Stanley Park Heronry Management Plan

February 2006

Table of Contents

Executive Summary

The Great Blue Heron Colony in Stanley Park has been an important natural feature dating back to the earliest days of the park's creation. There have been two major changes of venue since the first recorded observations in 1921, and colony size has also changed with the times. The maximum number of nests in the mid-1970s was 44 nests. Since 2001, with the colony move to the current location, the numbers have increased each year with over 170 nests recorded in 2005.

The primary purposes of this management plan are to assemble the information concerning the species within Stanley Park and to provide a planning document for an urban colony that is becoming increasingly significant in the BC Lower Mainland. It will also provide a framework to guide the activities of park staff to reduce interactions that may negatively impact the colony. The document also expands on measures connected with protection of the colony nesting site as well as providing recommendations to safeguard the public. The site attracts great public interest and the report addresses interpretive opportunities with the heronry.

The Pacific Great Blue Heron (*Ardea herodias fannini)* is currently a Blue Listed species in the province of BC, indicating that the species is considered vulnerable due to habitat loss and declining productivity. Herons are protected under the federal Migratory Birds Convention Act, and under the provincial Wildlife Act, which protects the birds and their nest sites. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists them as a species of "special concern". If the status were to be changed to "at risk", they would be afforded the full protection of the Species at Risk Act (SARA), as the colony is technically on federal land.

The heron colony in Stanley Park is located very near to the heart of a major city. Herons are known to habituate readily to urban sites and the factors and human activities that surround them. Nevertheless, human activity does have a measureable impact on reproductive success and so needs to be minimized near colonies.

Historically the Stanley Park colony established near Brockton Point in the early 1900s and moved to the old zoo area in the late 1960s. In 2001, the colony moved to its present location near the Park Board office, where it has experienced remarkable growth over the last five years. The colony growth provides added safety for the birds and may be in response to the increasing population of eagles living in the Lower Mainland.

Herons have coexisted with humans and many other species (especially in the days of the zoo colony) and at times they show remarkable tolerance for disturbance. In the current Beach Avenue site they contend with

parking lots, apartment buildings, automobile noises, tennis courts, and a stream of human movement below the nest trees. Despite this seeming tolerance, the heronry is susceptible to unusual disturbances or events, which may result in nesting failures or abandonment of chicks, eggs or nests. The reason for a colony failure is often unclear. Potential disturbance factors and precautionary measures are reviewed.

Provincial government sources recommend restricting removal of vegetation within a 60 m perimeter of nest trees unless human safety is an issue, and that it should be done only in areas that humans require access to; restriction of all human activity within 60 m of nest trees is also suggested. This report recommends added fencing for nest trees to protect the heronry and reduce the risk to humans from falling debris.

Events and unusual disturbance factors are identified and need to be monitored over time to develop a profile. Owing to studies conducted earlier, organizers have already agreed to move the Sun Run (an unusual and prolonged disturbance that could impact the colony.) Timelines for regular maintenance activities such as pressure washing, landscaping, and roadwork are provided so that park staff can minimize the disturbance factors.

The colony is compact in size and density has increased with many nests occupying few trees. Heron nest numbers have increased from six in 2001, to over 170 in 2005. Nesting habitat in a large colony can become degraded very quickly. The large numbers of adult and young birds deposit copious amounts of excrement; it coats the leaves of the trees and can effect changes in soil conditions, resulting in the accelerated death of the host trees. Several recommendations are made to mitigate these problems including identifying and protecting nest trees, detailed soil analyses and treatments, regular tree evaluations, and contingency planning for future changes in the location and size of the heronry.

Not everyone is pleased with the growth of the heronry. Many local residents are put off by the persistent noise and smell in the breeding season. There are possible human health issues associated with the large colony and the excrement created. The measures taken to safeguard the public from the main areas of the colony are considered satisfactory but follow-up will occur seasonally with the Coastal Health Authority.

There are many unanswered questions concerning the choice of site for the heronry, the birds' foraging territories, and their tolerance for disturbance. A well-designed monitoring program directed by the Stanley Park Ecology Society and the volunteers connected with the colony is recommended. The monitoring will include nest surveys and mapping and activity monitoring by park wildlife staff and volunteers. Installation of a video camera is also being planned. Directed studies are also

recommended, particularly related to the foraging areas of the birds and the factors for disturbance of the colony.

