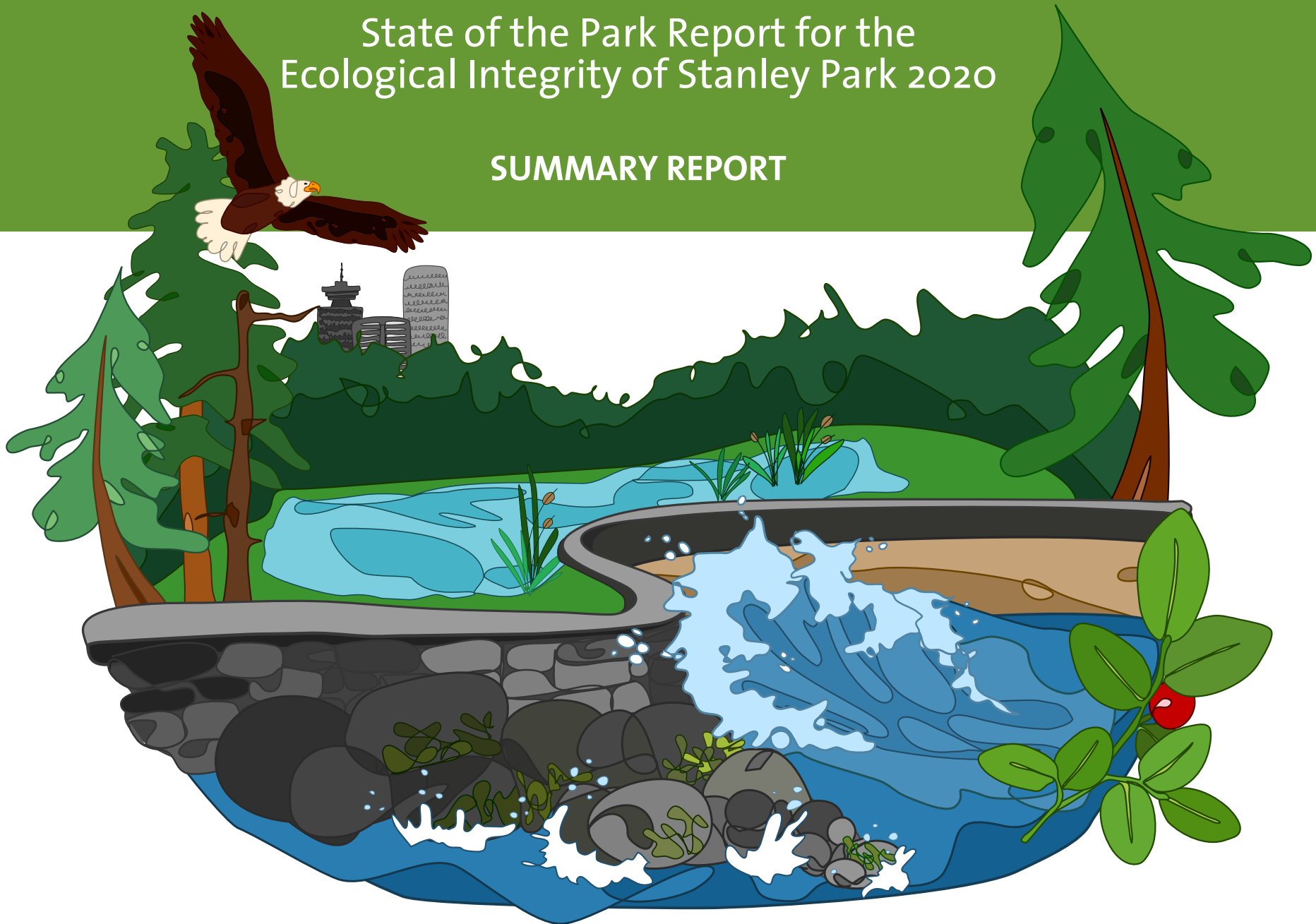


# State of the Park Report for the Ecological Integrity of Stanley Park 2020

## SUMMARY REPORT



# STATE OF THE PARK REPORT: STANLEY PARK

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## INTRODUCTION

### Why a State of the Park Report?

Under great stress from climate change, pollution, and outdoor recreation, it is crucial to understand the changing ecosystems of Stanley Park and what can be done to support their long-term health. In 2010, Stanley Park Ecology Society (SPES) published the first [State of the Park Report for the Ecological Integrity of Stanley Park \(SPES, 2010\)](#), which provided extensive information on the ecology of Stanley Park, evaluated its ecological integrity, and identified knowledge gaps.

