



2010

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

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Introduction



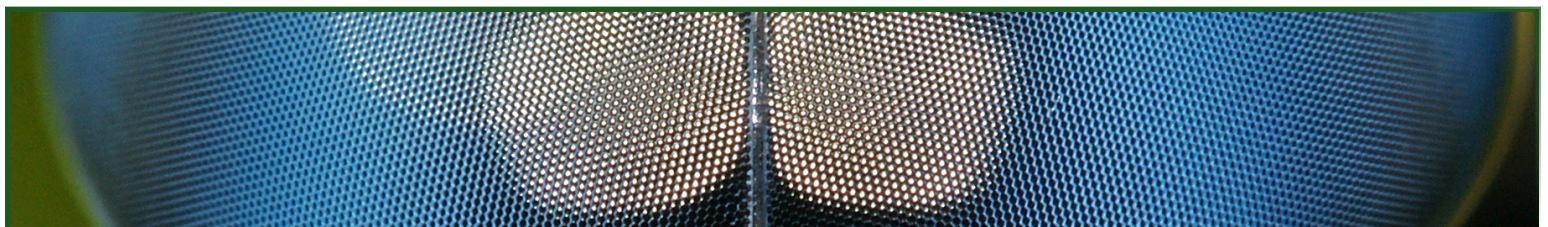
The Need for a State of the Park Report for Stanley Park

In December of 2006, Stanley Park was struck by a major windstorm resulting in substantial disturbance and windthrow. The storm triggered the need for extensive restoration work and also raised awareness about the lack of ecological information available for the Park and the need for an assessment of its ecological integrity. The 'State of the Park report for the Ecological Integrity of Stanley Park' was created by the Stanley Park Ecology Society (SPES) to fulfill the organization's strategic goals with respect to stewardship, education, research, and conservation. Parks Canada designated Stanley Park as a National Historic Site of Canada because: *"In its splendid setting and through the relationship between its natural environment and its cultural elements developed over time, it epitomizes the large*

urban park in Canada". The structure of this report was based on similar reports created for National Parks. Although cultural components are integral to Stanley Park, this report focuses mainly on the ecological aspects. It is hoped that it will serve as a sound basis for a future Stanley Park Master Plan and act as a step toward the long-term maintenance and restoration of the Park's ecological health and biodiversity.

The primary purposes of this report are to:

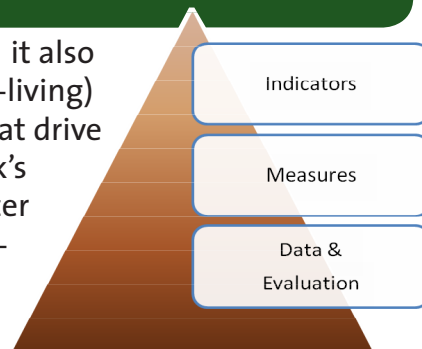
- Describe what is happening with respect to the major ecosystems and the potential stressors acting on them
- Identify gaps in ecological knowledge
- Establish a framework to assess the current state of Ecological Integrity



Methods and Limitations

Although this report was based on similar reports created by Parks Canada, it also contains a detailed biophysical inventory section including the abiotic (non-living) and biotic (living) components of its ecosystems as well as the processes that drive them. The inventory uses an ecosystem approach to understanding the Park's natural resources by recognizing the connections between the land, air, water and all living things, including people and their activities. The inventory provides detailed information about the ecological history of the Park and the stressors influencing its Ecological Integrity. It was created by conducting a literature review and by compiling recent research, monitoring data, and local knowledge.

The current state of the Park was assessed and evaluated by rating specific environmental indicators that provide a broad representation of key factors influencing the Park's ecosystems. One of the limitations of this report is that existing information is limited for many of the indicators. Where data were insufficient, professional evaluation based on observed evidence was used to assess current conditions and future trends. The preparation of this State of the Park report was undertaken with the understanding that all of the data needs have not been met and many of the measures for assessing these indicators have not yet been determined. These gaps will guide the direction of future research and monitoring programs.



Stanley Park's ecosystems are complex so Environmental Indicators have been chosen to provide a clear and practical way to describe and track the state of the environment.



Stanley Park is located in the heart of downtown Vancouver, British Columbia and is surrounded on all sides by ocean and urban development.

Photo: Vancouver Park Board

Ecological Integrity

Ecological Integrity (henceforth referred to as EI) is key to State of the Park reporting and is central to the analysis in this report. An ecosystem is defined as having EI "when it is deemed characteristic for its natural region, including the composition and abundance of native species and biological communities, rates of change and supporting processes" (Parks Canada, 2009).

The EI of Stanley Park will never be fully achieved because of its size, location and the past and present influences that surround it; the Park is a relatively small fragment of habitat in the middle of an urban landscape, and has been altered throughout its history by infrastructure developments, logging, and human use. However, EI is an appropriate goal to work towards if the end product of park management is to ensure that the structure and function of the ecosystems are unimpaired by human-caused stresses so that biological diversity and supporting processes can be safeguarded.

Biophysical Inventory

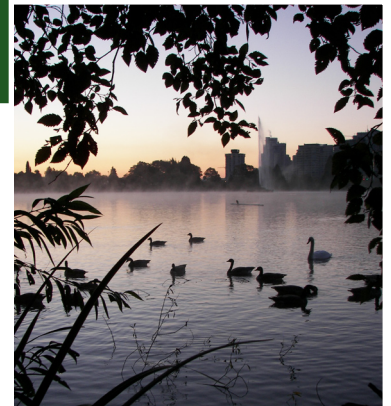
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The biophysical inventory includes detailed information on the species, ecosystems, and processes as well as the stressors influencing the EI of the Park.

