BIOPHILIC LAWS: PLANNING FOR CITIES WITH NATURE

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I. INTRODUCTION

The concept of "biophilia" describes humans' successful evolutionary adaptation to the natural world and our continuing need and love for access to nature. [1] For human health and mental well-being,

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[1] EDWARD O. WILSON, BIOPHILIA (1984). *See also* Timothy Beatley, *Biophilic Urbanism: Inviting Nature Back to Our Communities and Into Our Lives*, 34 WM. & MARY ENVTL. L. &

this affinity requires maintaining and nurturing a daily connection with nature. With this in mind, the Biophilic Cities Project at the University of Virginia School of Architecture aims to illustrate and promote the abundance of nature in cities.[2] The world is rapidly becoming more urbanized, and by nurturing nature in cities, we can ensure that nature is present and accessible in the places that people increasingly reside.[3]

As one piece of the larger Biophilic Cities Project ("the Project"), this article surveys legal mechanisms that aim to improve the abundance of nature in cities. This article's purpose is to assist members of the Biophilic Cities Network[4] in recognizing, conserving and enhancing nature in their cities by providing real-world examples of particular legal mechanisms adopted by representative North American cities. This article is by no means an exhaustive list of the laws that are enhancing the abundance and accessibility of nature in cities, but instead only scratches the surface. To facilitate this survey, I identify broad categories of nature in urban spaces and provide an introduction to the legal approaches used by some cities.

II. WHY BIOPHILIC LAWS?

Humans value nature.[5] At the practical level, we understand that nature benefits our mental and physical well-being, and even saves on the ultimate bottom line provided that we properly calculate extrinsic costs. At a spiritual level, we understand that nature provides unending inspiration and an appropriate sense of wonder for the vast beauty and complexity of our world. Understanding this, we have evolved our laws

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POL'Y REV. 209, 210 (2009) (relating E.O. Wilson's theory regarding humans evolutionary need for daily contact with nature); Melissa M. Berry, *Thinking Like a City: Grounding Social-Ecological Resilience in and Urban Land Ethic*, 50 IDAHO L. REV. 117, 119–20 (2014) (discussing E.O. Wilson's biophilia hypothesis).

[2] For more information see http://biophiliccities.org.

[3] *See* U.N. DEP'T OF ECON. & SOC. AFFAIRS, 2014 REVISION OF WORLD URBANIZATION PROSPECTS (HIGHLIGHTS) 1 (2014) (providing global urbanization projections, including estimates that percent of the world considered urban increased from 30% in 1950 to 54% in 2014 and is projected to further increase to 66% by 2050); MARK A. BENEDICT & EDWARD T. MCMAHON, GREEN INFRASTRUCTURE: LINKING LANDSCAPES AND COMMUNITIES 5 (2006) (documenting that urbanized land quadrupled in the U.S. in fifty years prior to publication of book and providing other statistics regarding the conversion of land to urban uses in the U.S.).

[4] The Biophilic Cities Network includes representatives from cities around the world, including all six inhabited continents. A growing number of cities have officially joined as partners in the Biophilic Cities Network with the promise of actively protecting, restoring, and growing nature in their cities. BIOPHILIC CITIES NETWORK, http://www.biophiliccities.org (last visited Oct. 29, 2015).

[5] The term "nature" in this article is intended to be inclusive of native ecosystems as well as human-influenced nature in cities. The intent is to promote daily interaction with plants and animals in both wild and cultivated urban settings.

to limit pollution, require the sustainable harvest and use of resources, and reduce our environmental footprint.

However, an oft-misplaced assumption in our current efforts is that humans are at odds with nature.[6] This line of reasoning asserts that the more we remove ourselves from nature and limit our interference, the better off our natural systems will be.[7] Yet this undercuts a motivation to make our lives compatible with natural systems and also does us a tremendous disservice by failing to deliver what we need most: access to nature in our everyday lives.

Scientific developments confirm what we probably already feel: that humans need a meaningful connection to the larger natural world. Studies continue to verify that access to nature has direct benefits for health and mental well-being.[8] For our younger generations, this is even more pronounced as technology undercuts physical presence in nature.[9] Economic markets also value nature: homes with stunning views and natural amenities, like access to trails, sell for top dollar, and commercial businesses on boulevards lined with trees are more successful than their counterparts in neighborhoods without green infrastructure.[10]

As our understanding continues to grow that we need more direct integration with the natural world, our laws also need to evolve. It is no longer sufficient for laws to "protect" and "guard" our natural resources,

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[6] *See* Berry, *supra* note 1, at 121 (urging abandonment of dualistic thinking creating artificial boundaries between nature and the human built environment); William Cronon, *The Trouble with Wilderness; or, Getting Back to the Wrong Nature*, *in* UNCOMMON GROUND: RETHINKING THE HUMAN PLACE IN NATURE 69, 69–90 (William Cronon ed., 1995) (contesting myth of wilderness and arguing that humans should not be considered to be outside nature and a negative impact on nature as "other").

[7] *See generally* RENEE DUBOS, THE WOOING OF EARTH: NEW PERSPECTIVES ON MAN'S USE OF NATURE (1980) (describing the interconnection of humans and the natural environment and arguing that human developments can be compatible with natural systems).

[8] *See, e.g.*, EVA M. SHELHUB & ALAN C. LOGAN, YOUR BRAIN ON NATURE: THE SCIENCE OF NATURE'S INFLUENCE ON YOUR HEALTH, HAPPINESS, AND VITALITY (2012); *Health Benefits of Nature,* AM. SOC'Y OF LANDSCAPE ARCHITECTS, http://www.asla.org/healthbenefitsofnature.aspx (last visited March 25, 2015) (providing links to variety of studies). Studies also document positive impacts for children, with access to nature, including: decreased obesity, increased cognitive ability and sense of self-worth. *Id.*; *see also Health Benefits,* NAT'L WILDLIFE FED'N, http://www.nwf.org/be-out-there/why-be-out-there/health-benefits.aspx (last visited March 25, 2015) (enumerating benefits for children of access to nature and studies documenting benefits).

[9] *See generally* RICHARD LOUV, LAST CHILD IN THE WOODS: SAVING OUR CHILDREN FROM NATURE DEFICIT DISORDER (2005) (examining the science demonstrating the need for children to have a meaningful connection with natural world).

[10] *See* Andrew Balmford et al., *Economic Reasons for Conserving Wild Nature*, 297 SCIENCE 950 (2002) (estimating that the overall benefit to cost ratio of an effective global program for conservation of remaining wild nature is at least 100:1); BENEDICT & MCMAHON, *supra* note 3, at 70 (discussing economic values and benefits of natural systems).

we must also plan our place in it.[11] This is not only because that will lead to better stewardship of natural resources, but also because it is better for us as humans.

III. OVERVIEW OF LEGAL MECHANISMS

This section provides a general overview of the legal mechanisms that are at play in the various municipal and local codes surveyed in this article. Adopting biophilic laws does not involve re-inventing the wheel.[12] Many of the legal mechanisms discussed herein have been the basis for decades-old land use regulation. The laws reviewed below, for the most part, use these existing legal mechanisms with a new focus, which is increasing the presence of nature in urban spaces and residents' access to that nature.

A. Land Use Controls

Land use controls typically influence the design of new development projects on a site-by-site basis. In most jurisdictions, such controls are implemented through zoning schemes, which are the primary source of land use controls in the U.S.[13] Designating what land uses are permitted in specific locations provides the basic framework for how communities are designed.

Naturally, our understanding of how we should design our communities continues to evolve over time. This creates a challenge for cities because one of the basic values of zoning is that it creates an expectation for how landowners can use their land. When zoning systems are established, land use expectations are set. Changing zoning designations requires consideration of both takings law and how fair it would be to revise the uses permitted on an owner's property.[14]

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[11] CHRISTOPHER DUERKSEN ET AL., AM. PLAN. ASS'N, PLANNING ADVISORY SERVICE REPORT NO. 470/471, HABITAT PROTECTION PLANNING: WHERE THE WILD THINGS ARE 10 (1997) ("The very notion of habitat 'protection' – of locking up nature in order to save it – runs contrary to the idea that human systems can interact with natural ones in a favorable way and plan landscapes that enhance environmental values like wildlife habitat.").

[12] *See* JAMES M. MCELFISH, JR., NATURE-FRIENDLY ORDINANCES 1–2 (2004) (emphasizing that ordinances focused on conservation of biodiversity must be congruent with land management tools); DUERKSEN ET AL., *supra* note 11, at 31 (noting that wildlife habitat protection can be accomplished by incorporating and combining wildlife habitat needs with traditional land-use controls).

[13] The constitutional basis for zoning was established by the Supreme Court in *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365, 397 (1926), where the Court found that zoning was a constitutional exercise of a local government inherent police power authority.

[14] A variety of takings cases have particular relevance in the context of regulations designed to conserve nature. *See, e.g.*, William C. Haas & Co. v. City of San Francisco, 605 F.2d 1117, 1121 (9th Cir. 1979) (holding that the mere fact that habitat protection ordinance will reduce value of

Awareness of the threshold for takings can inform how laws should be designed.[15] This includes avoiding laws that prohibit all development, as well as government programs that create unfunded mandates for private landowners.[16]

1. Overlay Zoning

An overlay zone is intended to supplement the standards set forth in an existing zone.[17] It is an additional layer of regulation for areas that do not necessarily conform to existing lot boundaries but that require a specific regulatory focus. For example, in urban areas that exhibit important characteristics for wildlife corridors, an overlay zone can add requirements related to the future development of those lots that include promoting the free movement of wildlife and connecting to other

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land is not a taking); Norman v. United States, 63 Fed. Cl. 231, 287 (2004) (holding that a Clean Water Act requirement requiring development of wetlands mitigation back to offset wetland losses did not constitute a taking); Glisson v. Alachua Cnty., 558 So. 2d 1030, 1035–36 (Fla. Dist. Ct. App. 1990) (applying *Penn Central Transportation Co. v. City of New York*, 438 U.S. 104 (1978), to uphold environmental regulations); Greater Atlanta Homebuilders Ass'n v. DeKalb Cnty., 588 S.E.2d 694, 696–98 (2003) (finding ordinance requiring tree retention and forest conservation for development approval was not a taking); Cradduck v. Yakima Cnty., 271 P.3d 289, 291 (Wash. 2012) (upholding ordinance preventing development within flood management zone); Hartman v. Twp. of Readington, No. 02-2017(SRC), 2006 WL 2353223, at *3–5 (D.N.J. Aug. 15, 2006) (finding open space ordinance permitting higher density development in exchange for setting aside land as open space is not an unconstitutional taking); Watt v. Planning & Zoning Comm'n of the Town of Kent, No. CV 990080594S, 2000 WL 1342560, at *7–9 (Conn. Super. Ct. Sept. 5, 2000) (applying Dolan v. City of Tigard, 512 U.S. 374 (1994), and finding that the burden imposed upon the developer is "uniquely attributable" to the development of the subdivision because the subdivision would cause a population increase, necessitating more open space); Krahl v. Nine Mile Creek Watershed Dist., 283 N.W.2d 538, 543 (Minn. 1979) (adding that "floodplain and wetlands regulations . . . have generally been held not to constitute takings of private property" and holding that an ordinance prohibiting development of the lower level of a floodplain was justified in light of the public interests it was intended to serve and not a taking).

[15] *See generally* MICHAEL S. GROSSMANN, ALAN D. COPSEY & KATHARINE G. SHIREY, OFFICE OF WASHINGTON STATE ATTN'Y GEN., ADVISORY MEMORANDUM: AVOIDING UNCONSTITUTIONAL TAKINGS OF PRIVATE PROPERTY (2006) (advisory to local governments as to process of evaluation of administration and regulatory actions that to avoid finding of unconstitutional taking).

[16] *See, e.g.*, Corrigan v. City of Scottsdale, 720 P.2d 528, 539 (Ariz. Ct. App. 1986) (invaliding regulation creating no development zone despite adoption of TDRs) (finding local government could not require exaction for storm drainage and pedestrian/bike path in exchange for development approval because exaction bore little or no relation to the benefit conferred), *aff'd in part*, Corrigan v. City of Scottsdale, 720 P.2d 513 (Ariz. 1986) ; Dolan v. City of Tigard, 512 U.S. 374, 391–96 (1994); Allingham v. City of Seattle, 749 P.2d 160, 163 (Wash. 1988) (striking down greenbelt ordinance to allow government to acquire lands that it otherwise had no funding to purchase).

[17] DUERKSEN ET AL., *supra* note 11, at 35 (discussing special overlay districts as a legal mechanism to promote wildlife habitat).

existing similar efforts. Overlay zones are also common in urban riparian areas, such as floodzones and wetlands.[18]

Overlay zoning is a particularly helpful tool for cities because it does not necessitate an overall revision of underlying zoning to address a new focus on biophilic planning. It maintains current land use designations, such as residential and commercial, but adds an additional layer of planning for future development in these areas. Additionally, it is helpful because it targets the boundaries of natural systems instead of artificial designations of property ownership boundaries.

2. Performance Zoning

Many jurisdictions have attempted to think outside the traditional zoning box by approving new developments with flexible mechanisms for achieving the developer's desired outcomes.[19] Examples from existing laws discussed in this article include targeting the volume of stormwater runoff from a new development or maintaining a certain percentage of tree coverage. However, there are endless opportunities for creative targets to promote biophilic design.

The challenge for these mechanisms is to create a sufficiently flexible system that ultimately maximizes the desired result using the limited amount of resources that are expended.[20] Setting targets to promote biophilic design necessarily involves understanding how identifying an end result will involve particular planning to achieve that result. This requires a technical background that city employees might not always possess.

3. Open Space Zoning

A common tool used by many jurisdictions to create more green areas is to require a percentage of new land developments to be dedicated for open space. This is often in the form of an open space overlay zone, but a jurisdiction can also create specific open space zones where the underlying primary use of a property is designated as open space. Even within cities, as areas are redeveloped, jurisdictions

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[18] *Id.*

[19] *Id.* at 37 (discussing performance zoning as a legal mechanism to promote wildlife habitat).

[20] For example, the U.S. Building Council Leadership in Energy and Environmental Design ("LEED") certification program, which uses a point system for rating the quality of new construction, continues to evolve its evaluation protocol in an effort to identify which design characteristics have the most significant impact on energy and environmental conservation. This effort has been subject to challenge and criticism. *See, e.g.*, Anastasia Swearingen, *LEED-Certified Buildings Are Often Less Energy-Efficient Than Uncertified Ones,* FORBES (April 30, 2014, 4:58 PM), http://www.forbes.com/sites/realspin/2014/04/30/leed-certified-buildings-are-often-less-energy-efficient-than-uncertified-ones.

can require that new developments include portions of property set aside for open space or can re-designate portions as a separate zone.

Traditionally, the requirements for open space dedication are aimed at creating parks and common areas to allow for outdoor activities. However, open space zoning can also be an effective tool to encourage more native wildlife habitat in urban areas and greater connectivity of habitat cores to allow wildlife and urban residents to move through cities in a natural setting.

4. Development Impact Fees and Taxes

One additional type of land use control with particular relevance for biophilic planning is using development impact fees. These are fees related to the scope of new development that can be used by jurisdictions to fund biophilic improvements in the city. By assessing development impact fees, cities can better reflect the full cost of development.[21] For example, cities can move beyond current categories of development fees that are currently imposed, such as the cost of extending roads, to directly linking the cost of new development with other community impacts, such as the loss of wildlife habitat or other elements of green infrastructure.

B. Land Use Incentives

In contrast to land use controls, this category of legal mechanisms attempts to promote biophilic planning on a volunteer basis through the use of carrots as opposed to sticks. This is probably a more promising category to encourage biophilic design. While there is generally broad support public and political support for biophilic planning, cities do not often prioritize funding for these efforts.[22] Outlined above are the myriad reasons why biophilic planning will reap benefits that exceed the costs of implementation, but at this point in time, the best approach may be to emphasize legal mechanisms where government and private actors can work together to develop concepts for increasing nature in our cities.[23]

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[21] BENEDICT & MCMAHON, *supra* note 3, at 185 (identifying service fees as a method for financing land conservation and restoration activities).

[22] Lack of prioritization may be the result of a lack of accurate understanding as to the value of increasing access to nature. *See, e.g.*, Jari Lyytimäkia, Petri Tapiob & Timo Assmutha, *Unawareness in Environmental Protection: The Case of Light Pollution From Traffic*, 29 LAND USE POL'Y 598, 598–603 (2012) (describing the public response to evolving science on the impact and need for control of light pollution).

[23] *See infra* Part III.A.

1. Incentive Zoning

Incentive zoning is a tool that grants increased development rights to promote a desired outcome.[24] One example discussed below is the use of a density bonus by various jurisdictions to permit a higher density of development in exchange for including green roofs in new developments.[25] When development space and opportunities are at a premium in cities, there is an opportunity to permit departures from existing zoning restrictions in exchange for targeted biophilic design elements. This can be a win-win for a developer that wants to attract buyers who desire increased presence and accessibility of nature as an amenity.

2. Tax Credits and Breaks

Another incentive is favorable taxes. Local governments can choose to budget the cost for biophilic planning on the income side of the equation by granting tax breaks to private entities and individuals that implement biophilic planning efforts. Tax breaks can serve to share the cost between willing private actors and city governments, depending on how the city chooses to cap proposed tax benefits. In rural jurisdictions, preferential tax treatment is often provided to encourage the continued use of land for agricultural or forest purposes. Conservation easement programs are also used throughout jurisdictions across the county. In more urban settings, preferential tax treatment can be used to encourage maintaining open space, especially land that is open and available for public use.

3. Development Agreements

Similar to incentive zoning but tailored to site-specific development, cities can enter into agreements with developers at the front end of the development process. The basis for such agreements is that developments generate significant public costs in terms of impacts and infrastructure development. In exchange for assurance of project approval, and to offset the external costs of projects, developers may be willing include biophilic elements in their project designs.[26] In crafting such agreements, cities need to give careful consideration to the

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[24] *See* MCELFISH, *supra* note 12, at 55–56 (describing use of incentive zoning as mechanism for conservation of natural areas).

[25] *See infra* Parts IV.E.4, IV.F.

[26] DUERKSEN ET AL., *supra* note 11, at 47 (discussing use of development agreements to incorporate considerations for wildlife).

requirement of takings jurisprudence for a rational nexus between the proposed proffer and the anticipated impact of the development.[27]

4. Recognition

A variety of jurisdictions are celebrating their investment in nature and are recognizing the residents who are contributing to the effort. Recognition can be a creative way to create ownership of biophilic improvements. It can also develop standards that can guide individual planning efforts and target desired outcomes.[28] At the government level, cities also look to receive recognition for creating more abundant and accessible nature in their communities. Recognition programs such as the Arbor Day Foundation's Tree City U.S.A. and Bird City Wisconsin motivate cities to push the envelope in creative ways through friendly competitions.