With the growth in colony size there have been increasing incidents of birds in distress, especially at the time of fledging. Young herons may fall out of the nest, some sustaining injuries or dying. Others will spend their first few days of true independence on the ground under the colony trees. Rescue and rehabilitation of some of these young herons is possible in some instances. A humane option for response to injured or downed birds is required. Currently the system for rescue and recovery is incomplete, involving park wildlife staff, park rangers, Ecology Society staff, and volunteers. A more direct and responsive procedure needs to be developed to eliminate the current gaps.

Finally, the Stanley Park heronry provides wonderful opportunities for public education and interpretation. With its public accessibility there is a community responsibility for public stewardship of a unique and important species of BC's coast. The report recommends improved signage, and more interactive opportunities for the public such as web cams, interpretive presentations, and fundraising for the program. These will all increase general awareness and appreciation for the surprising world of the Great Blue Herons of Stanley Park.

Introduction

> "The Stanley Park heronry has during the past few weeks become one of the points of interest in the park, and hundreds of residents of this city as well as visitors now stop to have a look at the curious bird colony, none of the members of which appear to be in the least disturbed, however many people gather about to watch them."

While this short description could have been written any time during the last few years, the quote is ascribed to Kenneth Racey in about 1921.[1] That year also marks the beginning of record keeping for the heronry. At that time, the heronry in Stanley Park was located at Brockton Point.

In 2006, 85 years after Mr. Racey made his observation, the heronry has since relocated twice and is now situated near the southern entrance to Stanley Park, behind the Vancouver Board of Parks and Recreations' office at 2099 Beach Avenue. It is still attracting "hundreds of residents" and the birds still don't appear to be in the least disturbed by the attention they generate.

However, in 2006 we know more about these herons – their range, habits, and the approximate size of the population. While population trends appear to be steady in recent years, numbers were declining during the 1980s and 1990s, and areas of local decline persist. Estimates of the total population of *A.h. fannini* in BC range from 3000-6000 birds.[2] The estimated Stanley Park heronry population in 2005 was approximately 175 nesting pairs, which constitutes roughly 5-6% of the total population of this subspecies.

More than just a "curious bird colony", the Stanley Park heronry presents an opportunity for humans to practice stewardship for a species at risk of declining, and to study these enigmatic and graceful creatures without travelling far from home. Most importantly, it gives us the opportunity to learn what we can to ensure the species continues to survive and thrive.

[1] Life Histories of North American Marsh Birds. Bent, Arthur Cleveland. 1963. Dover Publications Inc. New York, NY.
[2] http://wlapwww.gov.bc.ca/wld/documents/statusrpts/wr102.pdf

1. The Pacific Great Blue Heron

Biology & Ecology

Herons are members of the Ciconiiformes, which includes herons, egrets, and bitterns. The existence of herons is believed to date to the Cenozoic age, approximately 25 million years ago; North American fossil records of great blue herons date back 1.8 million years.

The Great Blue Heron, *Ardea herodias*, is common throughout North America and normally migrates to warmer climates during the winter. The subspecies found on the west coast of British Columbia is known as the Pacific Great Blue Heron, *Ardea herodias fannini*, and is one of only two recognized subspecies in North America. The geographical range of *A.h. fannini* extends along the west coast and islands from Prince William Sound in southern Alaska to Puget Sound in Washington.

While most North American herons migrate seasonally, the non-migratory Pacific Great Blue Heron enjoys moderate temperatures and a year-round source of food. The coastal subspecies has evolved separately for thousands of years; herons in BC's interior travel south to their wintering grounds and do not migrate to the coast and there is little likelihood of interbreeding.

Description

Mature Great Blue Herons stand just over one meter tall and weigh up to 2.5 kg. As with most birds, their bones are hollow, which accounts for their relatively light weight on a seemingly large body.

Unlike most birds, the herons' neck vertebrae are of uneven lengths; the sixth vertebra is longer than the rest and articulates differently, allowing displacement of the bird's gullet around the vertebrae to swallow large prey.

This adaptation also allows the herons to retract their

Figure 1 Pacific Great Blue Heron

heads in the characteristic “S” shape commonly seen in flight, and to “coil” their necks for greater thrust when striking at prey.