We are proud that the 2010 State of the Park Report has informed key management strategies and plans for Stanley Park, and it is our intention for the 2020 State of the Park Report to carry on that work.

This summary’s purpose is to highlight our most pertinent findings about the ecological health of Stanley Park, provide recommendations for future research and conservation efforts, and to encourage questions, conversations, and collaborations.

## INTRODUCTION (CONT'D)

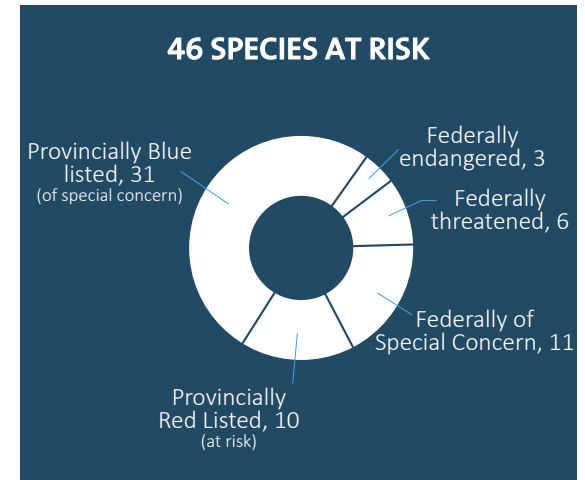
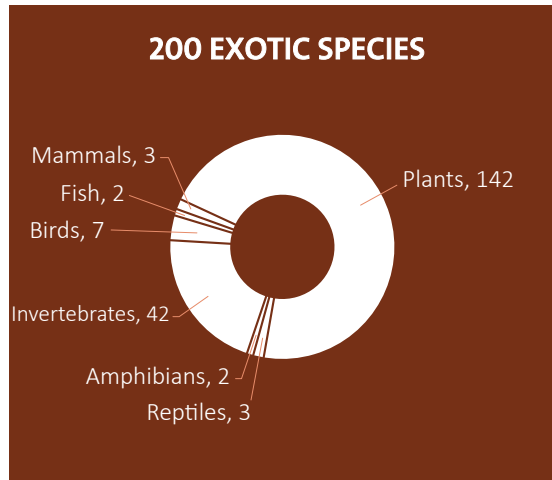
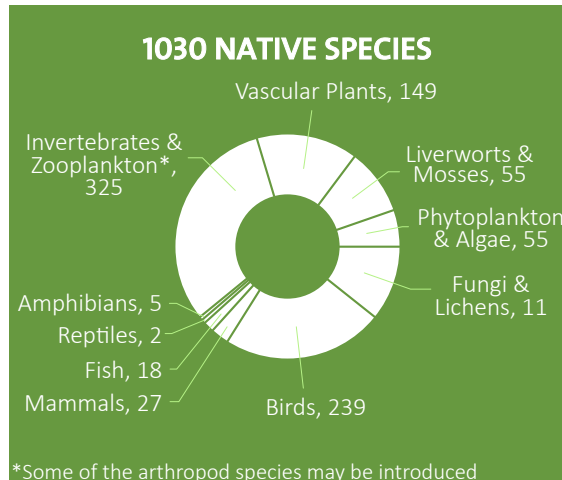
### What is “ecological integrity”?

Ecosystems have integrity when their native components, including the composition and abundance of native species, are interacting as they should be. The living and non-living parts of that ecosystem are characteristic for the region, and its ecological processes occur with the frequency and intensity expected in that region.

