

Ecological Planning Tools *for Biophilic Cities*

Tim Beatley University of Virginia

Ecological Planning Tools

Vision



**Ecological
Data and
Analysis**



**Metrics and
Targets**



**Plans and Plan
Making**



Codes
Implementation

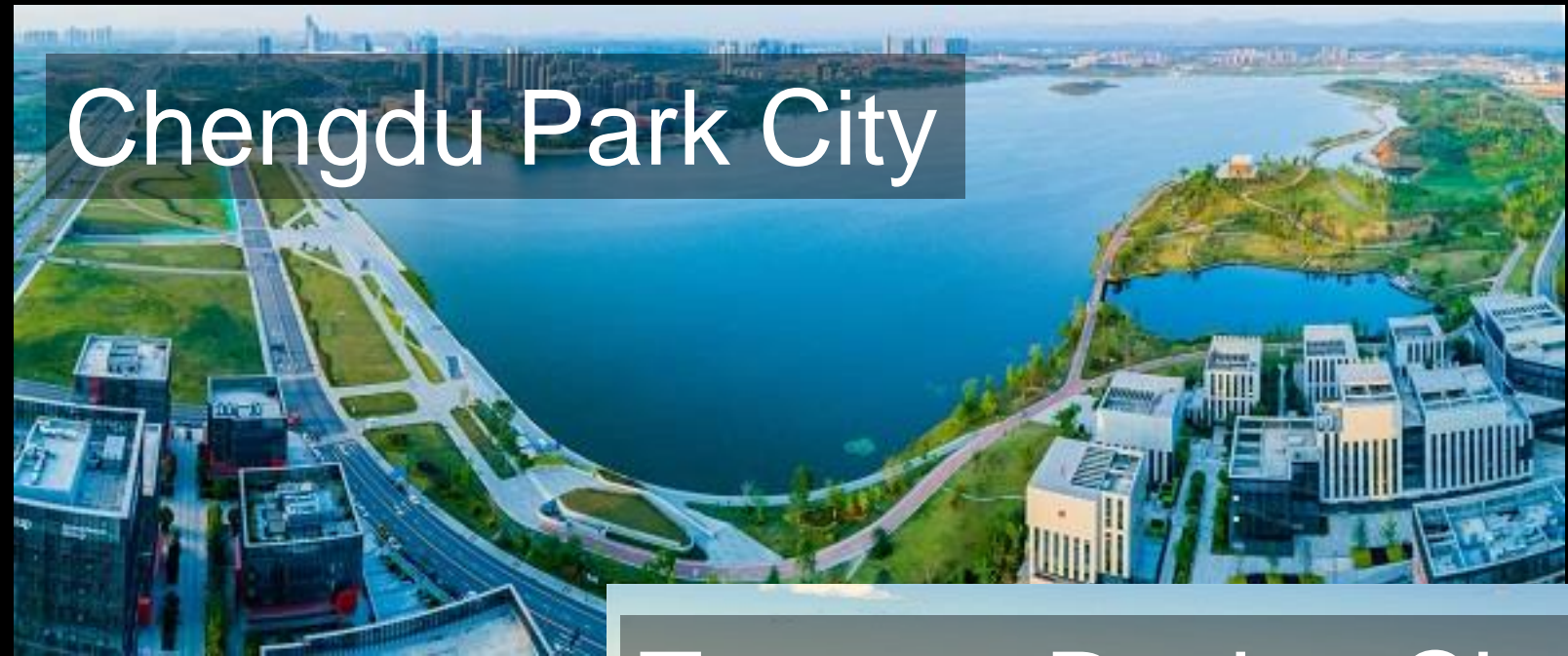
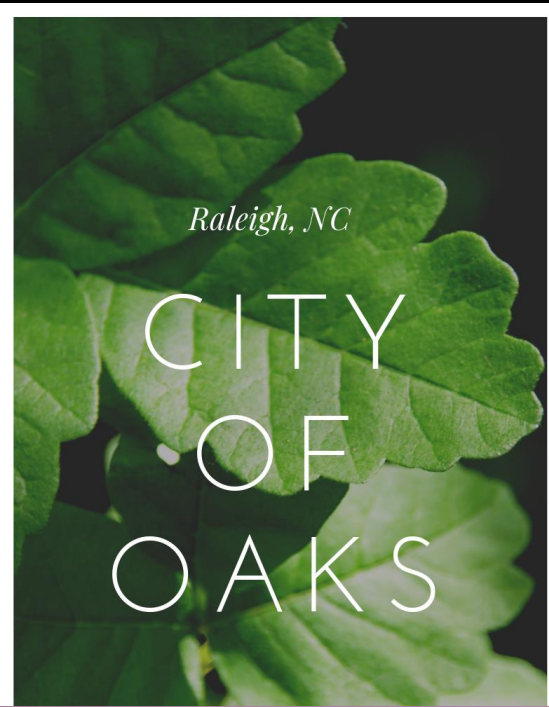


**Community
Engagement
and Education**

1. Vision

Singapore: City in a Garden
Biophilic City in Nature

PARK ROYAL at Pickering
WOHA Architects





**Immersive Nature
Integrated, Continuous and Seamless**



**Built and Natural
Environments
Together**



**Biodiversity and
Wildness**



Beyond Parks



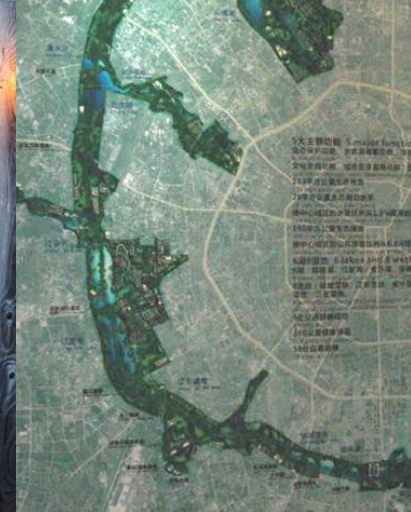
Whole of City



**Just and
Inclusive**



**Culture of
Biophilia**



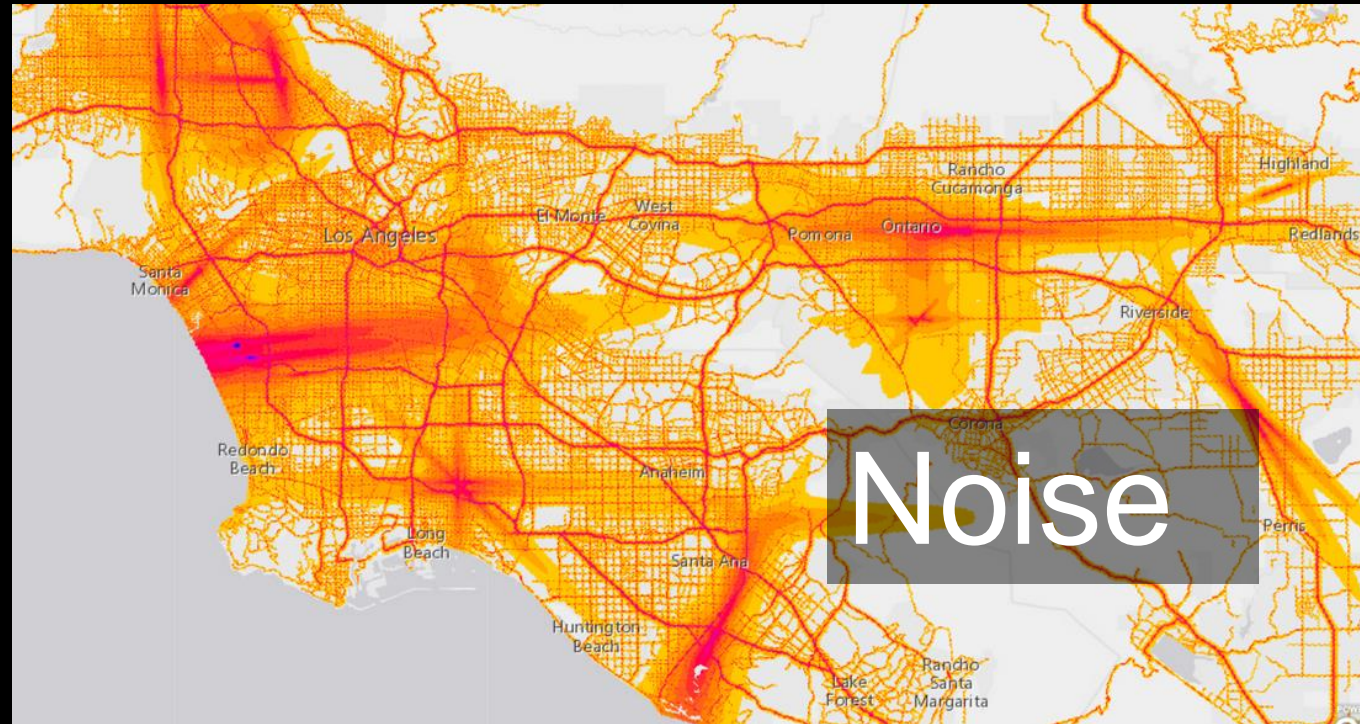
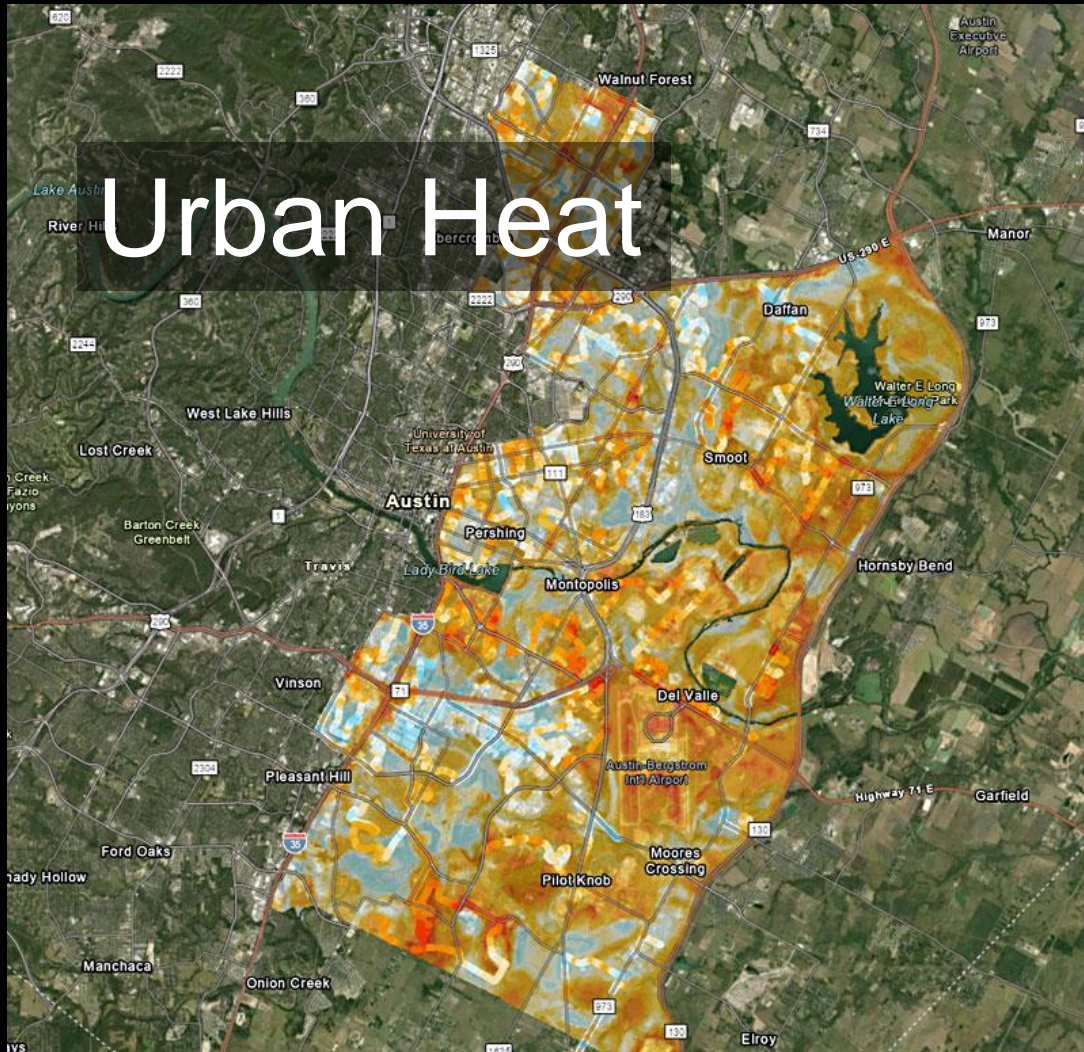
Whole of Life

What Are the Qualities of Biophilic Cities?