Males and females are generally undistinguishable, except that males are 5-15% larger and their bills a few centimetres longer than the females’. The birds are characterized by blue-grey feathers along the top portions of their bodies and have black “epaulets” at the fold of the wings. The characteristic long blue-grey plume feathers on their chests and necks develop during the winter in preparation for courtship displays. Adult herons have a black stripe extending from the beak to the back of the head beneath a white crown. Juveniles do not have the white stripe and have much shorter plume feathers. Herons have specialized areas of delicate feathers, which they rub with their bills to create “powder down.” The birds comb the crumbled filaments through their feathers using their third toe, which is flattened and serrated for this purpose, to clean their plumage of slime from their prey.

Heron chicks’ eyes start out grey but turn bright yellow in adulthood. The bills of non-breeding birds have a yellow underside and grey topside, which may change to a bright orange coour during breeding season. Their legs, normally a greenish-yellow, may turn brighter yellow during the early breeding season.

Breeding

Herons form monogamous pairs during the breeding season, but choose a new mate each year. Both parents are intensely involved in all aspects of the nesting and brooding process.

Males choose the nesting site in January or February and stage a courting display. After the female selects a mate, the pair builds a new nest or refurbishes an existing one using branches gathered from nearby trees, from unclaimed or unguarded nests, or sometimes from the ground. Male herons present sticks to the females, who place them in the nest; nest building may be completed within a day or take several weeks. Older nests are generally large bulky structures while newer nests may look like sparsely woven baskets. The nests can be up to a metre in diameter and 10 cm deep. Often a small “cup” is constructed to hold the eggs and young chicks, and it may be lined with soft materials such as moss, lichens, or leaves.

Copulation takes place soon after the nest site is chosen, sometimes before the nest is built. Approximately 10 days after copulation, the female lays 3-5 eggs at intervals of one to two days. The couple begins incubating immediately and both donate equal time to the task. They take turns sitting on the nest and foraging for food – generally males incubate During the day and females during the night.

Eggs hatch after 28 days. Hatching usually starts in March or April, but may be as late as June. As with egg-laying, hatching is staggered over several days. This gives the first-born chicks an advantage of having an extra few days in which to grow and it gives the parents the advantage of being able to plan the number of chicks they will have to feed.

Figure 2 New chicks

Photo courtesy of www.sciencerocks.ca

For the first three weeks of life, the chicks cannot regulate their body temperature, and the adults continue taking turns brooding. Of the three to five chicks that hatch, often only two or three survive. Chick mortality may result from starvation, predation, and exposure to the elements, or from falling or being pushed from the nest.

Chicks grow rapidly, gaining almost 40 times their weight in eight weeks, from approximately 50 g at birth to 2 kg at fledging. A family of two adults and two chicks uses approximately 2000 calories daily to survive; this growth requires almost constant foraging by the parents.

By about six weeks, the young birds will be practising flight behaviours, flapping their wings and hopping along branches, progressing to different branches and then different trees. Their first flight will often be a quick circle around the trees and a quick return to the nest. After about eight weeks, the young bird will leave the nest for good, following their parents to nearby foraging sites. Fledging is usually complete by July or August, but young birds have been observed in the nests and trees as late as the second week of September.

There is a 20-30% chance of survival in the first year of a heron's independent life. Young herons have to learn for themselves how to forage and avoid predators, and many are unsuccessful. Those born later in the season have a reduced chance of surviving if foraging conditions are unfavourable.

Raccoons, crows and ravens, and seagulls are predators of heron eggs.

Eagles, ravens, owls, gulls, crows, and hawks are predators of heron chicks.

The most common causes of mortality during a heron's first year are starvation and predation.

At 22 months herons are ready to reproduce, although they may not be highly successful for the first year or two. It is understood that often they will return to the home heronry to start their own families. Herons can live to about 20 years, with the oldest recorded one being 23 years of age.

Ecology

A successful heronry is a reflection of healthy seashore ecology, as it demonstrates that an abundant supply of food exists to raise the hungry chicks. Herons obtain most of their diet from the waters of the coast during spring and summer, and often forage in grasslands during winter when their coastal prey is less abundant.