5. Technical Assistance/BMPs

Often technical assistance and guidance for best management practices ("BMPs") may provide the needed support for stakeholders to take action.[29] If cities can make their expertise readily available, city residents may be willing to do the heavy lifting to create a more interesting and unique natural setting for their community.

C. Information Collecting and Sharing

A critical element for biophilic laws is understanding baseline conditions. Planning for nature in cities requires community buy-in and commitment. Even then, the reality is that resources are always limited, and sound planning requires an understanding of what opportunities exist, how to prioritize funding and forward-thinking strategies to address these opportunities. Information collection and sharing is at the heart of many exemplary codes discussed below.[30] Because of its importance, information collecting and sharing is set out as a distinct legal mechanism, but it is often tied with other legal efforts. For

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[27] *See* Nollan v. Cal. Coastal Comm'n, 483 U.S. 825, 837–42 (1987) (finding a constitutional requirement that exactions advance legitimate government interest and that a proposed exaction bear a rational nexus to the interest).

[28] *See* BENEDICT & MCMAHON, *supra* note 3, at 173 (highlighting value potential of notification of the value of green infrastructure and recognition of green infrastructure projects as motivation).

[29] *See id.* at 174 (noting that simply providing technical assistance to landowners can facilitate the implementation of green infrastructure).

[30] *See generally infra* Part IV.

example, adopting an overlay zone requires investigating and mapping areas that require an additional layer of zoning regulation.

D. Property Purchase and Accessibility

There are a variety of mechanisms for a city to purchase property or obtain access to property for public use. Taxes and fees are discussed above, but are also primary methods for generating dedicated funds to acquire and maintain public amenities. Similarly, development agreements provide a way for developers to agree to dedicate land towards biophilic improvements. To the extent that such taxes and fees can be earmarked for the specific use of developing biophilic elements at the front-end, the more likely these limited financial resources will be available again in the future. Because cities are constantly balancing limited funding and competing obligations, it is unlikely that municipalities will use general funds to develop biophilic elements in the city.[31]

1. Transferrable Development Rights

Cities can create markets for the exchange of development rights in order to concentrate development in specific areas and enhance the biophilic elements of other areas. New York City has used transferrable development rights ("TDRs") to develop several biophilic elements of the city, including the well-publicized High Line.[32] Development rights that owners of the land underlying the High Line did not use were transferred for use in projects elsewhere in the city, which freed up funding to construct the High Line park.[33] TDRs are of particular promise in urban areas where development opportunities may be otherwise limited. TDR programs will only be successful if there is a demand for development right.[34]

2. Purchase of Limited Property Rights

Easements involve acquiring a portion of property rights. Acquisition can occur through tax breaks, or can involve the outright purchase of those rights. This process often involves negotiations between

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[31] Eminent domain is another well-discussed tool for the government acquisition of property, but is not a tool we discuss here because of the understanding that there are limited funds for the outright purchase of property and is often politically infeasible.

[32] Vicki Been & John Infranca, *Transferrable Development Rights Programs: "Post Zoning?"*, 78 BROOK. L. REV. 435 (2013) (discussing NYC TDR program with specific case study of High Line).

[33] *Id.* at 435–36.

[34] *See* MCELFISH, *supra* note 12, at 86 (noting requirements for successful TDR program).

landowners and purchasers over transferring various property rights. To this extent, easements provide significant opportunities for flexibility.

Another way cities can obtain limited property rights is through a purchase of development rights ("PDR") program. PDR programs allow cities to use dedicated funds to purchase limited property rights from qualifying and interested property owners. The city of Virginia Beach funds a PDR program through dedicated property and cell phone taxes.[35] As with TDRs, cities can use PDRs to direct development away from specific prioritized biophilic resources. PDR programs are also not limited by the marketability of development rights because the government is the purchaser. In fact, PDR programs are most effective when cities can "buy low" on development rights.[36]

Of course, a government is not the only potential purchaser of development rights. Non-profit partners or other private purchasers can choose to work in concert with local cities and willing property owners to similarly purchase development rights that can enhance the availability of nature within cities.[37]

Cities can also place a "negative easement" on land it owns, which limit the use of the land. Cities may then sell or lease the land to private owners. This can be a cost-effective method for cities to exercise a certain amount of control over how the land will be used without having to bear the cost of purchasing the land outright.[38]

IV. SURVEY OF BIOPHILIC LAWS

Having provided an overview of the legal mechanisms at play, this article now turns to a survey of specific localities that use these mechanisms. As a framework, the survey identifies broad categories of urban nature and provide examples of laws from a variety of cities within the U.S. and Canada that are being used to promote and preserve natural areas in their urban spaces. There is tremendous overlap for these categories, but nonetheless there is some framework for communicating the large universe of ideas that exist for achieving the goal of increasing urban nature and city residents' access to nature. The focus of this article is urban landscapes, which means that some efforts

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[35] *See id.* at 92–94 (discussing the Virginia Beach PDR program).

[36] *Id.* at 92.

[37] *See, e.g.*, BENEDICT & MCMAHON, *supra* note 3, at 158–59 (discussing purchase of timber rights by conservation organizations and providing table of recent PDR purchases by the Trust for Public Land, the Nature Conservancy and the Conservation Fund).

[38] *See* DUERKSEN ET AL., *supra* note 11, at 44 (discussing option of sellback or leaseback as one method through which land can be conserved for wildlife).

that are of particular relevance to rural landscapes are not discussed.[39] The focus on urban landscapes also necessarily limits the scope of the proposed mechanisms.[40] While seeking to influence the larger urban framework, urban focused mechanisms often look to address land use on an individual home, lot, or building scale.[41]

A. Urban Wildlife

The first section broadly covers protecting of urban wildlife habitats and creating corridors for urban wildlife. In determining what an urban wildlife habitat is, this article starts with the assumption that native vegetation is preferred. Native vegetation begets native wildlife species, and it is often the cornerstone element of the local ecosystem. However, urban landscapes are also influenced by human design. Green roofs are a prime example of new habitats that are crafted by human hands that provide new wildlife habitats. At its most interesting, the urban environment can create opportunities for unique biophilic interactions that cannot be found elsewhere.

1. Highlights

A few highlights stand out from the model code sections discussed below. The first is an emphasis on the protection of scarce, high-value, or unique urban wildlife habitats. This requires an investigation into and an understanding of the best opportunities for preserving urban wildlife. For example, the city of Tampa has focused its conservation efforts on rare xeric and mesic upland habitat, which Tampa recognizes as critical for the survival of wildlife within the city. Other cities, like Fort Collins, cast a wider net in their efforts to define and protect wildlife habitat. Many cities create a sliding scale for identified wildlife habitat. In areas of high-value urban wildlife habitat, the emphasis is on zero disturbance.

One potential area of criticism is how stagnant wildlife habitat mapping efforts have been. Local governments are tasked with developing a map of existing wildlife resources and lands targeted for

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[39] For example, rural conservation easement programs, preservation of farm land and the right to farm laws are relevant to the protection of wildlife habitat and agriculture, but are not discussed in this article.

[40] *See* DUERKSEN ET AL., *supra* note 11, at ch. 3 (differentiating two scales for human impact on the environment - landscape and site scales – and describing mechanisms that are most appropriate depending on the scale of the impact); *see also* SHEILA PECK, PLANNING FOR BIODIVERSITY: ISSUES AND EXAMPLES chs. 1–2 (1998) (discussing different scales to consider in planning for biodiversity both biological and landscape).

[41] DUERKSEN ET AL., *supra* note 11, at ch. 3.

protection. The nature of legislative adoptions often means that mapping efforts are codified and, to a degree, written in stone until these legislative adoptions are formally updated. This can create a scenario where maps of wildlife habitat do not evolve on pace with new information. Cities like Fort Collins have recognized that mapping needs to be more adaptive and have put some of the burden of identifying significant wildlife resources on land owners at the time that they seek to develop and alter the landscapes.

A second common aspect is connectivity. The urban landscape provides limited opportunities for the large-scale preservation of wildlife habitat. With this reality in mind, cities are focusing on connectivity as a prime element of habitat protection. This often requires both an understanding of how species move through urban landscapes and an understanding of how species might adapt and embrace creative solutions to the challenge of limited resources.

A last commonality is flexibility for private land owners. As presented below, most efforts to protect wildlife habitat come in the form of some type of land use control, usually an overlay zone. Recognizing that this imposes a burden on landowners, cities have developed a number of alternative land use incentives, such as transferring development rights and density bonuses, to lighten the burden.

2. Portland, Oregon: Metro Habitat Protection Model Ordinance

Metro, the regional governing body for Portland, Oregon, has adopted a model urban wildlife habitat ordinance as part of its Nature in Neighborhoods program.[42] The model ordinance incorporates a range of legal tools to conserve urban wildlife habitat while at the same time providing flexibility to landowners and to jurisdictions within Metro to accomplish this.

Metro adopted the Nature in Neighborhoods program to comply with a statewide planning goal ("Goal 5"), which requires that Oregon cities and counties protect the state's natural resources and conserve scenic and historic areas and open spaces.[43] Goal 5 requires cities to inventory wildlife habitat and potential conflicts with the habitat. The Nature in Neighborhoods program places an urban emphasis on Goal 5 with a stated intent to "conserve, protect and restore a continuous ecologically

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[42] OR. METRO, METRO CODE tit. 3, ch. 3.07, § 3.07.1340 (2014).

[43] Adopted by Oregon in 1974, Goal 5 is one of 19 statewide land use goals. Goal 5 covers more than a dozen different resources, including wildlife habitat. *See* OR. ADMIN. R 660-015-0000(5) (2015) (text of Goal 5); s*ee also* OR. ADMIN. R. ch. 660, div. 23 (2015) (revision to state administrative rules implementing Goal 5).

viable streamside corridor system . . . integrated with upland wildlife habitat and the surrounding urban landscape".[44] The model ordinance was crafted by Metro to resolve these conflicts and protect the wildlife habitat resources within Metro cities and counties.

As the name suggests, the ordinance is a model. Local governments, including the city of Portland, that are within Metro can follow various courses to address the requirements of the Nature in Neighborhoods program. Localities can implement the model ordinance, or can implement another if they can demonstrate that their own programs meet a complex set of performance standards or other identified standards for wildlife habitat protection.[45]

The Metro model ordinance includes protection for the following habitat types: fish and wildlife habitat in urban streamside areas; larger intact upland habitat and wildlife corridors in the periphery of urban areas where expansion is occurring; and other identified habitat conservation areas ("HCAs") throughout the urban landscape.[46] A critical prerequisite for the model ordinance is identifying and mapping HCAs, since much of the regulatory structure of the model ordinance depends on an understanding of the proximity of new development to HCAs and the potential impacts on HCAs. Metro has already begun the process for inventorying and mapping HCAs.[47] The model ordinance provides a procedure through which landowners can then verify the existence of and extent of HCAs on their property.[48]

The model ordinance prescribes standards for new developments that occur wholly or partially within HCAs.[49] The stated preference is to be cognizant of HCAs, and the model ordinance provides several mechanisms for avoiding development within HCAs, which are all designed to grant flexibility from the requirements of other land use

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[44] OR. METRO, METRO CODE § 3.07.1310 (Intent).

[45] *Id.* § 3.07.1330(B) (setting out implementation alternatives for local governments); *id.* § 3.07.1340 (performance standards). In 2012, the City of Portland followed the latter course and provided a comprehensive report to Metro seeking certification that its variety of existing programs met the requirements of the Nature in Neighborhood program. Metro certified that Portland was in compliance with the Nature in Neighborhoods program in 2013. *See* PORTLAND PLAN. & SUSTAINABILITY DEP'T, METRO TITLE 13 COMPLIANCE EFFORTS, https://www.portlandoregon.gov/bps/50503 (last visited May 4, 2015). All cities and counties (except Damascus) within Metro were identified as in compliance in 2013. *See* OR. METRO, 2013 COMPLIANCE REPORT, APP. A, http://www.oregonmetro.gov/sites/default/files/2013%20Compliance%20Report.pdf (visited May 4, 2015). We are uncertain whether any jurisdiction has adopted the model ordinance without modification.

[46] OR. METRO, METRO CODE § 3.07.1320.

[47] *Id.* § 3.07.1320.

[48] Or. Metro, Ordinance 05-1077C § 9 (Sept. 29, 2005) (Map Administration and HCA Verification).

[49] *Id.* § 6 (Development Standards).

controls in favor of habitat protection. These mechanisms include: (a) building setback flexibility; (b) flexible landscaping requirements and (c) flexible site design. To achieve flexible site design, the model ordinance permits on-site density transfers that include dimensional and lot size modifications of up to 30 percent. The model ordinance also provides for a 25 percent density bonus if proposed development of four or more units will protect up to 75 percent of designated on-site HCAs. Finally, the model ordinance provides the additional option of adopting a TDR program to transfer developer rights off-site. An eligible off-site recipient must not itself include HCAs, be in designated flood plains or exceed 200 percent of the allowable development for the site.

If the preferred solution of avoiding development in HCAs cannot be achieved through the variety of flexible mechanism included in the model ordinance, the model ordinance limits the level of development that can occur within HCAs. The maximum disturbance area ("MDA") varies depending on if the HCA is high quality or low-to-moderate quality, and based on the size of the HCA relative to the overall size of the property. A greater degree of disturbance of HCAs is permitted on sites zoned for single-family residential units than on sites zoned for other uses.[50]

Regardless of the level of disturbance, mitigation is required for any development that occurs within HCAs.[51] Tree and vegetation replacement is limited to species included on a list of native plant species.[52] The Metro ordinance stands out because, in lieu of the development standards discussed above, landowners can comply with alternative discretionary development standards that the developer designs and that meet stated requirements for alternative standards that the model ordinance prescribes.[53] The alternative standards can provide for minor variation from the default development standards by allowing for off-site mitigation or some other departure from the required on-site mitigation. They can also create wholly different standards, provided that the landowner meets the model ordinance's detailed process for analyzing and evaluating impacts and alternatives, similar to an

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[50] Note that agriculture and forestry practices are entirely exempt from the development standards set out in the model ordinance. *Id.* § 3 (Exempt Uses and Conditioned Activities).

[51] *Id.* § 6(E).

[52] Metro has developed a variety of visuals to aid application of the requirements of the model ordinance. *See* OR. METRO, *Fish and Wildlife Habitat Protection Plan*, http://www.oregonmetro.gov/fish-and-wildlife-habitat-protection-plan (last visited May 4, 2015) (providing links to visuals at bottom of page).

[53] Or. Metro, Ordinance 05-1077C §7 (Alternative Discretionary Development Standards).

environmental impact statement ("EIS") type analysis required under the National Environmental Policy Act ("NEPA").[54]

Evaluating the alternative standards can be a burdensome process, but allows for tremendous flexibility for a landowner who can invest time and resources in developing the supporting documentation. The alternative standards review process boils down the model ordinance to its basic purposes and permits alternative methods for achieving those purposes. The model ordinance assists in the process by providing a wide array of ideas in the form of alternative habitat-friendly development practices designed to minimize hydrologic impacts, minimize impacts to wildlife corridors and fish passages, encourage use of native plant species and limit other impacts like light pollution.[55] Pre-existing development is exempted from the development standards or the need to craft alternative discretionary development standards.[56] This exemption is common to nearly all of the code provisions that are examined in this article.

3. Fort Collins, Colorado: Protection Standards for Natural Habitats and Features

The city of Fort Collins has adopted a comparatively simpler approach to the preservation of urban wildlife habitat, but still one that, in several respects, is more comprehensive than other ordinances examined.[57] Most notably, the Fort Collins protection standards apply to a wide range of wildlife habitats and share the burden of identifying wildlife habitats between the City and landowners looking to develop their land.[58] Moreover, the protection standards establish and limit development within a significant buffer zone of valuable wildlife habitat instead of seeking to limit only direct disturbances purely within the habitat itself. In these respects, the more simply drafted Fort Collins protection standards fill in some of the gaps seen in other code provisions.

Protection standards apply to any development site within 500 feet of a natural habitat or feature that is either identified on the City's Natural Habitats and Features Inventory Map, or if any portion of the development site possesses characteristics which would have supported

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[54] *Id.*

[55] *Id.* §7, Table 5 (Habitat-Friendly Development Practices).

[56] *Id.* § 3 (Exempt Uses and Conditioned Activities).

[57] FORT COLLINS, COLO., LAND USE CODE art. 3, div. 3.4, § 3.4.1 (2015) (Natural Habitat and Features Protection Standards).

[58] *Id.*

its inclusion in the map.[59] The latter determination is made by the landowner in consultation with the City as part of the site evaluation during the development review process.

The code defines "natural habitats and features" broadly to include a wide range of naturally occurring habitats within Fort Collins, as well as some specific features for these habitats.[60] Thus, unlike other model codes examined in this article, Fort Collins is not targeting a specific habitat type for protection, but it is attempting to preserve a diversity of wildlife habitats and features found within the boundaries of the city.

The first step for any development review in Fort Collins is an Ecological Characterization Study ("ECS") to determine the precise boundaries and presence of natural habitats and like features in the city.[61] It is understood that the City's map is only an estimate of existing natural habitat and that the precise boundaries of habitat will be determined with the aid of a qualified professional during the ECS, which is then submitted by the landowner as part of its project development application.[62]

The Fort Collins Code provides a table for general buffer zone distances according to natural habitats and features.[63] However, the Code requires an adjustment to these general buffer zones in order to comply with various identified performance standards. These performance standards require developers to preserve and/or enhance: (a) identified wildlife habitat; (b) wildlife corridors; (c) significant on-

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[59] *Id.* § 3.4.1(A) (Applicability).

[60] *Id.* § 3.4.1(A)(1)–(2). The Code lists the following natural habitats and features:

> (1) Natural Communities or Habitats: (a) Aquatic (e.g., rivers, streams, lakes, ponds); (b) Wetland and wet meadow; (c) Native grassland; (d) Riparian forest; (e) Urban plains forest; (f) Riparian shrubland; and (g) Foothills forest.
>
> (2) Special Features: (a) Significant remnants of native plant communities; (b) Potential habitats and known locations of rare, threatened or endangered plants; (c) Potential habitats and known locations of rare, threatened or endangered animals; (d) Raptor habitat features, including nest sites, communal roost sites and key concentration areas; (e) Concentration areas for nesting and migratory shorebirds and waterfowl; (f) Migratory songbird concentration areas; (g) Key nesting areas for grassland birds; (h) Fox and coyote dens; (i) Mule deer winter concentration areas; (j) Prairie dog colonies over fifty (50) acres in size; (k) Concentration areas for rare, migrant or resident butterflies; (l) Areas of high terrestrial or aquatic insect diversity; (m) Areas of significant geological or paleontological interest; and (n) Irrigation ditches that serve as wildlife corridors.

Id.

[61] *Id.* § 3.4.1(D) (Ecological Characterization and Natural Habitat or Feature Boundary Definition).

[62] *Id.* § 3.4.1(D)(1) (setting out detailed requirements for Ecological Characterization Study).

