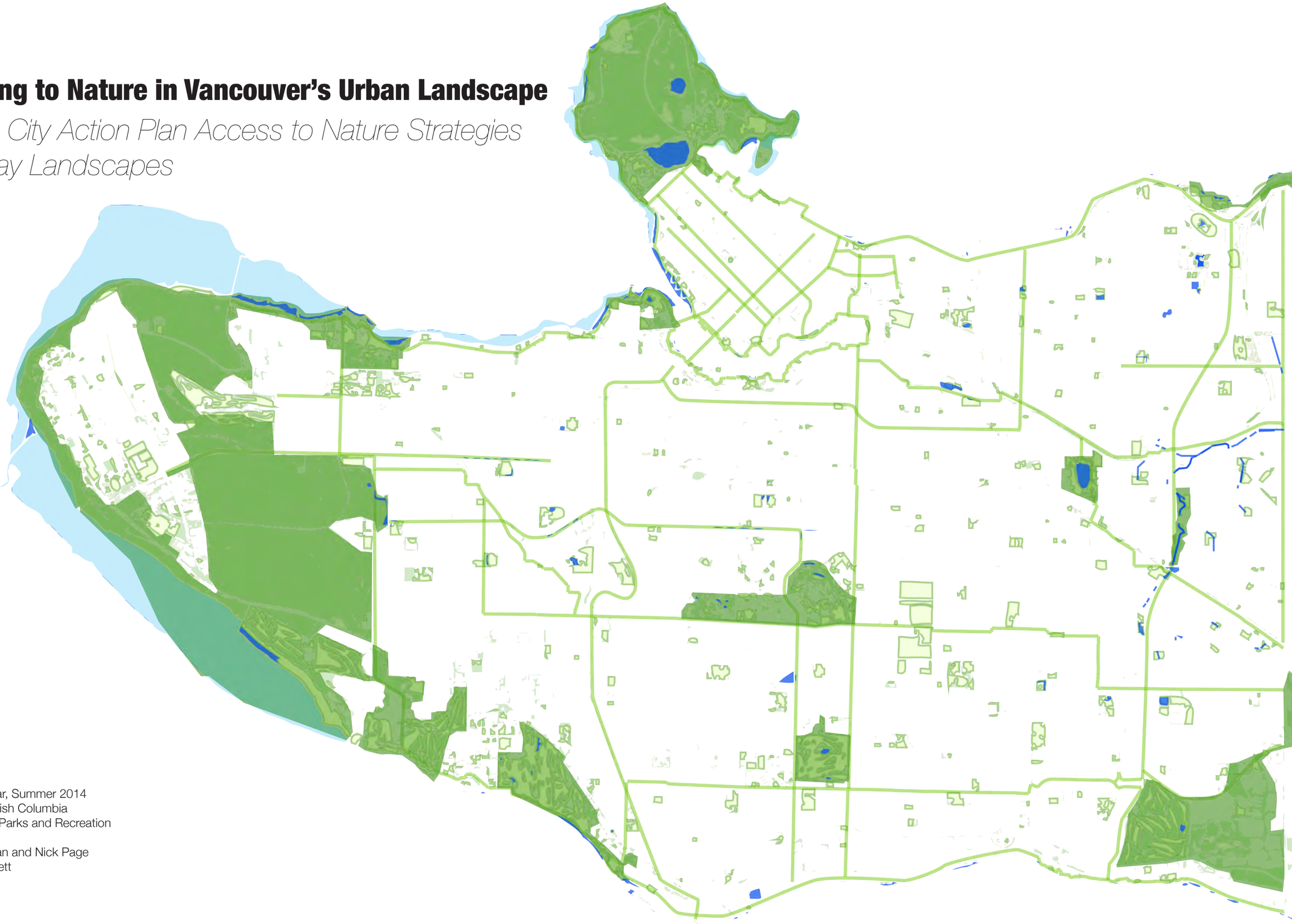
Connecting to Nature in Vancouver's Urban Landscape

Greenest City Action Plan Access to Nature Strategies in Everyday Landscapes



Greenest City Scholar, Summer 2014
The University of British Columbia
Vancouver Board of Parks and Recreation

Mentors: Alan Duncan and Nick Page
Scholar: Lindsey Fryett

How can multiple Greenest City Action Plan strategies be incorporated to increase connections to nature in the city within the design of characteristic urban landscapes?

Image of a stand of old-growth Douglas Firs: *The Forest Before Logging,* ca. 1912. Web: Vancouver Archives. Reference code: AM1376-: CVA 1376-545.02

Nature in Vancouver

Then and Now

The City of Vancouver was built in what was once a forest of Western Hemlock, Douglas-fir, and Western Red Cedar. The city motto, "By Sea, Land and Air We Prosper," now reminds residents in daily commute over the Burrard Street bridge of the early economic role that natural resources provided.

Today, much of the original landscapes and ecologies that once existed in Vancouver are gone or fragmented. By reputation, Vancouver is a green city: surrounded by nature in forest and shore front, framed by mountains, and home to world-renowned Stanley Park.

Our large parks provide a place to recreate and experience wildlife amid stunning natural features such as forests, foreshore and wetlands. They make up the major ecological network of our city, and play an essential role in providing habitat for native birds and other wildlife. There is no doubt that Vancouver enjoys a special character as a result of these elements.

Under the Greenest City Action Plan, the City of Vancouver has set for itself the goal of providing every resident with access to nature within a five minute walking distance from their home. Major projects, like the creation of Sanctuary Ponds and Habitat Island, and the daylighting of Still Creek are all notable successes in this narrative of access to nature and ecological restoration. However, the urban setting provides many limitations for the access to nature initiative. We no longer have large areas of land available for making large parks, like Stanley Park, and often the connection between small, site-scaled landscapes, in the greater ecological framework is overlooked in landscapes where the human uses are considered paramount.

A number of smaller City initiatives, however, have shown how interventions in common urban landscapes can help bring quality nature experiences and educational opportunities into the everyday experience of residents without compromising the human role of the landscape. Greenways, for example, support healthy and active transportation like cycling and walking, and can also act as habitat corridors for pollinators, and songbirds. The recreational activities of neighborhood parks can be overlain with small patches of habitat that foster song birds. Through the incremental application of these strategies, we can begin to mend the ecological framework that has otherwise been disrupted by urbanization.

