
- 18 Justifications for restrictions
- 20 Publicly-owned privately-maintained spaces
- 21 Enforcement

## 22 BEST PRACTICES

- 24 Codes
- 25 Education
- 27 Incentives

## 28 NEXT STEPS

- 29 Code analysis survey
- 29 A Toolkit for local governments





## **30 FUTURE RESEARCH**

- 31 Expanded analysis
- 31 Homeowner associations impacts
- 31 Consultation strategy
- 31 Inequity in enforcement
- 32 Neighbourhood norms & individual decision making
- 32 Multi-functional benefits

## **33 CONCLUSION**

## **35 APPENDIX**

- 36 Appendix 1: The history of the lawn in North America
- 37 Appendix 2: Typologies of different yard styles
- 38 Appendix 3: Height restrictions
- 41 Appendix 4: Definitions and exemptions from height restrictions
- 45 Appendix 5: Provisions relating to publicly owned privately maintained spaces (POPMS)
- 50 Appendix 6: Code analysis survey tool

## **53 REFERENCES**



# EXECUTIVE SUMMARY





Private yards provide an opportunity to bring ecologically rich and biodiverse habitats into the urban fabric of cities. However, in North America yards have been historically dominated by monocultures of turf grass. Monoculture yards require labour intensive care that contribute to greenhouse gas emissions and function as biological deserts with reduced ecological health benefits. Conversely, yards made of species with rich biodiversity provide ecological services, pollinator habitats and require less resource usage. Despite these ecological benefits, the monoculture lawn remains the cultural norm. Local governments are increasingly promoting ecological goals of naturalized ecosystems, yet many of these same local governments' by-laws and code requirements continue to prohibit and create barriers to the development of naturalized yards.

The Biophilic Cities Network ("The Network") promotes nature as an essential infrastructure in cities and advocates for the "natureful city". Integrating urban biodiversity into private yards supports the Network's vision by incorporating nature in privately owned urban settings. Even so, cities which have partnered with the Network to achieve this goal continue to impose barriers to biodiversity on private property through their codes. Under the supervision of Professor Nina-Marie Lister, our team from X\* University's School of Urban

and Regional Planning was tasked by the Network to undertake a review of how municipal codes may either encourage or create barriers in allowing private citizens to foster biodiversity within private land or on publicly-owned privately-maintained spaces (POPMS), such as right-of-ways. The Network also tasked our team with identifying best practices and case studies of local government actions which further promote biodiversity on private land or POPMS.

This project included two main components. First, a review of the Network's 15 North American partner cities' ("partner cities") municipal codes and by-laws was conducted to identify whether these cities had barriers preventing private properties from being converted to biodiverse habitat. Second, case studies were found that highlight programs and policies to educate people about the benefits of naturalized yards, and to incentivize them to make the switch. Following this research and analysis the team developed two key resources for the Network to provide to local governments. First, a survey will help local governments identify what aspects of their own codes prevent biodiverse habitats on private yards or properties. Second, a Toolkit will aid local governments in altering their own municipal codes and by-laws from preventing urban biodiversity, but instead, cultivating it. The Toolkit will also include best examples of innovative programs listed in this report to further encourage biodiversity in private yards in a user-friendly format.

\* The University has accepted the [Standing Strong \(Mash Koh Wee Kah Pooh Win\)](#) Task Force [final report](#) with 22 recommendations which include [renaming the university](#). "X University" is a placeholder until a new name is chosen to better reflect our values of equity, diversity and inclusion.





# INTRODUCTION



The Biophilic Cities Network (“the Network”) has retained the X University studio team to investigate how municipal codes create barriers to achieving urban biodiversity on private property and how these barriers can be overcome through best practices in both codes and programs to encourage ecologically rich yards. Through this project, the Network hoped to identify opportunities related to municipal codes to allow and encourage urban biodiversity on private property. To accomplish this, the studio team undertook four main activities:

- Conducted in-depth analyses of the municipal codes for all 15 North American biophilic partner cities (“partner cities”) that pertain to grass and weeds, and identified the degree to which the by-laws encourage or discourage the development of biodiverse landscaping;
- Researched local and international case studies to highlight best practices that encourage urban biodiversity;
- Developed a survey tool that can be shared with researchers and local governments in order to further understand barriers and opportunities in codes about weeds and grass in other jurisdictions; and
- Created a practical and user-friendly Toolkit for local governments based on the above work that will help them to implement changes in their codes and programs to promote urban biodiversity.

This report summarizes the key findings and outputs from these activities.





**CONTEXT**



In this section, we discuss important background information that guided our understanding and analysis of the assigned task. This includes a discussion on the prevalence of North American lawns, legal and social challenges to naturalization, the benefits of naturalization, and the biophilic cities movement.

## Lawns in North America

Most lawns in North America include a manufactured monoculture of clipped turf grass, creating the lush green image associated with the American dream. The manufactured monoculture lawn represents a sense of homeownership and community in North America (New York Times, 2019). The lawn traces its roots to Europe and the middle English term “launde” which infers “a glade or opening in the woods” (Planet Natural, n.d.). Through colonization, Europeans brought the idea of the lawn and the seeds to recreate it in the New World (Planet Natural, n.d.). Settlers imported European grass and clover seeds to replace native grasses. For more information on the history of the lawn, please see Appendix 1.

Today, yards are a major component of urban environments, making up approximately 11% to 23% of urban landscapes (Fuentes, 2021). As noted, yards have historically been monocultures of turf grass, regardless of local climate or native plant species (Milesi et al., 2005). While initially restricted to wealthy homeowners' properties, by the 20th century, the availability of herbicides, pesticides and chemical fertilizers allowed yards to become ubiquitous as seen today (Murphy, 2021). The social pressure to conform to the yard aesthetic remains strong, and is often enforced through local government codes.

In Canada, it is estimated that there are over 6.2 million lawns (David Suzuki Foundation, n.d.). In the United States, approximately 35,850 square kilometres of land is used for lawns, an area that is approximately three times larger than any other irrigated crop (Milesi et al., 2005). While lawns comprised of turf grass provide water quality protection, mental health benefits, and reduced urban heat island effects, they also require high amounts of fertilizer, irrigation, and labour-intensive care that contribute to greenhouse gas emissions and reduced ecological health (Milesi et al., 2005;







Watson et al., 2020). Naturalizing these large spaces by planting more biodiverse and ecologically rich species could therefore represent significant cost savings, increased urban resilience, and increased ecological benefits. See Appendix 2 for some examples of different yard typologies.

### The benefits of naturalized yards

Naturalized yards have many ecological benefits. Made of biodiverse species with lower maintenance requirements, they require fewer resources. For example, naturalized yards require little to no mowing which lowers greenhouse gas emissions from gas-powered mowing equipment (Milesi et al., 2005; Watson et al., 2020). Biodiverse yards often require less irrigation, and by planting species with deeper root systems, naturalized gardens can also aid in the filtration of stormwater (Dietz & Clausen, 2006; Milesi et al., 2005; Watson et al., 2020).

Increasing the biodiversity of yard ecosystems also provides habitat for wildlife and improved ecosystem services (Goddard et al., 2010; Hunter,

2011; Watson et al., 2020). This includes increased pollinator habitat, which is important to support pollinators and is crucial for both ecosystems and edible plant production (Burr et al., 2021; Goddard et al., 2010; Pardee & Philpott, 2014). Naturalized yards can also provide potential ecological corridors to allow wildlife to migrate or pass through urban environments (Bulluck & Buehler, 2006; Lynch, 2019). Ecological corridors are passages within an ecosystem that enable the movement of wildlife and plant species, helping with migration and reproduction (National Capital Commission, n.d.). Cities with only turf grass lawns disrupt habitat connectivity and thus prevent wildlife from being able to migrate through vast areas. Furthermore, naturalized yards help increase species richness, which has been found to help prevent zoonotic diseases, such as Lyme disease, by reducing the prevalence of host species (Bolund & Hunhammar, 1999; Bouchard et al., 2013).



## The legal barriers to naturalized yards

Unfortunately, even as public awareness and desire for more naturalized, low-resource lawn options increase, there remain legal barriers preventing citizens from incorporating diverse plant species into their properties (Denvir et al., 2016; Rappaport, 1993). Despite local governments often promoting ecological goals of naturalized ecosystems, many specific codes prohibit undefined ‘grass or weeds’ or lawns exceeding specific height limits which are generally shorter than many native species. There are multiple examples of private landowners being issued fines or citations for violating municipal regulations when attempting to plant a range of species on their property. For example, in 2021, X University Urban Planning Professor and ecologist, Nina-Marie Lister, received a notice of by-law violation for her naturalized property. Instead of accepting the City of Toronto’s exemption permit, she and her team at the Ecological Design Lab challenged the City of Toronto to update its code

relating to garden maintenance, and succeeded in overhauling the existing and outdated set of rules. However, many other jurisdictions continue to impose restrictive codes on local residents. This issue was identified by the Network as needing further research, resulting in this report.

As urban residential landscapes develop, they are shaped by socioeconomic, political and ecological factors, including: individual and household decisions, neighborhood level informal norms, and formal rules or policies (Chowdhury et al. 2011). The interaction between formal rules and informal norms about lawn care are complex. For example, grass height restrictions may formalize social norms around landscape aesthetics by promoting a certain type of turf grass lawn (Sisser et al, 2016). Previous literature, such as Larson et al. (2020) has identified the need for a comprehensive examination of the policies that regulate lawns, and the degree to which they are enforced.

## About the Biophilic Cities Network

The Biophilic Cities Network (“the Network”) is an organization with a vision to connect cities and nature, founded by Dr. Tim Beatley.

The Network collaborates with cities, advocates, and scholars globally to increase the knowledge and understanding of the benefits for urban residents when nature is embedded into the city. The Network has established a global network of partnerships with various municipalities working to reframe the idea of a “natureful city” within differing cultures and environments. The Network recognizes the influence of being in close proximity to nature in urban life, and the ethical and moral obligations cities have to conserve the integrity of a habitat for both human and non-human species (Biophilic Cities, n.d). Given its goal of improving ecological habitats within urban environments, and the many benefits of naturalized yards listed above, the Network initiated this project to identify barriers and opportunities in creating biodiverse ecosystems on private property in the 15 North American cities which have partnered with the Network.





**APPROACH**

Two main areas of study were conducted for this report.

First, a review was conducted of the municipal codes of the 15 partner cities to identify barriers to biodiversity in private property and in publicly-owned and privately-maintained spaces (POPMS). Where publicly available enforcement data was accessible, it was also reviewed. Implementation of enforcement and the effectiveness or outcomes of the municipal codes were not in the scope of this report.

Second, a review was conducted of best practices in the 15 partner cities and in other jurisdictions of codes and programs to encourage a shift away from monocultures of turf grass to more biodiverse yards.



## Methodology

### *Photographic Survey*

The work in this report was grounded by an initial photographic survey of naturalized yards located in neighborhoods within the City of Toronto\*.

Criteria for the neighborhoods chosen included socioeconomic diversity, cultural/ethnic diversity, and built form diversity. Given the context of the manicured yards as a constructed cultural status symbol, this ethnographic research method allowed the studio team to better understand and appreciate a wide variety of yard typologies, and how they relate to neighborhood norms. Outputs of this photographic survey are found throughout this report.

### *Code Analysis*

In order to determine components of local government codes that present barriers to biodiverse landscaping in favor of manicured lawns in the 15 partner cities, the team conducted a content analysis using a semi-formal review process for the codes of each local government. Codes of the 15 partner cities were accessed and reviewed between September 2021 and December 2021. The team altered the parameters of the content analysis in an iterative manner in order to hone in on the most relevant takeaways. Codes were searched for keywords and phrases related to landscaping, property maintenance, grass and weeds, and publicly-owned privately-maintained spaces (POPMS). The research team also reviewed policies and programs within the 15 partner cities related to biodiversity to identify any inconsistencies between sustainability or environmental objectives and property maintenance codes.