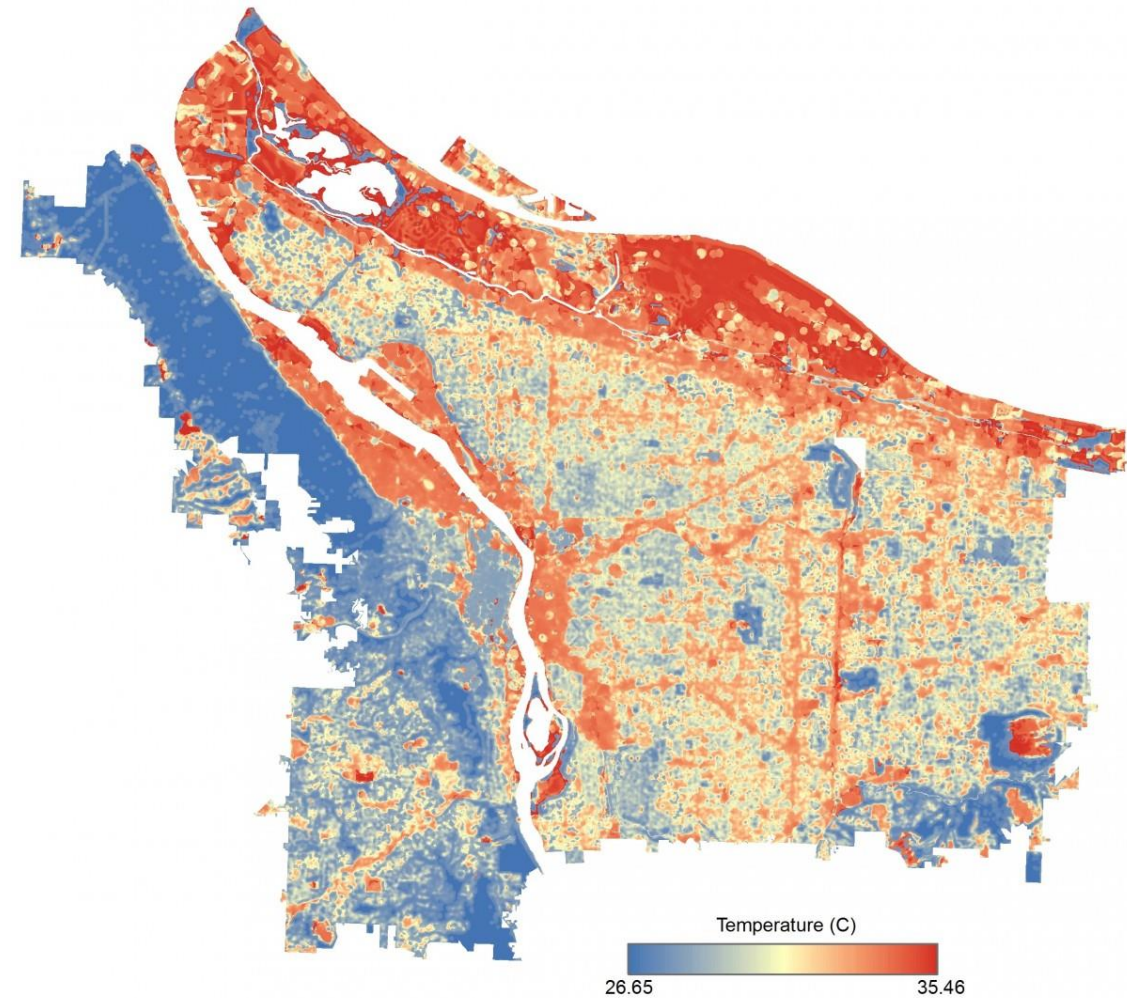


Networks of Interconnected Nature
Whole-of-City Approach

2. Ecological Data and Analysis



Citizen Heat Mapping Campaigns



Portland, Oregon



Mapping How Birds Move Through the City

A Birds Eye View:
Chickadee
Resistance Map

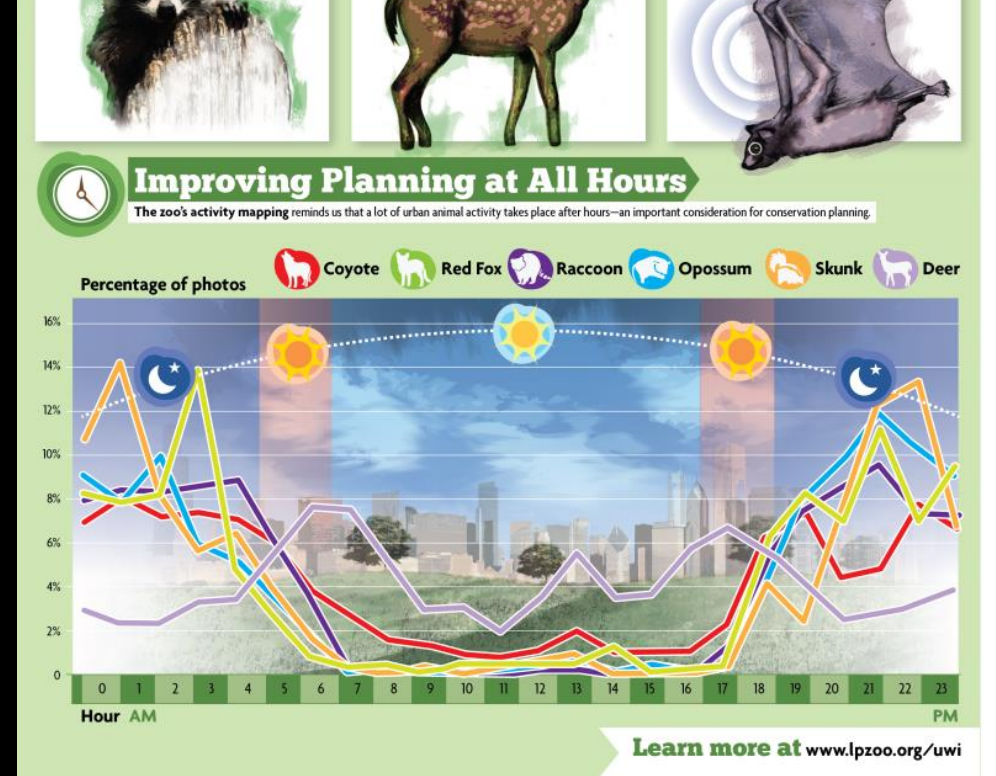
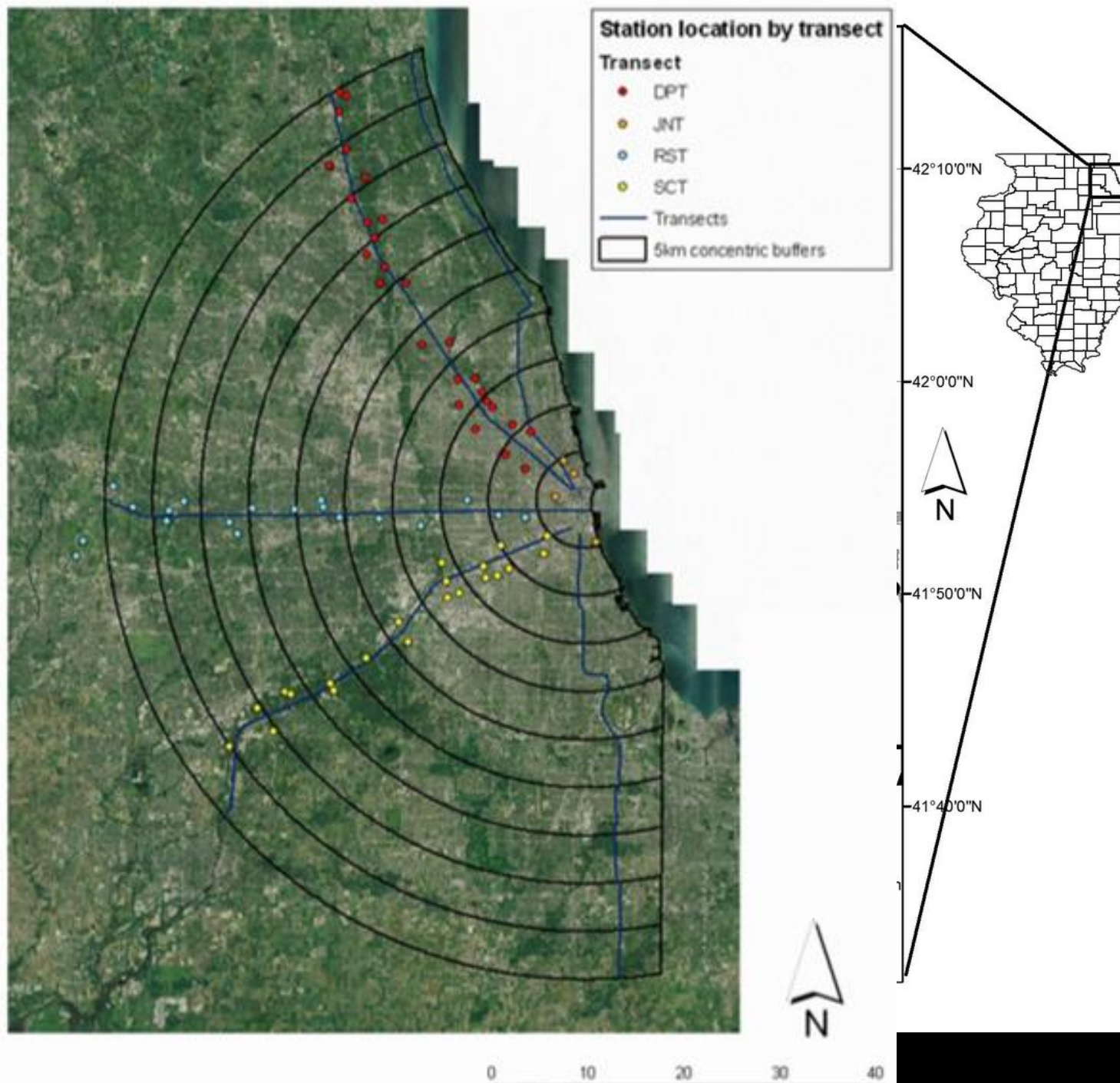
Source: Edmonton, CA

Circuit Theory in City Planning

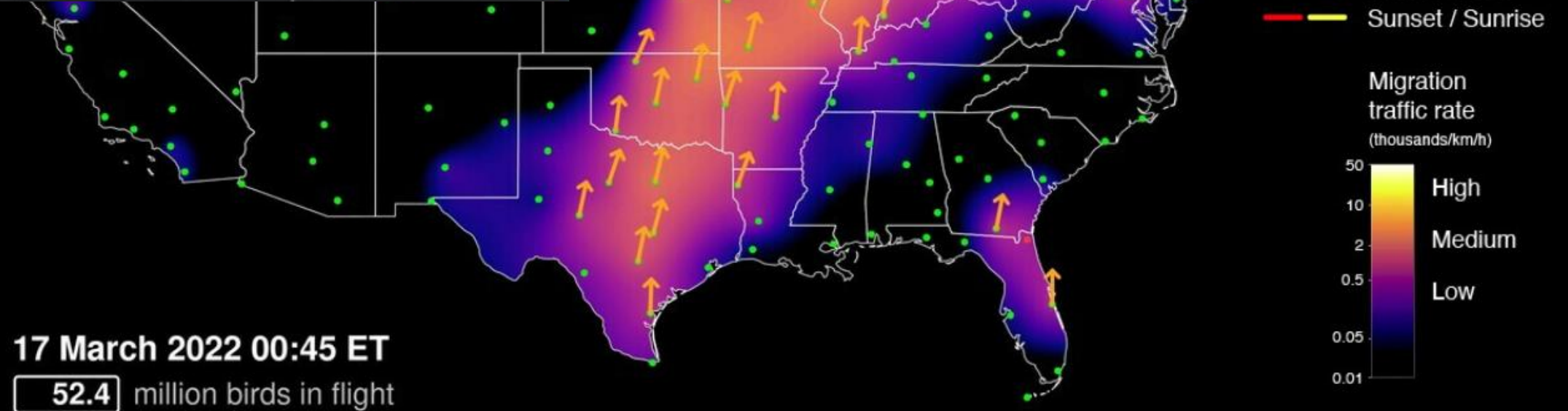
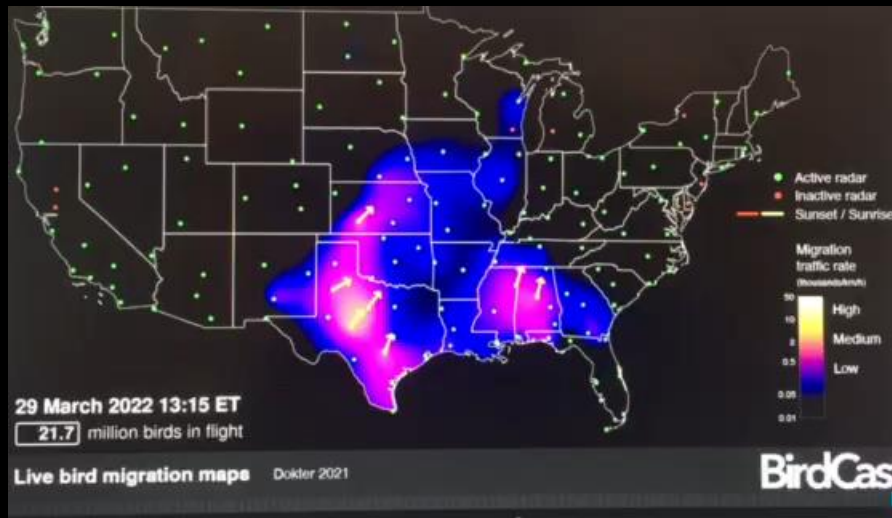