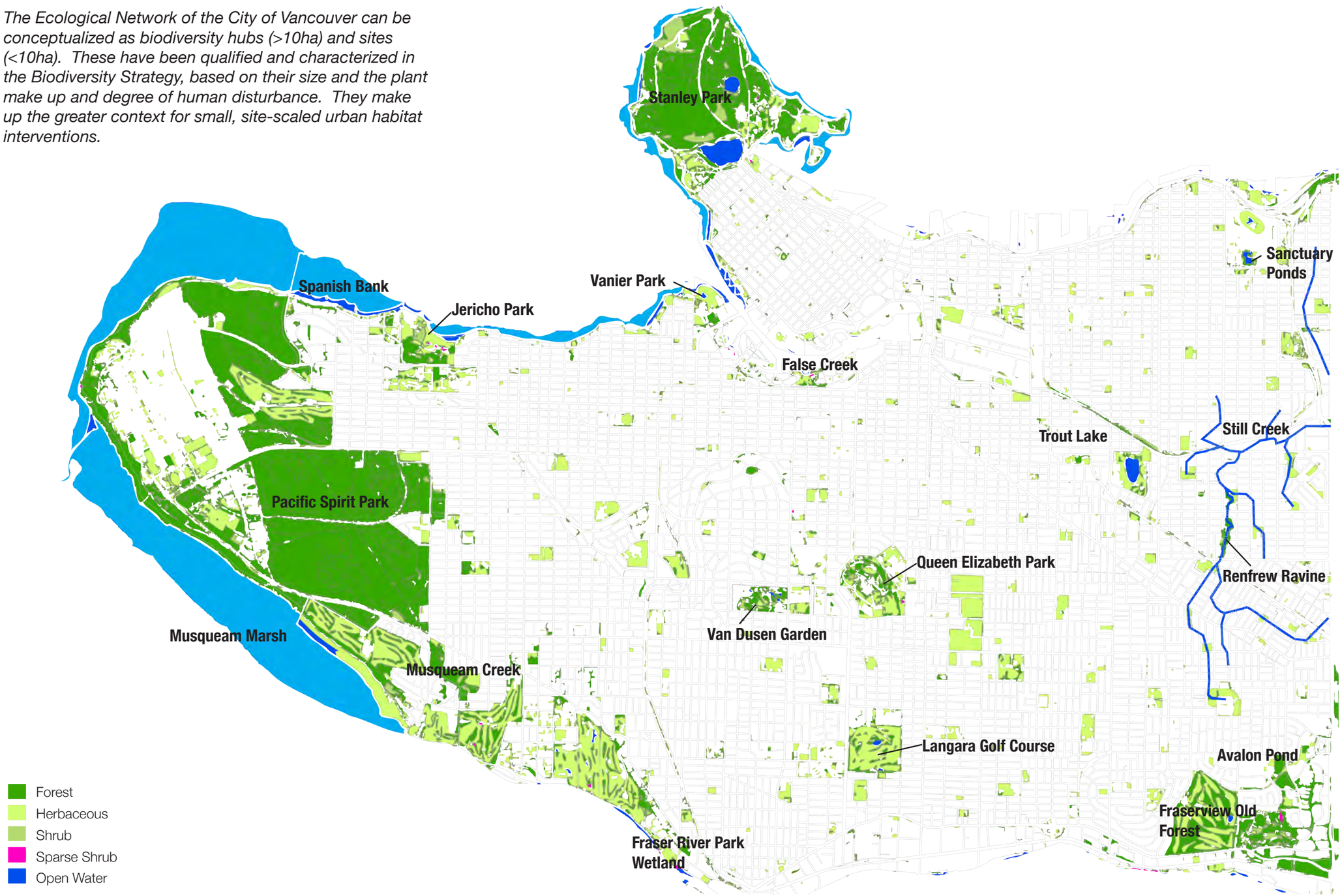
Conveying the role of these landscape interventions to residents, homeowners, and visitors is important. Landscapes managed for habitat look different; the aesthetic of them appears messy or neglected compared to what has come to be the conventional North American approach to landscape. When the role of ecological landscapes is convey, however, it has been shown that not only are they better appreciated, but also that they foster stewardship for the environment (Nassauer).

As a Greenest City Scholar, I have endeavoured in this research and design project to learn about the many initiatives, both large and small, that are taking place in our city. These, along with the Greenest City Access to Nature strategies (Bird Strategy, Biodiversity Strategy, Urban Food Strategy, Integrated Stormwater Management, and Urban Forest Strategy) are the basis which informed designs for a neighborhood park, and major boulevard to show how these common urban spaces can bring quality nature experiences into our urban landscape.

Biodiversity in Vancouver

Summary of Hubs and Sites

The Ecological Network of the City of Vancouver can be conceptualized as biodiversity hubs (>10ha) and sites (<10ha). These have been qualified and characterized in the Biodiversity Strategy, based on their size and the plant make up and degree of human disturbance. They make up the greater context for small, site-scaled urban habitat interventions.



Avalon Pond
SITE (0.8 ha)
Large freshwater wetland in Everett Crowley Park; doubled in size in 2010

Fraser River Park Wetland
SITE (2.5 ha)
Constructed intertidal slough and wetlands provides a range of habitats

Fraserview Old Forests
HUB (25.4 ha)
Substantial area of older, mixed forest; fragmented by golf course use

Jericho Beach Park Wetland
SITE (3.5 ha)
Freshwater wetlands with rich bird and invertebrate diversity

Musqueam Creek
SITE (8.1 ha)
Vancouver's healthiest remaining stream; supports salmon and trout

Left standing, a decomposing tree contributes to the value of biodiversity hot spots by providing habitat for cavity nesting birds.

Reforestation project and old field habitat project in nearby Musqueam Park.

Musqueam Marsh
HUB (72.3 ha)
Largest estuarine marsh in Vancouver; productive fish habitat

Pacific Spirit Regional Park
HUB (9.6 ha in City of Vancouver)
Largest natural area in Point Grey peninsula; mainly outside of City boundary. The Camosun Bog is a notable restoration project, the restoration of which was spearheaded by a local interest group of residents.

The Camosun Bog is home to a variety of native plant species that depend on the very particular environment. Walkways and educational signs promote stewardship by teaching visitors about bog ecology and history.

Renfrew Ravine
SITE (8.1 ha)
Remnant forested ravine with open stream; divided into north and south units.

A nurse log supports new growth of native plant species.

Sanctuary Ponds
SITE (4.2 ha)
Constructed small lakes recognized for bird diversity; constructed in 1999.

A bird oasis within the city also provides access to nature through recreation, such as fishing. Open water with vegetation that mimics natural structure is important to migratory birds, who use spaces such as these as rest places during their long journey.

Spanish Banks
HUB (328.4 ha)
Large, intertidal sand flat fed by bluff erosion; important for fish and shorebirds

Stanley Park
Stanley Park is home to the oldest colony of great blue heron, which are now on the BC Provincial Blue List meaning they could become endangered or extirpated in the foreseeable future.

Shoreline
HUB (73.2 ha)
Diverse, rocky intertidal and subtidal zone; important for overwintering seaducks

Old Forest
SITE (3.6 ha)
Contains some of the oldest trees in The Lower Mainland; isolated old trees occur elsewhere.

Rock Bluffs
SITE (2 ha)
Unique rock bluffs on northern edge of park including Prospect Point.

Lost Lagoon
HUB (17.4 ha)
Largest freshwater body in Vancouver; tidal until 1917 causeway construction.

Burnaby Shoal
SITE (1.8 ha)
Shallow subtidal area east of Brockton Point.

Beaver Lake
SITE (6.6 ha)
Important freshwater wetland in Stanley Park; rapidly infilling with sediment.

Still Creek Corridor
SITE (2.2 ha)
Narrow and fragmented stream corridor that is partially restored.