Herons are considered to be indicators of ecosystem health. They are near the top of the food web, preying on fish, shellfish, invertebrates, rodents, small mammals, chicks, amphibians, and reptiles. As adults, they have few predators other than eagles and humans.

Their diet consists mainly of fish, but they will eat almost anything they can swallow, including rodents (mice, rats), chicks (ducklings, goslings, others), reptiles, amphibians, small mammals (shrews, voles), and invertebrates (mud shrimp, crabs, dragonflies). They can't digest fur or feathers; regurgitated undigested parts are often found underneath their nests.

In the Fraser Valley, the herons' spring and summer diet includes gunnels, sticklebacks, sculpins, shiner perch, pipefish, tube-snout, starry flounder, shrimp, smelt, eulachon, peamouth chub, and redside shiner.[3] For the most part, the herons' preferred prey is made up of species that are not considered economically valuable to humans.

Figure 3 Heron with Wood Rat

Photo courtesy of Bob Paty

These usually solitary birds nest in colonies, sometimes singly, but more often with several nests to a tree and several trees to a colony. Lower Mainland colonies the have been known to reach 400 nests.

It is believed that colonial nesting confers benefits such as protection from predators and increased chance of locating food sources. It has been suggested that some birds will observe and follow others flying to their foraging grounds, and that chicks may follow parents to their foraging grounds when they first leave the nest.

[4,3] Butler, RW. The Great Blue Heron. UBC Press, Vancouver

In BC, deciduous trees are the preferred trees for nesting, perhaps because they provide more protection from predators: raccoons may not be able to climb them as easily, and when in full foliage these trees may provide more protection from eagles.

Colonies are usually located within 3-5 km of foraging grounds, but herons have been known to forage 10-30 km from the colony. Herons forage in shallow water along shorelines, rivers, marshes, and lakes; in winter, they may also hunt for prey in fields.

Status of the Great Blue Heron

Productivity has declined in recent times, largely due to habitat loss and fragmentation. Trends show that the population of the Great Blue Heron subspecies is fairly static at this time, but it has suffered declines in the last 20-30 years.

Both provincial and federal laws protect the Pacific Great Blue Heron. In British Columbia, they are protected year-round under the British Columbia Wildlife Act. Section 34 of this Act states that,

> "A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys
>
> (a) a bird or its egg,
>
> (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl..."

In Canada and the United States, the Migratory Birds Convention Act prohibits the "taking of nests or eggs."

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) currently lists the Pacific Great Blue Heron as a species of "special concern," citing "the limited number of colonies of this subspecies indicates a highly clumped distribution. Disturbance from human activities and eagle predation of nestlings are causes of concern for the population." Although the species does not have the full protection of the federal Species at Risk Act (SARA), regulation can be created at the discretion of the federal cabinet.

The City of Vancouver leases Stanley Park from the federal government, and technically the herons are situated on federal land. In the event the Pacific Great Blue Heron is appointed to COSEWIC's list as a species "at risk," they will be accorded full protection under SARA. Protection under the Act mandates that management planning is carried out, management success or failure is monitored, and evaluations of species are carried out every five years.

A.h. fannini has been "Blue-Listed" by the provincial Ministry of Environment, indicating it is considered vulnerable due to habitat loss and declining productivity.

Great Blue Herons are not listed on the U.S. Endangered Species Act, but they are included in the State of Washington's Priority Habitats and Species (PHS) list, and are monitored for distribution and status.

Bird Studies Canada, in conjunction with the Canadian Nature Federation, identifies and designates Important Bird Areas (IBA), sites that provide essential habitat for breeding and non-breeding birds. While the Stanley Park heronry would qualify as an IBA due to the size of the colony and status of the species, at this time the agency is not taking new designations. Appendix 5 outlines IBA criteria.

2. History of the Heron Colony in Stanley Park

Location and Movements

The Stanley Park heronry is the Lower Mainland's oldest heronry: records extend over 85 years. The current location is its third known site in Stanley Park since 1921, the earliest year for which records exist.

The coordinates of the heronry's present location are approximately 49°17"30' N and 123°8"30' W.

Figure 4 Herons in Stanley Park ca. 1925

W.J. Moore photo, City of Vancouver Archives, LGN 488. The photo has been cropped to remove a second image.