Terrestrial Ecosystems

Geology, Topography and Soils

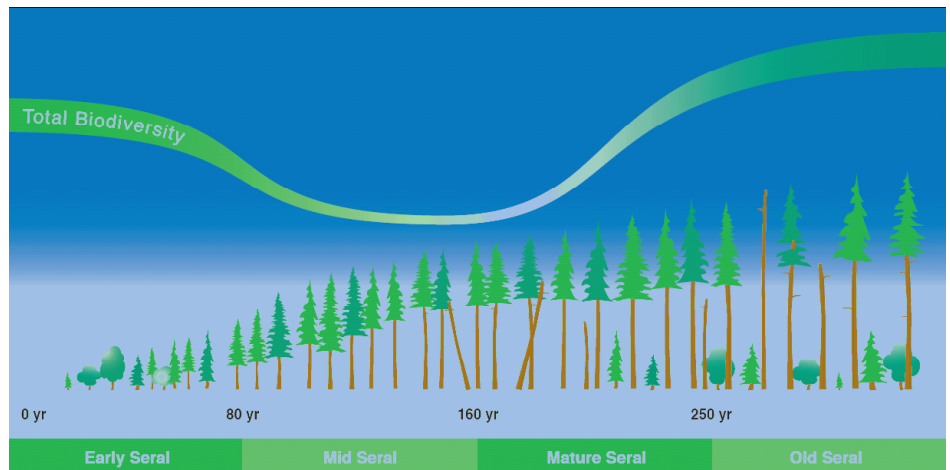
The sedimentary bedrock underlying the Park, called the Huntingdon Formation, consists of layers dipping south from the North Shore granitic bedrock mountains towards the Kitsilano Foreshore. The surficial geology of the Park consists mainly of Newton Stony Clay and Surrey Till that formed during the ice ages of the Pleistocene epoch, and the primary soil type is sandy loam.



The topography ranges from steep cliff regions in the northern portion of the Park to a relatively flat landscape in the area surrounding Lost Lagoon. The majority of slopes in the Park range from 0-20%, but the steepest slopes (in excess of 60 %) are found around Siwash Rock and Prospect Point. Most soils in Stanley Park are highly weathered by the abundant precipitation of the Pacific west coast climate and, like most coastal BC soils, they are generally acidic and low in nutrients.

Hydrology

The five watersheds in the Park have been negatively altered by humans since the first roads, trails, culverts, and ditches were created. Some improvements have been made to improve these effects in recent years, including a catchment area and vegetated swale at Prospect Point and the addition of a biofiltration wetland at Lost Lagoon. All of the Park's major wetlands and streams are augmented by municipal water supplies and are affected by infrastructure.



Forests are made up of different of stands of trees that vary in terms of their successional (seral) stage and species composition. A young forest has high biodiversity, while a middle-aged forest is less diverse due to the intense competition for light, and an old growth forest is the most diverse because it has light openings and dead trees.

Comparison between 1989 and 2009 forest cover types

	1989	2009
Conifer Forest	80%	79%
Deciduous Forest	11.7%	6%
Mixed Conifer and Deciduous forest	8.3%	15%

Forest

Stanley Park's forest comprises 256 hectares (65 %) of its total 395 Ha land area. This forest is part of the Coastal Western Hemlock (CWH) biogeoclimatic zone and is made up of different stands of trees that vary in terms of their successional stage (age) and species composition.

Coast Salish people who lived in and frequented the Park are believed to have caused only small-scale changes to the forest environment. Trees were often left scarred but alive when bark and other parts were harvested for use. Between the 1860-80s, five different timber companies operated in the Park, taking only the most valuable logs for removal. Oxen teams were brought in to remove logs along skid roads that were later turned into trails. The forest was heavily impacted between 1910 - 1960 due to measures aimed at controlling insect and fungus infestations and improving the overall appearance of the forest.



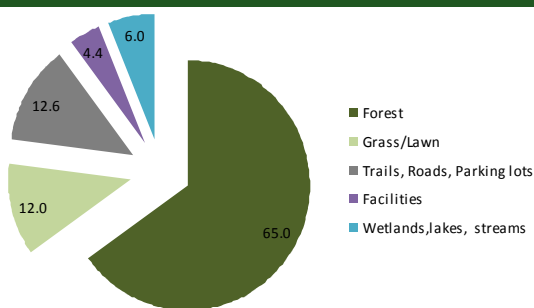
This red alder record tree near Third Beach is on BC's Big Tree registry.

Some of the most dramatic changes to the forest came from the creation of roads and facilities and the introduction of invasive plants. The forested areas of the Park were thought to have decreased by 25 % between 1930 and 1980, and new research shows that a further 4 % has been lost since the 1980s.

The Park's forest contains a significant amount of wildlife trees and coarse woody debris (CWD) especially since the 2006 windstorm which created many more dead standing and fallen trees.

There are over 500 large, veteran (over 150 years old) conifer trees in the Park; they are an important part of Vancouver's cultural heritage and provide vital wildlife habitat. At least 9 of the Park's deciduous trees are listed in BC's Big Tree Registry.

The results of an inventory of land uses in Stanley Park for 2010.