Seth Magle
Urban Wildlife institute
Lincoln Park Zoo,
Chicago





<https://birdcast.info/migration-tools/live-migration-maps/>



Live bird migration maps Dokter 2021

BirdCast



SPEED



[News](#)[Events](#)[Services](#)

Raleigh Joins Lights Out for Bird Migration

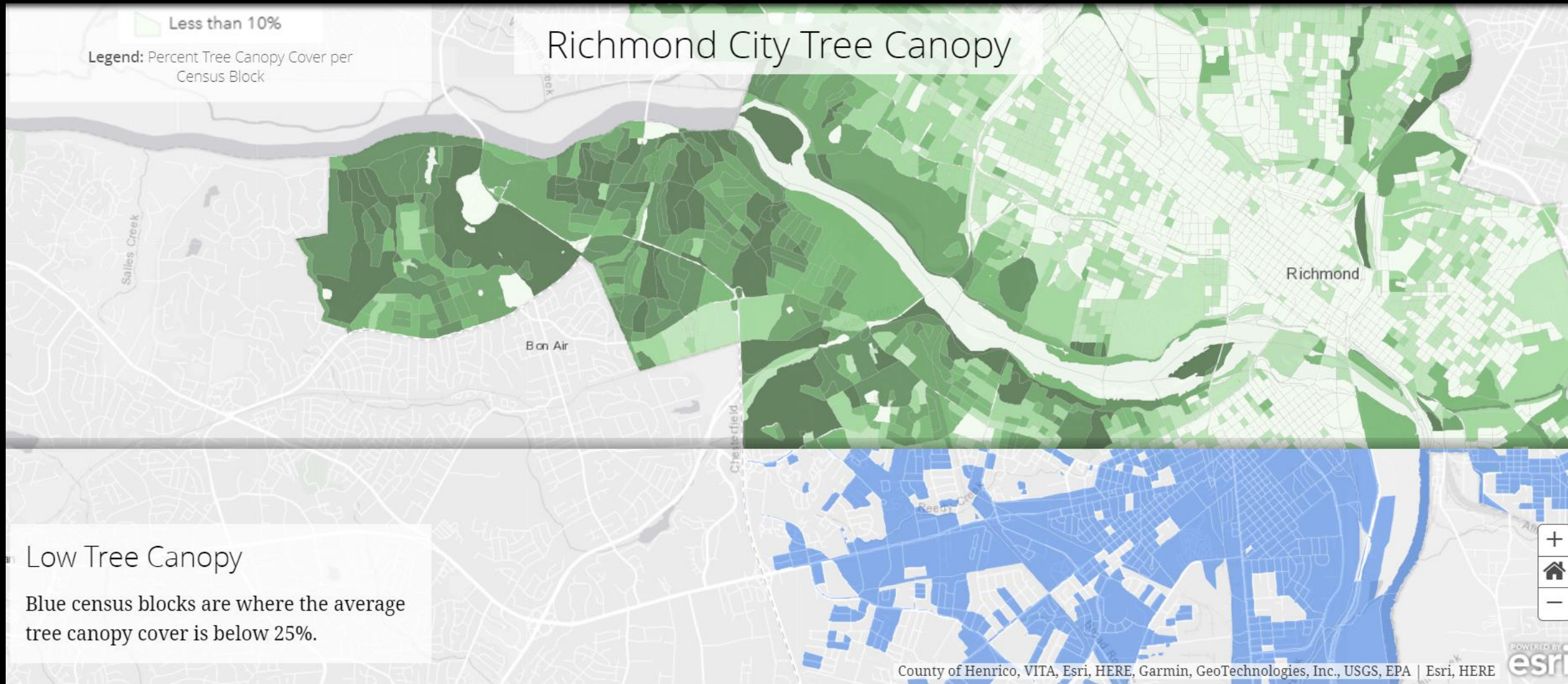
March 15 through May 31, 11 p.m. to 6 a.m.

MAR 8, 2022

Each spring and fall, millions of migrating birds travel through the State of North Carolina, mostly under the cover of darkness. To help assure their safe passage, the City of Raleigh is joining efforts to protect migrating birds by going Lights Out.

Effective **March 15 through May 31**, all non-essential lighting in City facilities will be turned off between 11 p.m. and 6 a.m. Bright lights can attract and disorient nocturnally migrating birds, leading to potential collisions with buildings. Migratory bird populations are in serious





Distribution of Tree Canopy is Often Profoundly Inequitable

Provide Greenways & Parks for All

100% of Richmonders within a 10-minute walk of a park

A connected network of parks and greenways will provide Richmonders with access to green space for places of relaxation, rejuvenation, and recreation and provide these benefits:

- **Reduce the heat-island effect:** Richmond's heat-island effect is more pronounced in areas of high poverty because there are not many parks, a lot of pavement, and a thin tree canopy.
- **Manage rainfall:** Green space manages rainfall and reduces the amount of rainwater that flows into the City's drainage and sewage systems.
- **Improve health outcomes:** Proximity to a park and greenway system can help reduce chronic conditions, such as asthma, diabetes, and obesity.
- **Anchor new and existing neighborhoods:** Parks and greenway systems create a gathering place in communities and can serve as catalysts to spur private investment in the city.
- **Increase resiliency to a changing climate:** vegetation sequesters carbon which helps reduce the total amount of emissions in the city and a network of greenways encourages biking and walking, instead of driving, thereby potentially reducing per capita carbon emissions

Many strategies in *Richmond 300* relate to creating more parks and greenways. Objective 17.4 states: "Increase the percentage of Richmonders within a 10-minute walk of quality open space to 100%, prioritizing low-income areas with a high heat vulnerability index rating, with a long-term goal of having all Richmonders within a 5-minute walk of a quality open space."

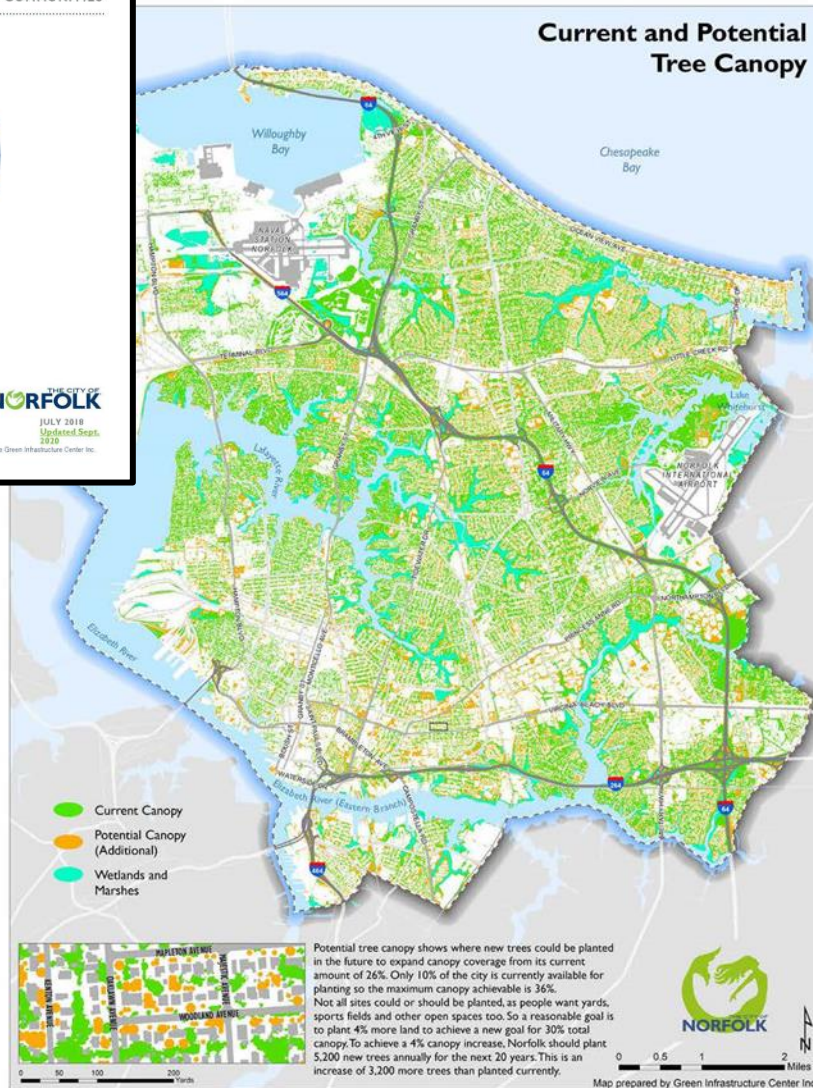
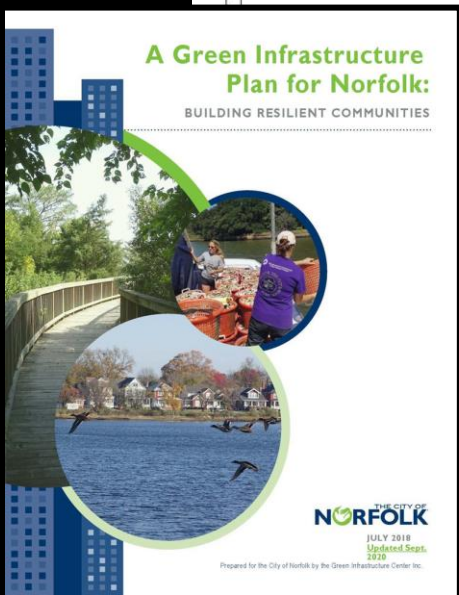


Parks and Greenways As Richmond looks to add new parks to the city, not all new parks will be large parks. Some may be pocket parks, like Scuffletown Park in the Fan [top] and others may be reclaimed industrial space, like the Low Line [middle]. The Capitol Trail [middle] and Cannon Creek Greenway [bottom] are greenways that provides safe paths for walkers, joggers, and cyclists.

3. Metrics for Biophilic Cities

Nature Targets

- Minimum Tree Canopy of 30% in all neighborhoods, with emphasis on those with high heat vulnerability index;
- 100% Richmonders within 10 min walk of a park.



Norfolk's Target:
30% Canopy
Site Plans for New
Development:
Minimum Canopy
by Zoning District
Tree Preservation
Incentive

A Green Infrastructure Plan for Norfolk:

BUILDING RESILIENT COMMUNITIES



Trees lost to flooding.



Tree root damage.

WHAT IS A GREEN STREET?

A green street provides places for multi-modal travel, enhanced vegetation, and other functions such as 'green' constructed stormwater management. Green streets not only take up excess stormwater; they can be more attractive to prospective businesses. Often, new shops and businesses locate in an area where a green street project has been installed. At right are hypothetical 'before and after' green street simulations to model the visual (aesthetic) improvements a green street can offer.

LIVING SHORELINES

A resilient city also needs to have healthy shorelines that are as natural as possible to absorb wind and wave energy and provide habitat. 'Living shorelines' are a key focus of this plan. There are many variables that affect whether a stabilized shoreline can be natural – also called a living shoreline. Factors such as waves and wind that build up energy over distances ('fetch') can require a hardened shoreline to protect man-made structures. However, there are many shorelines in the city that are unnecessarily hardened

Streets can be redesigned to be green, bringing back life and reducing vacancies in commercial districts.





Barcelona Building Block
Image Credit: Erwan Hersy on unSplash

The 3-30-300 Rule for Urban Forestry and Greener Cities

By Cecil Konijnendijk

Crucial Urban Forests

Urban forests provide a wide range of essential benefits. Current global challenges, such as climate change, environmental degradation, and the COVID-19 pandemic, have resulted in increased awareness of the importance of urban trees

spaces during times of restricted movements, and when lock-down restrictions were eased in Spain, many people flocked to parks and other green spaces. Many studies from across the world have demonstrated the importance and increased use of urban nature during the pandemic. Even indoor plants have become

show.

When working with cities, national governments, and international organisations, experts like me are often asked for specific guidelines for developing successful urban forestry programs. We have mostly declined, because every

cover) across various contexts and settings. The situation in Barcelona, for example, is very different from that in Vancouver, and Beijing is a world away from Lagos, even though these are both megacities.

Based on some of the most up-to-date research on the links between urban forests and health, wellbeing, and climate change, and the work of influential global organisations like the World Health Organization, we would

pandemic, people have often been bound to their homes or direct neighbourhoods, placing even greater importance on nearby trees and other green in gardens and along streets. Seeing green from our windows helps us keep in touch with nature and

the 3-30-300 rule:



The 10-20-30 rule, however, does not have a specific focus on the benefits provided by urban forests. Given the current climate and public health urgencies, as well as a range of other challenges we face, it would be useful to introduce a guiding principle for urban forest programmes, and city greening across the world, that ensures that all residents have access

infrastructure into all places where we live and work, so that nature is always within sight and easy access.