[63] *Id.* § 3.4.1(E).

site trees or vegetation; (d) a variety of key species-specific habitat; (e) site topography and (f) public access for recreational purposes.[64]

Within the boundaries of the buffer zones, development is severely limited.[65] New developments are not permitted to disturb these buffer zones, with few exceptions.[66] Any disturbances that do exist must be mitigated either on-site or off-site, at the discretion of the City.

4. Tampa, Florida: Upland Habitat Protection Ordinance

In contrast to Fort Collins, the City of Tampa has focused on protecting a specific habitat type to preserve urban wildlife: scarce, upland xeric, and mesic plant species.[67] Tampa prioritizes this as a means of retaining habitat diversity, wildlife corridors, and healthy and diverse populations of wildlife within the City.[68] Tampa has adopted a map of targeted existing plant communities and requires that developers submit an upland habitat plan that is reviewed by the City, which ensures development activity does not harm any significant or essential wildlife habitat.[69] Landowners are not bound by these ordinance obligations if they can document that no protected plant communities are present on the property.[70]

In protected areas, development is required to protect 50 percent of identified xeric plant communities and 25 percent of mesic communities, but collectively *no more than* 50 percent of the total property.[71] As a result, the ordinance caps the amount of land for which protection is required. Any failure to protect these species that falls below statutory minimums requires developers to mitigate those disturbances.[72] While the ordinance states a preference for on-site mitigation,[73] in practice the ordinance also permits off-site mitigation to offset species disruption. In fact, on-site mitigation is even discouraged if City staff determines that the owner lacks resources to properly maintain the protected wildlife habitat.[74] The owner is also permitted to

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[64] *Id.* § 3.4.1(E)(1) (Buffer Zone Performance Standards).
[65] *Id.* § 3.4.1(E)(2) (Development Activities within Buffer Zones).
[66] *Id.*
[67] TAMPA, FL., CODE OF ORDINANCES ch. 27, art. VI, div. 4, § 27-287 (2015).
[68] *Id.* § 27-287 (Habitat Protection Ordinance Purpose and Intent).
[69] *Id.* § 27-287.5 (setting out plan approval procedures).
[70] *Id.* § 27-287.5 (exempting certain properties from plan approval procedures).
[71] *Id.* § 27-287.11(c).
[72] *Id.*
[73] *Id.* § 27-287.10 (stating that on-site preservation is considered the most desirable alternative to protect upland habitat and plant and wildlife species).
[74] *Id.* § 27-287.11(c)(7) ("On-site preservation shall be recommended only when sufficient management capabilities exist to maintain or restore the habitat to a high quality natural plant community or communities . . . .").

disregard the recommendation of City staff for on-site mitigation.[75] The ordinance does provide for a number of mechanisms to mitigate habitat losses off-site, either directly by preserving land or indirectly by contributing to an off-site conservation fund.[76]

B. Humane Co-Existence with Urban Wildlife

More interaction between city-dwellers and wildlife is inevitable as urban landscapes expand over larger areas and urban planners continue to create hospitable landscapes for wildlife in their borders. While the presence of wildlife in urban areas is often welcome, there are also conflicts, especially for species whose survival depends on a wild, non-urban setting. The provisions from the two cities reviewed below highlight both the need to anticipate and plan for potential conflicts and to specify how animals should be treated when conflicts result.

1. Boulder, Colorado: Wildlife Protection Ordinances

While the City and County of Boulder have adopted a variety of laws that are designed to protect wildlife and wildlife habitat, this subsection focuses on specific protections to minimize conflicts between Boulder's human residents and its wildlife.[77] The County of Boulder first requires that proposals for new development in designated wildlife areas include a wildlife impact report.[78] The report must be prepared by a wildlife expert approved by the County, but retained by the applicant.[79] Wildlife areas that require a report include a variety of significant and critical habitats that have been identified and designated by the County through various mapping efforts.[80] These reports require: inventory; assessment of impact; potential for mitigation and recommendation as to whether the development can proceed as proposed without causing a materially adverse impact on significant habitat for species of special concern.[81]

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[75] *Id.* § 27-287.11(c)(9) ("Notwithstanding a recommendation by the coordinator for on-site preservation, the developer may elect to mitigate for the development's impact to significant wildlife habitat through off-site preservation.").

[76] *Id.* § 27-287.15.

[77] Fort Collins, Colorado has also adopted specific protection standards to minimize potential wildlife conflicts with species such as prairie dogs, beaver, deer and rattle snakes through the design of barriers and other site features. FORT COLLINS, COLO., LAND USE CODE art. 3, div. 3.4, § 3.4.1(F)(3) (2015); *see also id.* § 3.4.1(N) (standards for protection during construction activities).

[78] BOULDER COUNTY, COLO., LAND USE CODE art. 7, § 7-1700 (2015).

[79] *Id.*

[80] *Id.* § 7-1700(a).

[81] *Id.* § 7-1700(b).

Identifying potential materially adverse impacts is grounds for the County to deny a development application.[82]

In 2005, the City of Boulder adopted a wildlife protection ordinance that revised its existing code in several ways related to managing wildlife conflicts.[83] The City put particular emphasis on humane protections for prairie dogs and bird species.[84] The ordinance outlaws lethal means of controlling these populations, except in limited circumstances that include verified health and safety hazards. Any ongoing plan by the City to prevent recolonization of land on which prairie dogs had previously been legally removed. Lethal control also requires a demonstration that it is necessary and that other population control methods were considered but were inadequate.[85]

In 2014, City of Boulder also adopted a specific ordinance to address conflicts with bears.[86] In the year prior to adopting this ordinance, five bears were killed by humans or died accidentally while they were present in the City.[87] To address these conflicts, Boulder now requires all residents in the western portion of the City to use bear resistant trash containers.[88] Any containers damaged by wildlife need to be repaired by the residents.[89] Progressive fines that increase up to $1,000 are imposed for violations.[90]

2. Washington, D.C.: Wildlife Protection Act

The District of Columbia adopted comprehensive legislation in 2010 aimed at the humane treatment of wildlife within the District, in the form of its Wildlife Protection Act.[91] The Wildlife Protection Act establishes a licensing and regulatory system for wildlife control operators.[92]

Under the Act, "wildlife" includes all free-roaming animals, but does not include domestic animals, invertebrates, fish, or "commensal

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[82] *Id.* § 7-1700(c).

[83] Boulder, Colo., Ordinance 7321 (Jan. 18, 2005) (codified in BOULDER, COLO., MUN. CODE tit. 6, ch. 1 (2015)).

[84] BOULDER, COLO., MUN. CODE § 6-1-11 (2015) (Limitation on Lethal Means of Control for Prairie Dogs and Birds).

[85] *Id.* § 6-1-36 (Procedures for Obtaining Prairie Dog Lethal Control Permits).

[86] Boulder, Colo., Ordinance 7962 (Mar. 18, 2014) (codified in BOULDER, COLO., MUN. CODE tit. 6, ch. 3).

[87] *Bear Protection Oridnance,* CITY OF BOULDER, https://bouldercolorado.gov/wildlife (last visited Dec. 10, 2015).

[88] BOULDER, COLO., MUN. CODE § 6-3-12 (Bear Resistant Containers Required).

[89] *Id.* § 6-3-12(c).

[90] *Id.* § 6-3-12(d).

[91] WASH., D.C., CODE tit. 8, ch. 22, §§ 8-2201 to 8-2212 (2014).

[92] *Id.*

rodents."[93] This latter category includes rats and house mice, the control of which is not governed by Act.[94] The Act establishes a preference for non-lethal methods for handling wildlife "problems."[95] The Act stresses the general humane treatment of wildlife, requires that reasonable efforts be undertaken to preserve family units, and limits captivity to no more than 36 hours.[96] The Act also includes detailed requirements for permissible traps.[97]

Targeted wildlife that is captured can be released on-site or transported off-site to a location where it is unlikely to be a "nuisance."[98] Non-targeted wildlife is always to be released on-site unless it poses an "unreasonable risk" to the health and safety of people or domestic animals and, in that case, it is treated the same as targeted wildlife.[99] If any captured wildlife is injured, it can be transferred for medical attention.[100]

The Act does permit operators to euthanize wildlife if relocation or rehabilitation is not possible. Euthanasia methods approved by the Act are those most recently approved by the American Veterinary Medical Association Panel on Euthanasia or by regulations of the District Department of the Environment ("DDE"), the municipal agency tasked with implementing the Act.[101] There are also some species-specific limitations: toxicants cannot be used to control common urban bird species like pigeons, European starlings, or house sparrows.[102] The DDE is also required to adopt specific rules regarding the control of feral cats and dogs.[103]

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[93] *Id.* § 8-2201(5) .

[94] For more information on these species see: http://ipm.ncsu.edu/AG369/notes/commensal_rodents.html (last visited Sept. 29, 2015).

[95] WASH., D.C., CODE §8-2202.

[96] *See, e.g., id.* § 8-2202(d) ("Wildlife shall be captured, handled, and, when permissible, transported, in a manner to ensure against causing unnecessary discomfort, behavioral stress, or physical harm to the animal, including providing protections against weather extremes.").

[97] *Id.* § 8-2202. Traps used by a wildlife control service provider must be:

(1) labeled with contact information for the provider;

(2) set in a manner designed to catch the intended animal and not a "non-target" animal;

(3) checked every 24 hours;

(4) cannot be "sticky or glue traps";

(5) cannot be "leghold and other body-gripping traps, body-crushing traps, snares, or harpoon-type traps."

Id.

[98] *Id.* §8-2202(f).

[99] *Id.* §8-2202(f)–(g).

[100] *Id.* §8-2202(g).

[101] *Id.* §8-2202(n).

[102] *Id.* §8-2206(a).

[103] *Id.* §8-2202(b)(1).

C. Bird-Friendly Building Design

High-rise buildings are a significant cause of bird mortality in North America. Recognizing the natural vibrancy that comes with the presence of birds in urban areas, and the harmful impact that man-made structures can have on the survival of birds, several legislative bodies have adopted building design requirements and guidelines to reduce bird mortality from collisions with high-rise buildings.[104]

1. Highlights

The legislative effort to address bird-friendly building design generally works on two levels. First, there is a focus on buildings in specific locations that are heavily used and of particular importance to bird populations. Second, there is an effort to address specific building features that have a particular impact on birds. Legislative efforts by the cities of San Francisco, Oakland, and Toronto regulate new construction projects and buildings undergoing significant renovations by requiring that they include materials and design elements to decrease the potential for bird collisions.[105] Other cities like New York City and Chicago have adopted similar voluntary guidelines.[106] In the State of Wisconsin, a coalition of non-profits has implemented a program entitled "Bird City Wisconsin" that officially recognizes jurisdictions that adopt bird-friendly measures.[107] Proposed federal legislation sets forth requirements specifically for government buildings.[108] The State of Minnesota, among others, has legislated a "lights-out" program for government-owned and leased buildings to address the demonstrated impact of nighttime building lights on migrating bird populations.[109]

2. San Francisco, California: Standards for Bird-Safe Buildings

In 2011, San Francisco adopted comprehensive legislation requiring that new construction and buildings undergoing significant renovations incorporate a variety of bird-friendly design elements.[110] The 2011 ordinance includes findings that every year upwards of one billion bird

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[104] *See infra* Part IV.C.1.

[105] *See infra* Parts IV.C.2–4.

[106] *See infra* Part IV.C.5.

[107] Index to Bird Cities, BIRD CITY WISCONSIN, http://www.birdcitywisconsin.org/Applications/Index.htm (last visited Jan. 5, 2016).

[108] Federal Bird-Safe Buildings Act of 2015, H.R. 2280, 114th Cong. (as introduced by House, May 12, 2015).

[109] MINN. STAT § 16B.2421 (2015).

[110] S.F, Cal., Ordinance 199-11 (Sept. 12, 2011) *available at* http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ ordinances11/o0199-11.pdf), codified as S.F., CAL., PLANNING CODE art. 1.2, § 139 (2015).

deaths in North America may be caused by window collisions, and that these numbers could significantly be reduced by changes in building design.[111] The adopted standards for bird-safe buildings apply in two categorical circumstances known to cause bird mortality: "location-related hazards" and "feature-related hazards."[112]

The ordinance regulates buildings near specific locations, including those in open spaces, two acres and larger, dominated by vegetation like landscaping, forest meadows, grasslands, wetlands, or open water.[113] San Francisco has also adopted location-related standards for all buildings within 300 feet of an Urban Bird Refuge, if there is an unobstructed line to the building from the refuge.[114]

The location-related standards require the following: (1) no more than 10 percent glazing on building facades that face Urban Bird Refuges; (2) minimization of and shielding the building's lighting, along with directing building lights downward and (3) limiting the use of wind generation.[115]

The second category of building standards regulations in the Ordinance is feature-related. Building features that are identified as having a particular impact on bird species are: free standing glass walls; wind barriers; skywalks and rooftop greenhouses.[116] For these building features, the city requires 100 percent treatment of any glazing. Permissible "Bird-Safe Glazing Treatments," as defined by the regulations, include: fritting; netting; permanent stencils; frosted glass; exterior screens; physical grids placed on the exterior of glazing and UV patterns visible to birds.[117] The standards do not apply to some types of buildings, such as historic buildings or residential homes under 45 feet tall that have glazing on less than 50 percent of the home.[118]

3. Oakland, California: Bird Safety Measures

Following in the footsteps of its neighbor, Oakland has adopted bird safety measures as an element of its permitting review for new construction.[119] The measures apply to all new construction that falls in

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[111] S.F., CAL., PLANNING CODE § 139.
[112] *Id.* § 139(a).
[113] *Id.* § 139(c)(1).
[114] *Id.*
[115] *Id.* § 139(c)(1)(A)–(B).
[116] *Id.* § 139(c)(2).
[117] *Id.*
[118] *Id.* § 139(c)(3).
[119] *City of Oakland Bird Safety Measures*, GOLDEN GATE AUDUBON SOC'Y, http://goldengateaudubon.org/wp-content/uploads/Oakland-Bird-Safety-Measures.pdf (last visited July 9, 2015).

one of the following categories: projects located immediately adjacent to substantial bodies of water, vegetated recreation areas or parks or projects that include atriums, substantially vegetated areas, green roofs or green walls on or adjacent to project buildings.[120]

For qualifying new construction, Oakland requires that project stakeholders submit a plan to reduce the potential for bird collisions down to the maximum feasible extent.[121] Mandatory measures include limitations on rooftop antennae and mirrors in landscaping.[122] Bird-friendly attractants (such as bird baths, landscaped areas and green roofs) should be placed away from glass unless there is some shielding between the glass and the attractant.[123]

The measures also require the application of bird-friendly glazing treatments to no less than 90 percent of all windows and glass between the ground and 60 feet above ground, or to the height of existing adjacent landscaping.[124] The measures provide several options, similar to the San Francisco standards, for treating glazing. There is also the requirement that a variety of best management practices ("BMPs") be considered for bird-friendly design, including light pollution reduction and creating a building-user manual with instructions for reducing impacts to birds through the use of shades and turning off lights.[125]

4. Toronto, Ontario: Green Standards

The city of Toronto has adopted mandatory Green Standards that govern many biophilic elements of new construction.[126] They include specific bird-friendly development standards that address window glazing techniques that are designed to limit bird collisions.[127] The Green Standards require glazing on 85 percent of building windows to either the first 12 meters (39 feet) of a building's height or to the top of adjacent tree canopies, whichever is greater (first 16 meters (52 feet) for buildings owned by the city).[128] Particular emphasis is also given to glazing treatments at apparent fly-through conditions, like glazing at

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120 *Id.*
121 *Id.*
122 *Id.*
123 *Id.*
124 *Id.*
125 *Id.*
126 *Tier 1 Checklist & Standards: Planning Application Requirements Green Standards*, CITY OF TORONTO, http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=42350621f3161410VgnVCM10000071d60f89RCRD&vgnextchannel=f85552cc66061410VgnVCM10000071d60f89RCRD.
127 *Id.*
128 *Id.*

building corners where bird collisions occur with high frequency because birds mistakenly believe that no obstruction exists.[129]

5. Other Legislation and Voluntary Programs

Proposed federal legislation, known as the Federal Bird-Safe Buildings Act, is specifically aimed at including bird-friendly design elements in the new construction of buildings owned by the federal government.[130] The Act, which has been determined to be cost neutral, would require the General Services Administration ("GSA") to incorporate, to the maximum extent possible, bird-safe building materials and design features into existing federal buildings.[131]

Comprehensive, voluntary guidelines for bird-friendly construction have also been developed in other cities, including New York City and Chicago.[132] The State of Minnesota has also enacted legislation that requires state-owned or leased buildings to turn off building lights between midnight and dawn, provided this is compatible with the normal use of the building, during peak migration seasons (March 15 to May 31, and August 15 to October 31).[133] Similarly, a variety of cities in North America have adopted "lights-out" programs that aim to reduce nighttime lighting during peak migration periods.[134]

The State of Wisconsin's "Bird City Wisconsin" program is also noteworthy, because it is a collaboration between some of the larger national non-profit bird conservation organizations.[135] The program provides recognition for jurisdictions across Wisconsin that adopt bird conservation practices.[136] Criteria for being involved in the program and being recognized include: creating and maintaining a habitat; removing hazards to birds, such as window strikes and restricting outdoor cats; and public education regarding the value of these measures.[137]

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[129] *Id.*

[130] Federal Bird-Safe Buildings Act of 2015, H.R. 2280, 114th Cong. (as introduced by House, May 12, 2015).

[131] *Id.* at § 3(a).

[132] *See Bird Friendly Building Design*, N.Y.C. AUDUBON, http://www.nycaudubon.org/our-publications/bird-friendly-building-design; *Bird-Safe Building: Design Guide for New Construction and Renovation*, CHICAGO ORNITHOLOGICAL SOCIETY, http://chicagobirder.org/conservation/birds-building-collisions/.

[133] MINN. STAT. § 16B.2421 (2015).

[134] *See Lights Out for Birds: Programs in North America*, AM. BIRD CONSERVANCY, http://collisions.abcbirds.org/pdf/LightsOutProgramsJuly2012.pdf (visited June 9, 2015).

[135] *Short History of Bird City Wisconsin*, BIRD CITY WIS., http://www.birdcitywisconsin.org/History.htm.

[136] *Id.*

[137] *Criteria for Local Governments to be Recognized as a "Bird City"*, BIRD CITY WIS., http://www.birdcitywisconsin.org/PDF/CriteriaBecomingABirdCity.pdf.

D. Green Landscaping

Green landscaping has significant potential to both transform urban landscapes and serve critical functions for bioretention and stormwater reduction, in addition to the value of these landscapes as habitat for wildlife. The early focus on increasing the presence of green infrastructure in cities was often related to aesthetic qualities and its value for the livability and economic vitality of communities. In more recent years, there is growing understanding that green infrastructure provides a cost-efficient alternative to large-scale stormwater control projects, along with other environmental benefits such as controlling greenhouse gases and urban air pollutants.