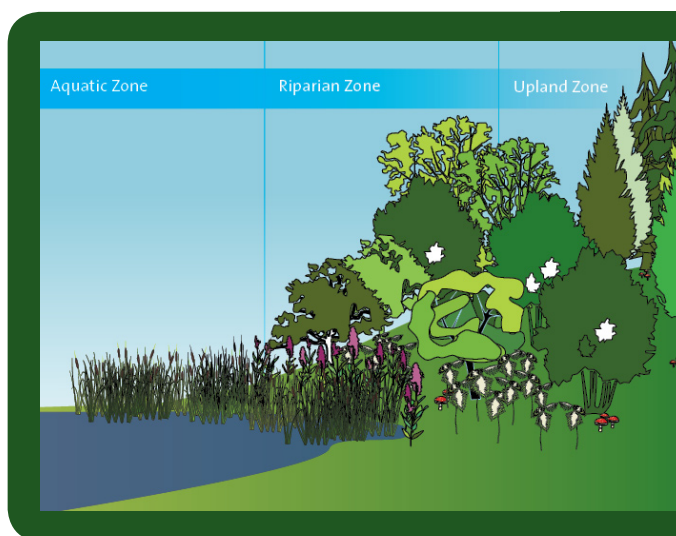


Riparian Areas

Riparian zones are frequently composed of a number of habitats in close proximity and due to the high diversity of plant species, wildlife use is also high. By definition, they are areas of mostly deciduous vegetation found directly adjacent to watercourses. The Lost Lagoon and Beaver Lake riparian zones are particularly extensive. Throughout the rest of the Park most streams flow in narrow, confined channels, and as a result have only a narrow band of riparian vegetation. Due to their sensitivity to disturbance and their importance for wildlife habitat, riparian areas have been designated as Environmentally Sensitive Areas (ESA) by SPES and Wildlife Management Emphasis Areas in the Park Board Forest Management Plan (2009).

Ecotones

Areas in the Park where two structurally distinct habitat types meet are considered ecotones. These edge habitats provide special refuge, breeding and feeding opportunities for wildlife, and represent high species diversity. There is abundant edge habitat in Stanley Park, and shrub-forest edges are the most productive especially for breeding birds, bats, and opportunistic hunters. On a larger scale, forest fragments such as those found in Stanley Park can also lead to detriments to wildlife due to edge effects such as habitat degradation and a greater risk of nest predation and parasitism.



Rocky Outcrops

These areas of the Park are found primarily along the steep slopes between Prospect Point and Siwash Rock, and provide a unique habitat for wildlife. Bird species such as falcons, cormorants, and guillemots use them extensively and they are colonized by specialized plants such as monkey flower and maidenhair fern.

Cultivated Areas

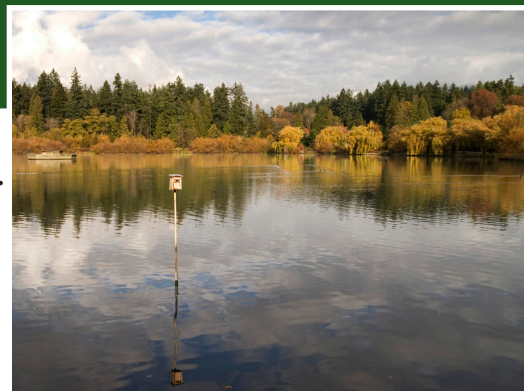
The cultivated areas of the Park can be classified as either gardens or grassy areas. They occur primarily in the eastern half of the Park and at its southern edges. Grassy areas act as feeding areas for some species of waterfowl, squirrels, insects, small mammals, and songbirds. There are 4 ornamental gardens and 1 community garden in the Park which are highly used by pollinators such as butterflies, bees, and hummingbirds.

Aquatic Ecosystems

The two most significant wetlands in Stanley Park are Lost Lagoon with its biofiltration marsh, and Beaver Lake with its associated bog. But there are many smaller, unnamed wetlands occurring throughout the Park.

Beaver Lake

Beaver Lake, located in the centre of Stanley Park, is one of the last natural wetlands in Vancouver. Its watershed drains 112 Ha of primarily conifer forest and contains 1.9 kms of tributaries. The presence of beavers in the lake in 1907 inspired its current name. The site has been used for various recreational pursuits, including a sport fish hatchery, during its history. In the 1930s, the watershed and lake were permanently altered with the completion of the Stanley Park Causeway and the introduction of invasive water lilies. Since that time, the lake has experienced an accelerated sedimentation rate and an increased natural eutrophication process (an accumulation of dissolved nutrients stimulates aquatic plant growth and causes a depletion of dissolved oxygen in the water). It has been documented as having shrunk from 6.7 Ha in 1938 to 3.9 Ha in 1997. The small bog adjacent to Beaver Lake on its southern edge is a rare and sensitive habitat. Studies have shown that this area is the remnant of a larger bog that existed prior to the Causeway being built and is being infilled over by terrestrial tree and shrub species.



Lost Lagoon as seen from the Stanley Park Nature House



This small, unnamed creek runs through the center of the Park and ends at the south end of Cathedral Trail

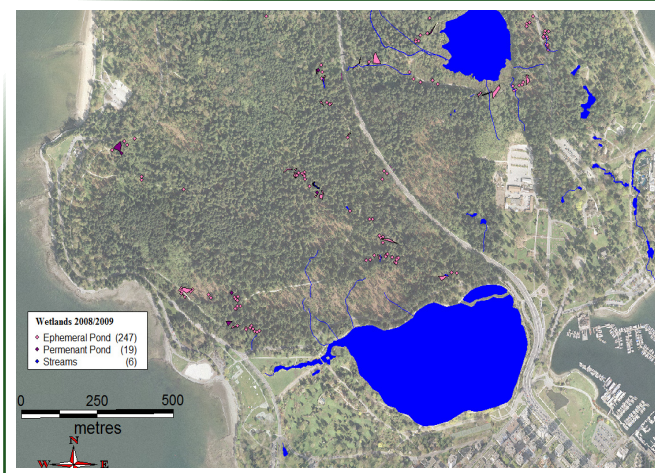
Lost Lagoon

Lost Lagoon is a shallow, brackish body of water that was originally an intertidal mud flat before it was separated from Coal Harbour in 1916. The unnatural formation of this water body and its periodic susceptibility to inflow of salt water has caused the Lagoon to remain a somewhat unproductive system; although the Lagoon supports large numbers of overwintering and breeding birds, it has little to no submergent vegetation and contains mostly invasive fish and herptile species. The stormwater treatment wetland on the northeast end of the Lagoon was completed in 2001 as a mitigation effort during the widening of the Causeway.