3 Trees from Every Home

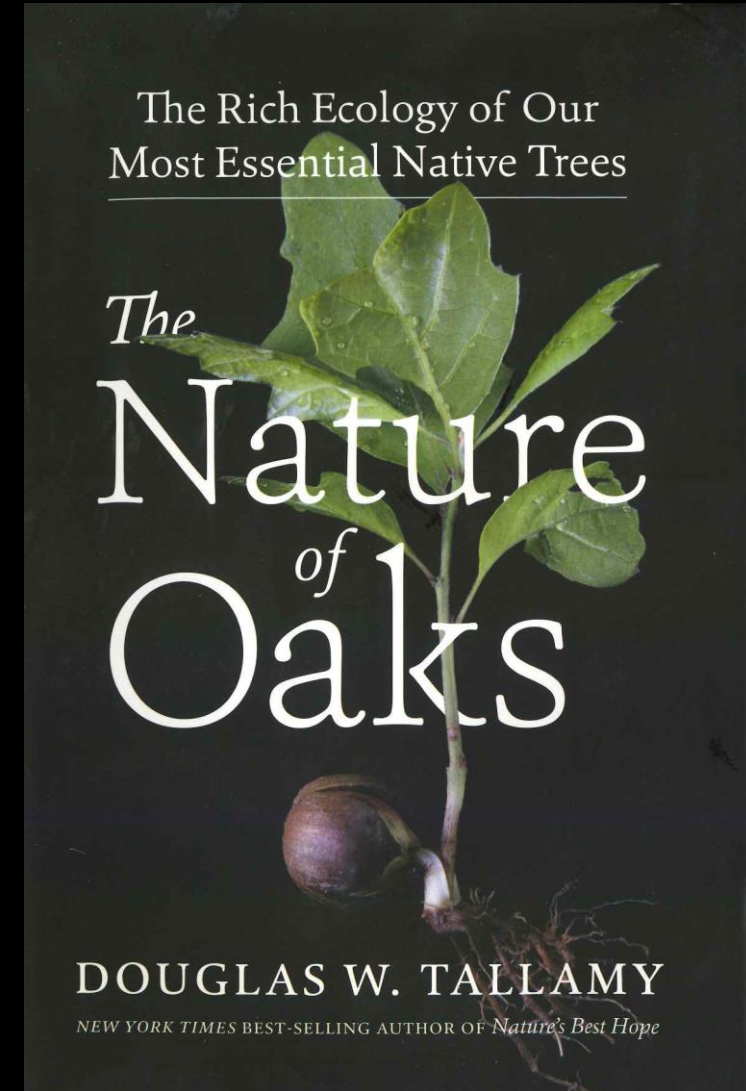
The first element of the rule is that every citizen should be able to see at least three trees (of a decent size) from their home. [Recent research](#) demonstrates the importance

percentage that ensures that residents benefit in terms of their health and wellbeing. By creating more leafy neighbourhoods, we also encourage people to spend more time outdoors and to interact with their neighbourhoods (which in turn promotes social health). Many of the most ambitious cities in the world in terms of greening, including [Barcelona](#), [Bristol](#), [Canberra](#), [Seattle](#) and [Vancouver](#)

What Species of Trees Should We Plant?



“Currently, the city’s canopy is estimated to be up to 50% crepe myrtles. While they are lovely and very hardy plants, they do not take up much stormwater, provide much shade, or host beneficial insects such as pollinators and butterflies.” —*Norfolk Green Infrastructure Plan, 2020*



Importance of Native Trees and Plants and the *Mutualisms* They Support

A photograph of a city skyline at sunset. The sun is low on the horizon, casting a warm glow over the buildings and reflecting on the water in the foreground. A large flock of birds is flying in the sky, silhouetted against the bright light of the setting sun. The city skyline features various skyscrapers and buildings, some with cranes visible on the left side. The water in the foreground is calm, showing clear reflections of the city and the sky.

INSIGHT

Why we must let birdsong be heard in our cities again

By **Sebastian McCarthy** | Thu 4 March 2021

From *Property Week*

4. An Ecosystem of Plans



Building and
Site

Block
and
Street

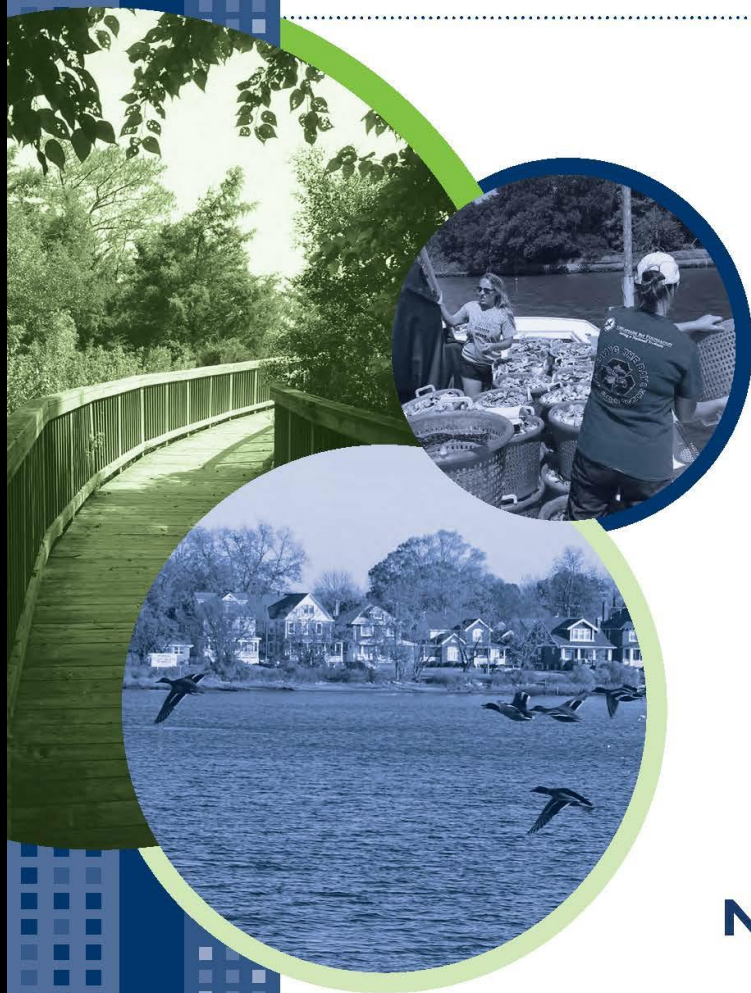
Neighborhood
and District

City

Region and
Bioregion

A Green Infrastructure Plan for Norfolk:

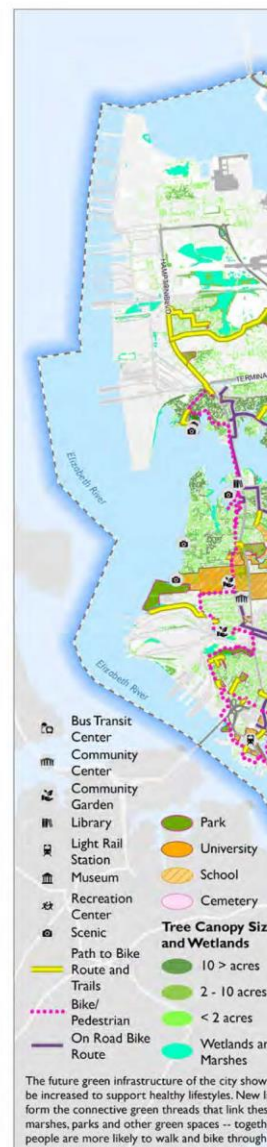
BUILDING RESILIENT COMMUNITIES



THE CITY OF
NORFOLK

JULY 2018

Prepared for the City of Norfolk by the Green Infrastructure Center Inc.



GOAL SUMMARY:

The following is a summary of goals and objectives. Detailed actions are included in the strategy section on page 50.

Land Goal 1: Increase and maintain natural green infrastructure – urban forest, shrub and meadow habitats – to support wildlife, infiltrate and clean water, improve air quality, reduce high temperatures and provide scenic beauty.

Obj. 1: Create a planting goal for tree canopy to achieve 30% canopy coverage (a 4% increase).

Obj. 2: Create incentives for tree planting by citizens and businesses.

Obj. 3: Protect intact habitat patches in the city and connect or reconnect them with green pathways to support people, plants, and animals. (See map of Future Green Infrastructure Network).

Obj. 4: Encourage the use of native plantings.

Obj. 5: Improve the city's data on trees to ensure good management and longevity.

Obj. 6: Promote urban food production for healthful communities and permeable landscapes.

Obj. 7: Daylight (re-surface) creeks that have been buried to expand channel capacity and provide natural amenities for communities.

Land Goal 2: Install and maintain constructed green infrastructure to detain and retain stormwater and beautify areas where natural green infrastructure practices are less suitable.

Obj. 1: Use schools and parks as demonstration sites for low impact development – constructed and natural green infrastructure – and continue to engage students as designers.

Obj. 2: Retrofit existing parking lots to create room for bioswales and other best management practices to infiltrate or store water.

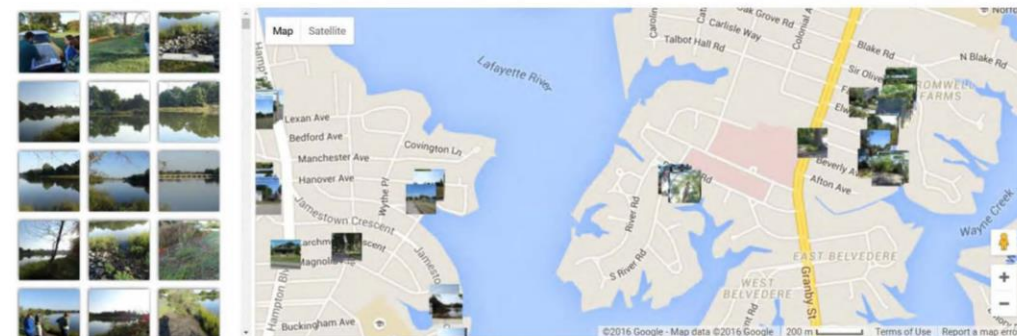
Obj. 3: Encourage building owners to retrofit existing roofs for stormwater treatment.

Obj. 4: Create an annual innovation award for those developments that use the greatest creativity in instituting and maximizing the use of low impact development strategies.

Obj. 5: Create and promote stormwater education through parks to demonstrate low impact development practices.

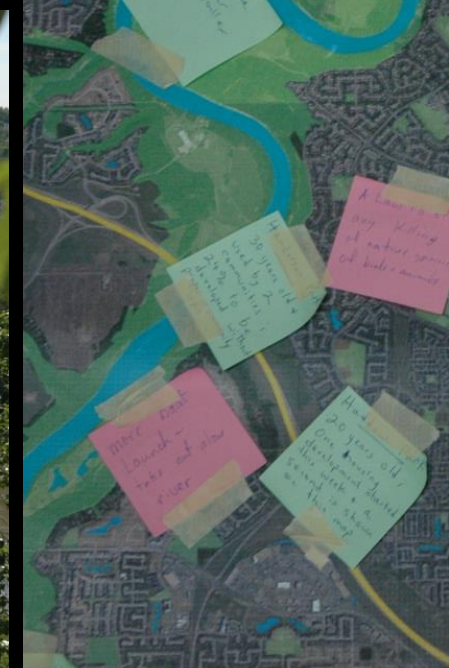
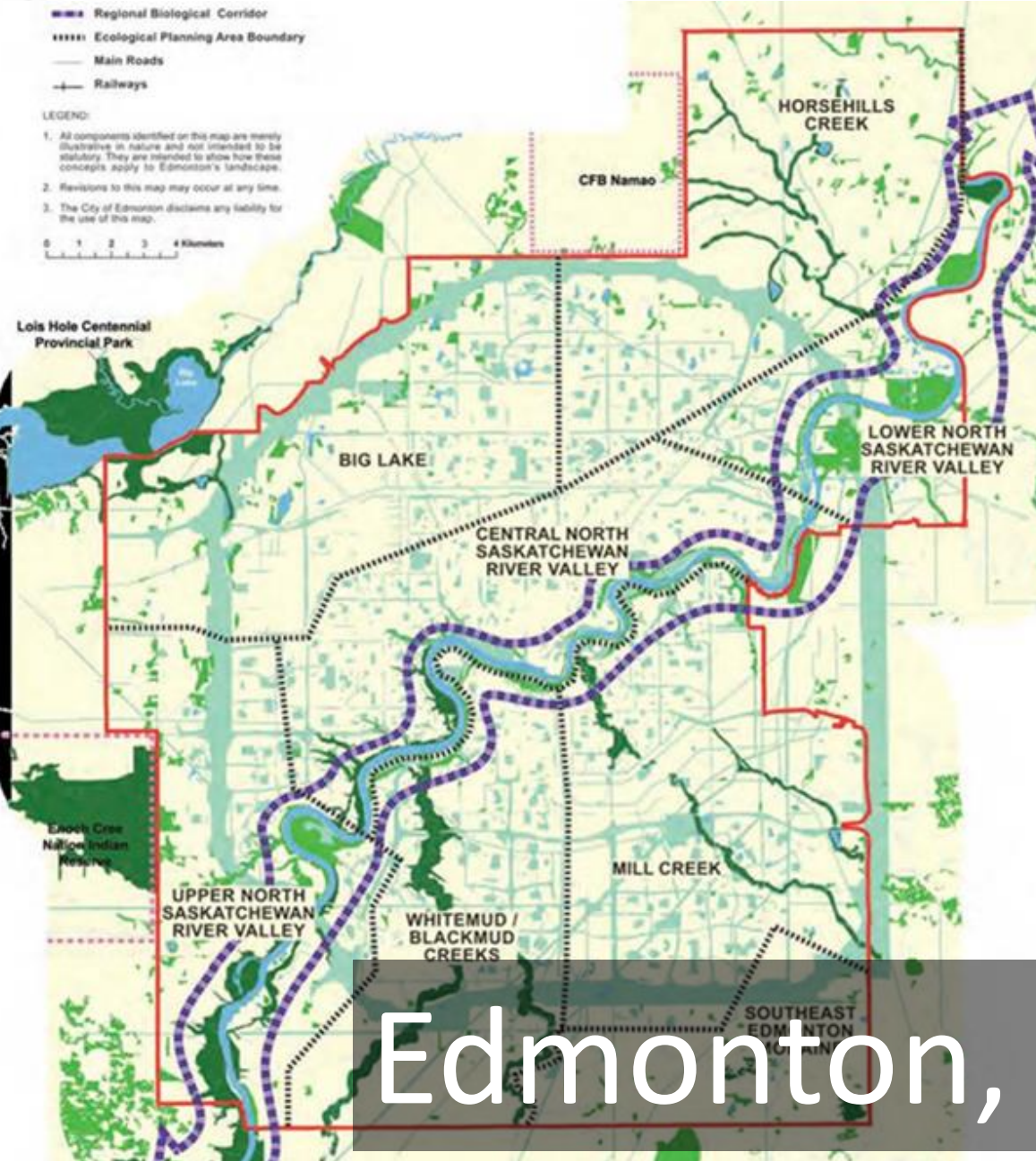
Obj. 6: Expand or create volunteer programs to maintain the aesthetics and health of green infrastructure projects.