1. Highlights

Several cities have adopted requirements that a percentage of newly developed land include green landscaping. The primary rationale for these requirements is that when new developments have negative environmental impacts on urban landscapes—by using impermeable surfaces, for example—that some of these external costs can be included at the front end of the project by factoring in required green infrastructure. The two primary examples that are included here are Seattle's Green Factor and the District of Columbia's Green Area Ratio requirement. There is also a focus on increasing green infrastructure in public rights of way. New York City has sought to update its land use code to include measures for the inclusion of native vegetation and biodiversity,[138] while San Francisco has permitted the transformation of its public sidewalks through private green landscaping endeavors.[139]

2. Seattle, Washington: Green Factor

First adopted in 2006,[140] the Seattle Green Factor is a landscape requirement for new development that aims to increase the amount and quality of green landscaping in those projects. It is modeled after similar laws in the European cities of Berlin, Germany, and Malmo, Sweden.[141] Seattle identifies the primary environmental purposes for the Green Factor requirement as: stormwater control; reduction in the urban heat

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[138] N.Y.C., N.Y., Council Int. No. 399-A (Feb. 25, 2013).

[139] S.F., CAL., PUBLIC WORKS CODE art. 16, § 810B (2015).

[140] The Green Factor requirement was adopted for commercial and neighborhood commercial districts in 2006 and was expanded to mid- and high-rise residential development in 2009. In 2011, it was further expanded to include low-rise multi-residential, the south downtown and industrial districts.

[141] The Berlin Biotope Area Factor was first implemented in 1997, while the Malmo Green Space Factor was implemented in 2001.

island effect; and increased wildlife habitat.[142] Non-environmental values include: increased aesthetics; support for adjacent businesses; and reduced crime.[143]

The Green Factor requirement varies by zone. The basic requirement for each zone is defined as a minimum required Green Factor "score."[144] For example in commercial, industrial and south downtown districts, the minimum Green Factor score required is 0.30.[145] The minimum Green Factor score for low-rise multi-residential family is 0.60.[146]

The "score" calculation is codified.[147] Certain features, such as bioretention areas, green roofs and walls and larger diameter trees, get a greater multiplier because they are higher quality and more desirable green landscape features.[148] Additional bonuses are provided if the landscaping has the following features: (1) it includes drought resistant or native plant species; (2) 50 percent of the annual irrigation needs for the landscaping are met by harvested rainwater; (3) the landscaping is visible from an adjacent public right of way or public space or (4) the landscaping provides food cultivation.[149] Other non-vegetative features like permeable pavement and structural soil[150] can satisfy up to one-third of the requirement.[151]

3. Washington, D.C.: Green Area Ratio

Building upon the Seattle Green Factor, in 2013, the District of Columbia adopted a Green Area Ratio ("GAR") requirement for several areas of the District.[152] The District identifies the Green Area Ratio as an "environmental sustainability zoning regulation that sets standards for

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[142] *What Is the Seattle Green Factor?*, SEATTLE DEPT. OF PLAN. & DEV., http://www.seattle.gov/dpd/cityplanning/completeprojectslist/greenfactor/whatwhy/default.htm (last visited July 2, 2015).

[143] *Id.*

[144] SEATTLE, WASH., MUN. CODE tit. 23, § 23.86.019 (2015).

[145] *See, respectively, id.* § 23.47A.016 (commercial and neighborhood commercial); *id.* § 23.50.038 (industrial); *id.* § 23.49.031 (south downtown).

[146] *Id.* § 23.45.524.

[147] *Id.* § 23.86.019.

[148] *Id.* at Table A (summarizing Green Factor landscape elements and multipliers).

[149] *Id.*

[150] Structural soil allows sufficient support for above ground structures like pavement, while still permitting sufficient movement within the soil for tree root growth. *See* Nina Bassuk et al., *Structural Soil: An Innovative Medium Under pavement that Improves Street Tree Vigor*, CORNELL UNIV. URBAN HORTICULTURE INST., http://www.hort.cornell.edu/uhi/outreach/csc/article.html (visited July 3, 2015).

[151] SEATTLE, WASH., MUN. CODE § 23.86.019(A)(2)(g).

[152] *See* Notice of Final Rulemaking and Zoning Commission Order No. 12-10, (June 24, 2013) (adopting Green Area Ratio); WASH., D.C., MUN. REGS. tit. 11, ch. 34 (2014).

landscape and site design to help reduce stormwater runoff, improve air quality, and keep the city cooler."[153]

As with the Seattle Green Factor, the GAR is a comparative weighing of landscape features with the aim of increasing the quantity and quality of the urban landscape's environmental performance.[154] The GAR requirement varies by district, with the highest ratio (0.4) required for higher density residential areas, although single-family residences are exempted from the GAR requirement.[155]

The basic formula for calculating the GAR is the various landscape elements, times their multiplier, divided by the total lot area.[156] Landscape elements can be "stacked" (cover the same area of ground) and still be counted towards the ratio.[157] For example, groundcover under trees or shrubs on an intensive green roof can be counted collectively even though they occupy the same vertical space. Square footage allotments[158] and multipliers[159] for each landscape element are also included in the body of the code. Specific conditions are set for some of the elements, such as vegetated walls and roofs.[160] Continual maintenance for the landscaping is required in order to meet GAR minimums.[161] If the landscaping falls below the minimum GAR for the zone, new landscape features must be added to compensate.[162]

4. New York, New York: Green Codes Task Force

In 2010, the Green Building Council at the request of New York City finalized a report on updates to the New York City construction code for

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[153] WASH., D.C., MUN. REGS. § 3400.2 (2014); *see also Green Area Ratio Overview*, WASH., D.C., DEPT. OF ENERGY & ENV'T, http://green.dc.gov/GAR (last visited July 3, 2015).

[154] WASH., D.C., MUN. REGS. § 3400.1.

[155] *See id.* § 3401.2.

[156] *Id.* § 3402.1. Various tools, like a GAR scoresheet, are provided by the District to aid in calculations. *See Green Area Ratios Forms and Documents*, WASH., D.C., DEPT. OF ENERGY & ENV'T, http://green.dc.gov/node/619622 (last visited July 3, 2015).

[157] WASH., D.C., MUN. REGS. § 3402.5.

[158] *Id.* § 3402.7 (table of square footage (s.f.) equivalents for various landscape elements). Plants that are 2 feet at maturity receive a 9 s.f. equivalent, tree 6 to 12 inches dbh received a 250 s.f. equivalent, while trees that are 24 inches dbh or greater receive a 2000 s.f. equivalent. *Id.*

[159] *Id.* § 3402.9 (table of eligible green landscape elements and their multipliers). Highest multiplier of 0.8 is trees of 24 inch dbh or greater and intensive vegetated roof of at least 8 inches growth.

[160] *See id.* § 3403.5 (Vegetated Walls); *id.* § 3403.6 (Vegetated Roofs). To be counted, vegetated walls cannot exceed thirty feet in dimension unless it contains a built in growth medium and have to be covered within two to five years from planting.

[161] *Id.* § 3406.1 (Maintenance Requirements for GAR).

[162] *Id.*

incorporating green building standards.[163] The task force proposed 111 different changes to construction code provisions.[164] Many of the recommendations have been subsequently adopted as code amendments or city policy,[165] including a provision related to increased use of native vegetation and biodiversity in public landscapes.[166]

The task force's Urban Ecology ("UE") proposal indicates that the historic use of foreign species and monocultures have been detrimental to the city's urban ecology, while native and diverse plants species tend to be hardy, require little water and fertilizer, and provide habitats for birds and other native animals.[167] Recognizing this, the task force recommended legislation to promote diverse and native plant species by requiring their use on city-owned property including buildings, parks, and sidewalks.[168] The task force also recommended the city's planting rules be amended to prohibit use of listed invasive plant species, to require percentages for planting native and drought-resistant species and to require biodiversity.[169]

Unlike the task force, the City legislation adopting these proposals did not specify the precise percentages and diversity requirements.[170] But the legislation did require that, by November 2013, the Parks Department must revise its design manual to increase biodiversity in its landscape practices to maximize use of "native plantings and drought and salt tolerant plantings, as appropriate, and minimize the presence of exotic monocultures on all city-owned property, including green streets, medians, sidewalks, parks, and other areas where plantings occur."[171] As of May 1, 2014, all plantings have been required to conform to these revised practices.[172]

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[163] U.S. GREEN BLDG COUNCIL, EXECUTIVE SUMMARY OF NYC GREEN CODES TASK FORCE REPORT (2010) *available at* http://urbangreencouncil.org/sites/default/files/greencodestaskforce_exsummary.pdf.

[164] *See, e.g.*, N.Y.C. GREEN CODE TASK FORCE, UE-1: INCREASE BIODIVERISTY IN PUBLIC LANDSCAPES (2013), *available at* http://www.nyc.gov/html/gbee/downloads/pdf/urban_ecology.pdf. UE-1 was adopted as amended, N.Y.C., N.Y., Council Int. No. 399-A (Feb. 25, 2013).

[165] *GCTF Enacted Proposals*, N.Y.C. MAYOR'S OFFICE OF SUSTAINABILITY, http://www.nyc.gov/html/gbee/html/codes/enacted.shtml (last visited July 3, 2015) (indicating that as of April 2015, 53 of 111 recommendations of the Green Code Task Force have been adopted).

[166] *See supra* note 164.

[167] *See* N.Y.C. GREEN CODE TASK FORCE, *supra* note 164.

[168] *See id.*

[169] *See id.*

[170] N.Y.C., N.Y., Council Int. No. 399-A (Feb. 25, 2013).

[171] *Id.*

[172] *Id.*

5. San Francisco, California: Sidewalk Landscaping Permitting

The city of San Francisco permits landowners to petition for the right to construct innovative landscaping on sidewalk right-of-ways for stormwater diversion.[173] This program originated from one individual city resident's interest in addressing creatively site-specific stormwater problems.[174] The landowner engaged the city to request the dedication of a low-use portion of her doublewide sidewalk to plant a garden with native species to control stormwater runoff entering her basement.[175] The city granted the request and a successful pilot project resulted, which has spurred both the creation of similar projects elsewhere in the city through the non-profit Plant*SF and San Francisco's own permitting program to encourage and guide similar projects throughout the city.[176]

The code requires that, upon completion, there must be at least one unobstructed sidewalk width of 48 inches.[177] For every 20 feet of parking, there must also be a minimum 48-inch-wide accessible curbside parking path that connects the sidewalk to the parking space.[178] These requirements may be waived, but only after a public hearing.[179] Fees for the permit decrease if there are applications for two or more projects on the same block.[180]

The Public Works Department has adopted additional requirements regarding the types of permitted planting materials, a requirement for a courtesy strip of pavement at curbsides to allow for egress from cars, and prohibitions on projects at certain locations (25 feet from intersections, fire hydrants, accessible parking).[181] Public Works provides extensive materials through its Web site to assist in the permitting process.[182] The materials include sample layouts and construction plans, plant and tree lists, and links to references and specifications.[183] The application requires a plan of the proposed

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[173] S.F., CAL., PUBLIC WORKS CODE art. 16, § 810B (2015).

[174] *See* Jane Martin, *Plant*SF – Abundance During Drought*, BIOPHILIC CITIES (Sept. 24, 2014), *available at* http://biophiliccities.org/plantsf-abundance-during-drought.

[175] *Id.*

[176] *Id.*

[177] S.F., CAL., PUBLIC WORKS CODE § 810B(d)(1).

[178] *Id.* § 810B(d)(2).

[179] *Id.* § 810B(f).

[180] *Id.* § 810B(c).

[181] S.F. DEPT. OF PUB. WORKS, GUIDELINES FOR PERMEABLE SIDEWALK LANDSCAPING PERMIT, *available at* http://sfdpw.org/Modules/ShowDocument.aspx?documentID=2704 (last visited July 6, 2015).

[182] S.F. DEPT. OF PUB. WORKS, SIDEWALK LANDSCAPING PERMITS, *available at* http://www.sfdpw.org/index.aspx?page=1532 (last visited July 3, 2015).

[183] *Id.*

sidewalk plantings and pre- and post-construction site visits by the city.[184]

E. Green Roofs

Within the last few years there has been a tremendous upsurge of legislative activity in the area of green roofs.[185] The value of green roofs is well documented.[186] While the primary interest for most cities in green roofs is as a storm water control, green roofs also contribute to reducing overall urban temperatures and the urban heat island effect. Green roofs also provide unique and valuable urban wildlife habitat for birds and insects.

1. Highlights

While legal mechanisms to incentivize the installation of green roofs fall into a few basic categories, the city of Toronto stands on its own as the only North American city to *require* the installation of green roofs for many forms of new construction.[187] The first category of incentives adopted by several jurisdictions is building density bonuses provided in exchange for the installation of green roofs. This comes in the form of "floor-to-area ratio" bonuses, which allow for an expansion of permitted buildable space relative to the building footprint if green roofs are included in the building design.

The second mechanism is to directly tie green roofs to utility fees. In exchange for the installation of green roofs, cities will directly reduce storm water fees. Another related mechanism is financial assistance in the form of tax credits, green rebates, or other incentives.

Finally, a few jurisdictions specifically identify green roofs as a form of open space or green landscaping and allow developers to meet open space and/or green landscaping requirements for new projects in part by installing green roofs.

2. Toronto, Ontario: Green Roof Bylaw and Eco-Incentive Program

In 2009, Toronto became the first city in North America to require green roofs.[188] Generally, the Green Roof Bylaw requires residential,

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[184] S.F. DEPT. OF PUB. WORKS, *supra* note 181.

[185] Much of the discussion in this section is applicable to green walls as well, but there is little direct reference to green walls in most initiatives.

[186] U.S. GEN. SERVS. ADMIN., THE BENEFITS AND CHALLENGES OF GREEN ROOFS ON PUBLIC AND COMMERCIAL BUILDINGS (2011) (including literature review of 200 research studies).

[187] See *infra* Part IV.E.2.

[188] *See* TORONTO, CAN., MUN. CODE Ch. 492 (2013) (Green Roofs).

commercial, and industrial buildings with gross floor area[189] of more than 2,000 square meters (21,500 square feet) to dedicate a gradually-increasing percentage of roof space, as building size increases, for green roofs.[190] Residential buildings that are less than six stories or 20 meters (66 feet) in height are exempt from the requirement.[191] The minimum percentage required for green roofs is 20 percent of available roof space (10 percent for industrial buildings), up to 60 percent for buildings with more than 20,000 square meters (215,000 square feet) in gross floor space.[192] The Bylaw also details the minimum design requirements.[193]

Despite these requirements, there are ways around them. The city adopted an amendment to allow industrial buildings to use approved cooling roof materials that reflect solar and other stormwater controls as an alternative to installing green roofs, for example.[194] Additionally, any property can apply for an exemption for a reduction in the amount of green roof and pay C$200 per meter for the reduction.[195] The cash-in-lieu payment is intended to reflect the prevailing actual cost of the construction of a green roof.

All cash-in-lieu funds are directed to Toronto's Eco-Roof Incentive Program.[196] The Program is another method the city has adopted to encourage the installation of green roofs for developments that are not subject to the Bylaw. Developers can receive a cash incentive to build green roofs at the rate of C$75 per square meter, up to C$100,000.[197] According to the city, since the adoption of the Bylaw and the Eco-Roof Incentive Program, 260 new green roofs have been created, which consist of 196,000 square meters (2.1 million square feet) of green roof area.[198] A total of 444 green roofs exist in the city overall.[199]

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189 "Gross Floor Area" is defined the statute as "The total area of each floor level of a building, above and below average grade, measured from the exterior of the main wall of each floor level, including voids at the level of each floor, such as an atrium, mezzanine, stairwell, escalator, elevator, ventilation duct or utility shaft, but excluding areas used for the purpose of parking or loading." *Id.* § 492-1 (Definitions).

190 *Id.* § 492-2 (green roof requirements).

191 *Id.* § 492-5(B).

192 *Id.* § 492-2(A), (C).

193 *Id.* § 492-9 (setting mandatory design standards for green roof assembly, gravity load, slope stability, water proofing, plant selection and other design elements).

194 *Id.* § 492-2(C).

195 *Id.* §§ 492-11 to 492-12.

196 *Id.* §§ 492-12(C).

197 *Eco-Roof Incentive Program*, CITY OF TORONTO, http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=3a0b506ec20f7410VgnVCM10000071d60f89RCRD (last visited June 10, 2015).

198 *Green Roofs*, CITY OF TORONTO, http://www1.toronto.ca/wps/portal/contentonly?vgnextoid= 3a7a036318061410VgnVCM10000071d60f89RCRD (last visited Jan. 7, 2015) (providing descriptions of variety of projects completed pursuant to the Bylaw).

199 *Id.*

3. Portland, Oregon: Floor Area Ratio Bonus

A few cities have sought to encourage green roofs for new large-scale developments by granting density bonuses in exchange for green roof construction. The City of Portland offers a floor area ratio ("FAR") bonus for large-scale residential, commercial, and industrial developments in the city's central business district for the installation of both "eco-roofs" and rooftop gardens.[200] Specifically, for rooftop gardens, Portland offers a FAR bonus of one square foot of additional floor area for each square foot of rooftop garden area.[201] To qualify for the bonus, the rooftop gardens must cover at least 50 percent of the roof, and the garden must contain at least 30 percent plants.[202] For eco-roofs, Portland offers a gradually increasing FAR bonus based on increasing percentage of green roof coverage.[203] A single building can earn both rooftop and eco-roof FAR bonuses, but cannot obtain double credit.[204] For both the rooftop gardens and eco-roofs, building owners are required to sign a covenant ensuring the continuation and maintenance of the features.[205]

4. Austin, Texas: Density Bonus

The City of Austin has authorized a density bonus for the installation of green roofs in its downtown area.[206] The authorizing legislation requires that green roofs meet specified performance standards for minimum periods; otherwise, the building owner must pay a fee into the Downtown Open Space Fund.[207] The Austin Watershed Protection Department administers the program. According to the Department, the offered bonus increases as the percent of roof cover increases, and also increases to the extent that the green roofs are publicly accessible or meet standards to qualify as a downtown public plaza.[208] A fact sheet provided by the Department summarizes the potential bonuses as follows:

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200 PORTLAND, OR., CITY CODE tit. 33, ch. 33.510, § 33.510.210(C) (2015).

201 *Id.* § 33.510.210(C)(4) (rooftop garden bonus floor area option for central city plan district).

202 *Id.*

203 *Id.*§ 33.510.210(C)(10) (eco-roof bonus floor area option for central city plan district).

204 *Id.*

205 *Id.* § 33.510.210(C)(4) (rooftop gardens); *id.* § 33.510.210(C)(10) (eco-roofs).

206 AUSTIN, TEX., CODE OF ORDINANCES tit. 25, ch. 25-2, subchapter C, § 25-2-586(E)(11) (2015).

207 *Id.*

208 *Existing Credits Fact Sheet*, CITY OF AUSTIN, http://www.austintexas.gov/sites/default/files/files/Sustainability/GR_Existing_Credit_Fact_Sheet_Revised_2014.pdf (last visited June 10, 2015).