Despite the heavily urbanized setting, Still Creek daylighting projects have successfully restored portions of salmon spawning habitat of the Still Creek corridor.

Trout Lake
SITE (5.7 ha)
Important lake and wetland in east Vancouver; remnant shore bog on east side.

Biodiversity Strategy: Appendix 1. *Defining Vancouver's Ecological Network. Draft with maps*, September 19, 2013.
Biodiversity Strategy: Appendix 7. *Special Places: Biodiversity Hotspots in the City of Vancouver.* Draft, December 11, 2013.

Bird Friendly Design for Vancouver

Habitat Patches in the Urban Setting

Almond Park: Improving Access to Nature

Through Songbirds in Everyday Landscapes

Greater habitat diversity adds to species diversity, and small scale interventions throughout the city can contribute significantly to the diversity of native birds in Vancouver.

A site, like Almond Park, can provide a small habitat oasis for birds as they travel between larger habitat hubs. A number of habitat features have been incorporated into Vancouver neighborhood parks, and these precedents informed this design for Almond Park.

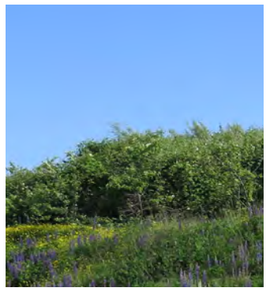
Biodiversity and Bird Friendly Habitat Precedents

Wildflower Meadow

The Trillium Park meadow is planted with Baby Blue Eyes, Yarrow, Sheep's Fescue, Strawberry Clover, and English Daisy. These drought tolerant plants reduce irrigation requirements and help add biodiversity to our parks.

Old Field Meadow

Oak Meadow Park has no-mow areas where grasses and other flowers are allowed to grow tall. These areas are more drought tolerant than lawn, and provide a place for voles which are a food source for the resident owl.



Pacific Crabapple and Native Shrub Layer

The meadow at New Brighton Park is planted with a variety of fruiting trees. The persistent fruits of Pacific Crab Apple trees used in the design provide food for native birds year round. The shrub layer of Salmonberry, Salal, and Oceanspray provides nesting and refuge habitat.

Mixed Forest and Native Shrub Layer

The forest paths through West Memorial Park are planted with native shrubs such as Salal and Huckleberry. The vertical layers that these shrubs create under the forest canopy create a place for native birds to forage and find refuge.

Lupin Meadow

The Museum of Anthropology is set in a native grass and lupine meadow which contributes flowering to biodiversity. This creates a place for native perennials, which support native pollinators, and to enjoy the seasonal blossoms.

Old Field with Pacific Crabapple

The photo of this old field habitat with Pacific Crabapple habitat model was taken outside of Vancouver, in a rural area of British Columbia. It was applied in the park where the Pacific Crabapple will provide songbirds with access to food through the winter months.

Almond Park: Context within the Ecological Hubs and Sites of Vancouver, and vegetation map.

This map and summary shows the context for the design of Almond Park within this framework. The proximity of Almond Park to Pacific Spirit Regional Park and Jericho Park, along with it's existing forest cover and slope, make it an ideal place to create songbird habitat where it can act as a stop over between these important biodiversity locations.

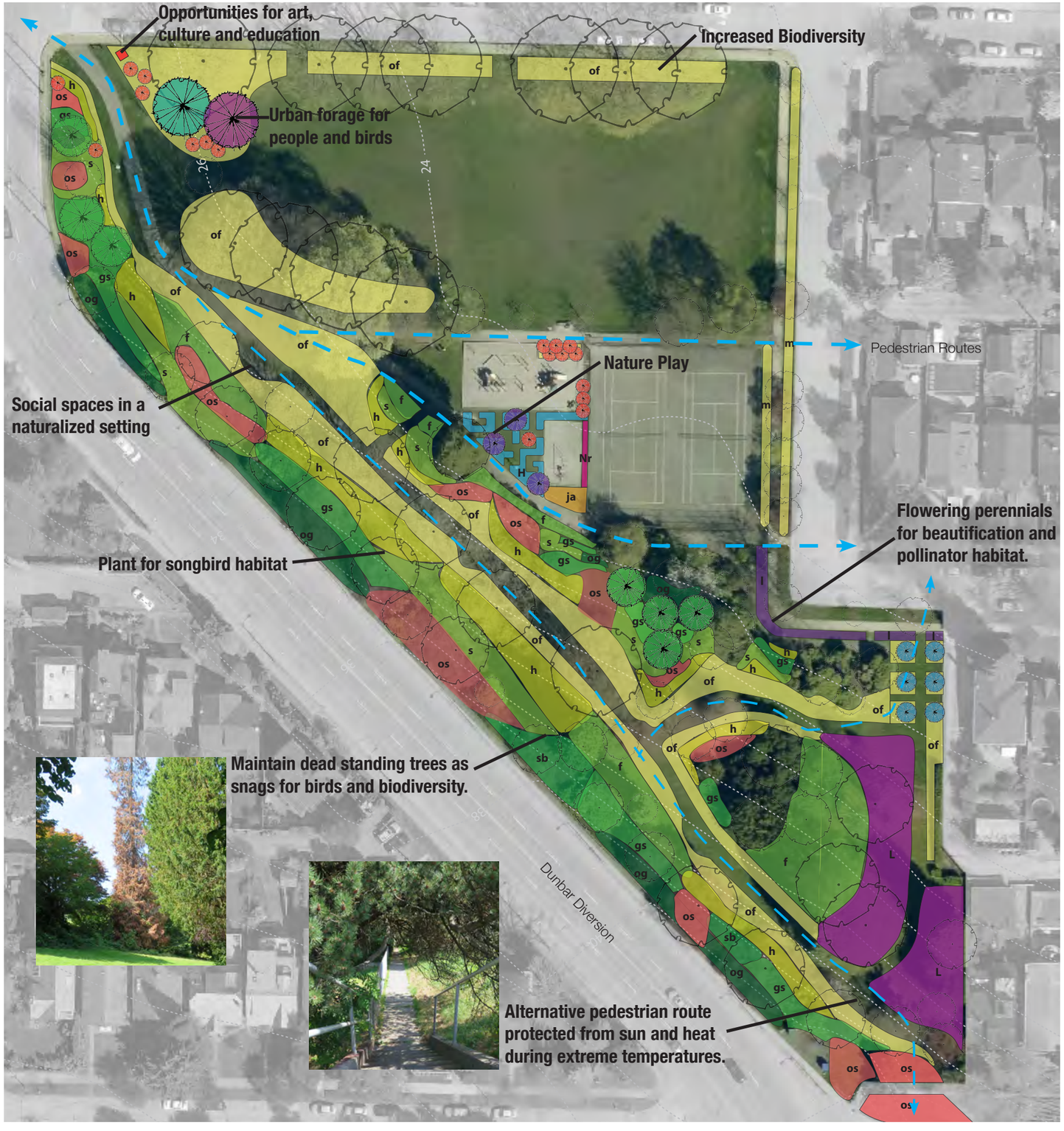
Almond Park is situated on the steeply sloped edge between the Dunbar Diversion and a low density residential area in Vancouver's Kitsilano neighborhood. The slope and traffic noise limit recreational uses where the park meets the Dunbar Diversion.