### *Best Practice Research*

After analyzing the barriers to biodiversity in the code analysis, a review of the best practices for private yard biodiversity was conducted. This review examined cities and organizations around the world to understand how to best improve urban biodiversity through various strategies. The best practices identified are grouped into three main categories: codes, educational programs, and programs to provide incentives to move towards more biodiverse yards.

\* Neighborhoods in Toronto visited by the research team include: Riverdale, Kingsway, Rosedale, Dovercourt, Kensington, Cabbagetown, St James Town, High Park, Parkdale, Eglinton East, and Little India.



# **CODE ANALYSIS**



## Code analysis summary

The review of the 15 partner city codes identified many barriers and opportunities in allowing people to grow biodiverse plant species on their private yards, or on publicly-owned privately maintained spaces (POPMS) such as right-of-ways maintained by community members.

Regarding barriers to biodiversity, we found that all but one of the 15 partner city codes included specific height limits to grass. Codes were often vague, restricting plants such as “weeds” without providing a definition of what a weed is. Codes or local government enforcement websites often listed or alluded to justifications for their restrictions that were problematic or antithetical to overall sustainability goals.

Opportunities for more biodiversity on private property and POPMS were also identified. Six codes differentiated between lawns and gardens, noting that height restrictions only applied to the former. Seven even included built-in exemptions for more biodiverse plants or naturalized gardens from the height restrictions.

We noted these opportunities and barriers were also included in ordinances related to POPMS. Ordinances related to POPMS typically mirrored the private property code for that local government, and either were similarly vague and restrictive, or similarly exempted naturalized plantings from landscaping requirements.

We also reviewed publicly available enforcement data to determine whether these codes were actively enforced. For those jurisdictions with data available, complaints related to grass and weeds often accounted for a substantial proportion of enforcement actions, indicating that these codes are actively enforced. These findings are further described below.





## Height limits

### Height limits and restrictions are universally common.

The 15 partner cities all included codes, ordinances or by-laws related to the maintenance of private property. These are listed in detail in Appendix 3. Of the 15 partner city codes reviewed, 14 included specific height limits for vegetation. Height limits ranged from 10 centimetres to approximately 30 centimetres. The only jurisdiction that did not include a specific height limit, San Francisco, did have an overarching ban on “overgrowth” which is not defined within the code. Many of these height limits are arbitrary and promote excessive mowing, despite the benefits of reduced mowing which include lower water use, more diverse species habitat, reduced need for pesticides, and reduced greenhouse gas emissions (Denvir et al., 2016; Rappaport, 1993).

This study also examined whether codes differentiated between lawns and gardens, or between lawns and naturalized gardens. The wording of these codes are noted in Appendix 4. Of the 15 partner cities, six differentiated between lawns and gardens, with height restrictions only applying to the former. For example, the Code in Pittsburgh notes that “weeds shall be defined as all grasses, annual plants and vegetation, other than trees or shrubs provided; however, this term shall not include cultivated flowers and gardens.” While this is a step in the right direction for promoting

alternative yard plantings, it remains unclear whether this includes native plants which are not “cultivated.”

Seven of the 15 partner city codes were even more supportive of biodiversity, either by being more broad in what types of plants were exempted from height restrictions or by specifically exempting naturalized areas from height restrictions. For example, Washington, D.C.’s Code prohibits vegetative growth that is “untended” or harbors snakes and vermin. However, it exempts the following from these requirements: “Healthy plants, grasses, or shrubbery in tended grounds, gardens, or landscape designed yards, which exceed 8 inches (203 mm) in height.” Even more explicit is the wording of the Miami-Dade County Code, which notes “that portion of any lot or parcel is exempt from the vegetative provisions of this chapter where that lot, or parcel is designated as a Natural Forest Community, Environmental Endangered Land, Native Plant Community, Native Habitat, or a wetland as defined and described in Section 24-3(151) of the Code of Miami-Dade County.” The Miami-Dade County code even includes botanical manuals that list plant species considered native. This type of wording, especially where no designation is required, would allow homeowners to grow naturalized gardens and spaces without contravening the codes. For the other cities in our sample, however, this lack of differentiation makes it unclear as to when height restrictions are applicable.



## Vagueness

### **Vague definitions for weeds, lawns and gardens leave compliance up to interpretation.**

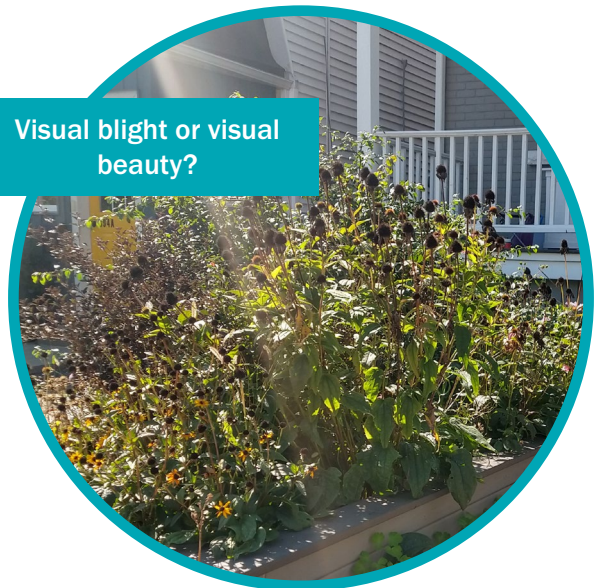
Many of the codes included either vague or overly broad definitions of weeds or restricted plants, as shown with the definitions described in Appendix 4. This vagueness makes it difficult for residents and enforcement officers to objectively understand compliance requirements or where infractions are appropriate. While many codes prohibited certain plants, such as noxious weeds defined as per regulation, many also placed restrictions on plants without clear definitions by using terms like “weeds” or “vegetative growth.” Some included no definitions for weeds whatsoever, whereas others included definitions that were broad and subjective. For example, Washington, D.C. defines vegetative growth as “vegetation of all types, including weeds, poison ivy, poison oak, poison sumac, kudzu, plants with noxious odors, and grasses.” While this definition does include some specific species, it also uses the term “weeds” which is not a botanical term, and “grasses” which encompasses a vast array of plant species, and includes “vegetation of all types.” Even less descriptive is San Francisco’s Code, which simply bans the “accumulation of hay, grass, straw, weeds, or vegetation overgrowth” without defining any of these terms.

Many codes also included terms that are dependent on individual judgement. These included wording such as “untended,” “unkempt,” and “unattended.” Undefined terms such as these leave much up to interpretation for residents, neighbours, and code enforcement staff. For example, St. Louis’ Code prohibits plant growth which “in the opinion of the Commissioner of Forestry, are unsightly.” Of course, there is not a universal definition of what is “unsightly.”

Not only do vague definitions make it difficult for both community members and enforcement officers to understand compliance, but vagueness in codes creates legal issues for municipalities as well. As previously noted, in Fall 2020 a City of Toronto a by-law enforcement officer notified Professor Nina-Marie Lister that her family’s naturalized yard violated the grass and weeds by-law and ordered it to be mowed. The City was unaware that Professor Lister is an ecologist and professional planner, and

she was able to use her platform and knowledge to challenge the City. Professor Lister, with the help of lawyer, David Donnelly, presented legal arguments that the grass and weeds by-law was unconstitutional due to the inclusion of aesthetic justifications and the vague definition of turf grass. As well, her argument noted that the City was in direct contradiction with the 1996 Ontario Court of Justice ruling that Sandy Bell’s naturalized Toronto garden was protected expression under the Charter. The City of Toronto conceded and has since made some adjustments to the by-law. This is just one example of the legal challenges municipalities may eventually face when they try to enforce by-laws and codes that are too vague.

Visual blight or visual beauty?



Unkempt or naturalized?





# Justifications for restrictions

## Code justifications are often problematic or contradict sustainability objectives.

While the codes often include reasoning for their restrictions, these reasonings and justifications are often arbitrary. Generally, we noted two main categories of justifications for the restrictions. The first was around aesthetics. Sometimes these aesthetic justifications were located directly in the code. For example, Edmonton, Alberta’s by-law states that “a nuisance, in respect of land, means land, or any portion thereof, that shows signs of a serious disregard for general maintenance and upkeep, whether or not it is detrimental to the surrounding area.” In other cases, the aesthetic justification was located on the local government’s enforcement website. For example, Reston, Virginia’s enforcement website noted that maintaining building exterior helps keep a property aesthetically pleasing. As noted previously, vague definitions around such aesthetic preference make these codes difficult for residents and enforcement officers to interpret since aesthetics are absolutely subjective.

The second main justification for the restrictions we noted was health and safety. Almost all of the codes make reference to dangers of tall grass, including exasperating allergies, harboring of animals, and even harboring of human criminals. As far back as 1976, American courts found that the argument for pollen and fire hazards were unsubstantiated (Rappaport, 1993). For example, when it comes to fears around allergies, it is important to note that pollen travels far distances, and cannot be kept out of the air simply by maintaining private residential property (Denvir et al., 2016; Rappaport, 1993; Smith, 2016).

Regarding the threat of harboring “vermin” – another undefined term found in multiple codes – the health and safety justification directly contradicts many local government sustainability goals which applaud the creation of habitat on private properties. See Figure 1 for examples of local government documents that indicate a desire to increase habitat alongside the same local governments’ enforcement websites that discourage habitat for health and safety reasons. Such arguments are further unsubstantiated as the majority of plants would not provide a substantial food source for rats or snakes, animals commonly considered to be “vermin” (Rappaport, 1993).

Sustainability Messaging from Local Government	Property Maintenance Messaging from Local Government
<p>Arlington, Virginia, United States</p> <p>“One of the simplest ways to begin [reducing pollution and improving the environment] is by replacing lawn areas with locally native trees, shrubs and perennial plants. The structure, leaves, flowers, seeds, berries and other fruits of these plants provide food and shelter for a variety of birds and other wildlife.” (From “Native Plants for Wildlife Habitat and Conservation Landscaping – Chesapeake Bay Watershed” from the U.S. Fish and Wildlife Service, linked on the Arlington, Virginia website)</p>	<p>“‘Danger or hazard to public health or safety’ means [...] conditions which may cause disease (including allergic reactions), harbor vermin and other animals, provide shelter or cover for unlawful activities, or be a source for the spread of litter or weeds to the property of others.” (From “Conditions of Private Property” within the Arlington, Virginia County Code)</p>
<p>Milwaukee, Wisconsin, United States</p> <p>“Pollinators like bees and butterflies are vital to keeping fruits, nuts, and vegetables in our diets. Over the past few decades, there has been a significant loss of pollinators from the environment.” (From the Milwaukee Metropolitan Sewerage District (MMSD), linked in the Milwaukee, Wisconsin Eco-Neighbourhood Toolkit)</p>	<p>“It shall be unlawful to permit within the city the pollenization of any turf grasses or weeds which cause or produce hay fever in human beings. In order to prevent such pollenization, no turf grass or weeds of any kind shall be permitted to grow or stand more than 7 inches on any property in the city.” (From Milwaukee City Ordinance - Nuisances)</p>
<p>Washington, D.C., United States</p> <p>“Resist the urge to have a totally manicured lawn and garden. Leave bare ground for ground nesting bees. Leave areas of dead wood and leaf litter for other insects.” (From “Selecting Plants for Pollinators” from the Pollinator Partnership, linked on the Washington, D.C. website)</p>	<p>“Excessive vegetative growth can cause serious public health implications. Tall grass can trigger respiratory problems like asthma and allergies in District residents and visitors. Weeds create a breeding place for mosquitoes, rats, mice, snakes and other vermin which are drawn to grass and weed overgrowth.” (From the Department of Consumer and Regulatory Affairs Washington, D.C. website)</p>

Figure 1. Contradictory messaging from local government websites

Not only do these arguments for protecting human health and safety have considerable problems, but they disregard the importance of ecological health. Despite humans becoming increasingly urban, we remain dependent on ecological systems to survive. Biologically diverse ecosystems provide an array of services to both humans and to the natural environment.