Percent Vegetated Roof Cover	Bonus Area Granted	Bonus Area Granted for Publicly Accessible Green Roofs	Bonus Granted for Green Roofs Meeting Downtown Public Plaza Standards
30-49%	2 bonus sq. ft.	2 additional bonus sq. ft.	2 additional bonus sq. ft.
50% plus	3 bonus sq. ft.	2 additional bonus sq. ft.	2 additional bonus sq. ft.

5. Chicago, Illinois: Floor Area Ratio Bonus

Beginning in 2006, the City of Chicago began offering a FAR bonus for green roofs that cover a minimum of 50 percent, or 2000 square feet of net roof area, whichever is greater.[209] Compliance with various City-established guidelines is required, and the vegetation must be maintained for the life of the building.[210] The floor area bonus for qualifying green roofs is calculated as follows: Bonus FAR = (area of roof landscaping in excess of 50 percent of net roof area ÷ lot area) × 0.30 × Base FAR.[211]

6. Minneapolis, Minnesota: Stormwater Fee Reduction

Because of the direct connection between green roofs and stormwater reduction, several cities are providing an incentive to install green roofs by providing a correlating reduction in property owner's stormwater fees. In an effort to reduce overall stormwater runoff, in 2005 the City of Minneapolis adopted stormwater fees as a separate municipal service fee line item.[212] The city concurrently authorized a reduction in

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[209] CHI., ILL., CITY CODE tit. 17, ch. 17-4, § 17-4-1015 (2015) (Green Roofs) ("Net roof area" is defined as "the total gross area of the roof minus any roof area covered by mechanical equipment."). For a discussion of Chicago green roof efforts, see Anthony Martinez, *Curious City: A Green Roofs Check-In*, WBEZ91.5 (Aug. 13, 2012), http://www.wbez.org/series/curious-city/green-roofs-check-101677 (last visited June 10, 2015).

[210] CHI., ILL., CITY CODE § 17-4-1015.

[211] *Id.* § 17-4-1015B (Bonus Formula).

[212] *See* MINNEAPOLIS, MINN., CODE OF ORDINANCES tit. 19, ch. 510, § 510.60 (2015) (authorizing implementation of stormwater charge and credit for property owners "who employ structural or non-structural best management practices or other stormwater management practices on-site that significantly reduce the quantity or significantly improve the quality of stormwater run-off from their property that enters the system."); *see also* Michael Krause et al., *Minneapolis*

stormwater fees if property owners adopt mechanisms to reduce their individual property's contributions to the stormwater system.[213] Green roof installation is included as a potential mechanism to reduce stormwater.[214]

By installing green roofs or other specified stormwater BMPs, a property owner can reduce stormwater fees by up to 50 percent.[215] To qualify, residents need to submit a credit application, which includes: creating a map that indicates the impact to the flow of stormwater on-site; measuring the impervious surface on the property; calculating stormwater fees; and discussing the proposed BMPs and their impact.[216] The application is intended for residents without particular technical expertise.

Ratepayers can receive an additional credit if they obtain a professional certification that their BMP improvements are reducing stormwater quantity and can handle all water from a 10-year or 100-year rain event.[217] A 50 percent reduction is provided for improvements that can handle a 10-year event and a 100 percent reduction is provided for improvements that can handle a 100-year event.[218]

7. Nashville, Tennessee: Green Roof Rebate

The City of Nashville offers a green roof rebate for installing green roofs on private properties.[219] To qualify, the green roof must cover at least 50 percent of roof space and must meet certain other design requirements.[220] The application requires a maintenance plan and review by a certified professional.[221] Qualifying green roofs receive a maximum

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Earns Stars and Scars by Charging for Hardscape, WATER LAWS, http://www.waterlaws.com/commentary/bulletins/GreenRooftops.html (last visited June 10, 2015) (providing detailed discussion of Minneapolis' effort to legislate stormwater controls).

213 MINNEAPOLIS, MINN., CODE OF ORDINANCES § 510.60.

214 *A Guide to the Stormwater Quality Credits Program*, CITY OF MINNEAPOLIS, http://www.ci.minneapolis.mn.us/www/groups/public/@publicworks/documents/webcontent/convert_276373.pdf (last visited June 11, 2015).

215 *Id.*

216 *See id.* (providing application and discussion of requirements).

217 *Applying for Stormwater Quantity Credits*, MINNEAPOLIS DEPT. OF PUB. WORKS, http://www.minneapolismn.gov/publicworks/stormwater/fee/stormwater_fee_stormwaterquantitycredits (last visited June 11, 2015).

218 *Id.*

219 METRO GOV. OF NASHVILLE & DAVIDSON COUNTY, TENN., CODE OF ORDINANCES tit. 15, ch. 15.44, § 15.44.050(E) (2015); *see also Green Roof Rebate*, CITY OF NASHVILLE, http://www.nashville.gov/Water-Services/Developers/Low-Impact-Development/Green-Roof-Rebate.aspx (last visited June 11, 2015).

220 METRO GOV. OF NASHVILLE & DAVIDSON COUNTY, TENN., CODE OF ORDINANCES § 15.44.050(E).

221 *Id.*

total credit equal to $10 multiplied by the square footage of the green roof installed.[222] The credit is applied to reduce monthly sewer bills for 60 months or until the maximum total is reached, whichever comes first.[223] The total annual credit cannot exceed $500,000.[224]

8. Philadelphia, Pennsylvania: Green Roof Business Tax Credit

The City of Philadelphia has adopted a tax credit against the City's business privilege tax for businesses to offset 25 percent of the cost of installing green roofs, up to a maximum credit of $100,000 per building.[225] The statute defines "green roof" as "[a]n addition to a roof that supports living vegetation and includes a synthetic, high quality waterproof membrane, drainage layer, soil layer and light weight medium plants."[226] To qualify, the green roof must cover 50 percent of the building's rooftop or 75 percent of "eligible roof top space," defined as the total space available to support a green roof.[227] Applicants must also demonstrate that the roof can structurally sustain a green roof and that there is adequate access for maintenance.[228] The tax has to be repaid if the owner fails to maintain the green roof.[229]

9. Washington, D.C.: Green Roof Rebate

The District of Columbia provides a present rebate for approved projects in targeted watersheds of $10 to $15 per square foot.[230] This is the most recent in a series of programs for the District, which first included a demonstration project put in place by the Chesapeake Bay Foundation and the District Department of the Environment with non-profit funding.[231]

F. Urban Trees

As one of the most ubiquitous elements in the spectrum of natural space in urban settings, trees can help define the feel of a city. For that reason, protecting trees has been one the most universally adopted measures for cities attempting to sustain the biophilic elements of their

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222 *Id.* § 15.44.050(E)(b).
223 *Id.*
224 *Id.* § 15.44.050(E)(d).
225 PHILA., PA., CODE tit. 19, ch. 19-2600, § 19-2604(8) (Green Roofs Tax Credit).
226 *Id.*
227 *Id.*
228 *Id.*
229 *Id.*
230 *Green Roofs in the District of Columbia,* WASH., D.C., DEPT. OF ENERGY & ENV'T, http://doee.dc.gov/greenroofs (last visited Jan. 7, 2015).
231 *Id.* (providing link to Chesapeake Bay Foundation report on demonstration project results).

communities.[232] That is not to say that tree protection ordinances have not continued to evolve. As represented below, several cities are continuing to develop new mechanisms to protect and maintain a vibrant urban forest setting.

1. Highlights

The laws examined below share an understanding of the complexity of protecting trees that includes not only the protection of the above ground elements of tree communities, but also the root systems and other important structural elements. Cities like Portland, Austin and Toronto have developed detailed specifications for any disturbance of the extended root area of protected trees.

These additional layers of protection expand upon the more traditional model for protecting trees, which is to clarify minimum tree sizes for protection and, if there is a failure to protect, then adequate replacement ratios for lost trees.[233] In large-scale development situations, Portland and Austin move beyond simply identifying minimum tree sizes for protection and require a plan of action from developers that provides flexibility to the developer to meet an overall objective of preserving and enhancing the urban forestry fabric of those cities.[234]

2. Portland, Oregon: Tree Code

Effective January 1, 2015, Portland has adopted an overhaul of its existing tree protection scheme.[235] The result is a comprehensive set of laws that represents an excellent model for urban tree protection. The Tree Code, at the outset, identifies the overarching purpose to "enhance

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[232] *See infra* Parts IV.F.2–4.

[233] Two other jurisdictions that review for tree protections are Atlanta, GA, and Jacksonville, FL. Atlanta has adopted a no net loss policy and specifies protections for mature trees (trees greater than 6 inches diameter at breast height ("dbh")). *See* ATLANTA, GA., CODE OF ORDINANCES art. II, § 158-28 (2015). Jacksonville designates a number of different tree sizes and locations for protection. *See* JACKSONVILLE, FLA., CODE OF ORDINANCES tit. VII, ch. 650, pt. 12, §§ 656.1203-656.1206 (2015). The City of Jacksonville requires an inch-by-inch replacement for all live oaks and "exceptional" trees (trees greater than 24 inches dbh). *See id.* § 656-1206(h) .

[234] *See infra* Parts IV.F.2–3.

[235] PORTLAND, OR., MUN. CODE tit. 11 (2015) ("Title 11 added by Ordinance 184522; Amended by Ordinances 185448, 185654 and 186053, effective January 1, 2015."). *See also* CITY OF PORTLAND BUREAU OF PLAN. & SUSTAINABILITY, RECOMMENDED DRAFT REPORT TO CITY COUNCIL: CITYWIDE TREE POLICY REVIEW AND REGULATORY IMPROVEMENT PROJECT (2010), *available at* http://www.portlandoregon.gov/bps/article/331401 (last visited June 16, 2015) (providing detailed discussion of recommendations for comprehensive overhaul of tree ordinance).

the quality of the urban forest and optimize the benefits that trees provide," including such benefits as:

> 1. Providing oxygen and capturing air pollutants and carbon dioxide;
>
> 2. Maintaining slope stability and preventing erosion;
>
> 3. Filtering stormwater and reducing stormwater runoff;
>
> 4. Reducing energy demand and urban heat island effect through shading of buildings and impervious areas;
>
> 5. Providing visual screening and buffering from wind, storms, and noise;
>
> 6. Sustaining habitat for birds and other wildlife;
>
> 7. Providing a source of food for wildlife and people;
>
> 8. Maintaining property values and the beauty, character and natural heritage of the city; and
>
> 9. Meeting the multi-purposed objectives of the Urban Forest Plan, including reaching and sustaining canopy targets for various urban land environments.[236]

Portland requires permits for tree removal at three different scales of disturbance.[237] The first is a non-development. At this scale, Portland regulates tree removal with the more traditional model for tree protection, which is to require a permit for removal of minimum tree sizes based on a tree's location on a street, in the city or on private property.[238] If these requirements are not followed, the City mandates certain replacement ratios that vary by the tree's location on public or private property.[239] Payment into the Tree Planting and Preservation Fund may also be required in lieu of planting replacements.[240]

The second permit scale is programmatic, which may be issued for "routine public facility or utility operation, repair and replacement, on-going maintenance programs, and for resource enhancement programs managed by a public agency."[241] In contrast to the first category of tree removal, the programmatic permits are intended not to regulate individual tree removal, but instead aim to regulate the on-balance,

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236 PORTLAND, OR., MUN. CODE § 11.05.010.

237 There are also overriding heightened standards for tree removal in a variety of the overlay zones, such as environmental conservation, greenways and scenic resources. *Id.* § 11.40.020, Table 40-1 (summarizing tree requirements of overlay zones).

238 *Id.* § 11.40.020 (requiring protection of all street trees, City trees greater than 3" dbh and private trees greater than 12" dbh).

239 *Id.* § 11.40.040 (City and Street Tree Standards); *id.* § 11.40.050 (Private Property Tree Standards).

240 *Id.* § 11.40.060 (Tree Replacement Requirements).

241 *Id.* § 11.45.010.

cumulative impacts of these types of activities. The overarching standard for these permitted activities is that they result in a "net gain" for the City's urban forest functions and benefits as described at the outset of the Tree Code.[242]

The third permit scale is development-related tree removal.[243] As with the programmatic permit, the focus is not on regulating individual tree removal but on the overall impact of the development "with a focus on achieving baseline tree preservation and total tree capacity on a site, considering the anticipated use and level of development."[244] The aim is "to encourage development, where practicable, to incorporate existing trees, particularly high quality or larger trees and groves, into the site design, to retain sufficient space to plant new trees, and to ensure suitable tree replacement when trees are removed."[245]

A tree plan is required for development-related tree removal as part of the overall development permitting process.[246] The standards for retaining trees on private lands are: (a) one-third of trees that are 12 inches and larger diameter at breast height ("dbh"); and (b) trees of specified desired species that at least 6 and less than 12 inches dbh as documented in an expert report.[247] In compensation for removal of each tree below the one-third threshold, the developer is required to make a payment to the Tree Planting and Preservation Fund equivalent to the cost of two trees.[248]

In addition to retaining existing trees, development activities are required to meet tree density standards that require either tree coverage of all area not covered by buildings, or the following densities:[249]

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[242] *Id.* § 11.45.040(A).
[243] *Id.* §§ 11.50.010-11.50.080.
[244] *Id.* § 11.50.010.
[245] *Id*.
[246] *Id.* § 11.50.020 (when tree plan required); *id.* § 11.50.070 (requirements of tree plan submittal).
[247] *Id.* at § 11.50.040(C)(1)(a).
[248] *Id.* at § 11.50.040(C)(1)(b).
[249] *Id.* § 11.50.050, Table 50-1 (Determining Required Tree Area).

Development Type	**Required Tree Density**
One and two family residential	40%
Multi dwelling residential	20%
Commercial	15%
Industrial	10%

Common to all three-permit schemes is a set of comprehensive technical specifications.[250] In many ways, these mirror the focus on root zone protection implemented by the cities of Austin and Toronto, but also go further by laying out detailed specifications for: tree planting;[251] root protection zones;[252] tree pruning and root cutting specifications;[253] tree removal[254] and tree maintenance.[255]

3. Austin, Texas: Tree and Natural Area Preservation Code

The City of Austin has developed a similar mechanism for regulating development impacts to trees. As with Portland, Austin is focused on the overall requirement that plans for development "demonstrate that the design will preserve the existing natural character of the landscape, including the retention of trees eight inches or larger in diameter to the extent feasible."[256] To achieve this end, Austin examines developments on a case-by-case basis.

All site plans for development require a grading and tree protection plan.[257] If development plans propose to remove a tree eight inches or larger in diameter, the City may require mitigation, including the planting of replacement trees, as a condition of site plan approval.[258]

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250 *Id.* §§ 11.60.010-11.60.06.

251 *Id.* § 11.60.020.

252 *Id.* § 11.60.030(C) (setting out detailed prescriptive and alternative performance standards for protection of root zone).

253 *Id.* § 11.60.040 (requiring adherence to proper arboricultural practices, using clean and sharp tools).

254 *Id.* § 11.60.050.

255 *Id.* § 11.60.060.

256 AUSTIN, TEX., CODE OF ORDINANCES tit. 25, ch. 25-8, § 25-8-604(A) (2015) (Development Application Requirements).

257 *Id.*

258 *Id.* § 25-8-604(B).

Austin requires a permit for removal of any tree, whether related to development plans or not, that is larger than 19 inches dbh.[259] The City can only grant a permit for removal of a protected tree after determining that the tree: prevents use or access of the property; represents imminent hazard to life or property; is dead or diseased or prevents vehicle access or construction of utilities on public property.[260]

The circumstances under which a heritage tree can be removed are further restricted. These limited circumstances are when the tree is dead, it presents an imminent hazard, or is diseased.[261] "Heritage tree" is defined as a variety of species of trees that are 24 inches or greater in diameter.[262]

As with Portland, Austin has adopted detailed regulations that provide specifications for protecting trees. City regulations define in detail the various elements of protected tree physiology, which include roots, trunk, and crown.[263] As identified in the discussion of tree physiology, primary foci for protecting trees during development is the protection of the critical root zone ("CRZ") and crown impacts.[264] The purpose of the CRZ is to establish a buffer beyond which any loss of roots would not have a significant impact on a tree's survival. To protect the CRZ, regulations establish minimum design criteria for ground disturbance with the CRZ.[265] As to impacts to the tree crown, regulations require that, at a minimum, not more than 25 percent of the foliage should be removed within an annual growing season.[266]

Regulations also establish the parameters for mitigation.[267] In terms of replacement, the regulations establish a formula that provides for replacing identified species of trees and requires replacement at the ratio of 300 percent for heritage trees and 100 percent for particular species of trees 19 inches and greater in dbh.[268]

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[259] *Id.* § 25-8-621 (requiring permit to remove protected tree). *See also id.* § 25-8-602(3) (defining "protected tree").

[260] *Id.* § 25-8-624(A) .

[261] *Id.* § 25-8-642.

[262] *Id.* § 25-8-602(1) (defining "heritage tree").

[263] AUSTIN, TEX., ENVIRONMENTAL CRITERIA MANUAL §§ 3.4.0–3.4.3 (2014) (Supp. No. 7-2015).

[264] *Id.* § 3.5.2(A)(B) (critical root zone impacts and crown impacts).

[265] *Id.* § 3.5.2(A).

[266] *Id.* § 3.5.2(B).

[267] *Id.* § 3.5.4.

[268] *Id.*

4. Toronto, Ontario: Tree Protection Zone

The City of Toronto is a third jurisdiction that takes a holistic approach to tree protection. The City has accomplished this by adopting a "tree protection zone."[269] The tree protection zone aims to prevent tree damage, including physical injury to stems and branches, root cutting, and soil compaction.[270] Minimum tree protection zones start at 1.2 meters (approximately 4 feet) for street trees less than 10 centimeter (four inches) dbh.[271] Trees greater than 100 centimeters (40 inches) dbh require a tree protection zone of six centimeters for every one centimeter of dbh.[272] For a 120 centimeter (47 inch) dbh tree, the city requires a tree protection zone of 7.2 meters (23.6 feet).[273] Specific site conditions may require an increase in the tree protection zone.

Within the zone, the following is prohibited: construction; altering the grade by adding fill; excavating, trenching, scraping, dumping, or disturbance of any kind; storage of construction materials, equipment, soil, construction waste or debris disposal of any liquids e.g. concrete sleuth, gas, oil, paint; movement of vehicles, equipment or pedestrians or parking of vehicles or machinery.[274] Plywood or steel fencing 1.2 meters (4 feet) high is required to indicate the borders of the tree protection zone.[275]

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[269] TORONTO DEPT. OF PARKS, FORESTRY & RECREATION, TREE PROTECTION POLICY AND SPECIFICATIONS FOR CONSTRUCTION NEAR TREES 2-3 (2013).

[270] *Id.* at 2.