### How healthy are Stanley Park’s ecosystems and why does this matter?

The answer is complex.

Stanley Park is home to at least 1030 native species, including 46 species at risk. The pie charts represent the number of species confirmed to be present in Stanley Park in the last decade (2010 to present). If the ecological health of Stanley Park declines, it impacts the native species living there in various ways.



#### Canada’s Species at Risk Act (SARA) list

**Endangered:** Species facing imminent extirpation or extinction.

**Threatened:** Species which are likely to become endangered if nothing is done to reverse the factors leading to their extirpation or extinction.

**Special concern:** Species which may become threatened or endangered because of a combination of biological characteristics and identified threats.

#### BC’s species list








**Red List:** Species that are at risk of being lost (extirpated, endangered or threatened)

**Blue List:** Species that are of special concern






















# ECOLOGICAL INTEGRITY INDICATORS - MAIN TAKEAWAYS

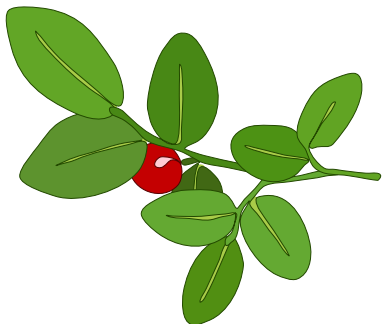
To generate this ecological assessment, we followed Parks Canada’s guidelines on *State of the Park* reporting (Parks Canada 2011). We chose four “indicators” to evaluate Stanley Park’s ecological integrity: climate and atmosphere, freshwater ecosystems, intertidal ecosystems, and terrestrial ecosystems. Through our long-term monitoring of “measures”, we assessed the health of the indicators as good, fair, or poor.

Status and trends legend:

<b>Status</b>		Good		Fair		Poor		Not Rated
<b>Trends</b>		Improving		Stable		Declining	(Blank)	Not Rated

The current status and trends for each indicator and measure:

<b>Climate and Atmosphere</b> 	<b>Freshwater Ecosystems</b> 	<b>Intertidal Ecosystems</b> 	<b>Terrestrial Ecosystems</b> 
Air quality 	Water temperature 	Algae 	Tree cover 
Air temperature 	Dissolved oxygen 	Sessile invertebrates 	Breeding birds 
Precipitation 	pH 	Limpet size 	Bald eagle productivity 
Sea level 	Stream invertebrates 		Huckleberry productivity 
	Amphibian richness 		Soil decay rate 



## CLIMATE AND ATMOSPHERE: A SNAPSHOT OF CHANGE

- Air quality is in good condition
- Precipitation seems to be declining in the summer
- Sea levels are increasing

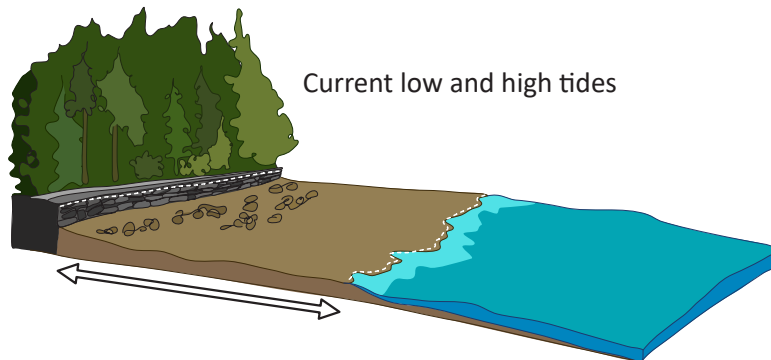
The air quality in Stanley Park is currently considered in good condition and improving. However, precipitation seems to be declining in the summer and the sea level is rising. Experts predict that climate change will affect the region through dryer summers, wetter winters, warmer air temperatures, and higher sea levels (BC MOE 2016). In Stanley Park, we can expect these changes to reduce soil moisture, increase erosion, and increase evaporation in fragile wetlands, further threatening conditions for aquatic freshwater species and tree lifespan.