Obj. 7: Increase knowledge about the infiltration capacity of the city's soils to ensure projects account for local soil conditions when designing stormwater projects or land development plans.



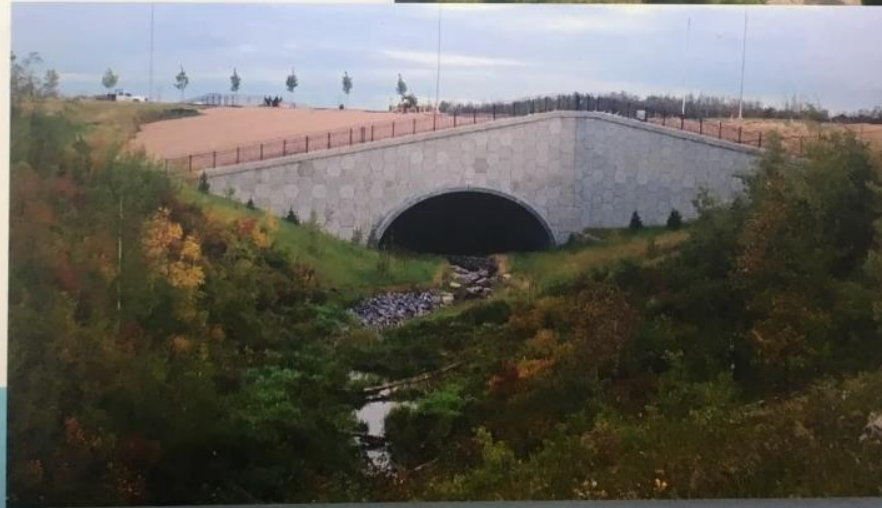
Field work for the project included site visits across the city to assess opportunities to improve shoreline habitats, connect and restore landscapes and improve access to the water.

Edmonton's Ecological Network



Now more than 35 wildlife passages!

2019 Newest wildlife passage!



And a Nearly 60% Reduction in Car-Wildlife Collisions

Design and Planning for Ecological Connectivity



Understanding Arlington County's Comprehensive Plan

The **Comprehensive Plan** guides coordinated development and sets high standards of public services and facilities in the County. It is a decision-making tool for the County Board, the Planning Commission and County Departments. The plan was established in 1960 and originally included five elements. Today, it includes these eleven elements:

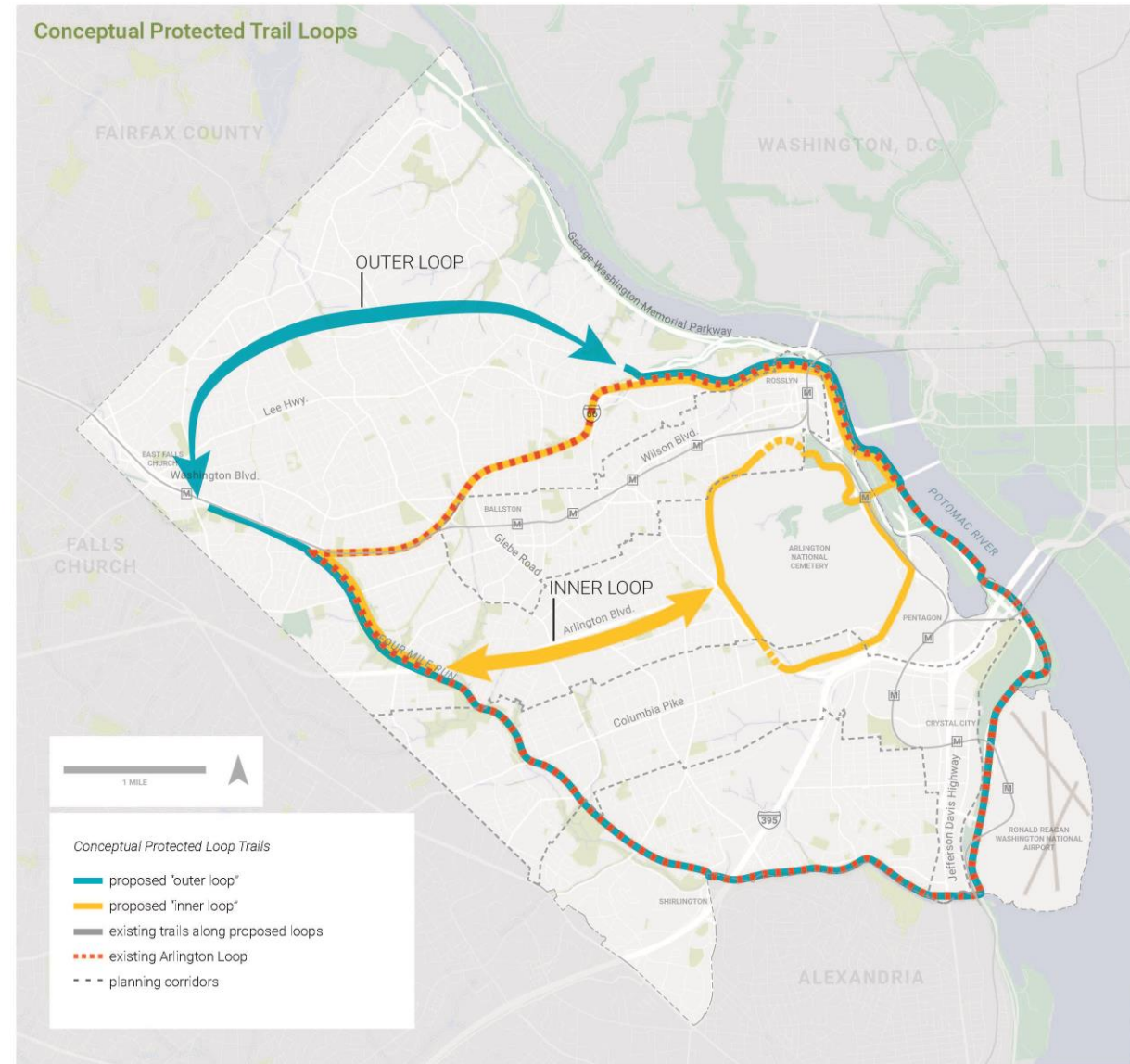


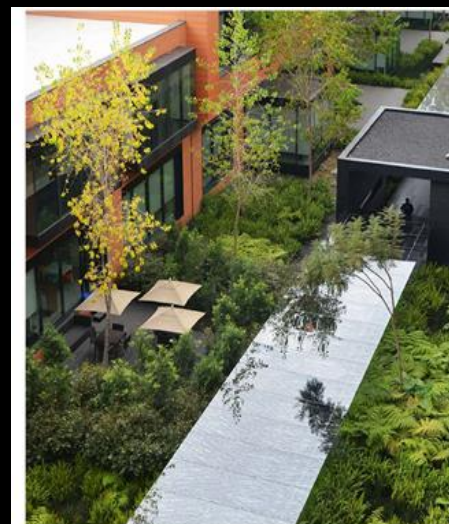
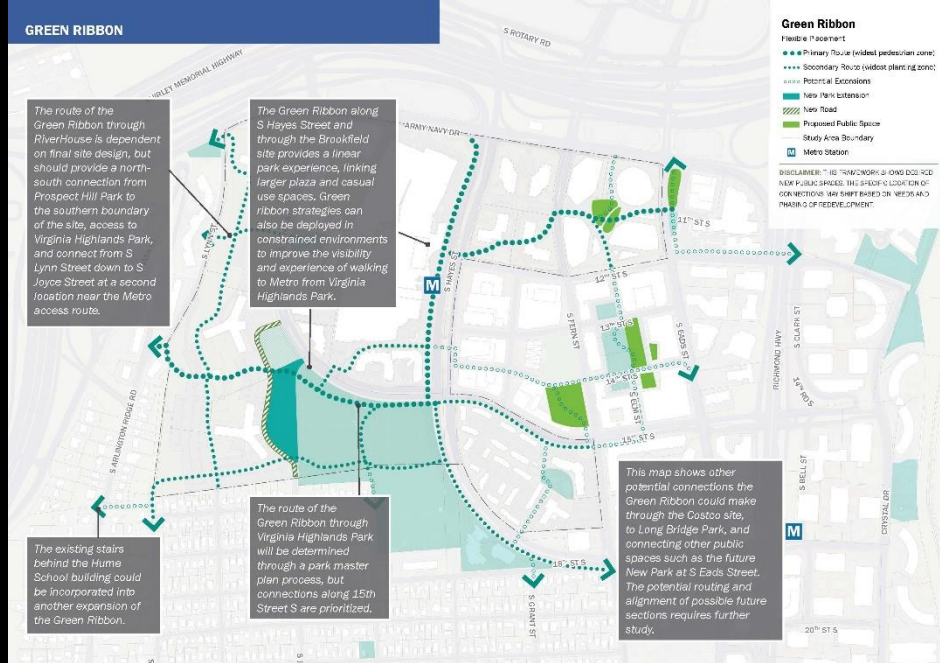
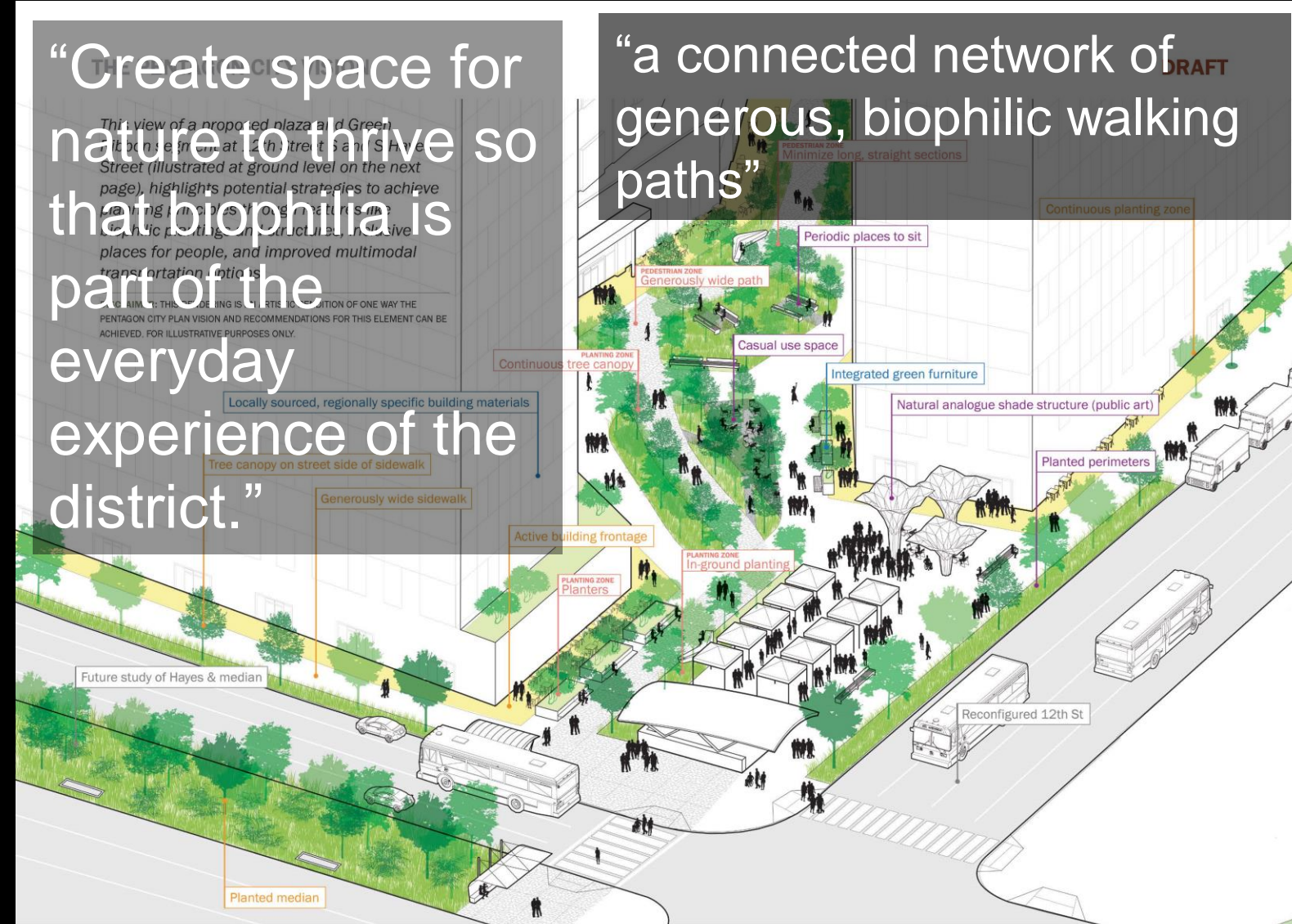
Figure 18. Map of conceptual inner and outer loops

2.1.2. Complete an "outer loop" of protected routes that connects the Four Mile Run, Mount Vernon and Custis Trails.

Arlington's Green Ribbon

“Create space for nature to thrive so that biophilia is part of the everyday experience of the district.”