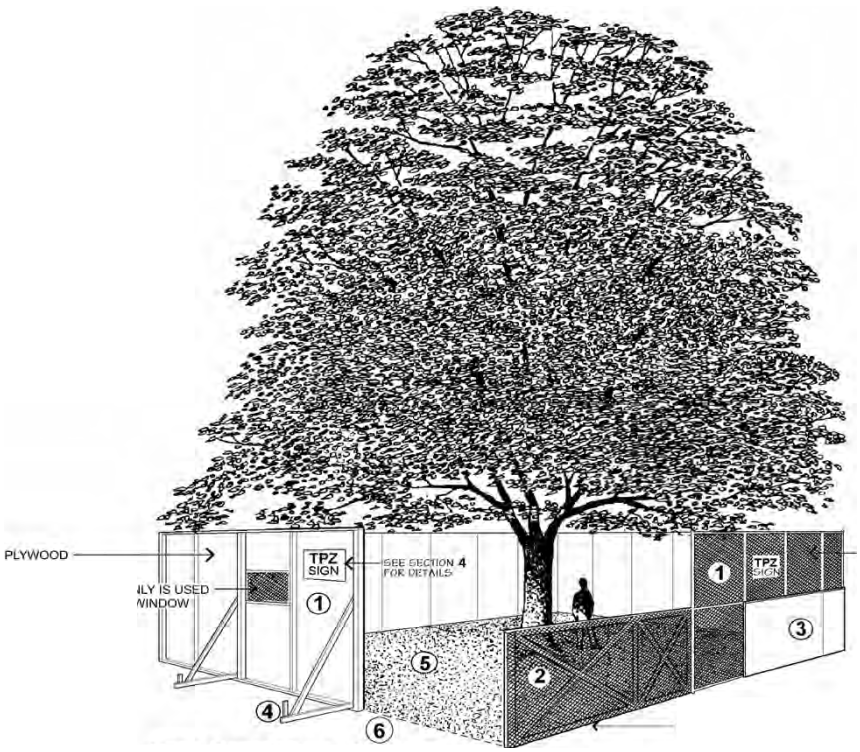
[271] *Id.* at 3.

[272] *Id.*

[273] *Id.*

[274] *Id.*

[275] *Id.* at 4.



[276]

Toronto separately regulates tree protection on City streets and on private lands.[277] However, both categories of regulation require adherence to the tree protection zone standards.[278] The standards apply to the protection of all street trees. On private property, the threshold for protection is 30 centimeter (11.8 inches) dbh.[279] When protecting trees on private property is not possible, the city may issue a permit to destroy or injure a tree, but it will also require that the property owner replace the tree or make a cash payment of 120 percent of the cost of replacement and maintenance of the tree for two years.[280]

G. Viewsheds

The geographic setting of a city can often define the feel of that urban space. Views of surrounding vistas create a sense of location and connection to the larger world beyond the borders of a city. Included

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[276] *Id.*at 5.

[277] *See* TORONTO, CAN., MUN. CODE ch. 813, art. II, III (2013) ("Trees on City Streets" and "Private Tree Protection" respectively).

[278] *See id.* art. II, § 813-6 (Street Tree Permit Requirements).

[279] *Id.* art. III, § 813-12 (Private Tree Permit Required).

[280] *Id.* art. III, § 813-20 (listing conditions for permits to destroy).

here are efforts by various cities to preserve the viewsheds of surrounding natural features and, in the following section, the night sky. These landscapes remind urban dwellers of the larger natural world around them and can provide an important visual and psychological departure from the confines of daily life.

1. Highlights

With efforts to preserve viewsheds, two general approaches are examined. The first is exemplified by code provisions adopted by the cities of Denver, Tucson and Seattle, and addresses how building height and density within the city can block views of natural features that exist outside the city core.[281] The second general approach is to regulate or guide the design of development on surrounding hillsides visible from cities. The focus of this second category is not as much to prohibit development, but to adopt design approaches that ensure that new development melds into the surrounding natural environment to the fullest extent possible. The second approach is illustrated by code provisions adopted by Colorado Springs.[282]

One point of commonality is the focus on maintaining views of natural settings from public spaces. A visual connection to the surrounding environment from all points in the city is not realistic and not the aim of these provisions. To the contrary, the intent is to equitably ensure that there are public spaces for all city residents to access views of the city surroundings.

2. Denver, Colorado: View Plane Ordinances

Denver, earlier than many cities, identified the value of preserving the viewshed of the majestic Rocky Mountains from a variety of locations within the city. The first viewplane ordinance was adopted in 1950 to protect views from five city parks.[283] Thereafter, the City adopted a number of additional view plane ordinances to protect views from other locations within Denver.[284] These locations include several City parks, City Hall and open-air professional sports stadiums.[285] The stated purpose for the adoption of the view plane ordinances emphasizes the importance of maintaining panoramic views from various public

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281 *See infra* Parts IV.G.2–4.

282 *See infra* Part IV.G.5.

283 *See* Landmark Land v. City & Cnty of Denver*,* 728 P.2d 1281, 1283 n.2 (Colo. 1986) (discussing adoption of viewplane ordinance).

284 DENVER, COLO., REVISED MUN. CODE ch. 10, art. IV, §§ 10-56 to 10-62.7 (2015).

285 *Id.*

locations within the city to engender civic pride and economic vitality.[286]

While these location-specific ordinances vary to a degree depending on what type of view is to be protected, the primary limit is on the height of surrounding buildings. The height restrictions are calculated from the elevation above sea level plus one foot per 100 horizontal feet from a designated reference point for the location for which the views are being protected.[287] Thus, the farther a building is from a public park, the higher the permitted building height up to the maximum allowed by the underlying zoning. The parameters of the height restrictions are illustrated for each location by adopting maps as elements of ordinances.[288]

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[286] *Id.* § 10-56.
[287] *Id.*
[288] *Id.*

[289]

3. Tucson, Arizona: Scenic Corridor Zone

Recognizing the value of its picturesque location in the Tucson Basin, the City of Tucson has designated various scenic corridors to protect views of the surrounding mountains.[290] In designating these scenic corridors, the Land Use Code states "Tucson is located on a

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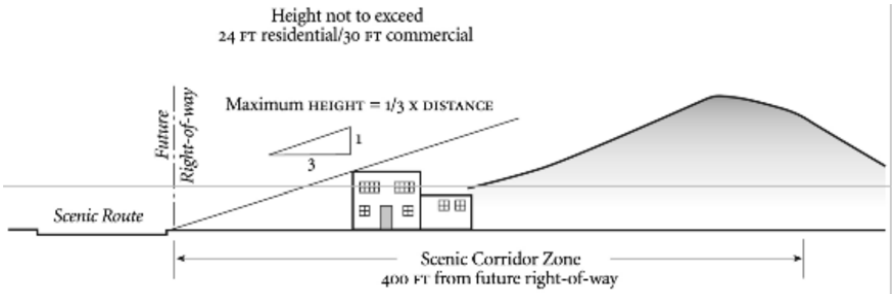
[289] DENVER, COLO., REVISED MUN. CODE ch. 10, art. IV, § 10-59; *see also View Planes,* DENVER COMMUNITY PLAN. & DEV. DEPT., https://www.denvergov.org/content/denvergov/en/community-planning-and-development/zoning/other-regulations/view-planes.html (last visited Jan. 7, 2016) (providing link to statutory map).

[290] TUCSON, ARIZ., LAND USE CODE art. 2, div. 8, § 2.8.2 (2012). While the Land Use Code is still in effect for some landowners, the City of Tuscon is in process of replacing it with a new Unified Development Code. *All Codes, Ordinances, Plans, & Zoning Determinations*, CITY OF TUCSON, https://www.tucsonaz.gov/pdsd/all-codes-ordinances-plans-zoning-determinations (last visited Nov. 20, 2015). However, the Unified Development Code retains the scenic corridor zones. TUCSON, ARIZ., UNIFIED DEV. CODE art. 5, § 5.3 (2013).

magnificent city site, with mountain ranges in all directions and attractive foothills leading up to the mountains. This setting is a scenic resource of great value for the city, for its inhabitants, and for its economy."[291] The "Purpose" section identifies that the protection of these scenic resources has several layers, which include preserving both views of the prominent mountain ridges and "viewsheds which provide the observer with a visual perspective of the area in terms of foreground, middle ground, and background."[292] Preservation of the scenic viewsheds also requires protecting the natural desert and mountain setting by retaining native vegetation and natural topography.

Building heights are regulated within 400 feet of the right of ways of these scenic routes.[293] In the case of specifically designated "gateway" routes, building heights are designated within 700 feet of the right of way.[294] A buffer of native vegetation is required for the first 30 feet from the scenic routes and thereafter building heights are permitted as one-third of the distance from the right of way, but not exceeding a maximum height of 24 feet for residential structures and 30 feet for non-residential (buildings of 12 feet or less are not restricted).[295]



2.8.2.5 Maximum Structure Height in Scenic Corridor Zone

[296]

Building siting must ensure that natural topography and vegetation is minimally disturbed.[297] In addition, buildings with frontage of at least 200 feet along a scenic route must provide for view corridors along that

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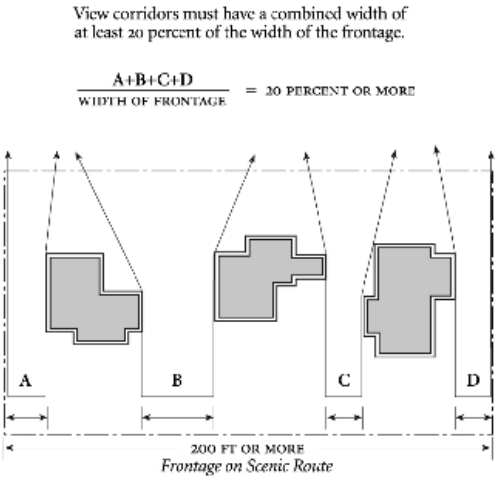
[291] TUCSON, ARIZ., LAND USE CODE § 2.8.2.1 (Introduction).
[292] *Id.* § 2.8.2.2 (Purpose).
[293] *Id.* § 2.8.2.3.
[294] *Id.*
[295] *Id.* §§ 2.8.2.4, 2.8.2.5 (Preservation and Reestablishment of Vegetation and Structural Height).
[296] *Id.* § 2.8.2.5.
[297] *Id.* § 2.8.2.6 (Siting).

frontage that permit views of locations beyond the buildings and account for at least 20 percent of the frontage.[298]



2.8.2.6.B View Corridors in Scenic Corridor

[299]

4. Seattle, Washington: Policies Regarding Public View Protection

Seattle incorporates viewshed protection into a larger environmental analysis of proposed development in the downtown area. Seattle has adopted rules to implement the Washington State Environmental Protection Act ("SEPA"), which require consideration of various policies adopted by the city.[300] In particular, Seattle has adopted a specific environmental policy related to "Public View Protection."[301] At the outset, the policy highlights that "Seattle has a magnificent natural setting of greenery, mountains, and water; visual amenities and opportunities are an integral part of the City's environmental quality."[302] Specifically, the policy identifies the surrounding Olympic and Cascade Mountain Ranges (including Mt. Rainier) along with the surrounding water bodies of the Puget Sound, Lake Union, and Lake Washington as significant natural features.[303]

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[298] *Id.*
[299] *Id.* § 2.8.2.6(B).
[300] SEATTLE, WASH., MUN. CODE tit. 25, § 25.05.01 (2015) (discussing authority for adoption of Seattle environmental policies and procedures).
[301] *Id.* § 25.05.675P.
[302] *Id.*
[303] *Id.*

The policy lists ten specific public sites (mostly parks) throughout the city where, in particular, the public is able to enjoy views of the natural settings of the City.[304] The policy permits the City to conditionally approve or deny a proposal for new development that adversely obstruct views from these locations.[305] Seattle has also adopted a separate policy to limit shadows on open spaces.[306] The policy acknowledges that access to light is of particular importance in Seattle's climate.[307] Access to light is protected at publicly-owned locations, including parks, schools, and street ends in shoreline areas.[308] While not mandating a viewshed for all these open spaces within the City, this policy does require that access to light be a consideration for new development.[309]

5. Colorado Springs, Colorado: Hillside Area Overlay

As a result of tremendous development pressure on the hillside districts that surround and are visible from most points in the City, Colorado Springs has adopted a comprehensive set of regulations and design guidelines related to the visual impact of new development on these hillside areas.[310] This approach is illustrative of a second focus for viewshed protection: limiting disturbance of the surrounding natural setting (versus access to a view of the natural setting).

The description of the overlay district identifies that significant natural features of the city include ridgelines; bluffs; rock outcroppings; vegetation; natural drainageways; wildlife habitat; geologic conditions; and slopes that contribute to the attractiveness of the community. The purpose of adopting the overlay includes ensuring that new hillside development is compatible with, and complementary to, the natural environment.[311]

To achieve the stated purpose and objectives of the overlay, the City requires a land suitability analysis to obtain basic information about the conditions of the site such as the slope, vegetation, wildlife, geography, and soils.[312] The next step is a hillside development plan, intended to meet criteria for approval that stresses whether the disturbance of the hillside has been minimized, whether natural vegetation and features are maintained, and whether the "visual impacts upon off-site areas [have]

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304 *Id.*
305 *Id.*
306 *Id.* § 25.05.675Q.
307 *Id.*
308 *Id.*
309 *Id.*
310 COLORADO SPRINGS, COLO., CITY CODE ch. 7, art. 3, pt. 5, § 7.3.504 (2015).
311 *Id.* § 7.3.504(A)(2).
312 *Id.* § 7.3.504(C).

been reduced or reasonably mitigated."[313] Identified mitigation measures include: (1) alternate siting of structures to include increased setbacks from ridgelines; (2) use of significant vegetation to soften structural mass when building sites are located in highly visible areas; (3) designation of special height restrictions; (4) use of native vegetative cover and retaining walls faced with stone or earth colored materials as stabilization measures for cuts and fills and (5) alternate street placement to reduce visibility of structures.[314]

Particular attention is also given to the building height of hillside structures. There is a stated preference for roof lines that slope with the natural contour of the hillside and an additional five feet in building height (35 feet versus 30 feet) is provided for sloped roofs as opposed to flat roofs.[315] For non-residential uses, building heights permitted by underlying zoning can be reduced based on the conditions of the site.[316]

H. Dark Skies

Recognizing the growing science and our own innate understanding regarding the debilitating effects of artificial light on the ability to see and enjoy night skies, cities have adopted laws to limit the adverse impacts of artificial light on the night sky.

1. Highlights

Municipal efforts to increase the visibility of the night sky can be placed into two general categories, not unlike similar plans to protect viewsheds. The first strategy is to regulate total lighting across the landscape, and the second is to regulate the design of individual lighting fixtures to improve shielding, angle lights downward, limit glare, change color spectrums, and increase efficiency. As with many of the issues discussed in this article, there is disagreement as to the best approach. This survey does not endorse either approach as superior to the other, but merely introduces the various ways that different places have addressed light pollution.

The International Dark-Sky Association ("IDA") has been at the forefront of both approaches.[317] IDA summarizes the primary damaging effects of artificial light as three-fold: (1) artificial skyglow—the diffused, pervasive light on the horizon; (2) glare—the visual

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[313] *Id.* § 7.3.504(D)(3)(c).
[314] *Id.*
[315] *Id.* § 7.3.504(F)(1).
[316] *Id.* § 7.3.504(F)(3).
[317] INT'L DARK-SKY ASS'N, http://darksky.org/ (last visited Jan. 7, 2016).

discomfort and reduced visibility caused by lights that are too bright and not shielded from view and (3) light trespass—unwanted light reaching across property lines and into natural habitats.[318]

2. Flagstaff, Arizona: Pattern Lighting Code

In 2000, IDA provided language for the adoption of a Pattern Lighting Code in its Outdoor Lighting Code Handbook.[319] This pattern code has been revised and updated by Christian B. Luginbuhl from the Flagstaff Station of the U.S. Naval Observatory.[320] "Pattern" in this context refers to regulating the total amount of light per area consistently across the landscape. The pattern code creates rough zones for differentiation (such as rural versus urban and residential versus non-residential), but for the most part sets forth a consistent, easy-to-apply pattern for light regulation.

Several cities have used this type of pattern approach in their own codes, including Flagstaff, Arizona.[321] The Flagstaff Code notes at the outset that the city was identified as the first International Dark Sky City in 2001, and places dark skies on par with other valued environmental qualities like clean air and water.[322] The Code creates different classes of lighting.[323] Class one is the least restrictive based on the recognition that adequate lighting is required for a particular use.[324] Class two regulates night light for safety purposes only.[325] Class three covers decorative lighting.[326] The Code also establishes lighting zones; in these zones, the amount of light permitted varies based on the class of lighting and the designated zone.[327]

Certain special uses are regulated separately. These include service stations, outdoor recreation facilities, parking lots, and car sales display lots.[328] Some types of lights are prohibited outright such as flood and

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[318] *Light Pollution*, INT'L DARK-SKY ASS'N, http://darksky.org/light-pollution/ (last visited Jan. 7, 2016).

[319] INT'L DARK-SKY ASS'N, OUTDOOR LIGHTING CODE HANDBOOK (Version 1.4) (2002), *available at* http://www.nofs.navy.mil/about_NOFS/staff/cbl/OLCHB1.14/lc-hb-v1-14.html (last visited June 4, 2015).

[320] CHRISTIAN B. LUGINBUHL, PATTERN OUTDOOR LIGHTING CODE (USA) (2010), *available at* http://www.nofs.navy.mil/about_NOFS/staff/cbl/CL_POLC_standard_v2.0.pdf .

[321] FLAGSTAFF, ARIZ., ZONING CODE ch. 10-50, div. 10-50.70 (2011) (Outdoor Lighting Standards).

[322] *Id.* § 10-50.70.010 (Purpose).

[323] *Id.* § 10-50.70.050.

[324] *Id.*

[325] *Id.*

[326] *Id.*

[327] *Id.* §10-50.70.050.C.

[328] *Id.* § 10-50.70.060.

search lights, except for emergency purposes.[329] Certain light types and uses are not covered by the code, including: airports; infrared security lighting; holiday lighting; and lighting for construction of municipal facilities.[330]

3. The International Dark-Sky Association Model Lighting Ordinance

Beginning in 2005, IDA teamed up with the Illuminating Engineering Society ("IES"), a lighting industry non-profit, to develop an alternative Model Lighting Ordinance ("MLO").[331] The primary distinction from the pattern approach is that the MLO takes into account the level of development on a site and permits more light as development on the site increases. The MLO also provides a mechanism for regulating individual light fixtures through a rating system it has named the Backlight-Uplight-Glare ("BUG") system.[332] The MLO has been subject to some criticism on the basis that it permits developed areas, such as cities, to emit more light based on the concentration of development. Critics argue that the MLO creates the potential for these areas to emit more light than is currently emitted in unregulated areas.[333] The current recommendations of IDA may lie somewhere in between its two model code concepts, based on when IDA worked with the City of Malibu, California in 2014 to develop a lighting ordinance.[334] IDA's recommendation for Malibu, based on Malibu's limited complexity and size, was to adopt a scaled back version of the MLO that incorporates many elements of the Pattern Lighting Code.[335]

I. Urban Agriculture

Increasingly, there is an understanding that the urban landscape provides ample opportunities for food production. There are numerous identified benefits from urban agriculture, which include: community access to cheap and healthy food; decreased transportation costs such as

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329 *Id.* § 10-50.70.070.