The wetland is 3,563 m² in area and can contain 1,170 m³ of stormwater. It was constructed to treat runoff water before it enters the Lagoon by running it through a series of settling ponds and aquatic vegetation, but it also serves as some of the most valuable habitat for wildlife in the area.

Unnamed Wetlands and Streams

Small, unnamed wetlands and streams serve as critical refuges for terrestrial amphibians and other species in the dry summer months. These wet areas are considered high-quality habitat for Species at Risk including potentially, the Pacific water shrew and red-legged frog. Some small ponds have been identified as important breeding sites for northwestern salamanders as they lack the invasive bullfrogs and green frogs that inhabit the larger wetlands. Two of the Park's creeks are home for salmonids including coastal cutthroat trout, a Species at Risk in BC. These wetlands are particularly sensitive to soil disturbance.



Intertidal Areas

The intertidal areas of Stanley Park support diverse communities of marine algae, invertebrates, fishes, and migratory and overwintering waterbirds. In the Park, the upper limit of the intertidal area is largely defined by the seawall, and the low tide mark ranges from 30 to 200 m. The rocky intertidal areas of the Park support rich overwintering waterfowl populations and the sand beaches, popular for recreation and significantly augmented with sand in 1963, are decreasing in size due to erosion. Plant species typically associated with coastal areas above the high tide mark are not common in Stanley Park because of the abrupt, artificial transition the seawall created between the terrestrial and marine environments.

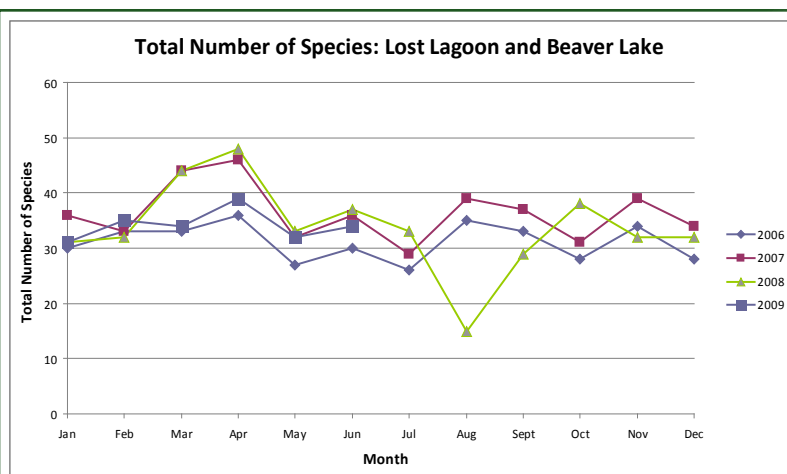
Native Wildlife



Stanley Park is home to a diversity of wildlife species including at least 30 mammals, 236 birds, 10 amphibians and reptiles, 72 freshwater and marine fish, and at least 192 genera of invertebrates. The most noticeable difference between Stanley Park and more remote natural areas is the complete absence of large mammals including deer, elk, bears, wolves, cougars, and bobcats. The more recent disappearance of smaller animals such as native frogs, toads, and reptiles has brought the total number of species extirpated from the Park to at least 20.

Mammals

There is little to no baseline data available on the population status of the Park's mammals. Rodents, insectivores, weasels, raccoons, skunks, coyotes and bats persist in the Park, but there is little information about the species or numbers present. The only preliminary studies to date have focused on bats and Pacific water shrew habitat.



Monitoring programs of wetland birds using Beaver Lake and Lost Lagoon have shown these areas to have consistent numbers of individuals and species since 2006.

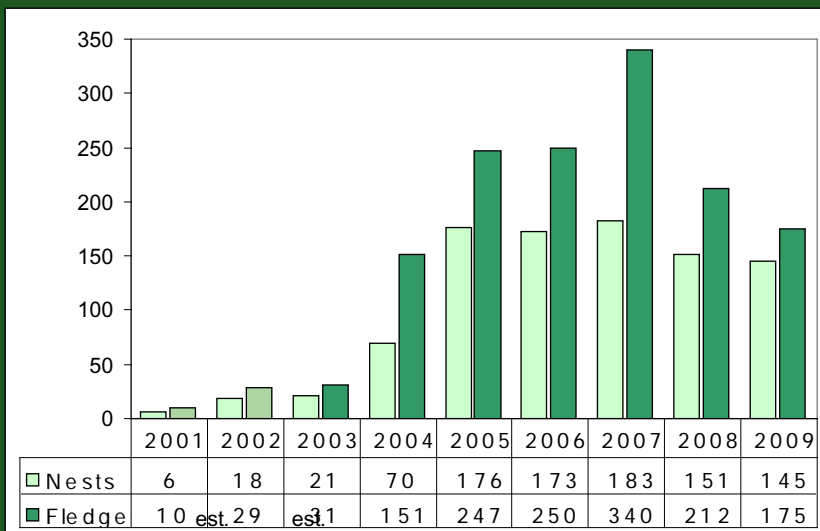
Birds

Stanley Park is a special place in the Lower Mainland for birds; many stop here during migration along the Pacific Flyway, in winter the foreshore is filled with thousands of waterbirds, and the summer breeding populations are diverse and plentiful. Year-round residents include raptors, riparian birds, wetland birds, forest birds, grazing birds, and colonial nesting birds, and the Park is also frequented by a number of bird Species at Risk. The waters off the Park are considered an Important Bird Area of Canada, with record numbers of 17,412 individuals from 50 species in the 1990s.

However, local naturalists have noticed population declines in about 30 species of seabirds; some species have declined from being common in the 1980s to rare today. Forest birds are those species that use the Park's forest as their primary habitat for breeding and/or overwintering. The highest diversity of these species live and breed in the deciduous-dominated parts of the forest, while the highest numbers of birds use the mature conifer stands. Breeding bird surveys have confirmed that there are at least 50 species of birds that use the Park's forest for nesting.