“a connected network of generous, biophilic walking paths”



The design of the Green Ribbon will vary by site and context, including whether the segment is part of a redevelopment project, pursued by the County on public property or right-of-way, or established on an existing site or access way in advance of redevelopment to enable greater connectivity. This example shows how the Green Ribbon could be integrated into development with interspersed frontage zone (including building access and outdoor spaces) and continuous, layered planting areas on both sides of the pedestrian path.



The section above shows a conceptual section of the Green Ribbon, including the pedestrian path and planting areas that make up the Green Ribbon, as well as adjacent frontage zones. These are not strict divisions—in most places, planting zones may intersperse within frontage area, or even into the pedestrian area. The frontage zone will vary by context; it may include further plantings, access to retail and services, outdoor dining, entrances or amenity spaces to residents, or other uses that help achieve an indoor-outdoor transition in redevelopment and help create a safe walking path. In some cases, the Green Ribbon may be located along right-of-way where there is a frontage zone on only one side. The design of the Green Ribbon through a site, and how redevelopment responds to it, should be an important topic for SPRC review.

Mandating Rooftop Biodiversity / BioSolar?



"50 UN Plaza", Photo by Lina K. Ardi, © 2013 The City of San Francisco



San Francisco
Planning

ZONING ADMINISTRATOR BULLETIN NO. 11

Better Roofs Ordinance

Date:
December 2016

Relevant Ordinance:
Better Roofs Ordinance

Relevant Code Section:
Section 149 Better Roofs; Living Roof Alternative

Section 307 of the Planning Code mandates the Zoning Administrator to issue and adopt such rules, regulations and interpretations as are in the Zoning Administrator's opinion, necessary to administer and enforce the provisions of the Planning Code.

PURPOSE:

Pursuant to the Planning Code, Green Building Code and the Better Roof Project Guide issued by the Planning Department in coordination with the Department of the Environment, there are requirements for new building construction to facilitate the development of renewable energy facilities and living roofs. These standards will require between one and two square feet of roof space on most new construction to incorporate solar, living, green, or a combination of both. The new living roof option will allow a project sponsor to replace the required solar with living roof at a rate of 2 square feet of living roof for every 1 square foot of solar.

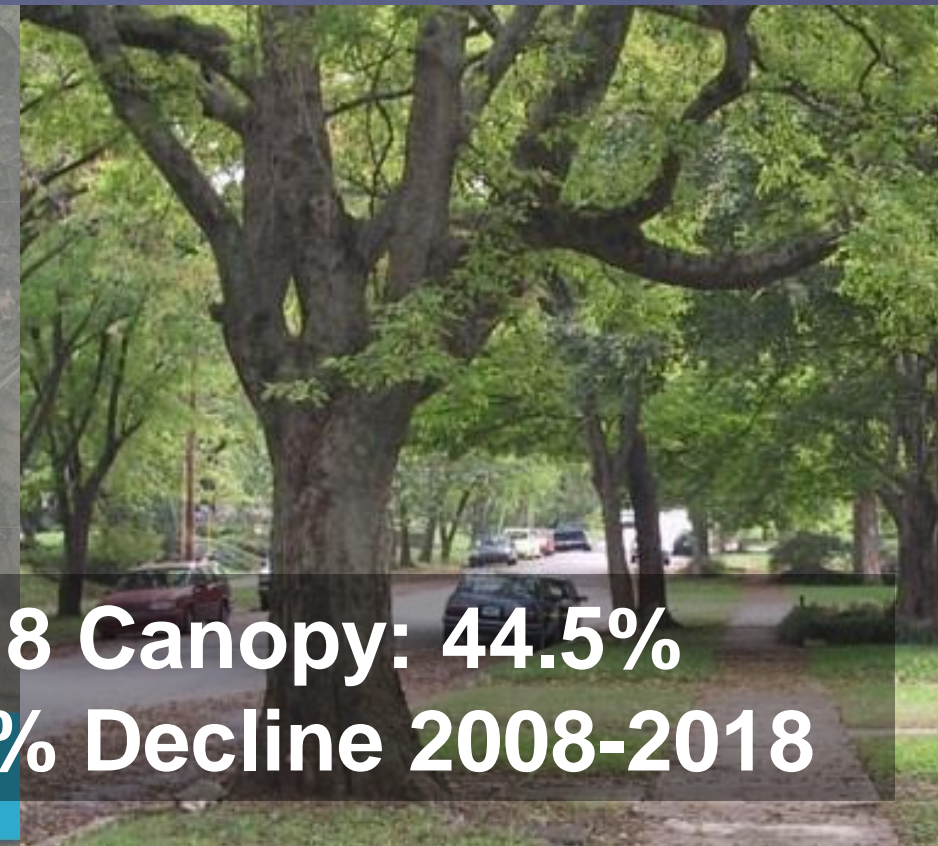
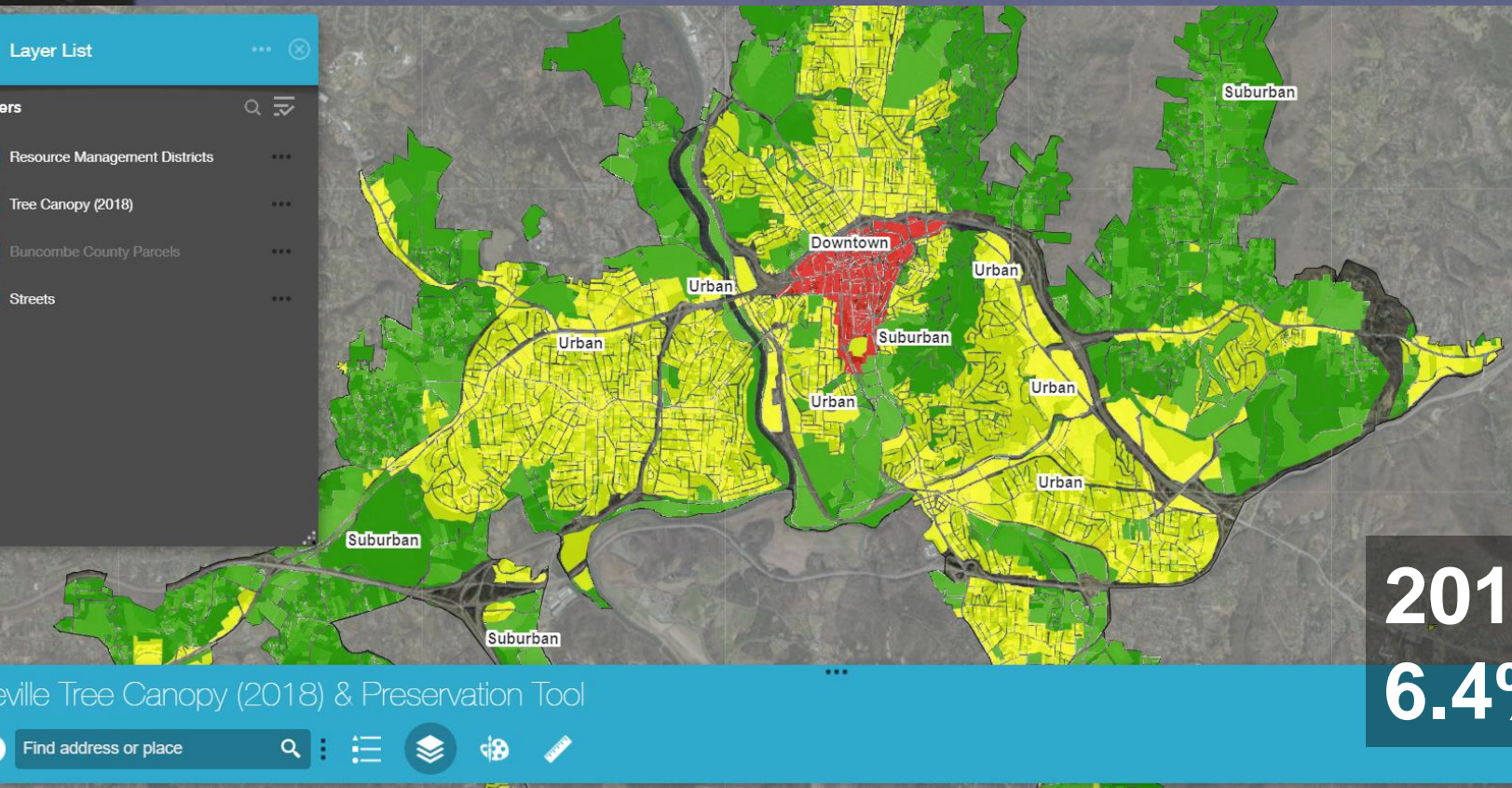
APPLICABILITY:

The Better Roofs requirements apply to all buildings that meeting each of the following: (1) a gross floor area of 100,000 square feet or more; (2) has 10 or fewer occupied floors; and (3) applies for a site permit or building permit on or after January 1, 2017.

5. Codes and Implementation

Source: SF Living Roofs Manual

Asheville Tree Protection Requirements



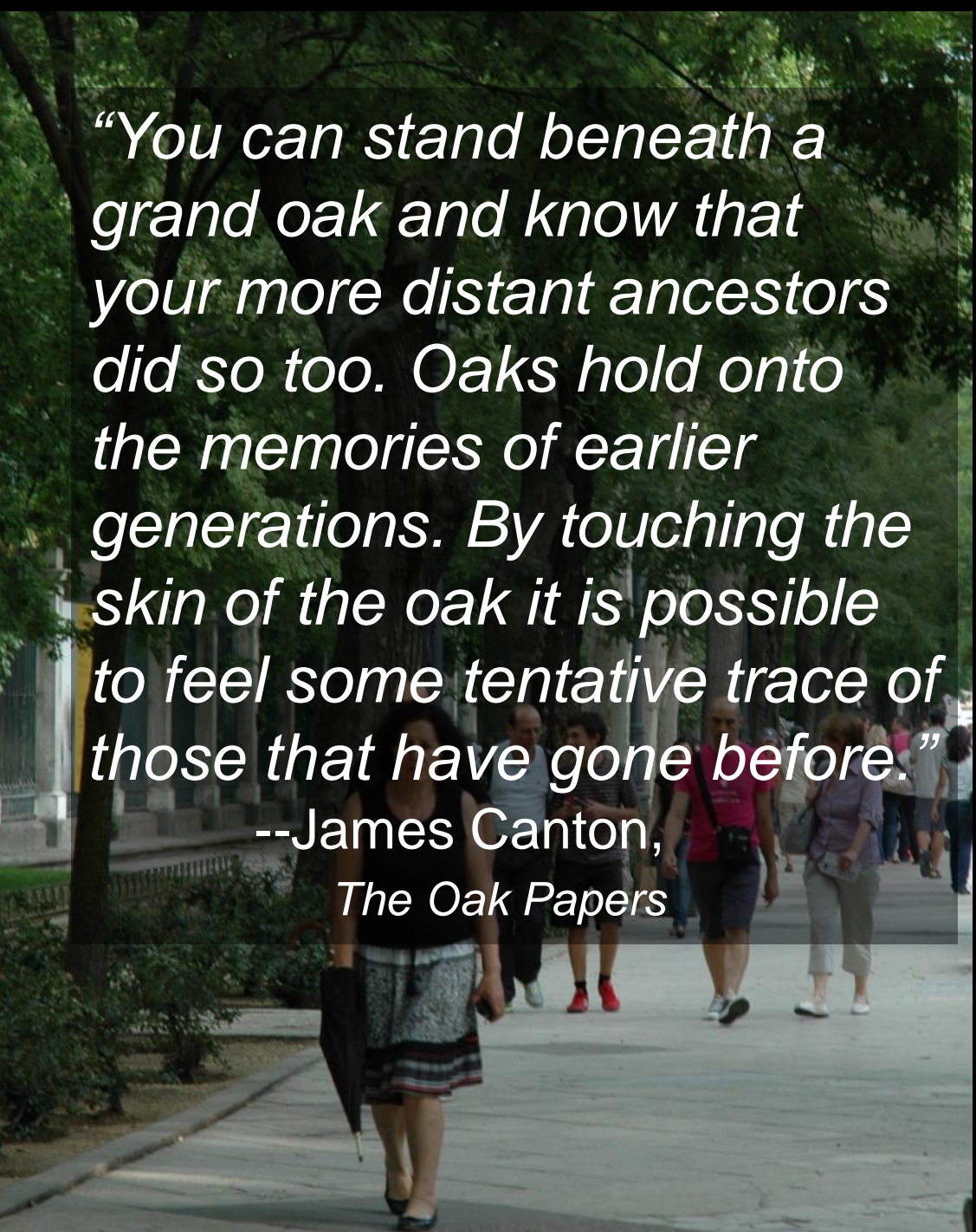
2018 Canopy: 44.5%
6.4% Decline 2008-2018

New Development Must Meet Minimum Canopy Standards By Zone

Trees and Urban Forests An Essential Element

A photograph of a man in a grey polo shirt and dark pants standing next to the thick, textured trunk of a large tree. The tree's canopy is full of green and yellowing leaves, suggesting autumn. The background shows a grassy area and other trees under a clear sky.