Sea level is predicted to rise by up to 1m between the years 2000 and 2100 (Ausenco Sandwell 2011). Sea level rise will result in the reduction of intertidal habitats. This phenomenon, known as “coastal squeeze”, threatens the intertidal food chain upon which mammals and birds along the coast depend. Additionally, coastal flooding due to higher sea levels and storm surge is expected to increase the salt water levels in Lost Lagoon and damage or, in some sections, submerge the seawall around Stanley Park. The City of Vancouver is exploring ways to adapt to these expected changes, such as creating more natural coastal shorelines (NHC 2014, 2015).

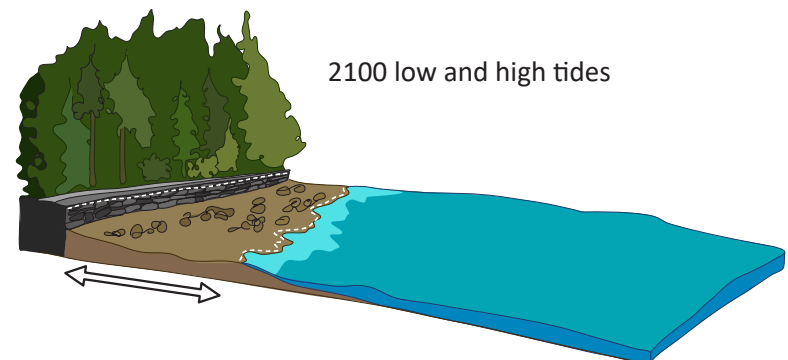


Stanley Park Seawall at Siwash Rock. Photo: Rachel Wei

### Coastal Squeeze



Current low and high tides



2100 low and high tides

Sea level rise will result in the reduction in intertidal habitat.

### WHAT ELSE CAN BE DONE?

- Install data loggers in the Park that measure air quality and noise/light pollution on site.
- Track how soil moisture, erosion, and water evaporation change over time.



## FRESHWATER ECOSYSTEMS: RED ALERT!

- Summer water temperatures in Beaver Lake and Lost Lagoon are too high for aquatic species
- Dissolved oxygen is reaching alarmingly low levels in Lost Lagoon and Beaver Lake
- Stream invertebrate sampling reveals a decline in Beaver Creek's water quality

Freshwater provides essential habitat for aquatic and semiaquatic species such as frogs, salamanders, fish, beavers, bats, and birds.

Unfortunately, freshwater ecosystems are doing poorly in Stanley Park. Water temperatures are high in Beaver Lake and Lost Lagoon and oxygen levels are exceptionally low in Beaver Lake to the point they are reaching lethal levels for salmonids and amphibians. These concerning levels may explain the low number of fish and amphibian species in Beaver Lake. Other studies have also shown high levels of heavy metals in both freshwater bodies (Faugeraux and Bendell 2011, VPB and AquaTerra Environmental Ltd. 2014, MacKinnon 2018).

Without proper intervention, the situation is expected to worsen. Dredging Beaver Lake, creating habitat islands, and developing long-term solutions to improve Lost Lagoon water quality were some of the proposed actions in the 2011 Stanley Park Ecological Action Plan (SPEAP 2011) and should be pursued.



Beaver Lake's resilience against severe stressors such as invasive species, infilling, and climate change is uncertain. Photo: Michael Schmidt, 2015

### WHAT ELSE CAN BE DONE?

- Install water quality and water level data loggers
- Determine the impact of municipal water shut off on Stanley Park's watershed
- Measure water flow through culverts to determine where widening should be prioritized