Reptiles and Amphibians

Reptiles have been found in the areas surrounding Lost Lagoon and Beaver Lake and along the bluffs and cliffs in the Park. However, these creatures are perhaps the most poorly documented, with only one snake and a couple of lizards having been observed in the past several years. Western painted turtles, a Schedule 1 Species at Risk Act (SARA) listed species, were once present in Beaver Lake, but there have been no reported sightings for many years.



The Pacific great blue heron colony on the edge of Stanley Park has been monitored since 2001 and is highly productive.

The Park is home to both terrestrial and pond-breeding amphibians which can be found in wetlands and moist forested areas. Recent pond-breeding amphibian surveys as well as visual searches of the forest have revealed that several species may have been extirpated in the last 30 years. The Pacific chorus frog (tree frog) and red-legged frog have not been observed in many years. Native northwestern salamanders have continued breeding in Beaver Lake and in at least two other small ponds. Terrestrial amphibians that do not require standing water for any part of their life cycle are fairly common in the Park and one area near Prospect Point was found to contain significantly high concentrations of salamanders.



Fish

Freshwater fish have been documented in Beaver Lake and Lost Lagoon as well as in Beaver Creek, North Creek, and the artificial salmon stream. While the diversity of fish is relatively low, the number of coho salmon and cutthroat trout in Beaver Creek were found to be at densities typical for a stream of that size and location in the region during the most recent survey in 1995. The predominant fish in the Lagoon are introduced carp, but in 2009, a school of about 1,500 threespine sticklebacks was observed near the Stone Bridge. There is a diversity of marine fish species found near the shores surrounding the Park; breeding grounds exist near Brockton Point and Figurehead Point, and several species have been documented spawning along the Park's rocky shores.

Amphibian biologist Elke Wind (left) and SPES staff Robyn Worcester (right) conducting pond-breeding amphibian surveys.

Photo by Peter Woods.



Invertebrates

There is an excellent diversity of invertebrates in Stanley Park including terrestrial, aquatic, and marine species representing 62 orders and 149 families. University of BC Forest Sciences insect surveys undertaken as part of the 2007-2008 Park Board Restoration in the Park focused on wood-boring insects and moths in the blowdown areas. The researchers collected 15 ground beetle species, 190 moth species, and 67 rove beetle species, including 2 that were new to science: *Oxypoda stanleyi* and *Sonoma squamishorum*.

Aquatic freshwater invertebrates are a key component of the food webs and are important indicators of ecological health. The Spencer Entomological Museum studies of these animals in Beaver Lake in 2007-2008 revealed 49 different species, including a blue-listed dragonfly, *Pachydiplax longipennis*.

There are at least 80 species of marine invertebrates on record for the Park's intertidal areas. The area of highest species diversity has been reported as Brockton Point, which was also home to an endemic bristleworm, the Vancouver feather-duster worm. Local biologists have observed an increase in the number of sunflower and giant pink stars in recent years, while there has been a concurrent drop in overall species diversity. More than 60 species of intertidal flora and fauna were found area between 2007-2009 by the Nature Vancouver volunteers.



Oxypoda stanleyi was first discovered in Stanley Park.

Natural Disturbances

On the coast of BC, frequent windstorms are the primary natural disturbance shaping forest ecology. Small canopy gaps are common, and major stand-replacing wind events such as the one that hit the Park in December 2006 are rare. Forest fires occur in south coastal forests only every 350-1000 or more years (estimates vary). Tree diseases and insect defoliators play only a minor role in forest dynamics on their own, but they are an important factor when they interact with wind events. Many small canopy gaps in the forest structure are created when the wind blows down groups of dead and dying trees, allowing light to penetrate the forest floor, and resulting in increased overall biodiversity.

Although there are major windstorms every few years in the Lower Mainland, there have been three significant storms in the Park's history that affected both the ecology and management of the Park (in 1934, 1962, and in 2006 when approximately 10,000 trees fell). Windstorms provide ecologically beneficial outcomes to coastal forests by creating openings in the tree canopy resulting in an increase in species and structural diversity.

Wildfires have been excluded from Stanley Park since it was founded in 1888, to reduce the risk to people and property, but because our coastal forests are characterized by infrequent fire regimes, the negative ecological effects of fire suppression have likely been minimal.

Insects and diseases made their mark on the Park's forests early in its history. Hemlock loopers, gall aphids, and tip moths were prevalent in the early 1900s, instigating the removal of dead and dying trees and underbrush, and the use of chemical controls. By the 1980s, there were no more serious disease or insect outbreaks in the Park, but it was reported that up to 50 % of the mature forest was infected by dwarf hemlock mistletoe, a naturally occurring parasitic plant. This parasite is believed to be at elevated levels in the Park due to historical logging practices, which selected for Douglas-fir and western red cedar and interfered with natural succession.



Dwarf hemlock mistletoe is a naturally occurring tree parasite which causes the 'witches brooms' to form and provides habitat for wildlife including the Johnson's hairstreak butterfly.

Stressors

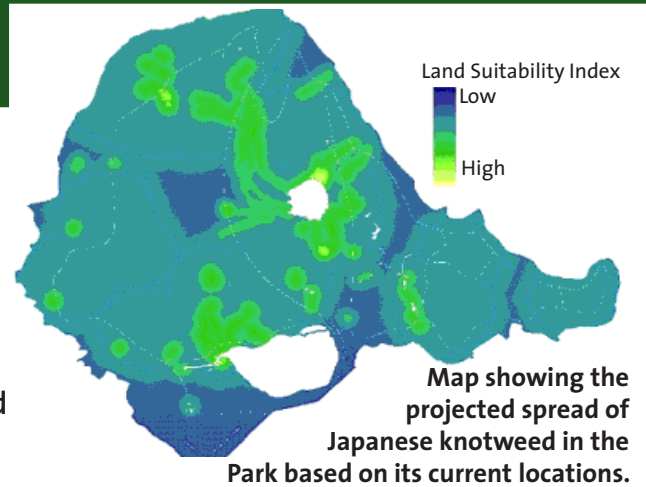
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As an old and intensively used Park bordering on a large urban centre, Stanley Park has been significantly impacted by human use and environmental stressors.