“You can stand beneath a grand oak and know that your more distant ancestors did so too. Oaks hold onto the memories of earlier generations. By touching the skin of the oak it is possible to feel some tentative trace of those that have gone before.”

A photograph of a paved path lined with trees. Several people are walking along the path. In the foreground, a woman in a black top and patterned skirt walks towards the camera. Other people are visible further down the path, some walking away and some towards the camera. The trees are lush and green.

*--James Canton,
The Oak Papers*

DC's Tree Canopy Protection Act

Special Trees =
44 inch – 99
inch
circumference



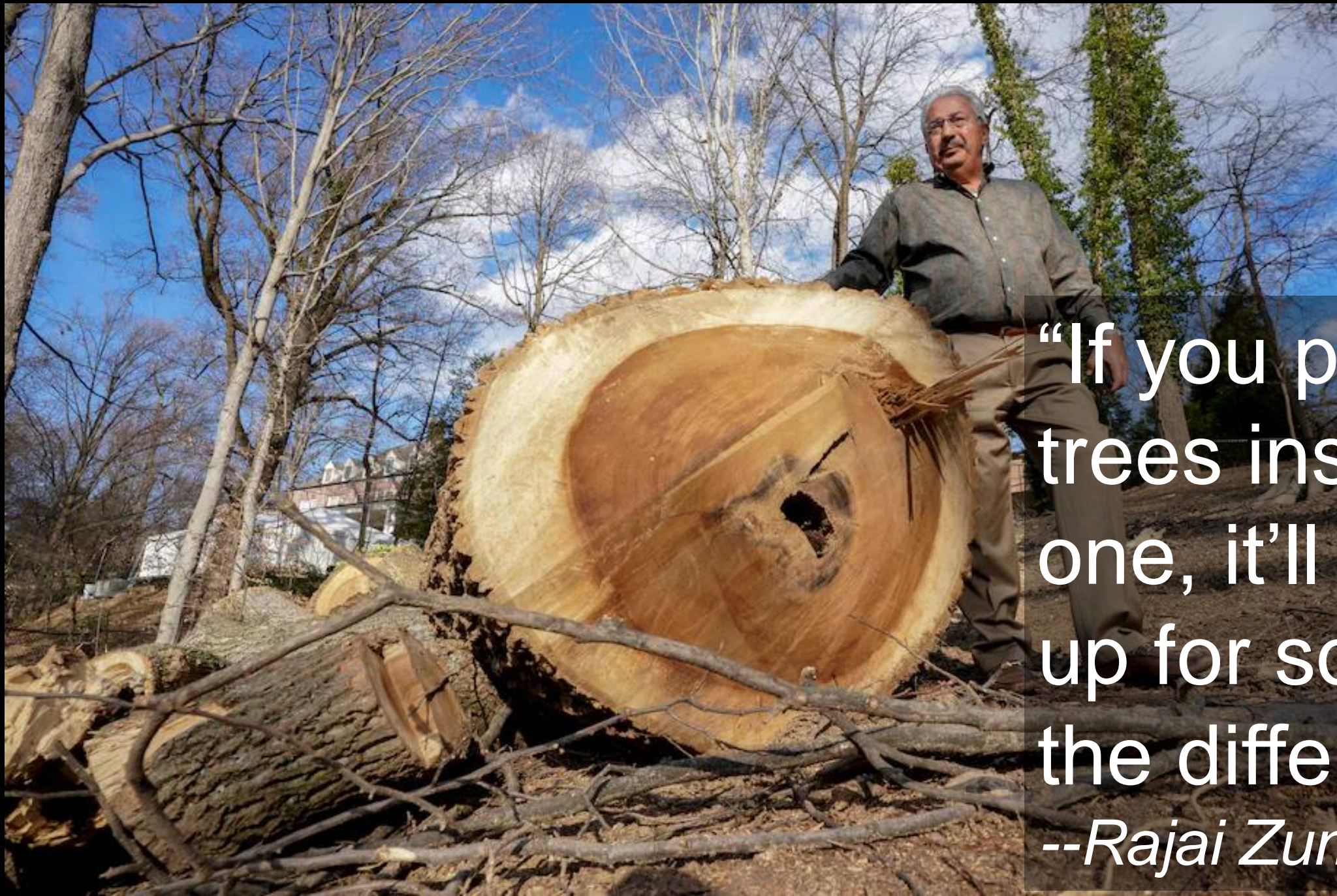
If not a hazardous tree, then
subject to a tree replacement fee
\$55 per inch of circumference, or
planting of seedlings that equal
or exceed circumference lost

Heritage Trees =
100 inch
Circumference
or greater



Removal only allowed if “necessary
to avoid imminent harm or danger to
persons or property...”

Can be relocated or replanted
If cut illegally, fine = \$300 per inch
circumference



“If you plant 100
trees instead of
one, it’ll make
up for some of
the difference.”

--*Rajai Zumot*

The New York Times

OPINION
GUEST ESSAY

How Do You Mourn a 250-Year-Old Giant?

Jan. 24, 2022



“We need to stop thinking of trees as objects that belong to us and come to understand them as long-lived ecosystems temporarily under our protection. We have borrowed them from the past, and we owe them to the future.”

--Margaret Renkl, NYT

Goal of 100,000 Acres of Healthy Tidal Marshes



22,000 acres

Additional acquisition/
restoration to reach goal

25,000 acres

Protected/planned for
marsh restoration

13,000 acres

Wetlands restored to
tides since 2000

40,000 acres

Healthy tidal marsh as
of 2000

Bay Nature magazine • Fall 2020

Stewardship

First-of-its-Kind Climate Parcel Tax Now a Measure of Hope

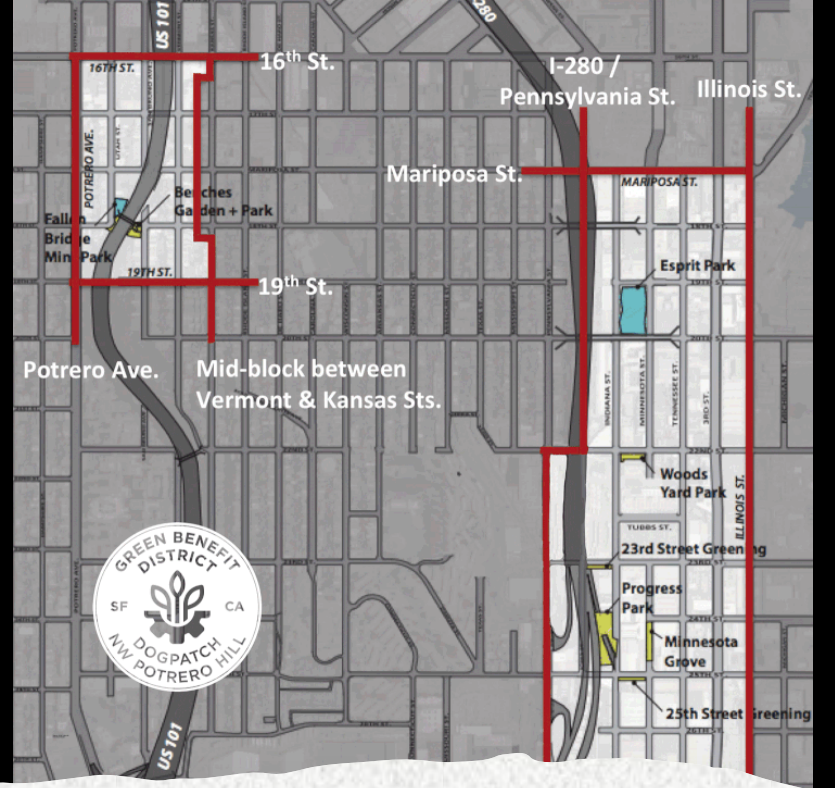
*Bay Area voters passed Measure AA in 2016. Its funding now
means jobs, restoration, and flood control*

by *Kristine Wong*

September 27, 2020 | SPONSORED BY SAN FRANCISCO BAY RESTORATION AUTHORITY

SHARE THIS: [f](#) [t](#) [e](#)

For centuries, San Francisco Bay's wetlands were one of the richest ecosystems in the world. It's estimated that 250 years ago the Bay was bounded by 200,000 acres of wetlands—lush habitat that provided a home for birds, fish, and other wildlife and that served as the basis of life for the Ohlone people who made, and still make, their home around the Bay. In the centuries since, 80 percent of these wetlands have been lost to development. That's been devastating to wildlife. And because wetlands filter water impurities and help



Green Benefit Districts (San Francisco)



Austin (TX) Carbon Credits



It Takes a [Wooded] Village



Jennifer McLean, left, and Jean Lu say when they discovered a tree was allegedly removed against city orders, dozens in the neighbourhood rallied to stop any more from being cut down. (Robert Krbavac/CBC)

Jennifer McLean, has lived in the neighbourhood for 35 years and was one of more than 150 residents who signed a petition in May asking the city not to approve the permit to take down more trees on the property.



6. Community Engagement and Education



Monarch Metamorphosis at Earth Day

Milkweeds for Monarchs: The St. Louis Butterfly Project
Earth Day Festival 2014





A Pollinator Haven

- Female monarch butterflies only lay their eggs on milkweed plants.
- Monarch caterpillars feed solely on milkweed.
- Monarchs also need nectar from native flowers to provide energy for their annual migration.
- St. Louis is an important part of the monarch's migration path.



- Plant a nectar- and pollen-rich native flower garden that blooms throughout the seasons. This will also support bees, birds and other important wildlife.
- Minimize or eliminate the use of insecticides, herbicides and fertilizers in your yard.
- Purchase locally grown, pesticide-free flowers, fruits and vegetables.
- Keep your native garden intact throughout the winter; pollinators use spent stems to lay eggs, nest and survive cold temperatures. In the spring, cut the dead plant growth to 15" high.



This habitat area is one of several along the Mississippi River that collectively serve as a pollinator pathway. The City has been promoting urban monarch conservation through **Milkweeds for Monarchs: The St. Louis Butterfly Project**. Find out more at StLouis-mo.gov/monarchs



To learn more, visit brightsidestl.org/pollinator-conservation

The mighty Mississippi River was foundational to the history and development of St. Louis. From the city's earliest settlers to modern-day commerce, the river and its tributaries are both economically important and recreationally inviting. From the Chain of Rocks Bridge and North Riverfront Park, to the renowned Jefferson National Expansion Memorial, Bellerive Park and Mary Meachum Freedom Crossing, the link between St. Louis, its residents and the Mississippi River are as important to its future as its past.