In 1921, the heronry was located at Brockton Point; there are no records of how long the heronry existed before then, but it remained there until at least 1967.[4] Canadian Wildlife Service (CWS) records describe 37 nests in a single large spruce tree at Brockton Point. In the photo at left, the herons and their nests are shown in stark relief in a tree almost completely devoid of foliage.

The heron colony moved to the Stanley Park Zoo during the late 1960s. CWS records for this location extend from 1974 to 1999, with a maximum of 44 nests recorded in 1978 for the location. Nests were located in trees near Malkin Bowl and around the duck ponds at the Zoo and Aquarium site. The herons abandoned the zoo area in 1999, and there are no records of the heronry in 2000.

In 2001, six nests were established in trees near the south entrance to Stanley Park, in an area bounded by the Park Board office, tennis courts, Nelson Street, and the tennis court parking lot. In March 2002, at the request of the Stanley Park Ecology Society Board of Directors, regular monitoring of the heronry commenced, and continues to the present.

The current heronry has grown from six nests in March 2001 to more than 170 at the end of the 2005 nesting season. Figure 5 shows an aerial view of the main part of the heronry as it existed in March 2005.

In its early days the heronry extended over an area approximately 10,000 m^2 (one hectare). In June 2002, five nests were abandoned in the two trees most distant from the Park Board office following repeated

[4] Mark, D. 1976. Ardea herodias Nesting Colonies. Northwest Science 50: 1. 32-41

raccoon and eagle attacks, and subsequently, new nests were built in an area beside the Park Board office parking lot. The following year, the two distant trees were not used at all and the heronry's area had shrunk significantly. Local residents observed abandoned nests being dismantled by the herons for construction of new nests.

With each nesting season, the number of nests increases, and mid-season growth by in-migration has also occurred, apparently from colonies abandoned elsewhere in the Lower Mainland. In June 2004, the heronry experienced an influx of herons that coincided with reports of abandonment of nests at the Point Roberts and Pacific Spirit Park heronries, which at different times were each considered the largest on the West Coast. Appendix 2 contains a diagram of the heronry and a table with key events and activities observed since monitoring began in 2002.

Figure 5 Aerial view of Stanley Park heronry March 30 2005

Photo Courtesy of VanMap

Herons are known to naturally leave from sites for reasons that remain largely unknown. Destruction of habitat, predation by eagles, and human disturbance are considered the most likely causes for abandonment. There has been no speculation as to why the herons moved from Brockton Point to the zoo area in the 1960s or '70s, and while some attributed the zoo abandonment to intrusive construction activity at the zoo, no studies were made regarding other sources of disturbance or habitat loss at that location. As the herons took advantage of the regular feeding schedules for the captive animal population, the closure and dismantling of the zoo

may have signalled the loss of a reliable food source for the herons and been a factor in the abandonment of that heronry.

Although the birds have been established in Stanley Park for 85 years, there is no way to predict occupancy of a given site from year to year. Given the longevity of heronries at other Stanley Park sites, it is possible the current site may also be in use for a long time.

Stanley Park and its environs offer a reliable food source for the herons. There is approximately 9 km of shoreline around the Park, much of it accessible to wading birds at low tides; it harbours a host of fish and other marine life, especially in the spring and summer. Lost Lagoon and Beaver Lake offer a captive population of fish with relatively few predators. The herons may still venture to the Aquarium to find food intended for the captive animals. People are known to hand feed the herons near Lost Lagoon despite bylaws prohibiting feeding of wildlife.

Outside the boundaries of Stanley Park, potential foraging ground within a 7 km radius includes the shores of Coal Harbour, Point Grey, False Creek, and the north shore of Burrard Inlet.

Urban Nature of Colony

Heronries are frequently located near urban centres throughout North America and the world, and some conflict has existed between humans and herons. Most problems cited involve aesthetic issues due to waste deposition, undesirable odours, noise, and damage to plants and trees due to nest-building activities. In urban and suburban areas, householders complain of theft from fish ponds. In industrial areas, conflicts arise when herons collide or interfere with aircraft movement, and when herons poach from fish farms.