Environmental

Climate Change

BC is experiencing a pattern of warming consistent with broader North American and global trends and our native species are being forced to adapt to changing conditions. Climate change models predict that Stanley Park will shift towards a drier Coastal Douglas Fir ecosystem and we may also see alteration of stream flows, increased flooding, increased severity and frequency of storms, sea-level rise, and changes to the productivity of near-shore habitats.



Invasive Species

Invasive alien species are those plants and animals that have been introduced by humans, are outside their natural geographic range, and pose negative stress on native biota and ecosystems. These species are able to spread quickly, grow rapidly, and thrive in their new environments and they represent one of the greatest threats to biodiversity in the world today. Some of the exotic species in the Park were introduced deliberately, early in its history (e.g. English ivy), others have occurred as a result of the abandoning of unwanted pets (e.g. red-eared slider turtles), and the rest are species that have spread with urbanization across the continent (e.g. European starlings). There are at least 50 invasive species that have become established in the Park, 7 of which are currently listed by the International Union for Conservation of Nature (IUCN) as being in the 'top 100 worst invasive alien species in the world.'



Intense algal blooms (such as this one in 2009) have been increasingly common in the summer months at the Lagoon.

Habitat Fragmentation and Isolation

Stanley Park is an island of habitat surrounded on all sides by ocean and urbanization. Forest fragments that are created by humans have localized and immediate effects on biodiversity especially when they are surrounded by development. The potential effects in Stanley Park include a loss of gene flow, increased competition, degradation of the existing habitat, increased predation and invasive species invasions.

Management Operations

Park maintenance operations can cause negative localized impacts on wildlife habitat. While some of these activities aim to benefit the forest in the long term, others that are necessary to maintain the Park's recreational trails, facilities, safety, and appearance, may be more beneficial to Park users than to the ecology of the Park. Park maintenance activities include tree planting, stand thinning, rock scaling, hazard tree removal, grass mowing, trailside vegetation brushing, and trail maintenance. The Park Board's Forest Management Plan outlines the effects of these activities and suggests timing windows for when they should be carried out to reduce their negative impacts on native habitat and wildlife.

Social Issues

Stressors arising from human use of the Park also affect its EI. Trails and roads represent a loss of valuable habitat and create ongoing problems with hydrology, wildlife movement, and the spread of invasive plants. Some areas of the Park are heavily impacted by unsanctioned off-trail uses that damage understory plants and soils. Off-leash dogs and wildlife feeding are ongoing issues that are detrimental to wildlife, especially birds and small mammals. Decreasing air quality along with marine contaminants are stressors that may be affecting the Park's ecosystems but originate mainly from outside its borders. Because Lost Lagoon is an artificially created wetland, it suffers from a variety of stressors including: high summer temperatures and associated low dissolved oxygen levels, frequent and severe algal blooms likely associated with poor water quality, low influx of freshwater runoff, periodic salt water incursions from Coal Harbour, limited riparian vegetation, progressive infilling from sedimentation, and high levels of E. coli and other fecal coliforms due to the high density of waterfowl.

Environmental Indicators

Environmental indicators help to describe the state of the environment for particular issues in a concise and easily understood manner. Indicators used in this report have been chosen to describe the current state and trend of particular components of EI, and according to the following criteria.

They:

- provide a basis for assessing ecological integrity
- provide information about changes in important ecosystem processes
- are based on reliable data
- represent features that are sensitive to external stressors and can be used for the early detection of change
- are measurable so that they can be monitored and assessed
- are defined by ecosystem, not institutional, boundaries

The designation of environmental indicators and the creation of research and ongoing monitoring programs to evaluate them will provide information which can be used to better analyse and assess EI in the Park.

The gaps in information identified through this report will aid in directing research so that we can effectively assess these elements in the future. Documenting trends and changes in these key indicators will provide a basis for ongoing SPES conservation efforts and will allow for a better understanding of the needs for ongoing restoration and enhancement in the Park.





Component of EI	Environmental Indicators
Climate & Atmosphere	air quality climate change
Aquatic Ecosystems	Water quality Stream flow and fresh water levels Diversity and extent of wetland habitat Connectivity between freshwater habitats Diversity of structure in fresh water habitat Diversity and abundance of indicator species in freshwater habitat Diversity of native intertidal species Diversity and extent of intertidal habitats Degree of connectivity between intertidal and upland habitats
Terrestrial Ecosystems	natural soil quality diversity of species and successional stages in forest stands diversity and quality of terrestrial habitat types connectivity between terrestrial habitats diversity of habitat structure riparian areas frequency and severity of natural disturbances number and distribution of native veteran and record trees
Native Biodiversity	Indigenous plant and animal species richness Number and extent of invasive plant and animal species native species productivity genetic diversity within species number of SARs and extent of park used by them population status of keystone spp.

Climate and Atmosphere





The current state of climate and atmosphere in Stanley Park is **FAIR**, but there is cause for concern mainly due to the effects of climate change. Stanley Park is experiencing trends felt across BC including increases in sea level and surface temperature, increased average air temperatures, and an increase in total greenhouse gas emissions. Recent severe weather events such as the windstorms in 2006 and record-breaking high temperatures in the summer of 2009 may indicate that the predicted impacts of global climate change are already affecting the Park.