26%
URBAN TREE COVERAGE
IN THE CITY OF ST. LOUIS

natural areas
rich with natural habitat and native species

greenspace
parks and structured landscape

large public
monarch gardens

community
gardens

naturescapes

tree farm

MSD rain gardens

trail heads

major highways

GRS bike paths

NATURE spaces & places to see

these are some of the most natural places in the area

in the region

in the city

In Forest Park:

- ☐ Audubon Center at Riverlands
- ☐ Cahokia Mounds
- ☐ Castlewood State Park
- ☐ Columbia Bottom Conservation Area
- ☐ Babler Memorial State Park
- ☐ Meramec River
- ☐ Powder Valley Nature Center
- ☐ Shaw Nature Reserve
- ☐ Two Rivers National Wildlife Refuge

parks & recreation centers

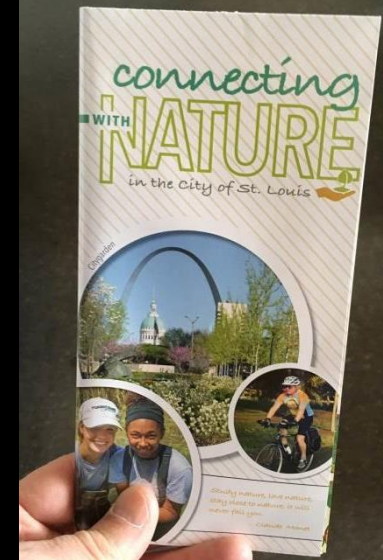
- ☐ Buder Playground
- ☐ Carondelet Park
- ☐ Columbus Square Park
- ☐ Compton Hill
- ☐ Reservoir Park
- ☐ Fairground Park
- ☐ Forest Park
- ☐ Lafayette Park
- ☐ Loretta Hall Park
- ☐ Ray Leisure Park
- ☐ Norman Sany Park
- ☐ North Riverfront Park
- ☐ O'Fallon Park
- ☐ Penrose Park Velodrome
- ☐ Ray Leisure Park
- ☐ Tandy Park
- ☐ Tower Grove Park
- ☐ Willmore Park

nature-based attractions

- ☐ Brightside Demo Garden
- ☐ Chain of Rocks Bridge
- ☐ Citygarden
- ☐ Forest Farm
- ☐ Jefferson National Expansion Memorial
- ☐ Mary Meachum Freedom Crossing
- ☐ Missouri Botanical Garden
- ☐ Saint Louis Science Center (GROW)
- ☐ St. Louis University's Urban Garden

make your own list of natural spaces & places you'd like to see

The Role of Community “Wonder Maps”



EVERY DAY IS A NEW ADVENTURE

DAILY

see which plants grow and animals visit your yard or space, or your pool business

MONTHLY

venture out farther and visit a state park, nature reserve or wildlife refuge to encounter a variety of species and fun activities

WEEKLY

take a walk in the park or bike a new trail this weekend; take note of seasonal colors and what's in bloom

ANNUALLY

explore national parks or be an eco-tourist abroad, and experience a place with plants, animals and ecosystems different from home

Thank you to the Urban Vitality & Ecology core team listed below, and the many organizations that support the LIVE



Images: Artie Raslich



Amherst's Salamander Tunnels

401PHOTOS
©2019 - Jason Freedman

"Salamander Crossing Brigade"

Photos:
Harris Center for
Conservation Education



*Spotted
Salamander*

feature

Visualising Melbourne's urban forest

SIMON CHESTER

By 2011, Melbourne had been in drought for more than a decade. Severe water restrictions were in place, and Australia's 'garden city' was no longer reflecting its moniker – the city's 'urban forest' was in rapid decline.

Melbourne's urban forest – the trees, parks, and gardens scattered throughout the city – consists of 77,000 trees, with an asset value of \$1 billion, excluding the added value of pollution and carbon sequestration, shading, and cooling. Its loss would pose both a significant environmental and economic loss.

Noticing the urban forest's decline, City of Melbourne sent out an arborist to conduct a city-wide 'useful life expectancy' analysis of each tree.

"Results of the surveys forecast that 23% of the city's current tree population will be lost within a decade, and 39% within 20 years," said Yvonne Lynch, team leader for Urban Forest & Urban Ecology in City Design at the City of Melbourne.

So, in 2011, the City of Melbourne moved to strategically address these combined challenges through the

Melbourne's Royal Botanic Gardens span 38 hectares and includes over 10,000 individual species.

au) – was decided as the best way to keep the public abreast of the goals, outcomes, and progress of the Urban Forest Strategy. Melbourne visualisation company OOM Creative was engaged to build the site.

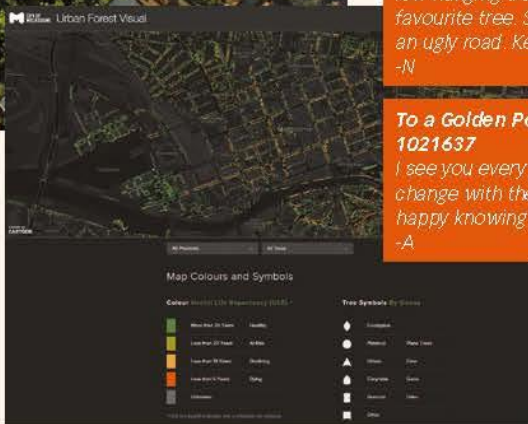
"The design was based on a number of questions," said Greg More, founder of OOM Creative. Firstly, how can the data of 70,000 trees be used to communicate the condition of Melbourne's urban forest? Secondly, how can this information be made available to assist an ongoing public consultation process, and therefore accessible across a range of desktop and mobile devices?

To a Golden Elm, Tree ID 1028612

Dear Tree,
If you are that big round beautiful low hanging tree I think you are my favourite tree. Such a beauty on such an ugly road. Keep up the good work.
-N

To a Golden Poplar, Tree ID 1021637

I see you every morning, watch you change with the seasons. It makes me happy knowing you are there.
-A



The Melbourne Urban Forest Visual site hosts an attractive webmap, usable across devices...

To a London Plane, Tree ID 1023923

Hi,
Is this the tree outside door 3 at the State Library? If so, we adopted this tree during the drought and used to put our unused and excess water onto its base.
All the best
-B

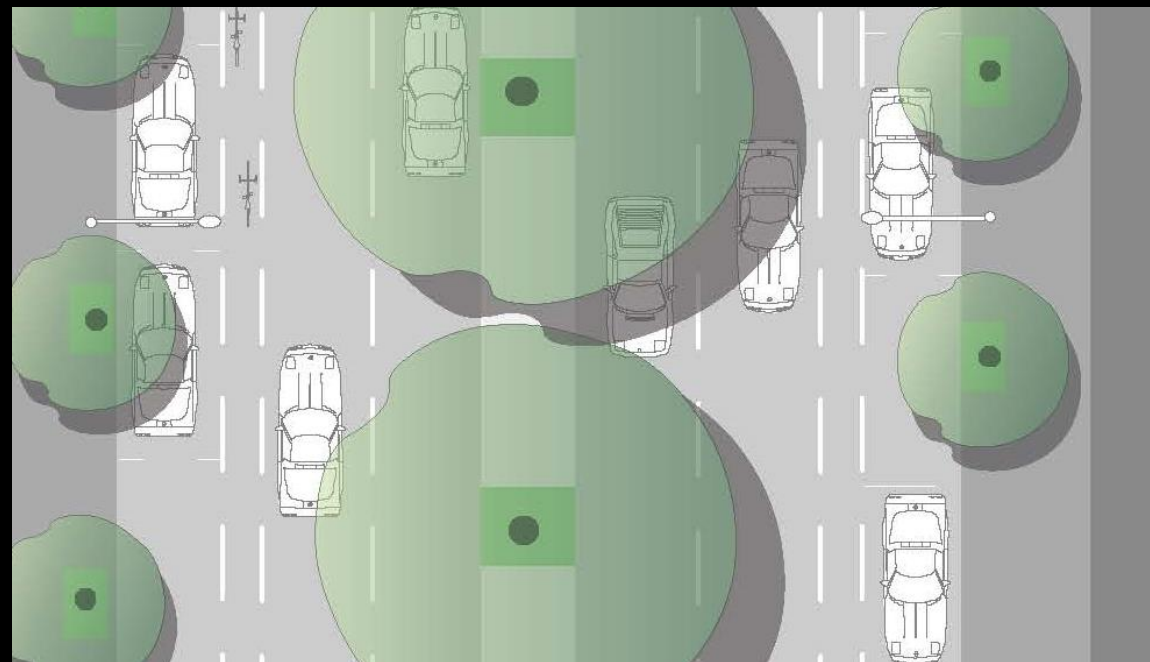
then we can reduce our summertime temperatures by 4 degrees Celsius – this will deliver significant benefits for our city in a climate-changed future.

"After a few data tests, CartoDB became a clear choice for the map component as it could provide solutions to support the above questions: it handles data management, the number of elements, and visual styling with ease, and works across platforms including mouse and touch interaction."

CartoDB is a cloud-based spatial platform that provides a framework to analyse and visualise spatial data, as well as easily embed it in websites. It's popular with web developers because it uses GeoJSON, which is based on the

From Trees in the City, to City in a Forest

Goal: Doubling of Canopy Coverage, from 22% to 40% by 2040



How Do We Show Our Love for Trees?

“I see you every morning, watch you change with the seasons. It makes me happy knowing you are there.”

--Alicia

Source: Yvonne Lynch, Head, Melbourne Urban Forestry and Urban Ecology Team



FOREWORD BY E. O. WILSON

BIOPHILIC CITIES

INTEGRATING NATURE
INTO URBAN DESIGN AND PLANNING



TIMOTHY BEATLEY



The N of Cit

生态城镇化系列

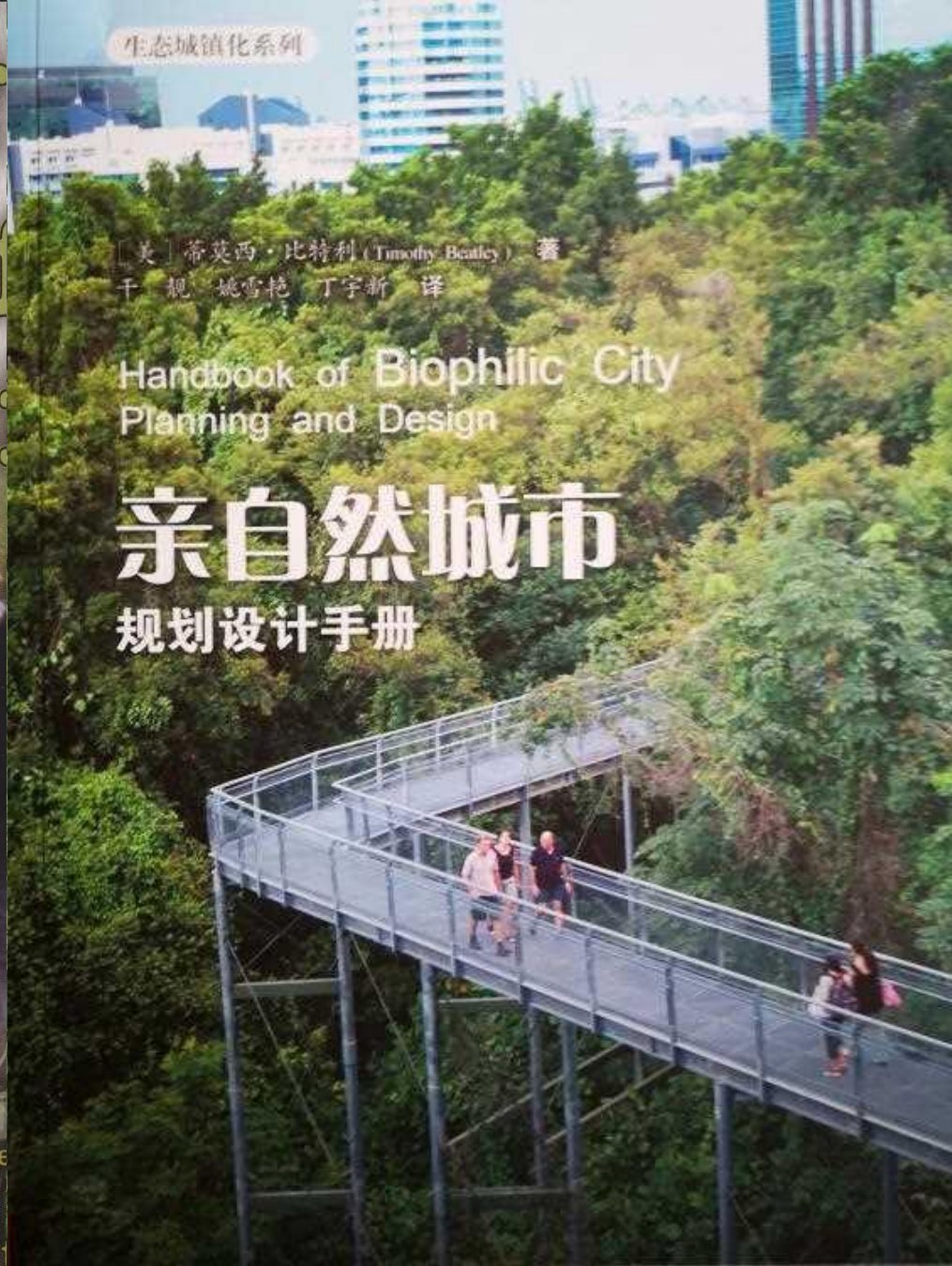
〔美〕蒂莫西·比特利 (Timothy Beatley) 著
干 枫 姚雪艳 丁宇新 译

Handbook of Biophilic City
Planning and Design

亲自然城市
规划设计手册

Director

Chuck Davis,
& Tim Beatley



上海科学技术出版社

ISLAND

02-08-21

Why cities should be designed for birds

Habitats that are good for birds are good for people, too.



[Photos: SteveByland/iStock, Rohit Tandon/Unsplash]

TIMOTHY BEATLEY

The Bird-Friendly City

CREATING SAFE URBAN
HABITATS



A photograph of a person walking on a metal elevated walkway or bridge that winds through a dense, lush green forest. The walkway has metal railings and is supported by vertical poles. The background is filled with various types of trees and foliage, creating a vibrant green backdrop.

Visit the Biophilic Cities Network

<http://biophiliccities.org/>
beatley@virginia.edu