As noted previously, benefits to human health include providing habitat for pollinators, species which are necessary for the pollination of an enormous amount of human food crops (Government of Ontario, 2014; U.S. Fish and Wildlife Service, 2021).

As also noted previously, the maintenance of turf grass uses large amounts of water resources, chemical fertilizers and herbicides, and mowing emits greenhouse gases (Barnes et al., 2018; Fuentes, 2021). Switching to more biodiverse and resilient plant species, including xeriscaping in more arid environments, helps to reduce the use of freshwater and save this precious resource for

other uses, and reduces the presence of fertilizers, herbicides and pesticides. Research has also found that healthy and complex ecosystems in urban areas help support air filtration, micro climate regulation, noise reduction, rainwater drainage, and sewage treatment (Bolund & Hunhammar, 1999). Local governments could further harness plant species to help combat other local issues, such as tamping down soil containing contaminants such as lead (Bricka et al., 2008; Environmental Protection Agency, n.d.), or in flood mitigation (Oram et al., 2021). Plus, as climate change continues to warm our planet, natural green spaces also help to reduce urban heat island effects (Aram et al., 2019). Lastly, a growing amount of empirical evidence supports the positive impacts that nature and natural experience have on human mental health (Bratman et al., 2019). Local governments must consider the ecological health and benefits of naturalized yards in their codes health and safety considerations as well.





## Publicly-owned privately-maintained spaces

### **Publicly-owned privately-maintained spaces (POPMS) code provisions contain similar opportunities and challenges.**

In certain contexts, individual residents are responsible for the maintenance of Publicly-Owned Privately-Maintained Spaces (POPMS). This can include areas like right-of-ways, medians, and the space between sidewalks and roads. These patches of land are an excellent opportunity to provide additional naturalized habitat and pollinator-friendly plantings (Bulluck & Buehler, 2006; Cariveau et al., 2019). Similar to private property, many POPMS are regulated by local government codes and experience the same issues and opportunities as private property.

Codes sometimes refer specifically to right-of-ways or other POPMS. Other times, they may use wording which suggests that property standards apply to all forms of property or lands regardless of ownership. The 15 partner city POPMS-related codes are listed in Appendix 5. We noted that references to POPMS tended to be similar to the private property provisions, either by being directly included within the private property provisions or by mirroring them in wording. We noted that of the 15 partner cities, seven included either the same or similar height restrictions for vegetation on POPMS as they did for private property, with no exemptions for naturalized plants. As with private yards, this limits the ability of community members to grow plants which have benefits for habitat creation and biodiverse ecosystems.

In addition, two of the 15 cities included extremely vague requirements for POPMS. San Francisco's Public Works Code Section 174 mirrors its Health Code Article 11 provisions, and requires that no one shall permit a public nuisance on a POPMS,

including, among other things, "hay, grass, straw, weeds, vegetation overgrowth." Similar to within the Health Code, however, these terms are not defined. These vague definitions are particularly harmful given how difficult they are to interpret and enforce.

Like with private property, we noted that some POPMS provisions exempted certain plants from landscaping requirements. For example, the Richmond, Virginia Code requires plants on right-of-ways to be kept under 12 inches, however, it exempts "trees, shrubbery, agricultural plants, garden vegetables, flowers or ornamental plants." Just like for private property, it is unclear whether naturalized biodiversity would fall within these categories.

Five of the codes reviewed included exemptions for naturalized plantings on POPMS. Section 10-2-21(D) of Austin, Texas' Code notes that plants on POPMS may be higher than the required 12 inches if it is a "a landscaped area arranged and managed consistent with a plan accepted by the City which area includes native or adapted vegetation, where weed control and other periodic maintenance occurs." Similarly, Washington, D.C.'s Code that applies to private property also applies to POPMS, and specifies that height restrictions do not apply to "healthy plants, grasses, or shrubbery in tended grounds, gardens, or landscape designed yards, which exceed 8 inches (203 mm) in height". Reston, Virginia is under the jurisdiction of the County of Fairfax Code which completely exempts POPMS from landscaping requirements in Chapter 11, Section 119-3-1. The most progressive code we noted in promoting biodiversity on POPMS was in Miami-Dade County. This code does not impose a height restriction for plantings on public right-of-ways and also specifies through its Chapter 18B Right-of-Way Landscape Ordinance that POPMS should include drought resistant plants, re-establish habitat where appropriate, and encourage the use of native plants in their landscaping.

# Enforcement

## Enforcement data demonstrates that cities do enforce codes.

The enforcement of codes is a key component of how strongly they impact residents. Of the 15 partner cities reviewed, all noted on their websites that they conducted enforcement based on complaints and four noted that they also conduct proactive enforcement. Five of the partner cities provided publicly available data on enforcement actions. This data was analyzed and it was found that enforcement related to grass and weeds accounted for between 12% to 43% of enforcement actions, as shown in Figure 2.

Media articles also highlight that the enforcement of lawn ordinances can be very costly for local governments. In 2017, it was noted that it cost the city of Richmond, Virginia up to \$500,000 USD a year to mow lawns contravening the code requirements (O'Brien, 2017). As well, leaving enforcement up to the whims and judgements of neighbours and non-ecologically trained enforcement officers leaves the system at risk for discrimination and predjudice. As with many enforcement actions undertaken by governments, there is a high risk that systemic racism and social inequities will result in certain equity deserving populations being disproportionately impacted by such regulations.

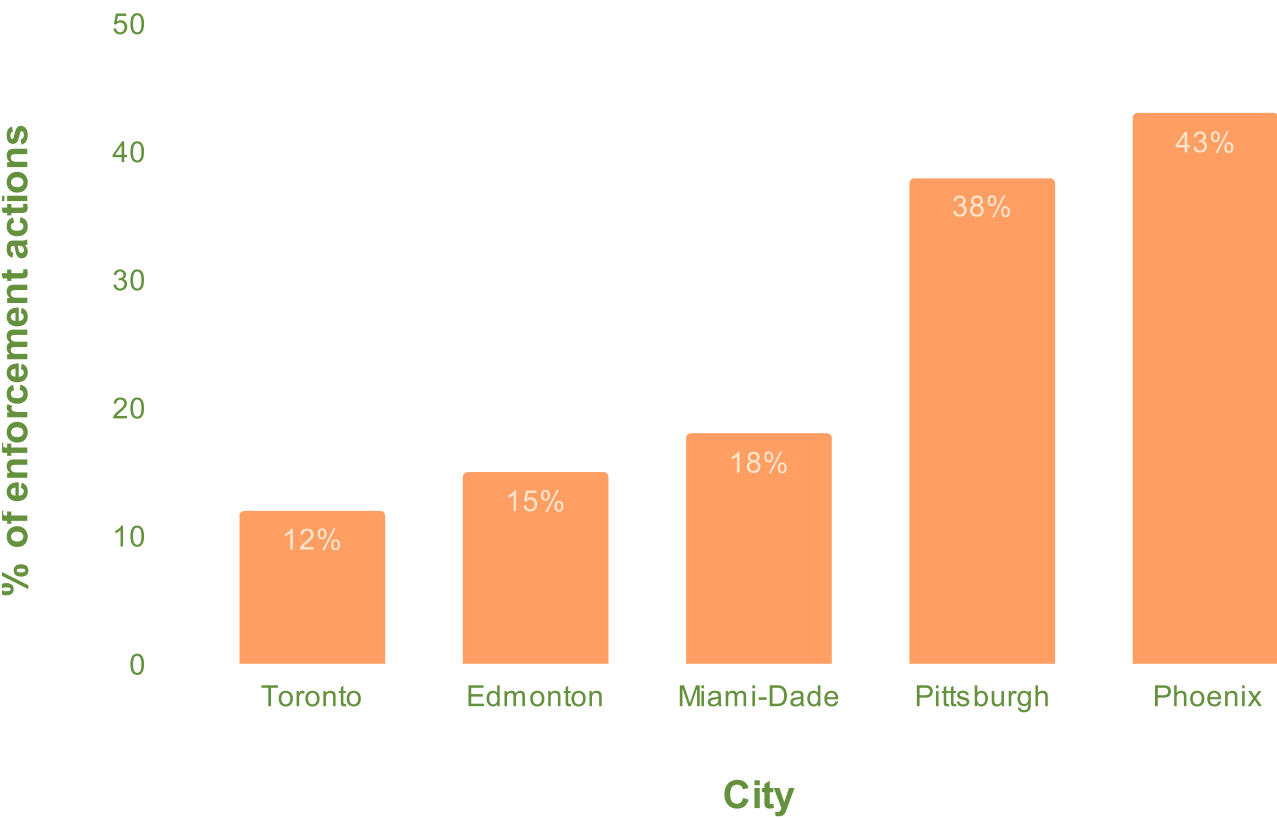


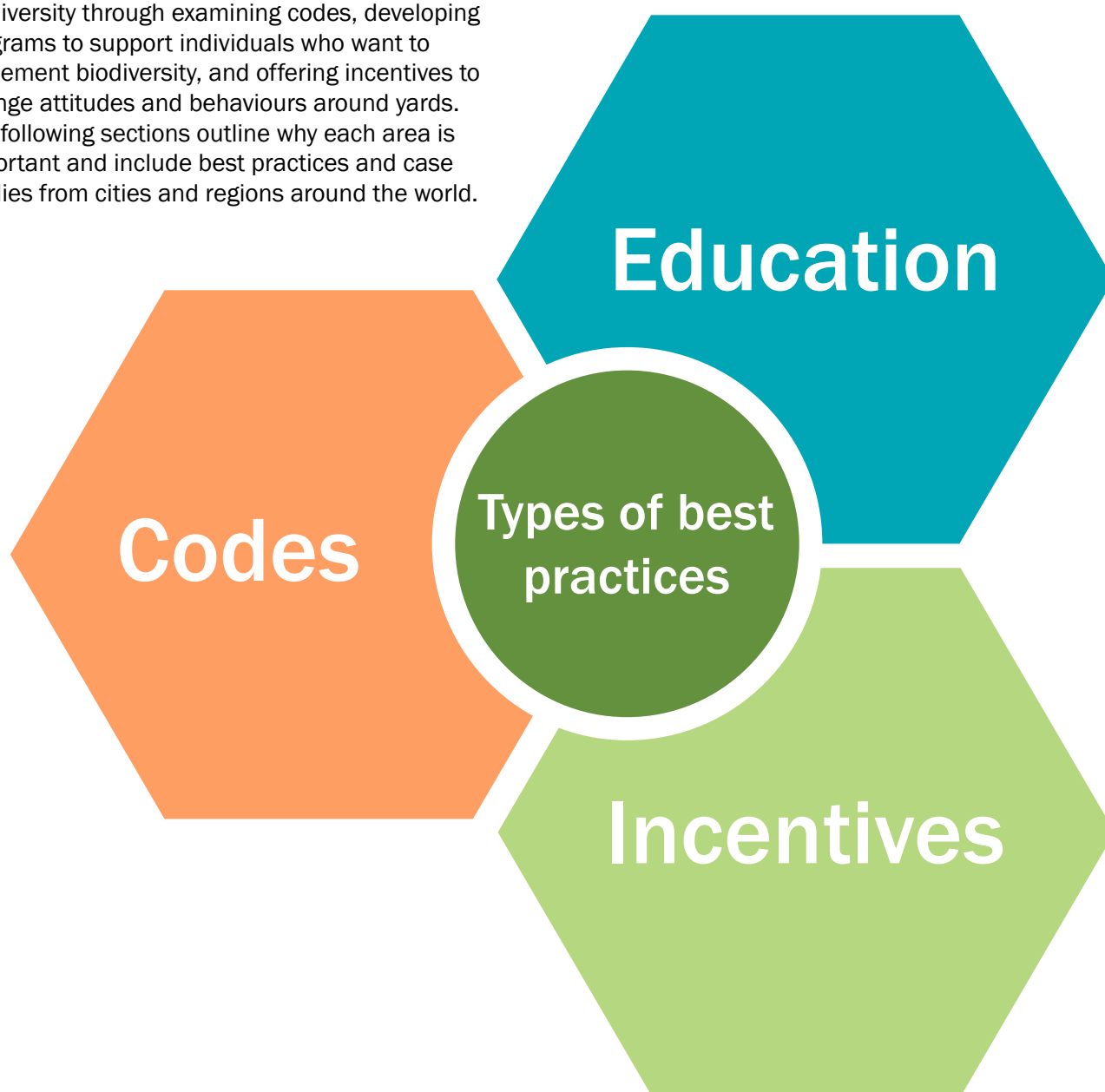
Figure 2. Proportion of enforcement actions related to grass and weeds



# **BEST PRACTICES**

The legal barriers to allowing and implementing naturalized yards have been identified through the literature review and code analysis. However, we also noted that social pressure and social norms impact whether an individual may choose to naturalize their garden even when code barriers are removed. To understand how these barriers can be overcome, a number of best practices from cities around the world were identified.