## TERRESTRIAL ECOSYSTEMS: THE COMEBACK STORY

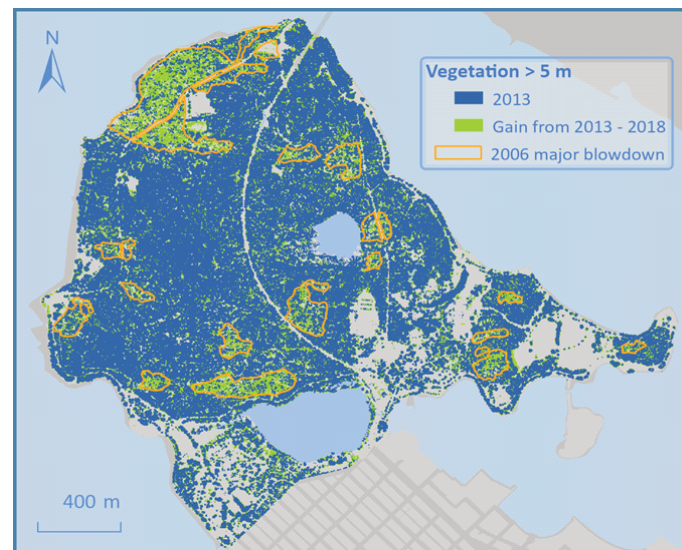
- Tree cover has rebounded since the windstorms of 2006-2007
- Bald eagle population is healthy and stable
- Breeding bird community is in fair condition and stable

The total tree cover of Stanley Park increased by 8% between 2013 and 2018, a rebound to celebrate after the loss of 10,000 Stanley Park trees (5-10% of all the Park's trees) during the 2006-2007 windstorms. This forest recovery is largely due to the 15,000 trees and shrubs that were planted in the blowdown areas (pre 2010), an effort supported by several generous donors and sponsors. SPES continues to host planting events to restore various areas of the forest and forest edges.

Three to five pairs of Bald Eagles breed in the Park every year, and the number of eaglets they produce (productivity) can indicate whether their environment provides the resources the eagles need to survive and breed, such as tall strong trees for nesting. In the last decade, on average, one eaglet per active nest was produced, which is considered sustainable for Bald Eagle populations (Sprunt et al. 1973).

Bird communities help us gauge forest ecosystem health because they respond predictably to changes in the environment. Specialist bird species (like woodpeckers) require specific conditions to thrive, while generalist bird species (like crows) adapt better to environmental changes (Goodwin and Shriver 2014). With that in mind, we developed a bird community rating index and four of our 22 surveyed forest sites indicated a good rating, while the 18 others indicated a fair condition. Not surprisingly, the bird community rated better where the forest is less fragmented.

Stanley Park's terrestrial ecosystems continue to face challenges like climate change, off-trail activities, and the spread of invasive species. Restoring disturbed areas into more natural and diverse habitats is one of our priorities at SPES. Every year, hundreds of volunteers have been joining us to remove invasive species and to plant native species.



The green areas represent the gain in tree cover between 2013 and 2018. Note that most of the tree cover increase took place in blowdown areas, where over 15,000 trees and shrubs were planted to mitigate the devastating 2006-2007 windstorms.



Bewick's Wrens are a specialist species: they require a tree cavity for nesting and are insectivores. Photo: Mark White, 2012

### WHAT ELSE CAN BE DONE?

- Measure the success of restoration efforts, including the regrowth of removed invasive plants and the resiliency and survival of native plants
- Monitor the abundance and diversity of birds both pre- and post-restoration
- Measure the effectiveness of the obstruction of unofficial trails



## INTERTIDAL ECOSYSTEMS: A START

Worldwide, intertidal ecosystems face various stressors like sea level rise, pollution, and recreation. Stanley Park is no different. The seawall surrounding the entire Park limits nutrient exchanges between coastal and terrestrial ecosystems, and will amplify the negative impacts of sea level rise over time (such as coastal squeeze).

We established a long-term monitoring program for Stanley Park's intertidal ecosystems in 2019. Marine algae and invertebrate species are vulnerable to physical and chemical changes in the marine environment, which makes them useful indicators for detecting environmental change (El Shoubaky 2013). We will share results in the next State of the Park Report once we collect enough data.