Herons can habituate to everyday human activities that don't threaten their survival, but may abandon colonies if a threat is perceived; they may abandon even with apparently benign stimuli. What constitutes a threat is not known: it may be damage to habitat in a defined radius, e.g., as would happen with removal of nearby trees. Or, it may be encroachment of human activities, such as people or objects moving around a nesting area, or construction taking place in the nesting or foraging areas. Studies show that even apparently benign human activity such as movement of pedestrians does have a measureable impact on reproductive success and so needs to be minimized near colonies. Another factor may be that human activity may have unforeseen consequences such as attracting eagle attacks.

Increased human activity in the Park coincides with the nesting season: with spring and summer come increased sporting and recreational activities.

In Stanley Park, each of the three heronry sites has been situated in areas that draw large numbers of people during the spring and summer, the herons' nesting season. The Brockton Point colony was near a wading pool, children's play area, and nearby playing fields. The Zoo heronry was near the Zoo, Aquarium, and Malkin Bowl. The current heronry is close to the tennis courts, English Bay Beach, and the Park Board office.

Very little is known about the heronry at Brockton Point, except that it drew crowds and denuded trees.

At the Zoo location, the herons were habituated to humans, and they coexisted with captive populations of marine mammals, domestic fowl, and urban wildlife including grey squirrels, eagles, and raccoons. They were close to the concession stands and Theatre Under the Stars (TUTS), both major gathering places for humans. The herons were subjected to noise from the whale shows and the Zoo's public address system. While there were no reports that the birds reacted negatively to this disturbance, it's possible that the disturbance was not measurable or outwardly noticeable, or that it did not disturb them. However, the birds were known to disrupt some of the TUTS performances with their squawks, screeches, and chattering. One Park Board employee recalls a heron chick falling from its nest to the ground within metres of the park bench where he sat eating lunch.

The Zoo provided a ready supply of food to supplement the herons' natural diet. It housed and fed penguins, seals, sea lions, polar bears, otters, and whales, and the herons were regularly observed mooching herring and smelt from zookeepers' buckets, and loitering in the penguin and seal pens.

At the current location, the herons contend with noise from vehicles from several sources - the parking lots, traffic entering the Park from Beach Avenue and Nelson Street, and in the lanes adjacent to the Park. The various types of vehicle noises include car alarms, horns, squealing tires and "boom boxes"; noise from large vehicles such as garbage trucks, road construction equipment, tour buses; and gardening equipment such as ride-on and power mowers, weedeaters, hedge trimmers, blowers, and power washers. They are subject to noise during events at English Bay and Ceperley Park: airplanes, public address systems, music, cheering, and the booming of fireworks. They coexist with people playing tennis, golf, or lawn bowling, running races, having picnics, and playing recreational games of football or soccer on nearby fields. The heronry draws crowds of tourists, photographers, and curious observers on a regular basis, many of whom stand in the parking lots and paths to watch or take photos. And, they are under constant watch from people in the highrise buildings.

While these activities and noises may be considered "ambient disturbances" in their local environment, they have the potential to disrupt the colony, especially at sensitive times in the breeding cycle.

Other Urban Colonies

Beacon Hill Park

This Victoria heronry was established in 1982 and has grown sporadically since then. Like the Stanley Park heronry, it is located near the edge of an urban park and can be observed from nearby apartment buildings. A live camera has been installed in a local highrise at the intersection of Douglas and Avalon Streets.

Tahsis, BC

This colony on Vancouver Island existed only for one year – 1989 – and was located approximately 350m from a shopping mall. Records show 10 active nests during that year.

Vernon, BC

The Silver Star Road colony in Vernon has been in existence since 1983, and records from 1999 show 35 nests. This colony is situated on one acre in an urban green area. Houses have been constructed around it, but now there is a "no build" heronry buffer to protect the area from further development, and the Vernon city council grants a 100% tax break for the landowners to prevent further development.[5]

New York State

A mixed heronry has been in existence since the 1970s; it is situated on 14 currently uninhabited small islands and contains about 1400 nesting pairs of wading birds, mostly herons and egrets. After an oil spill in 1990 destroyed much of the area's wetlands and killed hundreds of waterfowl, the heronry is actively being nurtured and protected.

Cape Town, South Africa

A large mixed heron colony was destroyed to make way for development and attempts were made to re-establish the colony by constructing an artificial heronry. The heronry has been successful in attracting breeding birds and has had to be enlarged twice since its original construction. The photo on the following page shows the reconstructed heronry inhabited by Sacred Ibis.