Allowing, supporting, and encouraging urban biodiversity will require adjustments to codes and policies, plus the implementation of new programs and initiatives. Cities and organizations around the world have shown how to improve urban biodiversity through examining codes, developing programs to support individuals who want to implement biodiversity, and offering incentives to change attitudes and behaviours around yards. The following sections outline why each area is important and include best practices and case studies from cities and regions around the world.





## Codes

Local government codes can present barriers for biodiversity in private yards, as seen in the code analysis section of this report. On the other hand, codes also have the potential to be a tool that provides a legal foundation for supporting biodiversity in private yards. Supportive codes can range from providing clear definitions for terms like naturalized yards, purposefully removing height limits and any reference to lawn aesthetics, and removing enforcement measures that could be used on a selective basis. Below are some examples of supportive codes that cities in Canada and the United States have implemented.

 Click the clips for more information!

### Fredericton, New Brunswick, Canada

Description: The City of Fredericton, N.B. “Residential Properties Maintenance and Occupancy Code” specifies the following: “A yard shall be: maintained free of ragweed, poison ivy, poison sumac and other noxious plants.” There is no mention of a height requirement and does not include any language pertaining to aesthetics or health and safety (City of Fredericton, 2005).

Solution: This code removes regulatory factors by completely eliminating any mention of height requirements or other legal controls.

*Note: The Fredericton by-law was referenced in Carly Murphy’s Major Research Paper “Remodeling City of Toronto’s Municipal Code Chapter 489, Grass and Weeds” completed at the School of Urban and Regional Planning at X University.*

### Guelph, Ontario, Canada

Description: The by-law of Guelph, ON states that the height requirement does not apply to areas that can be classified as “naturalized.” “Naturalized Area” is defined in the by-law as: “a landscaped area that has been deliberately implemented to produce ground cover which consists of one or more species of wildflowers, annuals, perennials, shrubs and grasses or a combination thereof.”

Solution: Seeks to affect the regulatory factors by encouraging the development of naturalized yards through a deliberate naturalized area definition and by exempting naturalized areas from height requirements.

### Saanich, British Columbia, Canada

Description: The District of Saanich, B.C. by-law states that residents have an obligation to maintain a boulevard to a specified standard (height and

trimming requirement). However, this does not apply if the boulevard vegetation is deemed primarily natural vegetation.

Solution: Seeks to affect the regulatory factors by defining natural vegetation and omitting natural vegetation from the by-law height requirement.

### Washington, D.C., United States

Description: The Washington, D.C. Sustainability D.C. Action Plan has implemented a program that conducts a review of conflicting laws. This is done through Action Number GV 1.3 which states that they will “identify existing laws, regulations, and policies that conflict with sustainability goals and areas where new authority is required.” The review shows that Washington, D.C. is already aware of the conflicts between different branches and laws of the municipality, much like the Network.

Solution: Seeks to affect the regulatory factors by identifying and removing legislative barriers within their own by-laws/codes.

### State of Minnesota, United States

Description: The State of Minnesota “Native Landscape Bill” has proposed new legislation that will require all local governments to permit native landscaping. The Bill is called HF 2618 and was introduced and received its first reading in May 2021. The Bill has been referred to State Government Finance and Elections.

Solution: Encourages ordinances and policies that encourage naturalized yards over ones that favour monoculture turf grass.

## Education

The power of neighbourhood groupthink is a large determinant of neighbours choosing to transform yards and POPMS into biodiverse habitats. To shift yard culture away from monoculture turf grass to naturalized yards, targeted and educational programs are required. This can be done through information campaigns, signage for naturalized yards to help neighbours understand the positive impacts of naturalized yards, and visual examples of naturalized yards. The following examples highlight successful educational programs.



*Click the clips for more information!*

### *Surfrider Foundation, Ocean Friendly Gardens, multiple locations*

Description: The Surfrider Foundation creates ocean friendly gardens through “conservation, permeability and retention”. Residents receive signage to post on their lawn to communicate the three components of an Ocean Friendly Lawn: conservation, permeability and retention.

Solution: Seeks to affect the understanding of the benefits of water management at the lot level through the design of a resident’s yard.

### *National Wildlife Federation, multiple locations*

Description: The National Wildlife Federation has a program where residents can have their yard designated as a “Certified Wildlife Habitat.” Residents receive signage to post on their lawns. The signage helps to communicate the benefits of the yard and its intention of creating habitat for birds, butterflies and other wildlife.

Solution: Seeks to influence the societal understanding of the benefits of providing a habitat in yards.

### *North Shore Garden Tour, City of West Vancouver, Canada*

Description: The City of West Vancouver puts on annual tours of naturalized gardens to provide education around permaculture, and how naturalized gardens contribute to pollinators, birds, and local food.

Solution: Seeks to affect the societal factors that impact the knowledge sharing of naturalized gardens.

### *The Pollination Pledge, Edinburgh, United Kingdom*

Description: Participants in the Edinburgh Living Landscape may choose to take a “Pollination Pledge.” The pledge is three simple actions that individuals can pledge to do to improve the network of pollinating landscapes in Edinburgh:

- Plant for pollinators using the programs’ resources on which plants are helpful to pollinators
- Make space for nature by planting wildflowers, reducing or stopping mowing, or, creating a bee hotel
- Expand the program network by sharing photographs and engaging on social media.

Once a resident has made the pledge, they send photos of their naturalized gardens along with emails and addresses to be added to the Edinburgh Pollinator Map.

Solution: Seeks to affect the societal factors that impact the understanding of the benefits of providing pollinating habitats. Through the map, the initiative also provides a spatial understanding of where residents are developing their own pollinating landscape.



### *Healthy Yards, New York, United States*

Description: Healthy Yards is an organization that helps individuals and households transition from environmentally harmful lawn practices to healthy yards. Healthy Yards aims to reduce the environmental concerns that surround lawn practices such as greenhouse gas emissions and wildlife endangerment (Healthy Yards, n.d.).

Solution: Healthy Yards provides resources to both homeowners and professionals regarding the following topics; pollinators, pesticides, leaf blowing, water conservation, equipment, lawn care, and soil (Healthy Yards, n.d.).

### *In the Zone, Ontario, Canada*

Description: The World Wildlife Foundation and Loblaws have partnered to promote native plant species to consumers. They have created a specific program called “In the Zone” where tags make it easy for shoppers to identify which plants are native to their area. This program also partners with growers across southern Ontario to get native plants into 123 Loblaws Garden Centres across southern and eastern Ontario.

Solution: This program is an example of an initiative aiding in the shift of public perception around turf grass being the only acceptable form of urban planting.



### *TRCA Rain Gardens Guide, Toronto, Canada*

Description: The TRCA Rain Gardens Guide walks private yard residents through the steps of creating a rain garden. A rain garden consists of a garden with native shrubs, perennials, and flowers rooted on a natural slope. This garden aims to hold and soak rain water temporarily from roofs, driveways, patios, and lawns. Overall, these gardens help 30% more water to be soaked into the ground (Groundwater Foundation, n.d.).

Solution: Seeks to reduce rainwater runoff, and collects pollutants such as dirt, fertilizer, chemicals, oil, garbage, and bacteria by filtering it with vegetation as it percolates into the soil (Groundwater Foundation, n.d.)



## Incentives

Encouraging urban biodiversity through codes and educational programs provides interested citizens with the proper legal backing and knowledge on how to implement the yard changes. By providing incentives that directly support the conversion and maintenance of naturalized yards, the knowledge learned can be put into action through encouragement or by helping to overcome financial barriers. The following examples show how incentive programs can be used to create behavioural changes.

 [Click the clips for more information!](#)

### *Boulevard Gardening Program, Victoria, Canada*

Description: The City of Victoria, B.C. Boulevard Gardening Program provides guidelines that enable property owners to create gardens on boulevards immediately adjacent to their property, or give permission to tenants or other groups to garden on the boulevard to promote pollination, ecological biodiversity and local food growth.

Solution: Seeks to affect the societal factors by allowing residents to implement their own naturalized gardens, including a garden to grow food.

### *Lawn Conversion, Pennsylvania, United States*

Description: The Lawn Conversion program through the State of Pennsylvania offers technical assistance to convert lawns into woods or meadows. State funding is available to those that have more than ¼ acre or, combined with neighbours, have ¼ acre. The funding provided is intended to be used towards the planning and planting of a meadow or wood lot on the property.

Solution: Seeks to affect the societal factors by providing financial incentives and education services to residents looking to develop a naturalized property.

### *Lawns to Legumes Program, Minnesota, United States*

Description: The Lawns to Legumes Program organizes workshops, coaching, planting guides and cost-share funding (individual support grants) to help support the installation of pollinator gardens. Demonstration neighbourhoods (pollinator programs run by local governments) are used to support public education campaigns.

Solution: Seeks to affect the societal factors by providing both education and funding in order to encourage the implementation of pollinator gardens on residents private lawns.

### *Median Greening Program, San Francisco, United States*

Description: The Median Greening Program is a community sponsored or co-sponsored funding to replace hard-paved areas on medians with Low Impact Development (LID) features in order to improve the ecological function of the median.

Solution: Seeks to affect the societal factors by implementing LID features in prominent publically owned spaces.

### *SoCal Water Smart, Southern California, United States*

Description: The SoCal Water Smart initiative provides a rebate if residents replace their turf grass with “organic, drought tolerant landscaping.” This program was created by the Metropolitan Water District of Southern California. Water conservation rebates are not taxable by the State of California as per Californian state law.

Solution: Seeks to affect the climate impacts by financially incentivizing replacing turf grass with landscaping that will limit water use.

*Note: This program could be further improved by incorporating drought resistant plants which provide habitat or food for local pollinators and other species.*



**NEXT STEPS**

## Code analysis survey

The above code analysis highlighted the complexity of codes in each local government and the barriers each one must overcome to adopt a biophilic approach for naturalized yards. While common themes existed among these 15 codes, further research must also be done to determine the prevalence of these themes across North America. As well, local governments must work on a case-by-case basis to address barriers within their own jurisdictions.

To replicate the research completed in this report on the 15 partner cities, a code analysis survey tool has been developed which could be used in other jurisdictions. This survey has been created for two groups. The first group are researchers who want to continue the work of this report and expand the scope to other cities. The second group are local governments who want to conduct a self-diagnosis on barriers to biodiversity within their own codes.