The strategy for the design of Almond Park is to increase bird habitat along this edge. In addition to creating bird habitat, the plan beautifies this edge and dampens the sound of traffic.

Legend

- f Native Ferns
- sb Snow Berry + Huckleberry
- og Tall Oregon grape
- gs Salal
- s Salmonberry
- h Hardhack
- of Old Field Meadow
- m Wildflower Meadow
- os Oceanspray
- L Lupine and native grasses
- H Evergreen huckleberry
- Nr Nootka Rose
- ja Jerusalem artichoke
- l Lavender
- Pacific Crabapple
- Red Alder
- Morus bombycis 'Unryu'
- Morus alba
- Morus nigra
- Ficus carica
- American hazelnut
- Existing Tree

5 10 20m



Almond Park: Improving Access to Nature

The Entry from West 12th and the Dunbar Diversion

Above: Exisiting entry.

Mulberries for birds and people (urban food and bird habitat).

Opportunities to align art, culture, and sustainability education with park programing.

Mown edge frames the less formal aesthetic of native plant bird habitat.

Variety of flowering perennials add seasonal colour, the shrub layer creates a visual and sound barrier from the traffic along Dunbar Diversion.

Variety of native shrubs provides birds with food for foraging, plant structure for sanctuary and nesting. Pacific crabapple for year round native bird foraging.

Almond Park: Improving Access to Nature

The Forest Walk

Above: Exisiting path.

A variety of fruiting shrubs for birds and people to forage.

Mown edge frames the less formal aesthetic of native plant bird habitat.

Potential for art/habitat installation. Shown here is a concept for a bench and mason bee structure.

Variety of native shrubs create a sense of enclosure

Almond Park: Improving Access to Nature

Play and Habitat: Natural Companions

Above: exisiting playground setting.

Nootka Roses for pollinators, delight in smell, and bird refuge.

A Blueberry maze for play and casual consumption

Jerusalem Artichokes tower over children and support pollinators.

Art installations for habitat and education.

Round and round the Mulberry bush, birds and people forage.

Almond Park: Improving Access to Nature

View from in the park towards the Dunbar Diversion and West 14th Avenue Entry

Above: exisiting stairs.

Increasing the shrub layer under the forest canopy reduces the heat effect from the street, making the forest walk a comfortable alternative for pedestrians during extreme summer heat.

Old Field Meadow: lower maintenance, more biodiversity, and better resistance to erosion on the slope.

Oceanspray: a native perennial that is resistant to drought and can tolerate the difficult conditions here created by the steep slope and the impact of the adjacent roadway.

Almond Park: Improving Access to Nature

Summary of Applied Strategies

Key
√ Applied
X Not applied
n/a Not applicable
√ Small contribution

Greenest City Action Plan Strategies

Biodiversity Strategy

Goals and Objectives
n/a a. Restore and create 25ha of forest
X b. Restore and create 10 ha of wetland, stream, and shoreline
√ c. Add novel habitat such as wildflower meadows, pollinator habitats, and biodiversity gardens to neighborhood parks and community gardens.

Vancouver Bird Strategy

Goals and Objectives
n/a a. Protect and enhance large patches of habitat.
√ b. Green the urban landscape by planting native trees and shrubs for birds.
√ c. Incorporate a mix of habitat types including: coniferous forest, deciduous/mixed forest, shrubland, meadow, freshwater wetland, priarian and coastal shoreline.
√ d. Increase vertical vegetation structure by planting and maintaing native trees and shrubs.
√ e. Select a diversity of native and non-invasive plants.
n/a f. Control invasive plants withouth disturbing breeding birds.
X g. Minimize disturbance from humans.
X h. Reduce light pollution.
√ i. Minimize lawn area.
√ j. Incorporate snags and downed wood.
√ k. Provide water for birds to drink and bathe.

Urban Forest Strategy

Goals and Objectives
√ a. Plant 150,000 trees by 2020
*This park design adds 18 trees. If a similar number of trees could be planted in all of Vancouver's parks, it would be well under the goal. Private residential landscapes will provide many opporutities for reaching the Urban Forest goals.

Integrated Stormwater Management Plan.

Landscape Elements for Treating Stormwater
√ a. Absorbent Landscapes
X b. Detention Tanks
n/a c. Green Roofs
X d. Infiltration Swales
n/a e. Pervious Paving
X f. Rain Gardens/Infiltration Bulges
X g. Rainwater Harvesting
X h. Tree Wells

Vancouver Food Strategy

Goals
√ a. Edible Landscaping
X b. Social interaction with shared garden plots

Climate Change Adaptation Strategy

Objectives that Overlap with Park Design
1. Minimize Rainfall in Storm Sewers
√ a. Reduce stormwater entering sewers using stormwater management techniques
X b. Account for climate change in system design.
2. Increase infrastructure resilience to flooding
n/a a. Regional approach to coastal flood management
n/a b. Strategic near-shore open space planning for inundation.
3. Increase capacity to respond to extreme weather
X a. Plan for response to windstorms, rainstorms, and flooding.
4. Minimize morbidity and mortality during heat waves
√ a. Complete urban heat island effect mapping. Coordinate with parks on targeting green space ad trees in hot areas.
*with mapping in progress, this design has not been adapted directly to the outcomes of the mapping. However, onsite the effect of the greenspace has a noticeable impact to the heat experienced along the south and west sidewalks.
5. Increase the long-term health and vigour of urban forests, green spaces and trees.
√ a. Urban Forest Strategy

Resources

Vancouver Bird Strategy: *Appendix B: Bird Friendly Design Guidelines, Considerations for Development and Parmit*. 2014.
Biodiversity Strategy: *Proposed New Biodiversity Target: Restore 25 ha of forest, and 10 ha of wetland, stream, and shoreline by 2020.* Biodiversity Tarkget Backgrounder, March 21, 2014.
Urban Forest Strategy: *City fo Vancouver Greenest City 2020 Action Plan - Access to Nature*. 41. Web. http://vancouver.ca/files/cov/Greenest-city-action-plan.pdf
Integrated Stormwater Management Plan. *Vancouver Citywide Integrated Stormwater Managment Plan: Alternativs Discussion Paper Draft 2014*. (Unpublished).
Vancouver Urban Food Strategy: *City of Vancouver Policy Report Development and Building, Urban Agriculture Design Guidelines for the Private Realm*. December 15, 2008.
Climate Change Adaptation Strategy: *City of Vancouver Greenest City 2020 Climate Change Adaptation Strategy.* Web: http://vancouver.ca/files/cov/Vancouver-Climate-Change-Adaptation-Strategy-2012-11-07.pdf

Water in the Urban Landscape

Stormwater and Biodiversity Goals

Historical Transformation of the Watershed

Rethinking Rainwater to Support Biodiversity

Vancouver's Integrated Stormwater Management Plan

The City of Vancouver has recognized the value of an integrated stormwater management plan. The tools used to achieve this goal treat water as a resource, reduce pollution to watersheds, reduce the risk of flooding, and help to ensure resiliency in the face of climate change. In addition to this, these practices can contribute to the restoration of local ecosystems.