330 *Id.* § 10-50.70.080.

331 INT'L DARK-SKY ASS'N, MODEL LIGHTING ORDINANCE, http://www.darksky.org/outdoorlighting/lighting-ordinances/35-ida/outdoor-lighting/79-mlo (last visited June 14, 2011).

332 *Id.* at 15.

333 CHRISTIAN B. LUGINBUHL, LIGHT POLLUTION AND LIGHTING CODES: AN ANALYSIS OF THE LIGHT POLLUTION CONTROL EFFECTIVENESS OF THE IDA-IES MODEL LIGHTING ORDINANCE AND THE IDA PATTERN OUTDOOR LIGHTING CODE (2013) *available at* http://www.flagstaffdarkskies.org/WPdev/wp-content/uploads/2013/02/ Lighting-Codes-and-LP-Luginbuhl-130115.pdf.

334 CITY OF MALIBU, CAL., COUNCIL AGENDA REPORT REGARDING DIRECTION OF PREPARATION OF CITYWIDE LIGHTING ORDINANCE (2014), *available at*: http://www.malibucity.org/AgendaCenter/ViewFile/ Item/1295?fileID=1521.

335 *Id.*

pollution and energy consumption; and the creation of small business opportunities.[336] Sustainable food production from urban agriculture is also one commonly identified core element for increasing the resiliency of cities.[337]

1. Highlights

Many cities have responded to the emerging practice of urban agriculture by revising codes, where zoning codes had previously failed to account for these activities. In particular, Boston has recently responded with the adoption of a single comprehensive legal framework for regulating urban agriculture.[338] Other cities, like Austin and Seattle, have been gradually developing a comprehensive approach for several years.[339] Detroit is an example of a city that is responding to a definite growing need for urban agriculture, but is just getting started with its regulatory process.[340] It has taken only the first steps towards regulating urban agriculture with a view towards adding further layers of legal regulations.

Most provisions reviewed below create a dichotomy between community gardens and urban farms. The former are smaller operations that are operated on a not-profit basis for the immediate neighborhood community. Urban farms, in contrast, refer to larger commercial operations. Every legal scheme creates some varying degree of regulation depending on the size of the operation and the scope of agricultural activities in that space.

The cities reviewed take varying approaches to animal-focused agriculture. Seattle is the most progressive in this regard, allowing for a wide variety of small and large animals.[341] Detroit, in contrast, has not yet developed regulations for animals, which has created a degree of uncertainty for some urban agriculture operations within the city.[342] One further interesting variation is the degree to which cities have incorporated rooftop farms into their local codes. Boston, Seattle, and

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336 SHEILA GORDON, URBAN AGRICULTURE IMPACTS: SOCIAL, HEALTH AND ECONOMIC: AN ANNOTATED BIBLIOGRPAHY (2013), *available at* http://asi.ucdavis.edu/programs/sarep/publications/food-and-society/uaannotatedbiblio-2013.pdf. (annotated bibliography of studies on the impact of urban agrigculture).

337 Stuart Fox, *Urban Farms Provide More Than Food*, 100 RESILENT CITIES (Dec. 27, 2013), http://www.100resilientcities.org/blog/entry/urban-farms-provide-more-than-food#/-_/.

338 *See infra* Part IV.I.2.

339 *See infra* Parts IV.I.3–4.

340 *See infra* Part IV.I.5.

341 *See infra* Part IV.I.4.

342 *See infra* Part IV.I.5.

Chicago all have moved to promote this type of food growing in their cities.[343]

2. Boston, Massachusetts: Article 89—Urban Agriculture

In 2013, after a few pilot projects, the City of Boston adopted a comprehensive framework for regulating urban agriculture in the form of Article 89 for the Boston Code of Ordinances.[344] Prior to Article 89, the City did not have any provision in its code clarifying whether commercial farming operations were permitted.[345] Article 89 establishes varying degrees of regulation based on the size and location of the urban agriculture operation. Unlike the other provisions examined below, Article 89 does not differentiate between community gardens and urban farms, or whether the operation is non-profit or for-profit. Instead, Article 89 creates categories of urban agriculture that include: (1) urban farm, ground level; (2) urban farm, roof level; and (3) freight containers used for hydroponics or aquaponics.[346]

For ground level[347] and rooftop level[348] urban farms, Article 89 further differentiates where operations are permitted based on the size of the operation. Some level of design review is required for many farm structures, whether at ground level or on roofs.[349] Larger operations require a Comprehensive Farm Review. [350] The purpose of the Comprehensive Farm Review is to ensure that urban agriculture practices are sensitive to other uses in the surrounding neighborhood.[351]

The only animals or insects addressed by Article 89 are chickens, bees, and fish.[352] Up to six hens are permitted and up to six non-egg-

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[343] *See infra* Parts IV.I.2, IV.I.4–5.

[344] BOS., MASS., CODE OF ORDINANCES art. 89 (2014).

[345] Helen Weatherall, *City of Boston Adopts Urban Ag Zoning Ordinance, Seeks to Build Equitable Farming Community*, SEEDSTOCK, (March 14, 2014), http://seedstock.com/2014/03/14/city-of-boston-adopts-urban-ag-zoning-ordinance-seeks-to-build-equitable-farming-community.

[346] *See* BOS., MASS., CODE OF ORDINANCES § 89-2 (Providing legal definitions for various forms of regulated urban agriculture).

[347] *Id.* § 89-4 (Urban Farm, Ground Level). Small and medium operations are permitted by right in all zones. Large operations (greater than 1 acre) are permitted conditionally in most zones, but still permitted outright in industrial zones. *Id.*

[348] *Id.* § 89-5 (Urban Farm, Roof Level). Roof top farms of all sizes and rooftop greenhouses are permitted outright in large commercial, industrial and institutional zones. In residential and small commercial zones, small size rooftop urban farms are permitted outright while medium, large and rooftop greenhouses are conditional uses. Building height is governed by underlying zoning with the exception of greenhouses, which can be up to twenty-five feet above the surface of the roof. *Id.* §§ 89-6(1), 89-6(2)(b).

[349] *Id.* §§ 89-4, 89-5.

[350] *Id.* § 89-6 (Comprehensive Farm Review).

[351] *Id.*

[352] *Id.* § 89-2.

laying replacement chicks are permitted in all zones unless otherwise subject to a conditional-use review.[353] No roosters and no on-site slaughtering are permitted.[354] Up to two beehives are permitted in many zones (potentially subject to conditional use review), but only for personal consumption.[355] Beehives must be set back a specified distance from public rights of way, or when adjacent to property windows and doors.[356] To the extent that setbacks are not met, there are requirements for fencing and enclosures.[357] Aquaculture is permitted in many zones, with the exception of freight container aquaculture in residential districts.[358] To sell the products of urban agriculture on-site, a single stand is permitted for all operations.[359] A farmer's market is permitted where retail is allowed by the underlying zoning code, or potentially otherwise as a conditional use.[360]

3. Austin, Texas: Sustainable Urban Agriculture and Community Gardens

Since 2008, the City of Austin has encouraged the growth of urban agriculture within the city, both by removing legal barriers and improving city support for food distribution.[361] This includes extending a lower commercial rate for water consumption to urban agriculture operations; providing tax benefits for small farmers; and permitting on-site sale of value-added farm products.[362]

In 2011, Austin adopted a permitting process for City-supported community gardens.[363] These are defined as gardens with four or more participating gardeners that non-commercially "produce and harvest food crops for personal or group use, consumption or donation by the non-profit organization or cooperatively for the benefit of its members."[364] Given the arid climate of Austin, there is a particular

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[353] *Id.* § 89-9 (Accessory Keeping of Hens).
[354] *Id.*
[355] *Id.* § 89-10 (Accessory Keeping of Honey Bees).
[356] *Id.*
[357] *Id.*
[358] *Id.* § 89-11 (Aquaculture, Aquaponics, Hydroponics, and Freight Containers).
[359] *Id.* § 89-12 (Farmers Markets and Farm Stands).
[360] *Id*.
[361] *See* Noelle Swan, *Restructured Policies and Community Partnerships Support Urban Agriculture Within Austin City Limits*, SEEDSTOCK (Mar. 24, 2014), http://seedstock.com/2014/03/24/restructured-policies-supports-urban-agriculture-in-austin-city-limits.
[362] *Id*.
[363] Austin, Tex., Ordinance 20110210-017 (Feb. 10, 2011).
[364] AUSTIN, TEX., CODE OF ORDINANCES tit. 14, ch. 14-7, § 14-7-1 (2015).

emphasis on water conservation—all watering must be done by hand without using automatic sprinklers or irrigation systems.[365]

Austin separately regulates urban farms, which are defined as "site[s] that can consist of multiple contiguous parcels . . . at least one acre in size cultivated primarily for the sustainable production of agricultural products to be sold for profit and may provide agricultural education activities."[366] Urban farms are permitted on sites that are one to five acres in size, provided the farm is 25 feet outside of a floodplain and 100 feet from a creek centerline.[367] For residential areas, "the residential character of the lot and dwelling must be maintained."[368] One fowl or rabbit is allowed per 1/10th of an acre of the site.[369] On-site animal slaughter is not permitted in residential zones.[370] In non-residential zones, slaughtering is allowed, but must be done at least 50 feet from adjacent residential structures.[371] Again, there is heavy emphasis on water conservation.[372]

4. Seattle, Washington: Urban Agriculture

Having invested in community gardens since 1973, Seattle undertook a major update to its urban agriculture legal system in 2010 as part of an effort to clarify permitted uses and locations.[373] Urban farms are permitted outright in all zones if they are under 4,000 square feet in size.[374] The Seattle Municipal Code does place limits on urban farms within residential zones, including the hours of operation, signage, deliveries per day, and structures allowed.[375] For urban farms that need a conditional-use permit (i.e. urban farm greater than 4,000 square feet in residential areas), a management plan is required which discloses whether there is an intent to spray pesticides, as well as a sediment and erosion control plan.[376] In addition, for conditional uses, the city requires

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365 *Id*.
366 *Id.* § 25-2-7.
367 *Id.* § 25-2-863 (Urban Farms).
368 *Id.* § 25-2-863(K).
369 *Id.* § 25-2-863(F).
370 *Id*.
371 *Id*.
372 *Id.* § 25-2-863(G).
373 Trish Popovich, *With Decades of Experience, Seattle Models Urban Agriculture for Cities*, SEEDSTOCK (Apr. 21, 2014), http://seedstock.com/2014/04/21/trending-in-the-city-of-flowers-urban-agriculture-in-seattle-wa.
374 *See* SEATTLE, WASH., MUN. CODE tit. 23, § 23.43.040(E) (2015) (urban farm permitted as accessory use in small lot residential zone up to 4K square feet, conditional use if larger than 4K sq. ft.).
375 *Id.* § 23.42.051 (Urban Farms).
376 *Id.* § 23.42.051(B)(1).

consideration of impacts and potential mitigation for impacts to water quality, traffic, parking, noise, odor, and agricultural chemicals.[377]

Keeping small animals, farm animals, domestic fowl, and bees is permitted in all zones.[378] Up to three small animals, or one miniature potbellied pig, are permitted per lot in each zone.[379] Up to four small animals are permitted for lots greater than 20,000 square feet, and an additional small animal for every additional 5,000 square feet of space thereafter.[380] In addition to small animals, eight fowl are permitted per lot, plus one additional for every 1,000 square feet beyond 20,000 square feet.[381] No roosters are permitted.[382] Large animals (horses, cows, sheep and other similar animals) are permitted on lots greater than 20,000 square feet at the rate of one animal per 10,000 square feet.[383] A fifty-foot buffer from adjacent residential lots is also required for these large animals.[384] Finally, no more than four bee hives are allowed on lots less than 10,000 square feet, and a significant buffer from adjacent properties is required.[385] Community gardens up to 1,000 square feet are permitted in all zones.[386] All structures are limited to 12 feet in height and are otherwise subject to the requirements of the underlying district.[387]

5. Detroit, Michigan: Urban Agriculture Ordinance

In response to a growing demand for local food alternatives and the desire to convert vast tracks of vacant land to a useful purpose, communities across the City of Detroit have turned to urban agriculture. Community gardens have historical roots in the City as far back as the 1890s, and one estimate indicates that there are nearly 1,400 community gardens throughout the City.[388] In 2013, the City adopted its first legislative effort to codify urban agriculture practices.

The 2013 Ordinance provides a legal process for establishing urban farms and other agricultural uses. The various urban agriculture uses

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377 *Id.* § 23.42.051(B)(2).
378 *Id.* § 23.42.052 (Keeping of Animals).
379 *Id.* § 23.42.052(A) (Small Animals).
380 *Id*.
381 *Id.* § 23.42.052(C) (Domestic Fowl).
382 *Id*.
383 *Id.* § 23.42.052(D) (Farm Animals).
384 *Id*.
385 *Id.* § 23.42.052(E) (Beekeeping).
386 *Id.* § 23.42.053 (Community Gardens).
387 *Id*.
388 Nina Ignaczak, *No Stranger to Urban Agriculture, Detroit Makes it Official with New Zoning Ordinance,* SEEDSTOCK (Apr. 9, 2013), http://seedstock.com/2013/04/09/no-stranger-to-urban-agriculture-detroit-makes-it-official-with-new-zoning-ordinance.

covered include: (1) urban gardens (less than one acre); (2) urban farms; (3) greenhouses; (4) hoophouses (or high tunnels), which are unheated structures for growing crops covered with walls and roofs of translucent material other than glass;[389] (5) aquaculture; (6) hydroponics and (7) aquaponics, which is the integration of aquaculture and hydroponics where fish waste products are used to fertilize hydroponic crops.[390]

Urban gardens, urban farms, greenhouses and hoophouses are permitted by right or as conditional uses in all residential, business and industrial zones.[391] Farmer's markets, aquaculture, hydroponics and aquaponics are not permitted in any residential or many business districts, but are generally permitted in industrial zones.[392] Urban farms and large-scale urban agriculture areas are subject to a site review process.[393] The application for establishing an urban farm requires an identification of existing site conditions (i.e. existing riparian areas and structures), a list of land uses within 100 feet of the parcel, a narrative description of proposed activities at the farm, and a site plan for the proposed farm.[394]

Unlike the other provisions examined here, Detroit does not currently permit farm animals within the City, including smaller animals like bees and chickens.[395] This failure to include urban-space farm animals has stranded existing farm animal operations within the City, who have been looking to the Michigan Right to Farm Act for protection.[396] The Right to Farm Act provides that local jurisdictions cannot adopt agriculturally-focused regulations that are more restrictive than state laws. Urban agriculturalists are also prohibited from growing oats, wheat, or barley, which are viewed as creating the unwarranted risk of attracting rodents.[397]

J. Urban Rivers

This section focuses on how cities are integrating urban rivers into their urban planning. Some of these cities require careful review of

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389 DETROIT, MICH., CITY CODE ch. 61, art. 16, § 61-16-103 (2015).
390 *Id.* § 61-16-33.
391 *Id.* § 61-16-33(chart of where agricultural uses are permitted).
392 *Id.* art. VII, art. IX, art. X.
393 *Id.* § 61-3-113 (Site Plan Review Applicability).
394 *Id.* § 61-3-128 (Submittal Requirements for Urban Farms and Other Agricultural Uses).
395 *Id.* § 61-12-326.
396 Cliff Weathers, *Bizarre — Why Is Michigan Govt. Trying to Derail Detroit-Area's Urban Farming Movement*?, ALTERNET (May 9, 2014), http://www.alternet.org/environment/bizarre-why-michigan-govt-trying-derail-detroit-areas-urban-farming-movement.
397 DETROIT, MICH., CITY CODE § 61-12-326.

riparian resources protection in light of riverfront construction projects, while also prioritizing access to these urban riverways.

1. Highlights

First, efforts by a few cities to increase the public accessibility of waterfront areas are examined. As part of its overall master plan to rehabilitate the Los Angeles River corridor, Los Angeles has adopted standards for new developments along the river that aim to integrate the new development with the river and to engender a "river identity" for communities along the River,[398] while the City of Fort Meyers offers a density bonus for new developments that provide public access to riverfront areas.[399]

Second, this section examines two examples of cities that aim to protect natural riparian habitat and promote river health in innovative ways by providing a buffer from other intensive urban uses. For Tucson, this means protecting scarce water resources through seasonal washes.[400] For Austin, this includes promoting a hands-off approach to maintaining riverside vegetation.[401]

2. Los Angeles, California: River Improvement Overlay

In 2014, after seven years of debate and refinement, Los Angeles adopted the River Improvement Overlay ("RIO") District that aims to guide river-sensitive development along the Los Angeles River and its tributaries.[402] The RIO District is one portion of a larger Los Angeles River Revitalization Master Plan that has been in development since the early 1990s and seeks to balance the ecological and developmental potential of the Los Angeles River.[403]

One stated purpose for RIO is to establish a positive interface between new development along the river and existing parks and greenways.[404] The intent is to create an area along the river that is conducive to walking and biking, and that promotes ecological restoration of the river and its native species and habitats. Another

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398 *See infra* Part IV.J.2.

399 *See infra* Part IV.J.3.

400 *See infra* Part IV.J.4.

401 *See infra* Part IV.J.5.

402 Carren Jao, *L.A. River Improvement District Encourages River-Embracing Development*, KCET (Jul. 17, 2014), http://www.kcet.org/socal/departures/lariver/confluence/river-notes/la-river-improvement-district-encourages-river-embracing-development.html (providing background on public process leading to adoption of L.A. RIO).

403 *Los Angeles River Revitalization*, CITY OF L.A., http://www.lariver.org/Projects/MasterPlan/index.htm (link to plan and associated actions and participants).

404 L.A., CAL., MUN. CODE ch. 1, art. 3, § 13.17(A)(3) (2015).

stated purpose is to promote a "river identity" for river adjacent communities.[405]

At its core, RIO establishes a number of standards for new development along the Los Angeles River and its tributaries.[406] For example, 75 percent of new landscaping must be planted with a combination of native trees, plants and shrubs, and other drought resistant plants or other species approved in the Master Plan.[407] RIO also establishes standards for screening and enclosing parking areas, utility equipment, and trash areas, as well as limiting and shielding exterior lighting.[408] All new developments, with the exception of single-family homes, are required to provide river access from the buildings and to provide entrances that accommodate bikes and meet Americans with Disability Act requirements.[409]

3. Fort Myers, Florida: Density Bonus for Open Space/Public Access at Waterfront

The downtown area of Fort Myers fronts the Caloosahatchee River, which flows into the Gulf of Mexico. In the late 1990s, the City set out to revitalize its downtown, and a critical piece of this process was creating access to the river and preserving use of it. [410] To do this, the City adopted "Smart Code" revisions to its planning ordinance that includes a density bonus for development along the riverfront that incorporates desired public amenities.[411]

The density bonus provision provides that, in the downtown area, additional density and height will be granted on a percentage basis for projects that provide one of a few different categories of desired amenities.[412] Relevant to the effort to revitalize the riverfront, the

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[405] *Id.* § 13.17(A)(8).