The survey has 26 questions that analyze 7 key areas. These key areas include biodiversity strategies; grass and weeds codes; enforcement strategies; justifications of codes; publicly-owned privately-maintained spaces; biodiversity in condominiums, apartments and homeowner associations; and other impactful regulations. The survey can be found in Appendix 6.

## Enhancing Biodiversity in Private Property: A Toolkit for Local Governments

For local governments wanting to promote biodiversity within their jurisdiction, a Toolkit has also been developed that can be used in conjunction with the survey.

“Enhancing Biodiversity in Private Property: A Toolkit for Local Governments” is intended to be a user-friendly and standalone document that local governments can use to incorporate the findings of this report. The Toolkit can be found as an accompaniment to this report.

This Toolkit includes the following resources:

- An overview of the benefits of naturalization;
- An in-depth review of concerns related to the negative impacts of biodiverse yards and the clarifications around these issues;
- A user-friendly version of the code analysis survey tool found in Appendix 6;
- A build-your-code section to help local governments reduce barriers to naturalization in their own codes;
- A subset of the best practices related to codes, education and incentives found within this report; and
- A list of resources related to urban biodiversity.

The target audience for this Toolkit is municipal leaders and staff who want to support biodiversity and create a more resilient urban fabric in private yards, gardens and POPMS.





# **FUTURE RESEARCH**

The following section covers potential areas of future research that could build upon the foundation of this report.

## Expanded analysis

**Expand this analysis to cities across North America to determine the pervasiveness of codes that limit or restrict biodiversity on private property.**

From property standards limiting grass height to strict requirements for POPMS, local government codes regulate the presence of nature and biodiversity in cities across North America for many reasons. This impacts water quality protection, water conservation, flood mitigation, heat mitigation, biological conservation, ethics, property values, pest control, safety, and allergen avoidance.

A comprehensive analysis reviewing the intent of these codes, how they originated and spread, and how they differ regionally today, is recommended. A fuller understanding of the way in which codes differ regionally and reflect local environmental priorities will enable jurisdictions to critically analyze and coordinate among planners, developers, researchers, and NGOs at multiple scales. The survey tool created in Appendix 6 could help implement this research.

## Role of Homeowner Associations

**Review the impact of Homeowner Associations (HOAs) on limiting or enabling biodiversity.**

While not within the scope of this review, the role of Homeowner Associations (HOAs) in permitting or forbidding naturalized yards was identified through literature review and in panel feedback.

The studio team came across multiple new stories of HOAs rejecting or penalizing residents in favor of ‘traditional’ lawn aesthetics and uniformity. However, the literature review also uncovered studies, such as ‘Homeowner Associations as a Vehicle for Promoting Native Urban Biodiversity’ by Lerman, Turner and Bang (2012), that found neighborhoods belonging to HOAs have significantly greater bird and plant diversity than those not belonging to HOAs.

Further research into HOAs, in particular research focused on leveraging HOAs structured landscape management and maintenance practices to increase biodiversity, is recommended.

## Consultation strategy

**Create a consultation strategy that is informed by local knowledge to educate and engage the public.**

When working to increase urban biodiversity, particular attention should be given to Indigenous communities. Local indigenous communities have a deep connection to and knowledge of their lands that must be highlighted, valued, and learned from. Furthermore, other equity deserving groups such as recent immigrants and racialized populations have unique and specific interactions with private spaces and nature.

Future research in local jurisdictions should include consultation strategies that emphasize the importance of engaging equity deserving groups including indigenous peoples, local immigrant communities, and racialized communities. Different communities may have different perspectives and values regarding private yards. During the photographic survey, the studio team noted that many homes in immigrant neighborhoods were growing culturally-specific foods. As long as those culturally-specific foods are not invasive, their growth exemption from landscaping requirements should be considered.

## Inequity in enforcement

**Measure and analyze inequity in enforcement.**

An inherent problem with an enforcement system based on complaints is that it can result in inconsistent treatment.

In 2021, the Portland City Ombudsmen released a report that analyzed six years of maintenance complaints submitted to the City (Ramakrishnan, 2021). Through this analysis, it was found that neighborhoods would weaponize the complaint driven system against each other for trivial maintenance issues. As well, gentrifying neighborhood newcomers tended to file complaints against long-term residents. Complaints would therefore harm vulnerable community members over matters unrelated to health and safety. This resulted in an enforcement system that disproportionately affected communities of color and neighborhoods vulnerable to gentrification, as well as individuals who were elderly or had disabilities that make landscaping challenging.



The Report noted that the enforcement of the Portland Code relied on neighbors or passerbys making confidential complaints, which were investigated by City inspectors. If an inspector found a violation, they would notify the property owner and set a deadline for remediation. If the violation was not corrected, the inspector would place a lien on the property, which could be detrimental for persons living in poverty. As the Department responsible for enforcement relies on the collection of fees to operate their enforcement program, staff are incentivized to fine residents.

Interestingly, the Ombudsman report determined that more than 30% of all complaints were without merit. Specifically for complaints about tall grass and weeds, almost half (46%) were found to be without merit. This report cast doubt on the efficiency and effectiveness of relying on complaints.

The City's Office of Equity and Human Rights responded to the report, imploring City Council to examine the issue. While this data was extracted from only the City of Portland, systemic racism is unfortunately much more endemic. The possibility that enforcement disproportionately affects vulnerable populations in other jurisdictions is likely.

Future researchers should determine if property maintenance enforcement systems result in similar patterns of inequitable harm, and challenge whether their city's property standards really relate to health and safety, or aesthetics and cultural norms.

## Neighbourhood norms & individual decision making

### **Research the relationship between neighborhood norms and individual decision making.**

The interaction between formal policies and informal norms is unclear: height restrictions in local government codes may formalize existing norms, or they may create that norm by restricting other yard forms, or they may be ignored entirely. Despite all the benefits of naturalized yards and the legal barriers around naturalized yards, it is also important to remember that residents should continue to have options to use their property as they desire. Families with young children may find a clipped lawn provides a suitable outdoor space

for their children to play. New immigrants may find planting some non-invasive non-native ornamental flowers reminds them of home. The purpose of this study is not to dictate how people should use their properties, but to provide the opportunity for those who wish to naturalize theirs the ability to do so.

Primary research through interviews with homeowners, renters, and local government officials is needed to more fully understand the process by which individuals choose to plant naturalized yards. This will help activists and local governments design programs that more effectively change the behaviors of residents.

## Multi-functional benefits

### **Promote the multi-functional benefits of naturalized yards, including benefits related to health, well-being, and green infrastructure.**

Harmful substances, such as lead, may be found in the soil surrounding the foundation of older buildings, from aging lead-based paints. Lead poisoning is a serious health concern, particularly for children, and certain plants and ground coverage are better at containing lead dust and limiting human exposure (Bricka et al., 2008; Environmental Protection Agency, n.d.). Another example is how well-designed rain gardens can gather stormwater that lands on impervious surfaces, such as an individual's roof or driveway, and aid in stormwater infiltration (Dietz & Clausen, 2006). Knowledge on these benefits should be made accessible for those interested in naturalizing their yards.

Local governments should examine any environmental issues or challenges within their jurisdiction which would benefit from specific plant species providing specific ecological services. Local governments should use this analysis when determining how best to roll out any naturalization incentive programs.

**CONCLUSION**





If local governments are truly committed to enhancing the environment, increasing urban resilience, and combating the detrimental impacts of climate change, they must consider how their property maintenance standards impact this. With an estimated 40 to 50 million acres of yard in the United States alone, the vast majority being turf grass monocultures, the potential impacts of wide scale yard naturalization would be far reaching (Milesi et al., 2005). By creating a culture of naturalized yards, governments can improve the health and well-being of humans and non-human life while strengthening the climate resilience of cities.



The analysis presented in this report concludes that supporting urban biodiversity requires governments to: rewrite and adopt codes that allow for urban biodiversity to take place on private yards and POPMS, develop or partner with non-profits to develop educational programs, and create incentives for the replacement of turf grass with naturalized yards.



The Biophilic Cities Network is well positioned to spread the important messages of this report. Using the attached Toolkit for “Enhancing Biodiversity in Private Property,” the Network can provide information and support to local governments hoping to encourage biodiversity in their own jurisdictions. As governments can often be siloed, the Toolkit can help remind staff working on sustainability initiatives to collaborate across government departments and with code and enforcement teams as well. With the environmental crisis continuing to worsen, local governments must act quickly and firmly to work together and promote the notion of naturalization over the outdated concepts of clipped lawns.

# APPENDICES



## Appendix 1: The history of the lawn in North America

The monoculture turf lawn represents a sense of homeownership and community in North America (New York Times, 2019). The lawn traces its roots to Europe, and the middle English word “launde” which infers “a glade or opening in the woods” (Planet Natural, n.d.). Early lawns were in the form of grasslands, present in medieval castles in France and Britain, fostering an environment with unobstructed views and no trees, so guards could keep the castles safe (Planet Natural, n.d.). But in the 17th century, the lawn became a status of wealth and power as only wealthy landowners could hire people to maintain the lawn aesthetic (Planet Natural, n.d.).

Through colonization, Europeans brought the idea of the lawn and the seeds to recreate it to the New World (Planet Natural, n.d.). Settlers imported European grass and clover seeds to replace native grasses. By 1672, 22 native European weed species had become common in the East Coast, rapidly spreading to North America (Murphy, 2021). Jefferson, a prominent political figure in the United States believed that the look of the lawn was aesthetically pleasing. Therefore, he replicated the lawn landscape into his estate in Virginia, known as Monticello (Murphy, 2021). Monticello has roots in slavery and plantation agriculture. Enslaved labourers were eventually responsible for maintaining the green lawn aesthetic (Murphy, 2021). This aesthetic imposed class divides in which lawns and romantic gardens were attained by the upper class, but only made possible by enslaved labourers, illustrating the gap between the rich and poor (Murphy, 2021).

Initially, lawns were restricted to the wealthy, however, by the 20th century, herbicides, pesticides and chemical fertilizers became available. This introduced a paradigm shift and the lawn become more common (Murphy, 2021). The social pressure to conform to the lawn aesthetic remains very strong up to today. This has led to legal enforcement of lawn conformation. Ultimately, lawns indicate success in the American (or North American) vision of home ownership (D’Costa, 2017).

However, there are alternatives to monoculture turf grass lawns, including naturalized gardens or pollinator gardens. These types of spaces with non-invasive and native plants offer ecological services in a multitude of ways. They reduce the need for fertilizers, pesticides, and herbicides; provide habitat that attracts wildlife

and pollinators; manage stormwater runoff; require less resources for irrigation and mowing; and more.

The recognition of naturalized gardens as a positive feature is in part inspired by the biophilic cities movement that started in the 1990s when designers sought to increase contact with “natural elements, views, and forms in order to transform the human experience indoors and support health and well-being.” Many biophilic designs can be seen in architecture today, including the Atlas Hotel in Hoi An and the Phipps Conservatory and Botanical Gardens in Pittsburgh (Panlasigui et al., 2021).

The biophilic cities movement imposes the idea that nature is essential infrastructure in cities. It seeks to integrate both human built infrastructure, as well as nature to provide accessible natural environments for residents, and to help improve other outcomes such as health and well-being. Urban planning for biodiversity is also recognized and complementary to biophilic design – the incorporation of natural features and processes built into the environment to better human lived experiences (Panlasigui et al., 2021).

The turf grass lawn has a dominant presence in the landscaping of suburban North America, which comes at great ecological costs. The naturalization of lawns is an alternative to counter the ecological harm of abundant turf grass lawns (Feagan & Ripmeester, 2010). There are many benefits to naturalization, some of which include climate control, air pollution, soil and water quality, and habitat creation (Hallet, 2007). These benefits create an urban landscape that is ecologically sustainable (Feagan & Ripmeester, 2010). Sustainable landscapes counter mainstream landscape architecture which remain driven by “cosmetic” notions of aesthetic quality (Thayer, 1989). Oftentimes, a sustainable landscape is perceived to be in violation of existing regional frameworks (Thayer, 1989). Alternative options to the monoculture of turf grasses provide both cost effective and sustainable options (Aronson et al., 2017). The monoculture turf grass of lawns greatly affect “population dynamics and community structures,” enhancing the need for a different type of lawn framework to help support biodiversity (Aronson et al., 2017).