The Camosun Bog

The transformation of the Camosun Bog is a common landscape narrative in North America, and understanding how human induced changes to the watershed impacted this special ecology shows how rethinking the way that we treat rain water supports Access to Nature and Biodiversity goals.

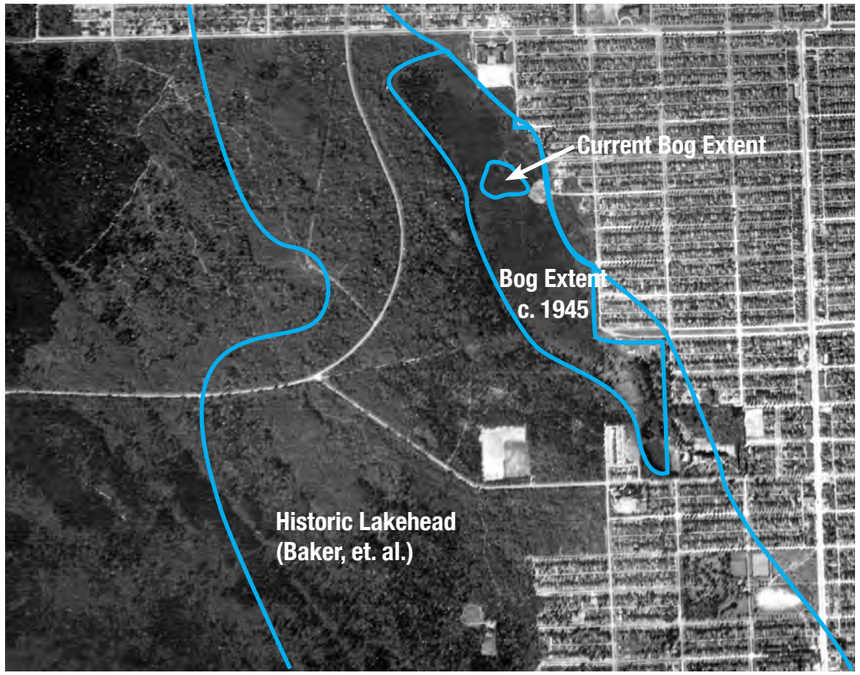
This very special ecology is the result of thousands of years of landscape transformation. The glacial depression left in the land collected water which became a lake, and after thousands of years developed into a bog ecology.

Before the environmentalist movements that arose in North American in the 1970s, the value of these special ecologies was not widely recognized: 'swamps' like the bog were drained, logged, and urbanized. By the 1960s, after a century of human-induced changes, the Camosun Bog almost disappeared.

More recently, Metro Vancouver has aligned with a dedicated group of local stewards dedicated restoring and maintainting this special ecology.

Integrated stormwater management in the historical catchment area of the Camosun Bog will help to recharge the groundwater here, and reverse the negative impacts of urbanization. These practices will allow rainwater to infiltrate into the landscape slowly where it will be cooled, cleansed, added to the groundwater and will help to maintain the bog.

Historical Extent of the Bog



The scale of the bog was reduced as urbanization lowered the water table, the hemlock forest, which prefers dryer, conditions filled in.

Storm Sewer System

Flow direction of the combined sewer system.

Rainwater Catchment Area

Historically, surface water was captured in the bog. The current catchment area was greatly reduced by the city's combined sewer system (adjacent page, right). Intercepting the stormwater before it enters catch basins using the Integrated Stormwater Management Plan Tool Kit will allow rainwater the chance to slowly infiltrate as it would have before urban development (see: examples of local precedent, right).

Local Precedents of Integrated Stormwater Management in Residential Areas


Infiltration Bulges


Residential Absorbent Landscapes


Permeable Surfaces: Gravel Parking Lane


Permeable Surfaces: Granite Fine Pathways

Resources
Baker, Nadia, et. al. *Investigation of Options for the Restoration of Camosun Bog, Pacific Spirit Regional Park*. The University of British Columbia, April 2000. WebL http://www.ensc.ubc.ca/about/pdfs/theses/baker_et_al.pdf

Camosun Bog Restoration website: http://www.camosunbog.org/

Vancouver Citywide Integrated Stormwater Managment Plan: Alternativs Discussion Paper Draft 2014. (Unpublished).

Aerial Imagery

Vancouver Archives, *Aerial view of West Point Grey, Kitsilano, Dunbar - Southlands and University Endowment Lands*. Item number AM54-S4-: VLP 186.4

Google Maps screencapture. www.googlemaps.com

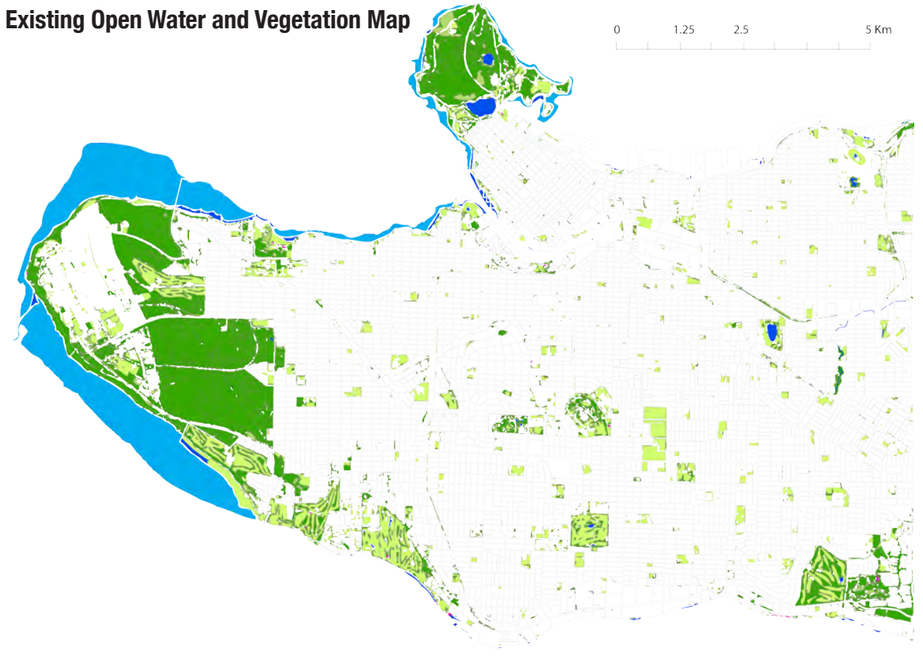
Wetlands for Biodiversity and Rainwater Management

Restoring and Creating Natural Ecosystems

The Greenest City Action Plan Biodiversity Strategy proposes to create or restore 10 hectares of wetlands in Vancouver.

Wetlands and other stormwater management features throughout the landscape contribute to biodiversity, and help to prevent floods by mimicking the natural water system.