[406] The Los Angeles RIO District encompasses properties within a 2,500 feet (half mile) of the 32 mile Los Angeles River. *See* Carren Jao, *supra* note 402 (summarizing area impacted to be codified as L.A., CAL., MUN. CODE § 12.04 (2014)). The RIO District is actually a series of distinct community districts that, while adhering to the basic requirements set forth by RIO, can also tailor requirements to the specific circumstances for a particular community. L.A., CAL., MUN. CODE § 13.17(D) (individual districts may develop standards tailored to the district).

[407] L.A., CAL., MUN. CODE § 13.17(F)(1).

[408] *Id.* §§ 13.17(F)(2), (F)(3).

[409] *Id.* § 13.17(F)(4).

[410] *See The Renaissance of Downtown Fort Myers, Florida: A Study of Partnership between Planners and Developers*, PIONEER WEST, http://www.pioneerwest.net/nomad/ftmyers.html (last visited Jan. 7, 2014) (discussing river front revitalization project); *see also Riverfront Development Plan*, FORT MYERS REDEVELOPMENT AGENCY, http://www.fortmyersbusinessdev.com/pdf/rivplan.pdf (last visited Jan. 7, 2016).

[411] FORT MYERS, FLA., CODE OF ORDINANCES pt. II, subtpart B, ch. 118, § 118.8.5(A)(5) (2015).

[412] *Id.*

following density bonuses are possible: a ten percent density bonus for projects that provide open space accessible to the general public, as well as a ten percent density bonus if water dependent uses, such as marinas, boat ramps and parks, are open to the general public.[413] Specifically for riverfront areas, the development must provide for a view corridor that ensures "that the proposed structure has an orientation and massing which is sensitive to and compatible with the building site and surrounding area, and which allows an unobstructed view of the river from the street visible from eye-level six feet above grade at the adjoining road pavement edge."[414]

4. Tucson, Arizona: Riparian Habitat Conservation Program

The City of Tucson has developed a combination of legal code provisions that are aimed at protecting the critical connection of the City's riparian areas with the larger regional hydrologic system. These connections are preserved through "washes," which originate on surrounding protected land and seasonally refresh the water supply for the City's riparian areas.[415]

The first part of Tucson's larger riparian conservation program is the Environmental Resource Zone ("ERZ") overlay, which targets washes that originate on nearby protected lands[416] and regulates land uses along these washes as they extend into the city. The ERZ overlay is recognized as one complementary part of a larger effort to protect Tucson's riparian habitats.[417] The ERZ overlay is applied to specific mapped critical riparian areas, including specific identified washes and their tributaries.[418] Construction projects in designated ERZ areas are subject to development standards.[419] At the outset, applications for development require a study of the affected resource corridor, except for landowners who choose not to build within the designated 100-year floodplain.[420]

Developments are required to preserve 100 percent of designated "critical riparian habitat."[421] If 100 percent preservation cannot be

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413 *Id.*

414 *Id.*

415 TUCSON, ARIZ., LAND USE CODE § 2.8.6 (2012). For a discussion of Tuscon's ongoing effort to replace the Land Use code with a new Unified Development Code see *supra* note 290.

416 Nearby protected lands include Saguaro National Park, Coronado National Forest, and Tucson Mountain Park.

417 TUCSON, ARIZ., LAND USE CODE § 2.8.6.1 (2012) (ERZ Purpose).

418 *Id.* § 2.8.6.2 (Applicability).

419 *Id.* § 2.8.6.2(C) (New Development).

420 *Id.* § 2.8.6.4 (Review and Approval Procedure).

421 *Id.* § 2.8.6.5 (Development Regulations).

achieved, the city requires a mitigation plan.[422] Specific design requirements are also established for roadway and utility encroachments into ERZ areas.[423] These encroachments are to be designed to cross underground at the narrowest point of critical habitat and only if no other alternative is available.[424] If the specific point of the crossing is a known wildlife corridor, the design must incorporate a means for safe and accessible passage for wildlife.[425] Fences and walls similarly must be designed to not impede wildlife passage.[426] Exterior lighting must be designed to create pools of light, as opposed to dispersed light.[427]

The second legal tool adopted by Tucson is the Watercourse Amenities, Safety, and Habitat ("WASH") ordinance.[428] This ordinance implements the City's Interim Watercourse Improvement Policy, which provides for flood control, erosion mitigation, and groundwater recharge through the preservation of designated washes in natural and undisturbed states.[429]

For any alterations within 50 feet of the banks of washes, the WASH ordinance requires a detailed study of the impacts the alternations would have on the hydrology of the washes.[430] The parameters of the study include impacts to soil conditions, groundwater recharge, and sedimentation.[431] Also required is documentation of the 100-year floodplain 200 yards upstream and downstream of the site, and a catalog of existing site vegetation and wildlife habitats.[432] For areas that are identified as existing resources (existing native vegetation or wildlife habitat), the emphasis is on avoiding the resource areas.[433] If the development plan cannot avoid impacting the existing vegetation, the City requires mitigation to ensure that the site is revegetated at the same or greater density than before the alteration.[434]

The last component of Tucson's comprehensive riparian area protection scheme is the Native Plant Preservation Ordinance ("NPPO"),[435] which protects native vegetation in upland areas outside of

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422 *Id.*
423 *Id.* § 2.8.6.6 (Standards for Roadway/Utility Encroachments).
424 *Id.*
425 *Id.*
426 *Id.* § 2.8.6.7 (Standards for Fences, Walls and Exterior Lighting).
427 *Id.*
428 TUCSON, ARIZ., CITY CODE, ch. 29, art. VIII (2015).
429 *Id.*
430 TUCSON, ARIZ., CITY CODE § 29-15 (Development in Study Area).
431 *Id.*
432 *Id.*
433 *Id.* § 29-16 (Development Requirements for Resource Areas).
434 *Id.*
435 TUCSON, ARIZ., LAND USE CODE §§ 3.8.1–3.8.8 (2012).

the riparian areas addressed by the ERZ and the WASH regulations. The NPPO division of the Tucson land use code opens with a description of the native Saguaro cactus, which dominated Tucson's landscape, as well as primary invasive threats to native species, which are converting "a fire-resistant desert to flammable grassland."[436] The intent of the NPPO is to encourage developers to plant native vegetation and to ensure, as in the WASH ordinance, that if native vegetation is disturbed that mitigation will revegetate at a compensatory ratio and recreate "the natural character and plant distribution similar to the undisturbed vegetation on and adjacent to the subject site."[437] In essence, the NPPO is a no-net-loss provision for native vegetation impacted by new developments.[438]

5. Austin, Texas: Grow Zone

As part of a larger program to restore riparian areas, the City of Austin has implemented a "Grow Zone" within 19 different City parks. The Grow Zone constitutes a twenty-five foot buffer along riparian areas where passive, natural plant growth is permitted with minimal City interference (i.e. no mowing).[439] The stated benefits of the program include:

> 1) filtering storm runoff;
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> 2) removing pollutants before they reach the creek;
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> 3) preventing stream bank erosion;
>
> 4) slowing flow, reducing downstream flooding;
>
> 5) providing a "sponge" that will absorb water;
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> 6) providing shade that cools air and water temperatures;
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> 7) providing habitat and food for a diverse group of animals;
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> 8) reducing the City's carbon footprint via both sequestration and reduced emissions;
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> 9) reducing mowing and maintenance by City staff; [and]

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[436] *Id.* § 3.8.1 (Intent).

[437] *Id.*

[438] Mitigation for replacement of loss vegetation varies by species. For example, Saguaro cacti are replaced at a ratio of 3:1 in order to ensure survival of at least one new plant for every plant lost. *See id.* § 3.8.6, TABLE 3.8.6-I (Protected Native Plant Preservation and Mitigation Requirements).

[439] *Grow Zones*, AUSTIN WATERSHED PROT. DEPT. (Oct. 3, 2012), https://www.austintexas.gov/blog/grow-zones.

> 10) creating a greenbelt forest and stream amenity with diverse tree and plant communities for outdoor enthusiasts.[440]

V. CONCLUSIONS

The following are some specific principles that are recurrent and important for the development of biophilic laws. Additionally, one major area is identified that requires further investigation, which is a survey of international biophilic laws.

A. Elements of Biophilic Law

There is no basic template for biophilic laws. There are, however, some themes that recur. To a degree, there are common elements for any legal frameworks, such as encouraging innovation, flexibility, and collaboration, which have particular resonance in the area of biophilic planning. More specifically though, there are three elements that are particularly important to developing natural space in urban areas with biophilic lawmaking: 1) adherence to ecological principles; 2) diffused decisionmaking and 3) information gathering.

1. Adherence to Ecological Principles

Nature must be a primary influence on how we plan for it. We need to learn from and understand the ecology of natural systems if we intend to improve nature's presence in our daily lives. Manmade systems can draw inspiration from the natural systems with which they seek to co-exist.[441] Biophilic laws require planning for interactions with nature and adhering to ecological principles that will allow natural spaces to flourish.[442]

a. Adaptability

A first principle is adaptability. One primary failing of traditional regulatory mechanisms is that they are "maladaptive" and assume a

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[440] *Id.*

[441] ***See*** Alexandra Ramsden and Jennifer Barnes, *The Urban Greenprint: Biomimicry Applied to a City*, TREEHUGGER (June 18, 2013) http://www.treehugger.com/urban-design/urban-greenprint-biomimicry-applied-city.html (discussing Urban Greenprint program of Biomimicry Puget Sound network, which seeks "to understand how the predevelopment ecosystem functioned, and then ask how our urban structures and spaces can restore those same functions); *see also* MICHAEL KINSLEY, ROCKY MOUNTAIN INST., BUILDING COMMUNITY PROSPERITY THROUGH NATURAL CAPITALISM (2007) (promoting shift to biologically inspired economic models).

[442] DUERKSEN ET AL., *supra* note 11 (recognizing that human and natural systems can co-exist provided that biological principles are followed).

stable, linear change with predictable conditions.[443] Laws that seek to promote co-existence with natural systems need to respond to changing natural systems, maintain a tolerance for uncertainty, and allow for flexible decision-making.[444]

b. Connectivity

A principal challenge for high-density urban areas is establishing connectivity for wildlife and other natural systems. Such connectivity is essential for nature to function. This includes maintaining both large, intact patches of native vegetation and corridors for wildlife movement between habitats across areas dominated by human activities.[445] Biophilic law must encourage a conscious tolerance for nature to co-exist and flow through urban areas. Successfully addressing this important element of urban and environmental planning has significant rewards for communities by increasing the opportunities to engage with nature and by creating greenways through the urban fabric that residents can use as alternative transportation routes and experience a different pace of life.[446]

Connectivity can also have important meaning beyond just natural systems.[447] The success of urban biophilic projects will depend on how well they integrate with the larger urban landscape, remaining accessible to and usable for urban residents.[448] Truly successful

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[443] *See generally* Craig Anthony (Tony) Arnold & Lance Gunderson, *Adaptive Law and Resilience*, 43 ENVTL L. REP. 10426 (2013) (discussing need for development of "Adaptive Law" that is responsive to changing ecological conditions, maintains a tolerance for uncertainty and allows for flexible decision-making); Tony Arnold, *Resilient Cities and Adaptive Law Pt. 1: Resilient Science & the Legal System*, BIOPHILIC CITIES (July 31, 2013), http://biophiliccities.org/resilient-cities-and-adaptive-law-pt-1-resilience-science-the-legal-system/ (applying theory of adaptive law in specific biophilic cities context). *See also* Berry, *supra* note 1, at 148 (promoting creation of laws to aid in the resiliency of urban areas that account for adaptive social-ecological management and adaptive governance); PECK, *supra* note 40, at 154 (discussing value of adaptive management in planning for biodiversity).

[444] Arnold & Gunderson, *supra* note 443, at 10436.

[445] DUERKSEN ET AL., *supra* note 11, at 11–22 (establishing connectivity as primary biological principles for wildlife habitat protection at both landscape and site scales); *see also* PECK, *supra* note 40, at 96 (discussing strategy of conserving landscape corridors to promote connectivity).

[446] Peter Aspinall, Panagiotis Mavros, Richard Coyne, & Jenny Roe, *The Urban Brain: Analysing Outdoor Physical Activity with Mobile EEG*, 49 BRIT. J. SPORTS MED. 272 (2013) (neurological study evidencing lower frustration and higher meditation when moving from active city street to urban nature setting).

[447] BENEDICT & MCMAHON, *supra* note 3, at 37 ("Green infrastructure draws its strength from its focus on connectivity – between natural lands and other open spaces, between people, and between programs.").

[448] *See* Berry, supra note 1, at 140 (cultivation of urban land ethic requires establishing connection between citizens of the city and the land).

biophilic projects will invite creative and varied uses for these urban-nature settings.[449]

c. Native Ecosystems and Species

Biophilic design requires an emphasis on allowing natural systems to do what they do best. Natural landscapes, and the species that depend on them, have evolved to thrive in local climates and environmental conditions. The interconnectivity between native landscapes and the species that use them is often complex and not fully understood. The most assured way to allow nature to flourish is to focus on promoting the health and resurgence of plants and animals that are native to a place. In many circumstances, this may be more difficult than it sounds because societal norms encourage a preference for certain landscapes, such as the iconic American grass lawn, that are not only non-native ecosystems, but are often in conflict with local conditions.[450]

A review of more recent attempts at regulating vegetation in urban areas, such as the Seattle Green Factor and the New York City Urban Ecology Green Code Revisions, demonstrates an increasing emphasis on cultivating native vegetation in urban landscapes. In turn, the species that depend on the native vegetation are more likely to flourish.[451]

2. Diffused Decision Making

There is growing consensus that cities are at the forefront of developing new policies and creating new opportunities for unique partnerships between government and private actors.[452] The result of this

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[449] One example from an endless list: an enchanted fairy day for children in Teardrop Park in New York City. *Fairy Day: Enchanted Fairies & Elves*, N.Y. METRO PARENTS, http://www.nymetroparents.com/manhattan/2014neweventinfo.cfm?id=135414 (last visited Jan. 7, 2016).

[450] *See generally* F. HERBERT BORMAN, DIANA BALMORI & GORDON T. GEBALLE, REDESIGNING THE AMERICAN LAWN: A SEARCH FOR ENVIRONMENTAL HARMONY (1993) (examining historical development of American grass lawns, which as a landscape is at odds with the diversity of ecosystems naturally occurring across the breadth of the United States).

[451] *See, e.g.*, DUERKSEN ET AL., *supra* note 11, at 23 (discussing positive correlation between diversity of bird species in urban areas and the amount of native vegetation).

[452] *See generally* BRUCE KATZ & JENNIFER BRADLEY, THE METROPOLITAN REVOLUTION: HOW CITIES AND METROS ARE FIXING OUR BROKEN POLITICS AND FRAGILE ECONOMY (2013) (providing wide range of examples of successful city government programs and partnerships and advocating for increased push for placing cities at the forefront of decision-making). *See also* Tony Arnold, *Resilient Cities and Adaptive Law Pt. 2: Local Governance & Resilient Cities*, BIOPHILIC CITIES (Aug. 8, 2013), http://biophiliccities.org/resilient-cities-adaptive-law-pt-2-local-governance-resilient-cities (arguing for "polycentric structure of an adaptive legal system" that can offer opportunities for cities to be leaders in efforts for social-ecological resilience); DUERKSEN ET AL., *supra* note 11, at 3 (documenting growing role of local initiatives in conserving wildlife habitat).

reality is that a push for innovative laws is likely to "trickle up" from urban centers. The vast majority of the biophilic laws highlighted in this paper originate from the creativity of urban areas and the diversity of interest groups active in those communities.

Decentralizing the creation of laws allows cities to mold the laws to their unique local circumstances. It also ensures that these laws do not become boilerplate and fail to address changing conditions and evolving science, in addition to avoiding the debilitating stalemate of national politics, where fresh ideas are difficult to implement on a one-size-fits-all national scale. While good policies should be replicated, cities must take their own hand at drafting the laws that define how their communities look, feel, and develop.

3. Information Gathering

Full and complete information as to existing conditions is a powerful influence on decision-making.[453] It serves the dual purpose of ensuring that the best decisions with the most effective results can be made, and also ensures that everyone is on the same page and fully understands what is at stake.[454] Full information includes taking stock of current conditions and assessing where the greatest needs exist and the most bang-for-the-buck can be achieved.

A fundamental building block is an understanding or appreciation of the value of nature in our lives and how easily it can be improved. How to engender an appreciation and to communicate the value of biophilic planning is the first step in developing a system of laws that will increase exposure to nature. Any effort to improve the design of cities will be for naught unless there is foundational buy-in for the effort across the community.

B. Further Survey of International Biophilic Law

This article introduces a survey of a number of different legal mechanisms in cities across North America that are designed to encourage protecting and access to urban nature. This survey does not account for examples from numerous cities outside of the United States

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[453] *See generally* PECK, supra note 40, at ch. 6 (outlining importance of collecting and understanding information on baseline conditions at outset of planning process); RANDALL ARENDT, GROWING GREENER: PUTTING CONSERVATION INTO LOCAL PLANS AND ORDINANCES ch. 3 (1999) (describing role of development of effective comprehensive plan to aid in conservation planning).

[454] *See also* Berry, supra note 1, at 147 (identifying education as a critical element for the cultivation of an urban land ethic and noting the direct correlation between increased environmental education and pro-environment behavior).

and Canada that are at the forefront of adopting legal mechanisms to promote biophilic planning.

For example, this article discusses the Green Roof Bylaw adopted by Toronto. Similarly, Basel, Switzerland, requires green roofs for newly constructed flat roofs.[455] The Singapore National Parks Board has has adopted a number of incentives and programs for financial assistance to spur both the development of green roofs and green walls.[456]

Also as mentioned above, the Seattle Green Factor is modeled after similar pioneering provisions adopted in Berlin, Germany, and Malmo, Sweden.[457] A similar survey of the various legal mechanisms adopted internationally is certainly warranted, though it would present the additional challenge of drawing from different systems of law. While some of these countries may be similar the American legal system, some differ in significant respects. A proper survey of international biophilic policies should identify where commonalities exist and how the international examples can be adopted in North America despite the differences in legal systems.

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[455] Stephan Brenneisen, *Space for Urban Wildlife: Designing Green Roofs as Habitats in Switzerland*, URBAN HABAITATS (Dec. 2006), http://urbanhabitats.org/v04n01/wildlife_full.html.

[456] *See* SKYRISE GREENERY, https://www.skyrisegreenery.com/ (last visited Jan. 7, 2016).

[457] *See supra* note 141 and accompanying text.