## Appendix 2: Typologies of different garden and lawn styles

There are a variety of ways individuals and households can maintain a yard that is more beneficial to the environment than conventional turf grass lawns. Denvir et al. (2016) described a number of alternative yard typologies in their work. Listed below are typologies based on their work and the studio team's field research.

### *Unmowed turf grass*

This type of yard is when conventional turf grass is no longer mowed. As shown throughout this report, unmowed grass is generally a prohibited nuisance within by-laws and regulations. Unmowed turf grasses provide additional habitat for wildlife, however will generally be met with resistance from neighbours and local governments.

### *Low-growing turf grasses*

Low-growing turf grass lawns use alternative low-growing grass species that need little to no mowing. Examples of low-growing grasses include fescues or bentgrasses, though species must be selected based on the local context of the property. Some species of these types of grasses are also drought resistant and need less water to grow. These species typically grow up to heights of three to six inches, allowing them to exist within the requirements of many property maintenance ordinances.

### *Biodiverse naturalized yard*

This type of lawn replaces turf grass with alternative types of plant species that are either native to the area, or ecologically beneficial and non-invasive. This approach has many benefits, as noted in this report. This type of landscape often includes plant species that are taller than grass height limits of local codes and ordinances. Because many different plant species grow taller than the requirements of many local codes and ordinances, these types of yards often face citations or threats of mowing from local jurisdictions.

### *Edible plants*

This type of lawn includes herb, fruit and vegetable gardens. Edible plant lawns can provide food security and personal independence to residents. However, some jurisdictions continue to view these as infractions of local property standard ordinances or codes. In some municipalities, property owners who tend their land for food production have been actively prosecuted if their lawns do not align with aesthetic expectations.

### *Pollinator Gardens*

Pollinator gardens include flowering plants selected to provide food and habitat for pollinators such as bees and butterflies. Some examples of species include flowers that may be considered “weeds,” such as dandelions and creeping charlies. These plants are often deemed unaesthetic and are combatted by both code requirements and social pressure.



## Appendix 3: Height restrictions in the partner city municipal codes

City, State/Province	Code (Chapter, Section)	Excerpt
Arlington, Virginia	<u>Arlington County Code, Chapter 10, Article II, Condition of Private Property, Section 10-13.B</u>	"It shall be the duty of each owner of occupied residential real property to cut the grass or lawn area of less than one-half (1/2) acre on such property within ten (10) days after notice from the County Manager or designee when the growth on such grass or lawn area exceeds twelve (12) inches in height."
Austin, Texas	<u>Austin Code of Ordinances, Chapter 10.5, Article 2, Sanitary Condition of Real Property</u>	"(B) A person may not allow the following to accumulate on the person's property or in the area from the person's property line to the adjacent curblineline: (1) weeds or grasses more than 12 inches tall."
Edmonton, Alberta	<u>Edmonton By-law 14600, Section 6</u>	"6 (1) A person shall not cause or permit a nuisance to exist on land they own or occupy. (2) For the purpose of greater certainty a nuisance, in respect of land, means land, or any portion thereof, that shows signs of a serious disregard for general maintenance and upkeep, whether or not it is detrimental to the surrounding area, some examples of which include: [...] (d) unkempt grass or weeds higher than 10 centimetres"
Miami-Dade County, Florida	<u>Miami-Dade County Code of Ordinances, Chapter 19: Responsible Property Owner and Merchant Act, Section 19-13</u>	"(A) In accordance with Section 19-14, it shall be the responsibility of the responsible party for any lot in a residential-zoned district that is within 330 feet of a residential structure to regularly maintain their property to prevent the following: (2)The growth or accumulation of any grass, weeds, non-native undergrowth or other dead plant life that exceeds the height of twelve (12) inches from the ground for more than ten (10) percent of the area to be maintained."
Milwaukee, Wisconsin	<u>City Ordinances, Chapter 80 Nuisances, Section 80-17-2</u>	"It shall be unlawful to permit within the city the pollenization of any turf grasses or weeds which cause or produce hay fever in human beings. In order to prevent such pollenization, no turf grass or weeds of any kind shall be permitted to grow or stand more than 7 inches on any property in the city."
Norfolk, Virginia	<u>Code of Ordinances, Chapter 27 Nuisances, Sec. 27-14 Cutting of Overgrowth</u>	Section 27-14: "It shall be the duty of the owner or occupant or other person who is responsible for the maintenance and upkeep of any land or premises, occupied or vacant, including the area adjoining such property extending to the center line of an abutting alley, to prevent overgrowth (as defined in chapter 27 of the City Code) to exist in a manner that is in violation of this section. Overgrowth shall be unlawful if any one or more of the following applies: (a) The overgrowth is abandoned, neglected, or not adequately maintained [...]"  Section 27-2: "For purposes of this article, "overgrowth" is defined to include overgrown shrubs, trees, and other such vegetation, including but not limited to running bamboo, vines, ivy, noxious weeds, and any other plant material that may inhibit the growth of native vegetation which has grown to sufficient height and cover or to a height of more than twelve (12) inches or accumulated so as to provide cover or harborage or potential cover or harborage for rodents or vermin."

City, State/Province	Code (Chapter, Section)	Excerpt
Phoenix, Arizona	<u>City of Phoenix: Phoenix City Code Chapter 39, Sec. 39-7</u>	<p>“D. Weeds, bushes, trees and other vegetation. All exterior property areas shall be kept free from dry vegetation, tumbleweeds, weeds, bushes and tall grass and trees which present a visual blight upon the area, which may harbor insect or rodent infestations and dry vegetation, or which may likely become a fire hazard or result in a condition which may threaten the health and safety or the economic welfare of adjacent property owners or occupants.</p> <p>The premises shall be free from visual blight; potential fire hazards; dead trees and branches; dead palm fronds within ten feet of the ground, a structure, a fence or wall, or of any combustible other than the tree from which the fronds have grown; lawn grass higher than six inches; tumbleweeds; or weeds higher than six inches tall.”</p>
Pittsburgh, Pennsylvania	<u>Pittsburgh Zoning Code, Title 10, Chapter 1004.01 Subsection 302.4</u>	<p>“302.4 Weeds. All premises and exterior property, including but not limited to the lawn space adjacent to curb lines along the front, rear and side lot lines, shall be maintained free from weeds or plant growth in excess of ten (10) inches. All noxious weeds, including but not limited to ragweed and poison ivy, shall be prohibited.”</p>
Portland, Oregon	<u>Portland City Code, Title 29, Chapter 29.20 Property Nuisances, Section 29.20.010</u>	<p>“It is the responsibility of the owner of any property, improved or unimproved, to maintain the outdoor areas of the property and adjacent rights of way in a manner that complies with the following requirements:</p> <p>[...]</p> <p>F. Overgrown lawn areas. Cut and remove and keep cut and removed all weeds and grass that are located in lawn areas and have a prevailing height of more than 10 inches.”</p>
Reston, Fairfax County, Virginia	<u>Fairfax County, Code of Ordinances, Chapter 119 Grass or Lawn Area, Article 3, Section 119-3-1</u>	<p>“It shall be unlawful for any owner of any occupied residential lot or parcel which is less than one-half acre (21,780 square feet) or any vacant developed residential lot or parcel which is less than one-half acre (21,780 square feet) to permit the growth of any grass or lawn area to reach more than twelve (12) inches in height/length.”</p>
Richmond, Virginia	<u>Richmond Code of Ordinances, Chapter 11, Section 11-105, Weeds and other vegetation</u>	<p>“It shall be unlawful for any person who owns or occupies property within the City to permit any grass, plant, bushes, weeds or any other vegetation 12 inches high or over, other than trees, shrubbery, agricultural plants, garden vegetables, flowers or ornamental plants, to exist on such property.”</p>
San Francisco, California	<u>San Francisco Health Code, Article 11, Section 581</u>	<p>“(a) No Person shall have upon any premises or real property owned, occupied or controlled by him, or her, or it any public nuisance.</p> <p>(b) The following conditions are hereby declared to be a public nuisance: [...]</p> <p>(2) Any accumulation of hay, grass, straw, weeds, or vegetation overgrowth.”</p>



City, State/Province	Code (Chapter, Section)	Excerpt
St. Louis, Missouri	<u>St Louis Code of Ordinances, Title 11, Chapter 11.04, Section 11.04.040</u>	“Russian, Canadian, or common thistle, wild lettuce, wild mustard, wild parsley, ragweed, milkweed, ironweed, poisonous plants or shrubs, and all other unattended vegetation and noxious weeds which have attained a height of seven (7) inches or more growing or being upon any lot or lands within the City, and unattended growths of shrubs, trees, and seedlings, which in the opinion of the Commissioner of Forestry, are unsightly and which may impede the clearing of any lot or lands within the City contrary to the general purpose of this chapter, are hereby declared a public nuisance.”
Toronto, Ontario	<u>Toronto Municipal Code, Chapter 489 Long Grass and Weeds By-law, Section 489-2</u>	“The owner or occupant of private land shall cut the grass and weeds on their land and remove the cuttings whenever the growth of grass and weeds exceeds 20 centimetres in height.”
Washington, D.C.	<u>D.C. Property Maintenance Code, Chapter 3, Section 302</u>	<p>302.4: All premises and exterior property shall be maintained free from weeds or plant growth in excess of 8 inches (203 mm).</p> <p>302.4.1 Vegetative Growth: The following types of vegetative growth are prohibited regardless of height:</p> <ul style="list-style-type: none"> <li>• Vegetative growth that is untended;</li> <li>• Shrubbery that is a detriment to the health, safety, or welfare of the public;</li> <li>• Vegetative growth that creates a harbor or concealment, including hiding places for persons and harbors or concealments for refuse or trash;</li> <li>• Vegetative growth that harbors, or provides a refuge for, snakes, rodents, or other vermin, including rats and mice;</li> <li>• Vegetative growth that creates an unpleasant or noxious odor;</li> <li>• Vegetative growth that constitutes a fire hazard;</li> <li>• Vegetative growth that creates a breeding place for mosquitoes; and</li> <li>• Vegetative growth that is dead or diseased.”</li> </ul>

## Appendix 4: Definitions and exemptions from height restrictions in the partner city municipal codes

City, State/Province	Code	Definition of what height restrictions apply to	Exemptions
Arlington, Virginia	<a href="#"><u>Arlington County Code, Chapter 10, Article II. Condition of Private Property, Section 10-13.B</u></a>	What height restrictions apply to: “grass or lawn area”  Definitions: No definitions identified.	None
Austin, Texas	<a href="#"><u>Austin Code of Ordinances, Chapter 10.5, Article 2, Sanitary Condition of Real Property</u></a>	What height restrictions apply to: “weeds or grasses”  Definitions: No definitions identified.	<p>“It is an affirmative defense to a violation of Section 10-5-21(B)(1) that the weeds or grasses observed on the subject property did not reduce or impair visibility or line of sight at, of, or for right-of-way, vehicles, cyclists or pedestrians, and that the over-height weeds or grasses observed were located at or on one or more of the following:</p> <ol style="list-style-type: none"> <li>1. an area within or adjacent to a stream, waterway, or water quality facility;</li> <li>2. a landscaped area arranged and managed consistent with a plan accepted by the City which area includes native or adapted vegetation, where weed control and other periodic maintenance occurs; or</li> <li>3. city parkland, a greenbelt, nature preserve, or other publicly maintained open space.”</li> </ol>
Edmonton, Alberta	<a href="#"><u>Edmonton By-law 14600, Section 6</u></a>	What height restrictions apply to: “unkempt grass or weeds”  Definitions: No definitions identified.	None
Miami-Dade County, Florida	<a href="#"><u>Miami-Dade County Code of Ordinances, Chapter 19: Responsible Property Owner and Merchant Act, Section 19-2</u></a>	What height restrictions apply to: “grass, weeds, non-native undergrowth or other dead plant life”  Definitions: No definitions identified.	<p>“That portion of any lot or parcel is exempt from the vegetative provisions of this chapter where that lot, or parcel is designated as a Natural Forest Community, Environmental Endangered Land, Native Plant Community, Native Habitat, or a wetland as defined and described in Section 24-3(151) of the Code of Miami-Dade County or is owned by a governmental agency or not for profit company and is held, owned or maintained as a natural area.”</p>