Existing Open Water and Vegetation Map



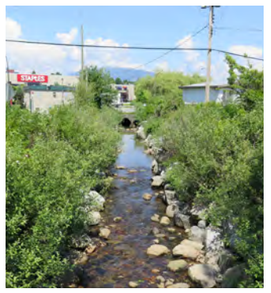
Local Precedents

Infiltration Bulges in Residential Streets

Raingarden bulges intercept water before it enters the conventional storm sewer system, allowing it time to infiltrate into the ground, cleansing pollutants from the water before it enters streams, and regulating peak flow and temperature.

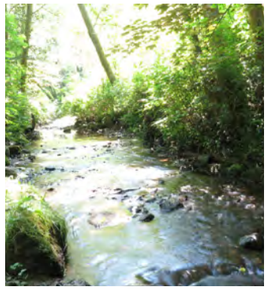
Constructed Wetland

The Vanier Park stormwater wetland supports a healthy water system, and acts as bird habitat.



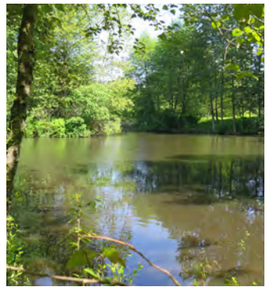
Still Creek Day-lighting

A success story for the restoration of salmon and trout bearing streams, in a highly urbanized setting, with salmon returning to spawn since 2013.



The Renfrew Ravine and Still Creek Corridor

A significant biodiversity hub in Vancouver, the Renfew Ravine provides refuge to birds and a healthy, naturalized setting for Still Creek to pass through.



Sanctuary Ponds and Creekway Park

The Sanctuary Ponds and the Creekway Park stream day-lighting project have become a bird oasis within the city that also provide access to nature through nature recreation, such as fishing. Open water with vegetation that mimics natural structure is important to migratory birds, who use spaces such as these for refuge and feeding during their long journey.

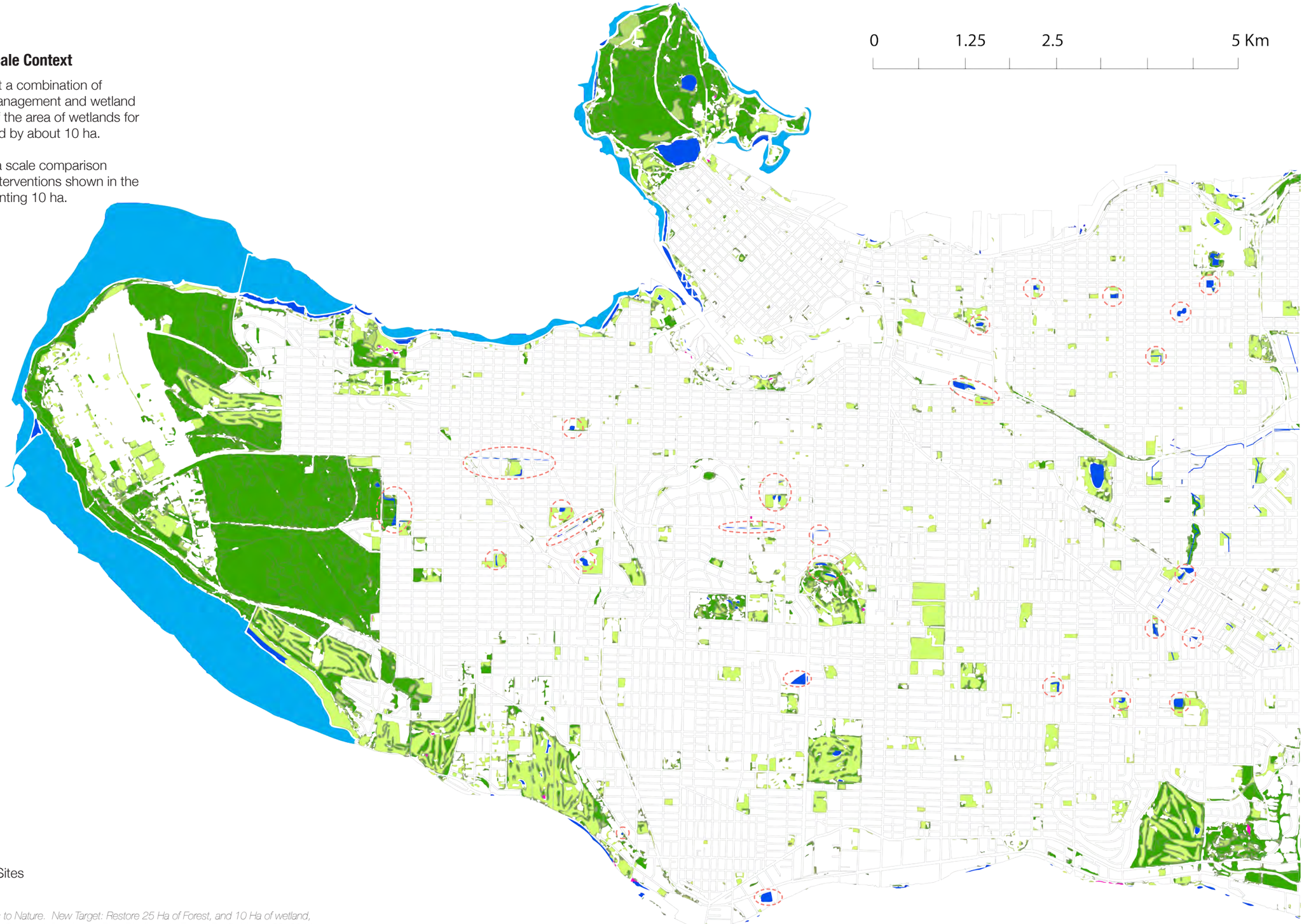
Rain Gardens and Absorbent Landscapes

Rain gardens, like infiltration bulges, allow water to infiltrate, be cleansed and cooled rather than being directed to a conventional storm sewer system. This example from Trillium Park also adds to biodiversity with the variety of plants, and wood debris.

Concept for the City Scale Context

This concept shows what a combination of integrated stormwater management and wetland projects might look like, if the area of wetlands for Vancouver were increased by about 10 ha.

The visual below shows a scale comparison between the proposed interventions shown in the map and an area representing 10 ha.



10 ha

Interventions

Proposed Intervention Sites

Biodiversity Strategy. *Access to Nature. New Target: Restore 25 Ha of Forest, and 10 Ha of wetland, stream and shoreline by 2020.* Greenest City Action Plan Biodiversity Target Draft, March 20, 2014.

Boulevards and Greenways

as Green Connectors

Photo: The City of Vancouver.