[5] Sept 27 2004 city council meeting minutes: http://vernon.ca/council/documents/2004/minutes_040927.pdf

Figure 6 Constructed heronry at Intaka Island, S. Africa

Photo courtesy of James Harrison

Barrington, Ill

In a Chicago suburb, a heronry was constructed in a nature reserve after overcrowding destroyed the vegetation of the small island the herons used for nesting. This heronry is still productive, partly due to continued human intervention.

Other Local Colonies

UBC

The Pacific Spirit Park heronry was until recently considered Greater Vancouver's largest, with nest numbers reaching more than 200 in the 1980s and '90s. This heronry was abandoned in 2004, and may have relocated elsewhere in the UBC grounds. Some herons from this colony may have relocated to the Stanley Park heronry in June of that year.

Jericho Beach:

A very small heronry existed here briefly - three nests were used in 2004, but none were used in 2005.

Point Roberts

This large heronry existed from about 1970 but was abandoned in 2004. According to anecdotal information, the Tsawwassen heronry gained birds when Point Roberts was abandoned.

Tsawwassen

This very large heronry has about 400 nesting pairs, and records of a heronry here date back to 1948. The heronry had a large influx of herons

in 2004, which coincided with the abandonment of the Point Roberts heronry.[6] [7]

McFadden Creek, Saltspring Island

This heronry was in existence from 1990-2002; it was purchased by the Wild Bird Trust in 1998 and established as an Important Bird Area (see Appendix 5 for IBA criteria.) The herons abandoned the colony in 2001 but more than 100 pairs returned in 2002. Sources from the BC Ministry of Environment confirmed in December 2005 that this site has now been abandoned.

[6] Deltaport Third Berth Project Environmental Assessment: http://www.eao.gov.bc.ca/epic/output/documents/p212/1121900194655_1b27e844f3ea4e0c95f4d2a3f2ac78e6.pdf

[7] R. Vennesland, pers comm

3. Habitat Protection

Nesting and Colony Area Habitat

The most important factors in the choice of a nesting site are access to food and protection from predators. Some heron colonies have been known to last for 30 or more years in one location before habitat degradation or increased disturbance renders them unfit for the birds. Other colonies have been abandoned after only one season, often for unknown reasons but likely after an unsuccessful breeding season.

The current Stanley Park location has completed five successful breeding seasons despite its location in a heavily trafficked area of the Park.

Nest Trees

Stanley Park is located in the Georgia Depression ecoprovince, in the Coastal Western Hemlock (CWH) zone. Tree species in this zone include western hemlock, western redcedar, Douglas fir, amabilis fir, Sitka spruce, and yellow cedar.

A large variety of non-native trees have been planted in Stanley Park. At the Beach Avenue site, the herons currently inhabit several types of trees, including big leaf maple, London plane, pin oak, western redcedar, and Douglas fir trees. Herons are also known to nest in alders, cottonwoods, and spruce trees. Height seems to be the main criteria for tree selection: at the current site, most nests are located at least 15 m from the ground, and records indicate that historically most nests are situated between 20 and 30 m from the ground.

Figure 7 Heron on ground with stick

Photo courtesy of Andrew Waddy

While herons are known to nest successfully in trees that are bare and even dead, these trees create a potential hazard for people, whose safety needs must be considered a priority in a public park. To improve public safety, the Vancouver Board of Parks and Recreation has restricted public access by fencing in major areas of the nesting site.

The fence enclosing the nest trees was erected prior to the 2004 nesting

season, and it was enlarged twice in 2005 to accommodate new nest trees. In January 2006, a separate fence was constructed around the large London plane tree beside the tennis courts (see diagram in Appendix 2.)

The fence may provide the birds with increased security: herons were observed on the ground gathering nesting material for the first time after the fence was constructed. Figure 7 shows a heron gathering twigs within the confines of the enclosure.

Habitat Integrity

Herons have a direct effect on trees and other vegetation within and around the nesting area, and may have adverse effects on the soil beneath the heronry. Historically, heron colonies grow too large for the site and eventually kill the nest trees. This may be partly due to the fact that they prefer to nest in mature trees, which may be more susceptible to damage from bird feces, or which may already be failing when first colonized.