City, State/Province	Code	Definition of what height restrictions apply to	Exemptions
Milwaukee, Wisconsin	<a href="#"><u>City Ordinance 80-17-2 &amp; 80-17-6</u></a>	<p>What height restrictions apply to: “turf grasses or weeds”</p> <p>Definitions: “Turf grass” means annual bluegrass, annual ryegrass, bahiagrass, bermudagrass, buffalograss, carpetgrass, centipedegrass, colonial bentgrass, creeping bentgrass, fine fescue, hybrid bermudagrass, kentucky bluegrass, kikuyugrass, orchardgrass, perennial ryegrass, quackgrass, rough bluegrass, seashore paspalum, St. Augustinegrass, tall fescue and zoysiagrass.</p> <p>No definition of “weeds” identified.</p>	None
Norfolk, Virginia	<a href="#"><u>Code of Ordinances, Chapter 27 Nuisances</u></a>	<p>What height restrictions apply to: “overgrown shrubs, trees, and other such vegetation, including but not limited to running bamboo, vines, ivy, noxious weeds, and any other plant material that may inhibit the growth of native vegetation.”</p> <p>Definitions: No definitions identified.</p>	This by-law appear to omit native vegetation from its definition of “overgrowth.”
Phoenix, Arizona	<a href="#"><u>City of Phoenix: Phoenix City Code Chapter 39, Sec. 39-7</u></a>	<p>What height restrictions apply to: “grasses and weeds”</p> <p>Definitions: “Weeds: A useless and troublesome plant generally accepted as having no value and frequently of uncontrolled growth. No definition of grasses identified.”</p>	None
Pittsburgh, Pennsylvania	<a href="#"><u>Pittsburgh Zoning Code, Title 10, Chapter 1004.01 Subsection 302.4</u></a>	<p>What height restrictions apply to: “weeds or plant growth”</p> <p>Definitions: “Weeds shall be defined as all grasses, annual plants and vegetation, other than trees or shrubs provided; however, this term shall not include cultivated flowers and gardens.”</p>	Cultivated flowers and gardens.
Portland, Oregon	<a href="#"><u>Portland City Code, Title 29, Chapter 29.20 Property Nuisances, Section 29.20.010</u></a>	<p>What height restrictions apply to: “all weeds and grass that are located in lawn area”</p> <p>Definitions: No definitions identified.</p>	Weeds and grasses located outside of “lawn areas.”

City, State/Province	Code	Definition of what height restrictions apply to	Exemptions
Reston, Fairfax County, Virginia	<a href="#">Fairfax County, Code of Ordinances, Chapter 119 Grass or Lawn Area, Article 3, Section 119-2-1</a>	<p>What height restrictions apply to: “grass or lawn area”</p> <p>Definitions: “The words ‘grass or lawn area’ shall include an area of ground covered with grass and/or associated growth. Trees, shrubs, cultivated areas, including, but not limited to beds of ornamental grasses, ferns, fruits, vegetables, herbs, spices, flowers, or wildflowers are specifically excluded from this definition.”</p>	“Trees, shrubs, cultivated areas, including, but not limited to beds of ornamental grasses, ferns, fruits, vegetables, herbs, spices, flowers, or wildflowers are specifically excluded from this definition.”
Richmond, Virginia	<a href="#">Richmond Code of Ordinances, Chapter 11, Section 11-105, Weeds and other vegetation</a>	<p>What height restrictions apply to: “any grass, plant, bushes, weeds or any other vegetation other than trees, shrubbery, agricultural plants, garden vegetables, flowers or ornamental plants.”</p> <p>Definitions: No definitions identified.</p>	“Trees, shrubbery, agricultural plants, garden vegetables, flowers or ornamental plants.”
San Francisco, California	<a href="#">San Francisco Health Code, Article 11, Section 581</a>	<p>What is prohibited*: “Any accumulation of hay, grass, straw, weeds, or vegetation overgrowth.”</p> <p>Definitions: No definitions identified.</p> <p><i>* San Francisco does not impose any height restrictions.</i></p>	None
St. Louis, Missouri	<a href="#">St. Louis Code of Ordinances, Title 11, Chapter 11.04, Section 11.04.040</a>	<p>What height restrictions apply to: “all other unattended vegetation and noxious weeds.”</p> <p>Definitions: No definitions identified.</p>	None
Toronto, Ontario	<a href="#">Toronto Municipal Code, Chapter 489 Long Grass and Weeds Bylaw, Section 489-2</a>	<p>What height restrictions apply to: “grasses and weeds”</p> <p>Definitions: “For the purposes of this section, the term ‘grass and weeds’ refers to:</p> <ol style="list-style-type: none"> <li>1. All noxious weeds and local weeds designated under the Weed Control Act; and</li> <li>2. Any other vegetation growth that does not form part of a natural garden that has been deliberately implemented to produce ground cover, including one or more species of wildflowers, shrubs, perennials, grasses or combinations of them, whether native or non-native, consistent with a managed and natural landscape other than regularly mown grass.”</li> </ol>	“One or more species of wildflowers, shrubs, perennials, grasses or combinations of them, whether native or non-native, consistent with a managed and natural landscape other than regularly mown grass.”

City, State/Province	Code	Definition of what height restrictions apply to	Exemptions
Washington, D.C.	<u>D.C. Property Maintenance Code, Chapter 3, Section 302</u>	<p>What height restrictions apply to: “All grasses, annual plants, and vegetation other than trees or shrubs.”</p> <p>Definitions: “Weeds shall be defined as all grasses, annual plants and vegetation other than trees or shrubs; provided, however, that this term shall not include cultivated flowers and gardens” and “vegetative growth [is] vegetation of all types, including weeds, poison ivy, poison oak, poison sumac, kudzu, plants with noxious odors, and grasses.”</p>	<p>Exemption to height restrictions include “cultivated flowers and gardens.”</p> <p>Exemption to vegetative growth provisions include:</p> <p>“1. Weeds, grasses, or other vegetation planted for agricultural use, if such weeds, grasses or vegetation are located at least 150 feet (45.72 m) from property zoned for nonagricultural use.</p> <p>2. Healthy plants, grasses, or shrubbery in tended grounds, gardens, or landscape designed yards, which exceed 8 inches (203 mm) in height.”</p>



## Appendix 5: Provisions relating to publicly owned privately maintained spaces (POPMS) in the partner city municipal codes

City, State/Province	Code	Excerpt of POPMS Code	Exemptions
<b>Codes which promote or exempt naturalized plants from height restrictions</b>			
Austin, Texas	<u><a href="#">Austin Code of Ordinances, Chapter 10.5. Article 2. Sanitary Condition of Real Property</a></u>	<p>Captured in same provision as private property:</p> <p>“(B) A person may not allow the following to accumulate on the person’s property or in the area from the person’s property line to the adjacent curblineline: (1) weeds or grasses more than 12 inches tall;”</p>	Same as Private Property: “It is an affirmative defense to a violation of Section 10-5-21(B)(1) that the weeds or grasses observed on the subject property did not reduce or impair visibility or line of sight at, of, or for right-of-way, vehicles, cyclists or pedestrians, and that the over-height weeds or grasses observed were located at or on one or more of the following: an area within or adjacent to a stream, waterway, or water quality facility; a landscaped area arranged and managed consistent with a plan accepted by the City which area includes native or adapted vegetation, where weed control and other periodic maintenance occurs; or city parkland, a greenbelt, nature preserve, or other publicly maintained open space.”
Miami-Dade County, Florida	<u><a href="#">Miami-Dade County Code of Ordinances, Chapter 18B Right-of-Way Landscaping Ordinance</a></u>	<p>“[...] Right-of-way landscaping shall include the use of native plant species in order to re-establish an aesthetic regional quality and take advantage of the unique diversity and adaptability of native species to the environmental conditions of South Florida.</p> <p>Where feasible, the re-establishment of native habitats shall be incorporated into the landscaping. [...]”</p>	Not applicable
Reston, Fairfax County, Virginia	<u><a href="#">Fairfax County, Code of Ordinances, Chapter 119 Grass or Lawn Area, Article 3, Section 119-3-1(d)</a></u>	“Exemptions [to lawn height]: Detention ponds; rights-of-way through residential, commercial, and industrial properties; park lands; and conservation and scenic easements approved by Fairfax County are specifically exempted from the provisions of this Chapter. (35-91-119.)”	All right-of-ways

City, State/Province	Code	Excerpt of POPMS Code	Exemptions
Toronto, Ontario	<u>Toronto Municipal Code, Chapter 743 – Streets and Sidewalks, Use of – Section 743-36</u>	<p>“The owner or occupier of land adjoining the street shall maintain the boulevard at their expense, as follows:</p> <p>A. Sustain all vegetation planted in the boulevard in a state of healthy and vigorous growth, and maintain the grassed portion of the boulevard at a height not exceeding 20 centimetres.</p> <p>[...]</p> <p>F. Prune and trim hedges, trees, shrubs and soft landscaping to provide a minimum vertical clearance of 2.5 metres above a sidewalk, and 5.0 metres above a road.</p> <p>[...]</p> <p>Ensure adequate intersection turning sight distances by maintaining soft landscaping and other vegetation located in a boulevard at a height of not more than 0.85 metres measured from the traveled portion of the adjoining road”</p>	<p>“The responsibility of the owner or occupier of land adjoining the street to maintain the boulevard as described in § 743-36 does not apply to:</p> <p>[...]</p> <p>D. Street trees, hedges, shrubs and maintained natural gardens planted by the City;”</p>
Washington, D.C.	<u>D.C. Property Maintenance Code, Chapter 2, Definitions</u>	<p>Captured under the same provisions as private property.</p> <p>“PREMISES. A lot, plot or parcel of land, easement or public way, including any structures thereon.”</p>	Exemption to height restrictions include “cultivated flowers and gardens.”