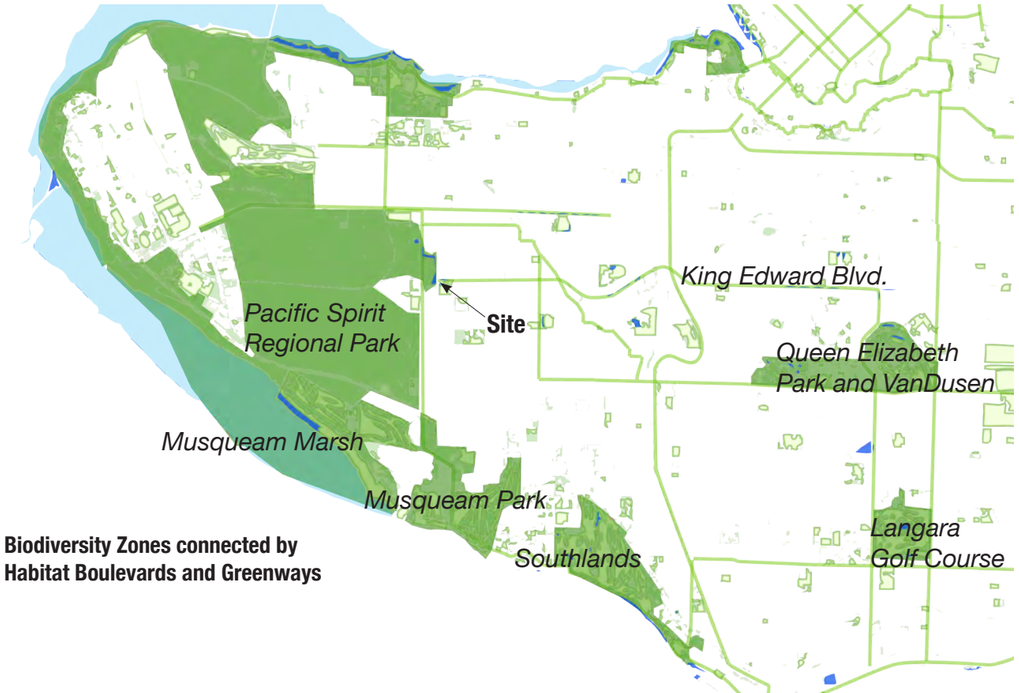
Boulevards as Green Connections

Between Biodiversity Zones

King Edward Boulevard

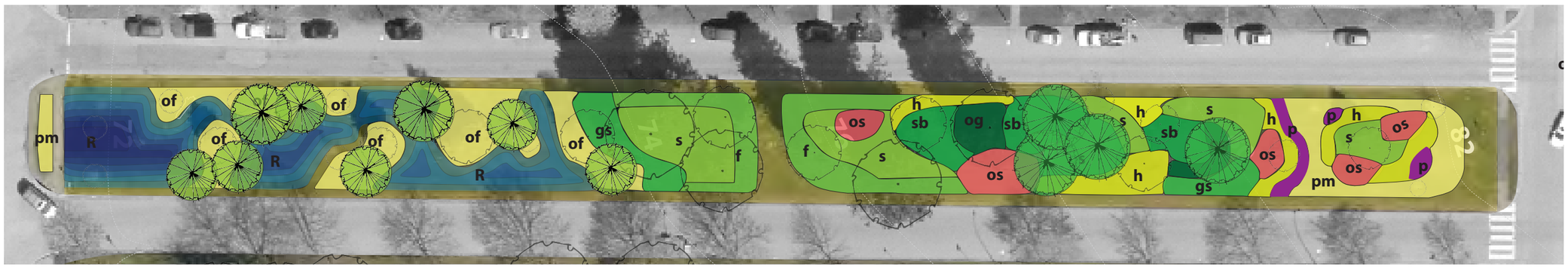
Boulevards are often uniformly designed, planted and maintained throughout the city. This design shows their potential to act as green corridors that connect larger greenspaces, and to support the Bird Friendly Strategy, the Biodiversity Strategy, and Integrated Stormwater Management goals.

The design for the western most block of King Edward Boulevard, where it meets Pacific Spirit Regional Park and the Camosun Bog, makes this an ideal place to improve hydrological function. In addition, slow and limited traffic counts make this an ideal place for implementing the Vancouver Bird Strategy.



Biodiversity Zones connected by Habitat Boulevards and Greenways

Integrated Stormwater and Biodiversity | **Bird Friendly Habitat** | **Pollinator Habitat**



Biodiversity Zone map data complied from:
Biodiversity Strategy. Appendix 1. *Defining Vancouver's Ecological Network. Draft with maps*, September 19, 2013.
City Greenways Plan. The City of Vancouver. Web. http://vancouver.ca/files/cov/city-greenways-network-map.pdf
Open Data Catalogue. The City of Vancouver. Web. http://vancouver.ca/your-government/open-data-catalogue.aspx

Existing Boulevard: Looking South

Pollinator Habitat

Conventional street planting perennials (e.g. Russian Sage) are paired with native flowers in the pollinator meadow, which promotes biodiversity through flowering.

Bird Friendly Habitat

Forest understorey planting provides birds with a place to forage. A mown pathway provides a view through the forest shrub layer to the park.

Integrated Stormwater and Biodiversity

A small wetland with Red Alder brings habitat diversity to the area. Here birds gain access to open water. By intercepting stormwater from catch basins, water can feed the Camosun Bog with interflow.

Biodiversity Corridors

Greenways as Pollinatorways

Greenways support healthy and active transportation like cycling and walking, and can also act as habitat corridors for pollinators.

Precedent: The Pollinator Pathway, Seattle

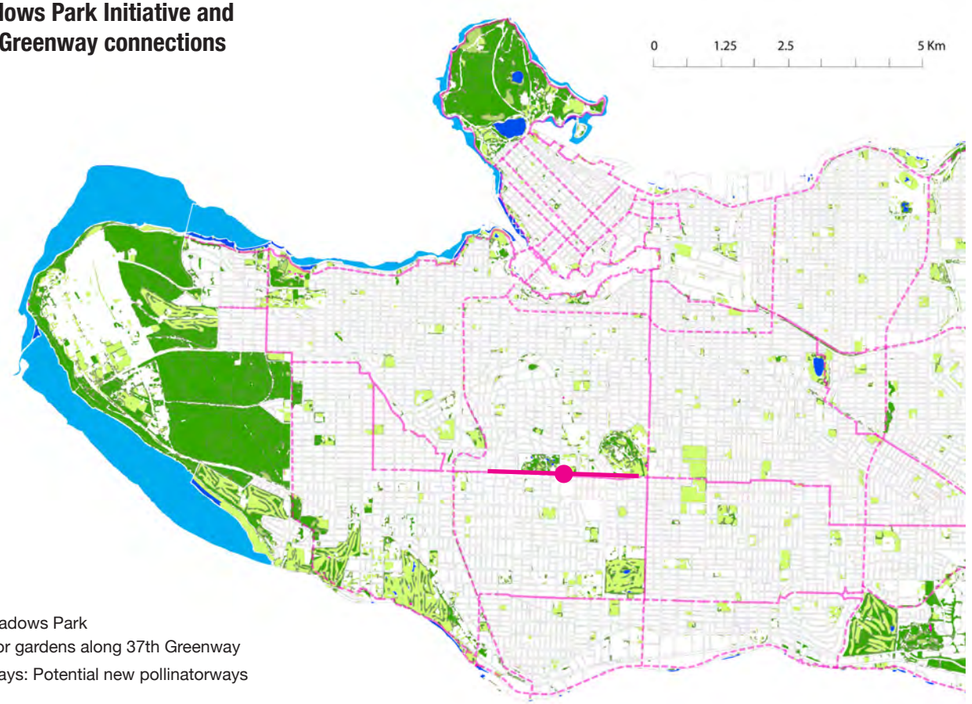
The Pollinator Pathway connects the larger green spaces of Seattle University and Nora's Woods with pollinator habitat.