This aspect of the Park's EI was given a **DECREASING** trend because of the predicted negative impacts of climate change and decreasing air quality in the City of Vancouver. Although air quality is currently fair, local and provincial governments have predicted air quality to decline as Lower Mainland populations grow. Experts have also predicted that climate change will have predominantly negative consequences for biodiversity and the overall integrity of ecosystems. As the temperature and precipitation in the province rise, plant communities will have to adapt to changing conditions. It is predicted that Stanley Park will change from a Coastal Western Hemlock (CWH) plant community to a drier Coastal Douglas-fir zone by 2085.

Condition

-  Good: the condition of the indicator is satisfactory
-  Fair: there is concern regarding the state of this indicator
-  Poor: the condition of the indicator is poor or low
-  Not rated: there is insufficient information to determine condition

Trend

-  Improving: the condition of the indicator has been improving in recent years
-  Stable: the condition of the indicator has not changed significantly in recent years
-  Declining: the condition of the indicator has been declining in recent years
-  Not rated: there is insufficient information to determine condition

Current State



Trend



Aquatic Ecosystems

Aquatic ecosystems in Stanley Park are rated as **POOR** overall because there is evidence that freshwater and marine habitats are suffering from unnatural water regimes, pollution, and invasive species and because the Park's healthiest natural system, Beaver Lake, is disappearing.

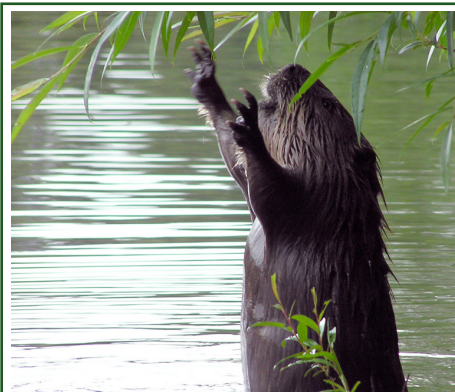
Current State



Trend



- Water quality is poor because of invasive species, unnatural water regimes, salt water incursions, elevated nutrient levels, high densities of waterfowl affecting freshwater systems and the pollution from road runoff and port activities affecting marine waters. There is a lack of long-term water quality monitoring data.
- Water levels and stream flow are cause for concern because they are affected by unnatural water regimes, changing weather patterns, and Park maintenance operations.
- The diversity and extent of wetlands is good but the introduction of invasive plants and accelerated lake succession threaten their long-term viability. Beaver Lake is decreasing in size.
- Wetland connectivity is poor because the Park is heavily fragmented by roads and trails. Some action has been taken to use 'wildlife-friendly' culverts, but further study is needed to assess wildlife movement within the Park.
- Park maintenance operations and altered successional patterns have adversely affected the degree of structure in freshwater aquatic habitats. This situation is improving since specific provisions were made in the new Forestry Management Plan, habitat enhancements have been put in place, and beavers have begun positively affecting wetland habitats in the Park.



- There is a high diversity and abundance of native intertidal species but introduced species, pollution, and climate change may affect these communities in the future.
- There are extensive and diverse intertidal habitats around the Park that, despite habitat fragmentation due to the seawall and the slow erosion of sandy beaches, remain relatively stable.
- The connectivity between intertidal and upland habitat is poor mostly due to the seawall that runs along the Park's shoreline.

Overall, aquatic ecosystems are **DECLINING** in quality and size. The decreasing size of Beaver Lake due changes to its hydrology and the introduction of invasive water lilies will likely have serious negative impacts to the overall ecological integrity of the Park because it will result in a decrease in species and habitat diversity. Although it was not originally a freshwater lake, Lost Lagoon is also of high importance for people and wildlife and it is experiencing decreasing water quality. The intertidal areas of the Park may be declining in quality but more study is needed to determine to what extent this is happening.

Terrestrial Ecosystems

Terrestrial ecosystems are rated as **FAIR** because there have been many impacts to their integrity over the Park's long history and invasive species have taken hold in most areas, but there have also been dramatic improvements as a result of the 2006 windstorms and subsequent Restoration.

Current State	Trend
	



- Forest soils have been negatively impacted by introduced plants, habitat degradation due to roads / trails, compaction/erosion due to off-trail activities, and certain maintenance operations.
- The Park has been heavily fragmented by roads and trails and has increased in isolation as the surrounding city has grown.
- Riparian areas are cause for concern because they have been impacted by introduced species, habitat degradation due to roads/trails, Park maintenance operations, and off-trail activities.
- The frequency and severity of natural disturbances (windstorms, fire, insects, and disease) are not rated, but they will likely be affected by stressors such as climate change and the effects of altered successional patterns and introduced plant species.
- There is currently a good diversity of forest stand types and successional stages in the Park and there is a wide diversity of plant species and terrestrial habitat types.
- The diversity of habitat structure in the forest is generally high except for in older conifer plantations and where off-trail use occurs. Previously low CWD levels have increased as a result of the 2006 winter storms and new wildlife trees have recently been recruited.
- There are a large number of veteran and record trees distributed across Stanley Park. Their presence is considered stable although there is some concern regarding their long-term viability.

The health of terrestrial ecosystems Stanley Park is **IMPROVING** mainly as a result of the 2006 windstorms and the creation of a new Forest Management Plan by the Park Board. Many of the Environmentally Sensitive Areas in the Park are now called `Wildlife Management Emphasis Areas` under the new Forest Management Plan, and this will especially benefit riparian zones, deciduous patches, and forested wetlands. The connectivity between terrestrial habitats is expected to remain stable, and previously low CWD levels will improve as a result of the provisions in the new Forest Management Plan.