SPES volunteers surveying intertidal invertebrates and algae. Photo: Meghan Cooling, 2019



Moon jelly. Photo: Michael Schmidt



Red rock crab. Photo: Devon Yu

### WHAT ELSE CAN BE DONE?

- Measure the level and impact of coastal squeeze over time
- When more data becomes available, use the BCIT mussel and Barrow's Goldeneye counts as a measure for the Intertidal Ecosystems indicator



## COLLABORATIVE HABITAT ENHANCEMENTS SINCE 2010

Highlighted below are the notable ecological restoration and habitat enhancement projects that have been implemented in Stanley Park since 2010. These projects were possible thanks to the invaluable partnerships and collaborations between SPES, the Vancouver Park Board, and many other groups. These projects not only enhance the natural habitats and native biodiversity of Stanley Park, but also provide unique opportunities for the community to engage with and learn about this culturally and environmentally significant place.

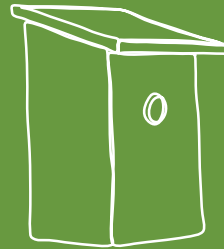
In the full SOPEI 2020 report, we tracked the progress of the proposed conservation actions of the Stanley Park Ecological Action Plan (SPEAP 2011). This has helped to identify milestones and obstacles in reaching the action plan's goals, and we intend SOPEI 2020 to provide guidance for revisiting prioritized conservation actions for Stanley Park.



Installed Cathedral Trail boardwalk to reconnect the wetland, improving drainage and wildlife passage



Installed predator guards to protect nests in the Great Blue Heron colony



Installed 22 nest boxes for swallows and Wood Ducks in Lost Lagoon and Beaver Lake



Re-established a wet meadow ecosystem at Ceperley Meadow



Built three bee condos to provide homes for blue orchard mason bees



Installed wire guards around trees to foster better coexistence with beavers



Restored 500 m<sup>2</sup> of Beaver Lake Bog, where sphagnum, round-leaved sundew, bog laurel and bog cranberry now thrive



Removed over 8000 m<sup>3</sup> of invasive plants



Planted over 8000 native plants



Developed the *Ecological and Culturally Sensitive Enhancement Plan* to mitigate the rapid infilling of Beaver Lake

(Collaborative work of several consultants and scientists)

## FUTURE STEPS

This ecological assessment provides a snapshot of how Stanley Park's ecosystems are faring, and how they are responding to natural and human impacts. This information, in turn, helps guide Park management strategies. As Stanley Park continues to change (ecologically and culturally), SPES remains dedicated to supporting resilient Park ecosystems. We aim to release our next State of the Park Report in 2030, and in the meantime, we will continue our collaborative efforts towards environmental research, stewardship, and education. We will continue to promote citizen science through initiatives like Bioblitzes and community bird counts, and by sharing the data we collect with other organizations. Lastly, we recognize that the ecological assessment presented here is based on a Western science perspective. SPES would benefit from an increase in Indigenous relationship building. To draw a more holistic picture of the Park's ecological integrity, the future reports would benefit from the incorporation of Traditional Ecological Knowledge (TEK) held by individuals of the Musqueam, Squamish, and Tsleil-Waututh Nations.

For the complete State of the Park Report for the Ecological Integrity of Stanley Park, please visit

[www.stanleyparkecology.ca](http://www.stanleyparkecology.ca)

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## ACKNOWLEDGMENTS

We gratefully acknowledge that our work takes place on the traditional, ancestral, and unceded traditional territory of the xʷməθkʷəy̓əm (Musqueam), Skwxwú7mesh (Squamish), and sə́lilwətaɣ̓ (Tsleil-Waututh) First Nations. The study of Stanley Park that we summarize here is incredibly young compared to the long history of Traditional Ecological Knowledge of the land held by these three Nations.

**The State of the Park Report on the Ecological Integrity of Stanley Park is an initiative of Stanley Park Ecology Society**

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Supported by



*Stanley Park Ecology Society promotes awareness of and respect for the natural world through collaborative leadership in environmental education, research, and conservation in Stanley Park.*

Heron eating fish. Photo: Greg Hart



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