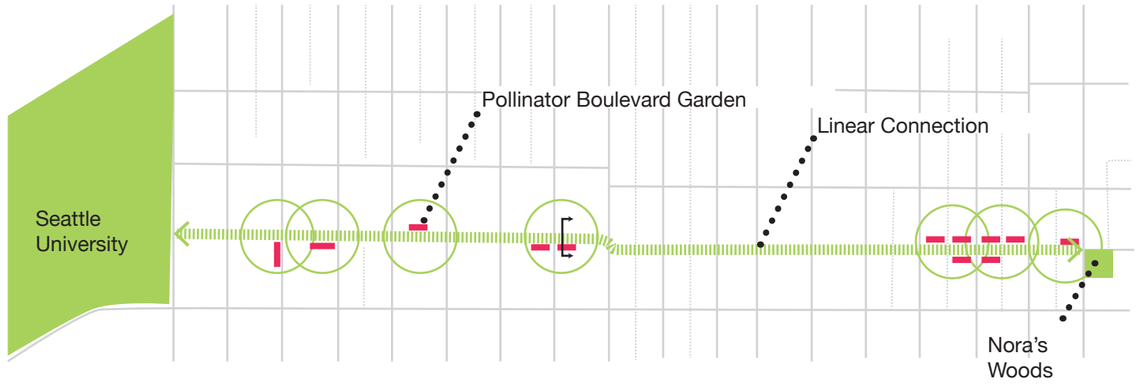
The narrow boulevards between sidewalks and parked cars are planted with a diverse range of native plants to support pollinator life cycles.

Street in Section showing the pollinator garden in pink.

Presecedent Source: *The Pollinator Pathway.* Web. http://www.pollinatorpathway.com/

Oak Meadows Park Initiative and potential Greenway connections





Columbia Street Pollinator Strategy, between 12th and 29th. Seattle, Washington.

Oak Meadows Park

Pollinator gardens align with art and education

Initiatives like the Pollinator Project in Vancouver contribute to biodiversity, while creating opportunities for youth and community engagement and education.

The next step for the pilot project, started in Oak Meadows Park, is to expand along the 37th Avenue Greenway, in both civic and private space.

Delightful show of flowers throughout the summer.

Pollinator gardens in Oak Meadows Park were installed by high school students, along with the Environmental Youth Alliance

The Insect hotel aligns art, habitat, and education.

Additional City of Vancouver, Greenest City 2020 Action Plan Resources

(including Published Documents and Unpublished Drafts)

Biodiversity Strategy Background Documents

Biodiversity Target: Backgrounder. March 21, 2014.
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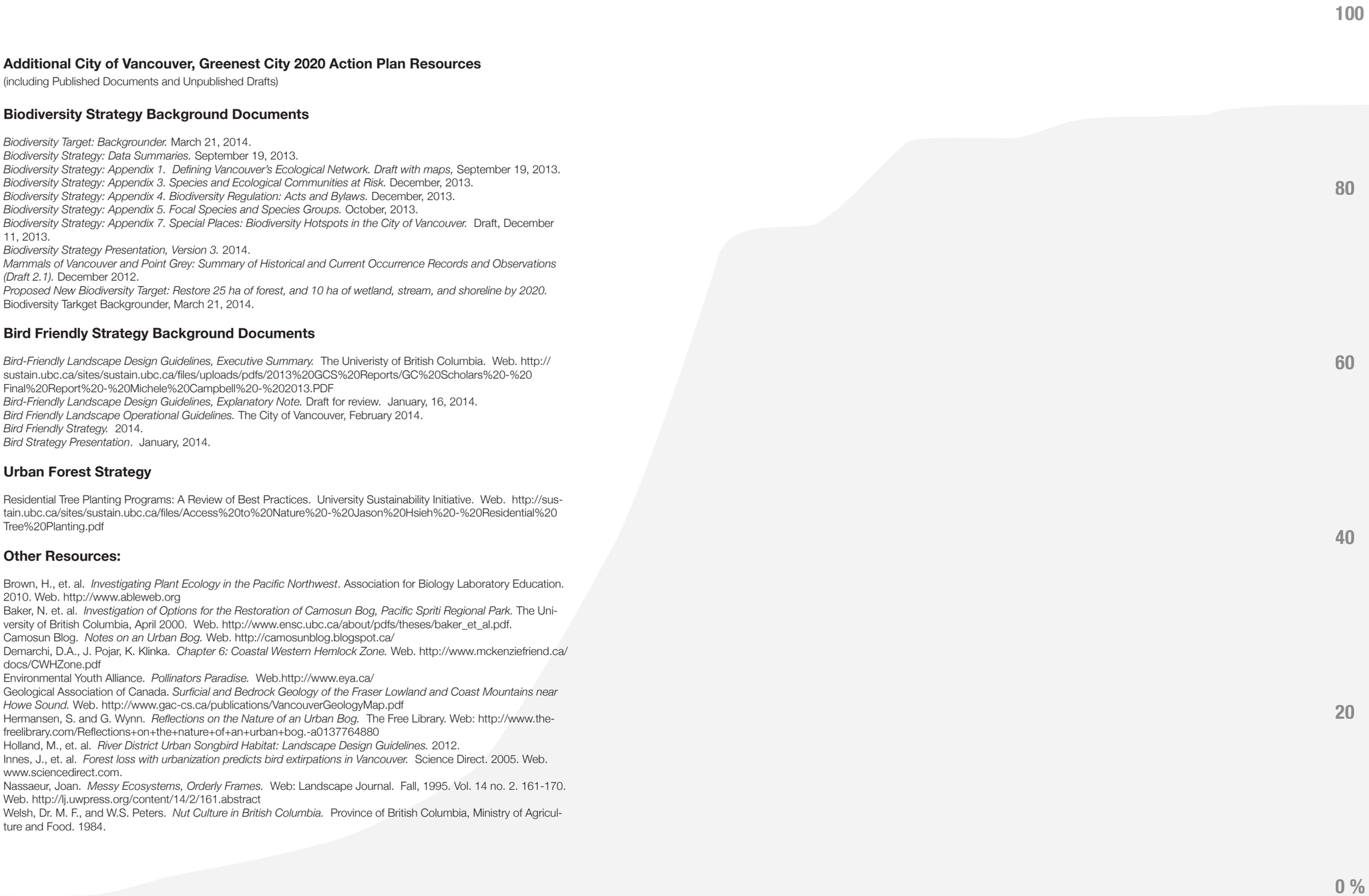

Proportion of urban land in Vancouver, from 1859 to 1989

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