### Codes which limit heights due to sight lines

Arlington, Virginia	<u>Arlington Design Standards and Guidelines, Horizontal Standards H-3.6(Medians and Traffic Islands) and H3.9 (Sidewalks)</u>	<p>Medians: “Plantings in landscaped medians shall reach a maximum mature height of 3’ or if trees that are determined to pose a sight distance problem then they shall be limbed up to a minimum of 7’ above the road surface.”</p> <p>H3.9: “Trees, grass and other vegetation may be planted in this zone in strips, pits or raised containers.”</p>	Not applicable
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City, State/Province	Code	Excerpt of POPMS Code	Exemptions
<b>Codes which limits plant height on POPMS</b>			
Edmonton, Alberta	<u>Edmonton By-law 14600 Section 8</u>	<p>“A person shall maintain any boulevard adjacent to land they own or occupy by:</p> <p>(a) keeping any grass on the boulevard cut to a reasonable length; and</p> <p>(b) removing any accumulation of fallen leaves or other debris”</p>	A “ <a href="#">Licence of Occupation</a> ” may be sought to allow for the road right-of-way to be used for commercial or residential purposes, such as parking and storage areas, landscaping and gardening, walls and fences, free-standing business identification signs and artwork. The licence for landscaping costs \$75 CAD per year.
Milwaukee, Wisconsin	<u>City Ordinance 80-17-2 &amp; 80-17-6</u>	<p>Captured in same provisions as private property:</p> <p>“BY OWNER OR OCCUPANT. It shall be the duty of the owner and the tenant, or occupant of any leased or occupied premises, and the duty of the owner of any vacant or unoccupied premises within the city to comply with this section both as to the premises owned or occupied and as to public sidewalks on which such premises abut.”</p>	None
Norfolk, Virginia	<u>Code of Ordinances, Chapter 27 Nuisances, Section 27-9</u>	<p>Section 27-9:</p> <p>“It shall be the duty of the owner or occupant of any land or premises abutting upon any public right-of-way, including between the sidewalk and curb, whether paved or not, and the duty of the owner of any unoccupied land or premises abutting upon any public right-of-way, including between the sidewalk and curb, whether paved or not, to remove solid waste (as defined in chapter 14.5 of the City Code), therefrom and to have any grass, weeds, and other vegetable matter cut and removed, and at all times to prevent such area from becoming unsightly, impeded, or offensive by reason of failure to remove any such solid waste (as defined in chapter 14.5 of the City Code), or cut any such grass, weeds, and vegetable matter.”</p> <p>Section 27-2:</p> <p>“For purposes of this article, “vegetable matter” is defined as any grass, weeds, bushes, underbrush, poison ivy, poison oak or any other vegetable matter which has grown to sufficient height and cover or to a height of more than twelve (12) inches or accumulated so as to provide cover or harborage or potential cover or harborage for rodents or vermin.”</p>	None



City, State/Province	Code	Excerpt of POPMS Code	Exemptions
Phoenix, Arizona	<u>City of Phoenix: Phoenix City Code Chapter 39, Sec. 39-7D -Chapter 39 Neighbourhood Preservation Ordinance: Sec. 39-7.</u>	<p>“Streets, alleys, easements, and sidewalks abutting land. The owner and any responsible party in control of any land abutting a sidewalk, alley, easement or street shall maintain the sidewalk, alley, easement or street in the same manner as provided in subsections A and D of this section.”</p> <p>Subsection D includes a height limit of 6 inches for grasses and weeds on private property.</p>	None
Pittsburgh, Pennsylvania	<u>Pittsburgh Zoning Code, Title 10, Chapter 1004.01 Subsection 302.4</u>	<p>Captured in same provisions as private property:</p> <p>“All premises and exterior property, including but not limited to the lawn space adjacent to curb lines along the front, rear and side lot lines, shall be maintained free from weeds or plant growth in excess of ten (10) inches”</p>	None
Portland, Oregon	<u>Portland City Code, Title 29, Chapter 29.20 Property Nuisances, Section 29.20.010</u>	<p>Captured in same provisions as private property:</p> <p>“It is the responsibility of the owner of any property, improved or unimproved, to maintain the outdoor areas of the property and adjacent rights of way in a manner that complies with the following requirements:”</p>	None
Richmond, Virginia	<u>Richmond Code of Ordinances, Chapter 11, Section 11-105, Weeds and other vegetation</u>	<p>“It shall be unlawful for any person who owns or occupies property within the City to permit any grass, plants, bushes, weeds or any other vegetation 12 inches high or over, other than trees, shrubbery, agricultural plants, garden vegetables, flowers or ornamental plants, to exist on any sidewalk, public right-of-way, or grass strip adjacent to such property or unimproved street or alley (to the centerline of such unimproved street or alley).”</p>	None

City, State/Province	Code	Excerpt of POPMS Code	Exemptions
San Francisco, California	<u>San Francisco Public Works Code, SEC. 174. NUISANCE.</u>	“No person, firm or corporation, including but not limited to any department, board or commission of the City and County, shall have or permit upon any public sidewalk, public stairway or other right-of-way for public pedestrian travel that abuts property owned or occupied such person, firm, or corporation, any nuisance detrimental to health or any accumulation of filth, garbage, decaying animal or vegetable matter, waste paper, hay, grass, straw, weeds, vegetation overgrowth, litter, trash, cigarette or cigar butts, unsanitary debris, waste material, animal or human excrement, or stains, marks or grime caused by oil and other wastes absorbed or compressed into the surface, or any other matter that constitutes a threat to public health and safety. For purposes of this Section, the owner and/or the occupant of the premises or unit nearest the public sidewalk, public stairway or other pedestrian right-of-way shall be held liable for the cleanliness of said public sidewalk, public stairway, or other pedestrian right-of-way that abuts the building.”	None
St. Louis, Missouri	<u>St. Louis Code of Ordinances, Title 11, Chapter 11.04, Section 11.04.040</u>	Captured in same provisions as private property:  “Russian, Canadian, or common thistle, wild lettuce, wild mustard, wild parsley, ragweed, milkweed, ironweed, poisonous plants or shrubs, and all other unattended vegetation and noxious weeds which have attained a height of seven (7) inches or more growing or being upon any lot or lands within the City, and unattended growths of shrubs, trees, and seedlings, which in the opinion of the Commissioner of Forestry, are unsightly and which may impede the clearing of any lot or lands within the City contrary to the general purpose of this chapter, are hereby declared a public nuisance. Every owner, occupant, or person in control of any lot or land within the City shall cause such lot or lands to be kept free from such noxious weeds and vegetation by destroying them, by cutting or spraying with a chemical compound approved by the United States Department of Agriculture and the United States Environmental Protection Agency for the destruction of weeds, or by digging under, or by any other method approved by the Commissioner of Forestry.”	None

## Appendix 6: Code analysis survey tool

The following code analysis tool has been created based on the 2021 report “Urban Biodiversity: Cultivating Support Through Municipal Code.” This report examined how municipal codes create barriers to achieving urban biodiversity on private property and how these barriers can be overcome. Specifically, it highlighted the complexity of codes in local government and the specific barriers each one must overcome to adopt a biophilic approach for naturalized yards. While common themes were found to exist among codes in North America to properly create and implement policies and plans that support naturalized yards, individual research and work must be done on a local level. That is why this code analysis survey tool has been created.

This survey has been created for two user groups. The first user group includes future researchers who are continuing the work of this report and expanding the scope to other cities. The second user group is local government staff who want to conduct a self-diagnosis on the barriers to biodiversity within their own jurisdictions’ codes. For the purpose of this survey, “code” will refer to any ordinance, by-law or regulation within local government jurisdiction

The survey has 26 questions that analyze 7 key areas. These key areas include biodiversity strategies; grass and weeds codes; enforcement strategies; justification of codes; publicly-owned privately-maintained spaces strategies; condo, apartment and homeowner association biodiversity; and other impactful regulations.

For local governments, a Toolkit has been developed that can be used in conjunction with the survey. The Toolkit provides next steps to help local governments reduce the barriers identified in the survey.

### *Biodiversity Strategy*

1. Does your local government have any commitments, strategies, policies, or plans related to increasing biodiversity or ecological resilience within its jurisdiction?

a) If so, does the strategy, policy or plan include consultation with indigenous communities?

b) If so, does it outline how private property and private yards are part of the biodiversity strategy, policy, or plan?

2. Does your local government have any data, statistics, or estimates of how much total land mass is made of private yards, or publicly-owned privately-maintained spaces?

### *Grass and Weeds Code*

3. Does your local government have any code provisions that address grass and weeds maintenance, or exterior property maintenance?

a) If so, do the provisions include a maximum height limit for grass and/or weeds? If so, are the provisions clear about what plants are included or exempted from this requirement?

4. Does the code use any of the following words or phrases: weeds, flower, shrub, garden, lawn, overgrowth, negligence, unkempt, adequately maintained, visual blight, or any other wording or phrase used to describe the state of homeowners’ yards or vegetation?

a) If so, does the code provide specific definitions for each (e.g. plant species which are considered weeds)?

5. Under the provisions of this code, would a biodiverse naturalized yard be permitted (e.g. a yard with native plants, pollinator habitat, edible plants, or other plants other than turf grass)?



## Enforcement

6. If your local government has a code that addresses grass and weeds or private property maintenance, does it specify how the code is enforced?
  - a) If yes, does the enforcement officer have specific training to: distinguish between different plant species (e.g. “weeds” that cause hay fever vs. native pollinator habitat on biodiverse lawns) and identify prohibited or noxious plants?
7. How is enforcement undertaken: proactive enforcement activity, complaints driven, or both?
8. If enforcement is based fully or partially on complaints, are complainants required to show any due diligence or understanding of naturalized yards before submitting a complaint? For example, do you require complainants to specifically state the species of plants or type of growth that is the issue? Are complaints allowed to be filed based on aesthetic concerns alone?
9. How many violations per year do you have?
10. How are complaints, violations and enforcement actions tracked?
11. Has your local government ever conducted any reviews or analyses of complaints, violations, or enforcement data? Specifically, have any equity-based reviews been conducted to identify whether enforcement disproportionately impacts specific populations or communities?
12. Is enforcement data publicly available? If so, how can it be accessed?

## Justifications

13. Are aesthetic preferences used as a justification for code provisions that address grass and weeds maintenance, or exterior property maintenance (e.g. property value or maintaining a neighbourhood aesthetic)?
  - a) If so, does the assessment of aesthetics consider the local government’s policy, plan or strategy for biodiversity (e.g. are naturalized properties considered acceptable)?
14. Are specific health and safety concerns used as a justification for code provisions that address grass and weeds maintenance, or exterior property maintenance?
  - a) If so, does the health and safety justification include preventing allergens?
    - i) If so, does it include a comprehensive list of all allergen causing plants? Do any of the identified plant species also support pollinators?
    - ii) If so, has your government conducted any assessments, research or reviews that concluded that removing these plants would affect allergy prevalence?
    - iii) If so, would removing these allergen causing plants have a negative impact on urban biodiversity?
  - b) If so, does the health and safety justification include preventing “vermin”?
    - i) If so, are “vermin” defined anywhere in the code?
    - ii) If so, has your local government conducted any assessments, research or reviews that concluded different more biodiverse lawns would increase species considered to be “vermin”?
  - c) If so, does the health and safety justification include fire prevention?
    - i) If so, has your local government conducted any assessments or reviews that concluded different yard types increase fire risk?

### *Publicly Owned Privately Maintained Spaces (POPMS)*

15. Do your code provisions address property standards or landscaping requirements of publicly owned but privately maintained spaces (POPMS) (i.e. right-of-ways, medians)?

a) If so, do provisions that address POPMS have any plant height limits? Are they clear about which species are included or exempted from these limits?

16. Are any terms within POPMS provisions undefined (e.g. weeds, overgrown, or unkempt)?

17. Under the provisions of this code, could an individual plant biodiverse and naturalized species instead of a turf grass lawn on a POPMS?

18. Under the provisions of this code, could an individual plant edible species instead of a turf grass lawn on a POPMS?

19. Can you think of any other ways in which your local governments' code encourages or inhibits local biodiversity in private spaces or on POPMS?

### *Condominiums, Apartments, and Homeowners Associations*

20. Do code provisions regarding grass and weeds or private property maintenance apply to condominiums, apartments or homes within homeowners associations?

a) If not, what codes, guidelines, or provisions determine the exterior property maintenance of condominium, apartments, or home owner associations?

21. Under the provisions of the relevant code, could a biodiverse naturalized species instead of turf grass lawns be included in condominiums, apartments, or homes within a homeowner association?

22. Under the provisions of this code, could an individual plant edible species instead of a turf grass lawn on a POPMS?

### *Other impactful regulations*

23. Do any code provisions limit the use of leaf blowers for the purpose of protecting local ecosystems?

24. Do any code provisions ban or limit invasive plant species for the purpose of protecting local ecosystems?

25. Do any code provisions ban or limit pesticides beyond state or federal regulation?

26. Do any code provisions ban or limit non-native tree species?

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