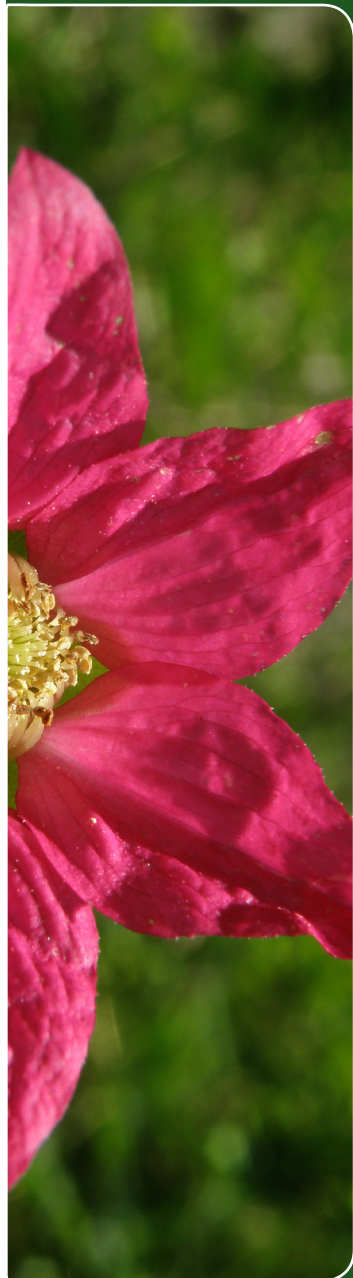
Native Biodiversity

The state of biodiversity in the Park is **FAIR** because although there is a great diversity of species using the Park, several key species have declined or have been locally extirpated in the last 30 years.

Current State

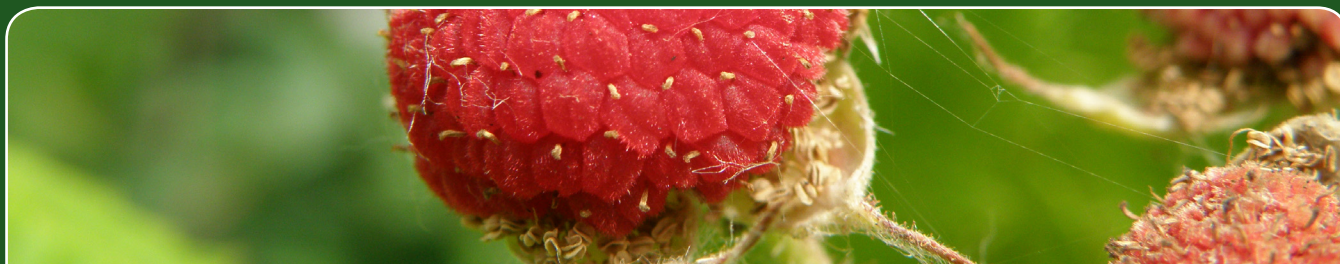


Trend



- There are at least 266 native plant species, 36 species of marine algae and seagrasses, 368 ornamental plant species, 361 native vertebrates, and 192 genera of native invertebrates on record for Stanley Park.
- At least 20 native species have become locally extirpated from the Park and at least 30 bird species that were once abundant in the intertidal areas of the Park are now thought to be in serious decline.
- Intertidal species may be declining in richness (diversity) and productivity but more information is needed.
- At least 50 documented invasive species are impacting the Park including at least 37 plants, 4 rodents, 5 birds, 1 reptile, 2 amphibians, 2 fish, and 46 invertebrates.
- There are 8 Schedule 1 Species at Risk Act (SARA) listed species that have been documented in Stanley Park, including 4 that have not been confirmed breeding for many years. There are 32 BC Conservation Data Center (CDC) listed species documented, including 21 that are known to regularly inhabit and/or breed in the Park.
- Possible keystone species such as woodpeckers and beavers exist but their population status is undetermined.
- Edge effects and the loss of habitat connectivity resulting from habitat fragmentation are likely negatively affecting the productivity of wildlife populations, including a loss in genetic diversity for some species. More information is needed.

Although overall native biodiversity in the Park has declined in recent years, and stressors such as habitat fragmentation, climate change effects, and invasive species are acting on them, it is thought that the current state is relatively **STABLE**. More baseline data is needed for several groups of wildlife (including reptiles and small mammals), and efforts to restore and enhance existing habitat should benefit biodiversity in the future.



The Stanley Park Ecology Society (SPES) created this report to compile baseline information about Stanley Park's ecosystems and to determine the current state and future trend of key indicators of EI. In doing so, it has become evident where the major gaps in ecological knowledge lie and where we should focus our environmental conservation and educational efforts.

This report was prepared with the understanding that not all of the data needs have been met and many of the measures required for assessing the EI of the Park have not yet been determined. However, as a first step towards improving our understanding of the Park's natural ecology and working towards the goal of EI, the following recommendations were made to guide SPES's conservation and education activities in the Park in the coming years:

1. Fill gaps in information with baseline data collection and local knowledge in order to better understand and conserve the ecology of Stanley Park.
2. Maintain existing monitoring programs and create new ones to track changes concerning the Park's EI.
3. Undertake restoration and enhancement activities to benefit the ecological health and biodiversity of the Park's ecosystems, with priority given to:
 - Aquatic species and habitats
 - Environmentally Sensitive Areas
 - Invasive species management
 - Species at Risk
 - Human caused stressors
4. Continue to provide environmental education in Stanley Park and the greater community for the benefit of the Park and its surrounding environment.
5. Use measurable factors to assess environmental indicators and update the 'State of the Park Report for the Ecological Integrity of Stanley Park' on a regular basis.

For the complete 'State of the Park Report for the Ecological Integrity of Stanley Park', please look online at: www.stanleyparkecology.ca



STANLEY PARK ECOLOGY SOCIETY

Connecting People With Nature



The Stanley Park Ecology Society promotes awareness of and respect for the natural world by playing a leadership role in the stewardship of Stanley Park through collaborative initiatives in education, research and conservation.

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Parks Canada. [Internet]. 2009. National Parks of Canada: ecological integrity. [cited 2009 October 14]. Available from: <http://www.pc.gc.ca/eng/progs/np-pn/ie-ei.aspx>

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