Vegetation

When harvesting sticks for nest-building materials, herons strip foliage and branches from both nesting and non-nesting trees. Nest building occurs primarily during the months of February to April, a time when many trees are coming into leaf. Removal of actively growing branch tips can reduce leaf numbers and thus photosynthetic ability, reducing the trees' ability to grow. Some non-nest trees near the heronry have suffered marked defoliation due to the herons' activities.

Nest trees may suffer breakage due to the combined weight of the birds and their nests (which may weigh 2-5 kg.) Branches stressed by the weight of nests may be more susceptible to blowdown during windstorms.

Soil

Herons keep their nests clean by throwing the eggshells from the nest soon after chicks hatch, and by defecating over the side of the nests, It's likely the purpose is to reduce the chance of chicks being exposed to pathogens such as fungi and bacteria, and to avoid attracting insects while chicks are young and defenceless.

Young chicks soon learn to emulate their parents by defecating at the edge of the nest, but while learning they coat the sides of the nest with guano. The adults' white excrement (guano) coats everything underneath the nests: branches, trunks, foliage, and the ground, giving all a whitewashed appearance.

The bird droppings act as a natural fertilizer as they contain large quantities of nitrogen, phosphorus, and potassium (NPK). However, the amount deposited may lead to overfertilization, especially if it is released rapidly during rainfall or watering. During the nesting season, the ground

beneath the heronry becomes littered with branches and twigs that fall during nest-building, get dislodged by heron activities, or get blown down during windstorms. The fallen sticks intercept some of the guano, delaying its seepage into the soil.

Figure 8 Young herons in nest

Photo courtesy of www.sciencerocks.ca

While the guano can be a source of soil and plant nutrition, it can harm the nest trees in three ways:

- It coats the needles and leaves. This can block the sun's rays, reducing photosynthesis and thus reducing tree growth. It can also clog the stomata (small pores on leaves that facilitate transpiration) and alter temperature regulation of the plants and trees.
- It leaches into the soil during precipitation events and alters the chemical balance of the soil, perhaps causing harm to tree roots. While the excrement itself has a neutral pH, the conversion of ammonia to nitrate can lead to acid conditions; the decreased pH may release aluminum bound to soil particles, which can be taken up by tree roots and result in toxicity. The birds' diet of fish and ingestion of seawater may also make their droppings rich in salts, which can harm plant roots.
- It causes a chemical burn to leaves. Guano is rich in nutrients such as nitrogen and phosphorus, and high concentrations applied directly to leaves can draw moisture and nutrients from them.

In studies done on the effects of guano from several bird species, the findings indicate that guano enriches the soil and may encourage plant and tree growth, but may also kill some species, resulting in decreased

species richness and diversity. Blocking photosynthesis is considered more of a threat to the trees than the effects of acidifying the soil.

The soil in the fenced enclosure has been affected most by the guano deposition over the last few years. The area was well shaded by the dense overstory before the herons started nesting, and the grass was not lush even then. Now, it is very sparse and only a few weeds survive. The grass underneath nest trees beside the tennis courts is not mowed during nesting season, and grows extremely long. In fall and winter, it is patchy but healthy.

Soil chemistry has been measured from samples taken underneath nest trees, and also from control areas without substantial guano deposition. Appendix 6 contains a table with results from analyses performed in 2004 and 2005.

Buffer Habitat

The June 2004 Ministry of Environment document "Best Management Practices for Urban and Rural Land Development" has been the basis for the direction of this report concerning the issue of buffers and protective zones for the heronry.

The report includes sections on habitat for special wildlife and species at risk. Section 4 defines a buffer as "*a leave area around a sensitive feature. Their purpose is to provide protection for that core feature by reducing the impact of potentially adverse effects from the outside. This can include access by humans and their pets, changes in microclimate, access by predators, etc. Buffers help to maintain the long term values - both environmental and economic - of an environmentally sensitive area*."

Table 4.1 in that report also provides suggested minimum buffer zones applicable to specific development conditions. The Ministry advises using **"***an appropriately qualified professional to identify buffer widths, as circumstances may vary on a site by site basis***."**

The Best Management Practices Guidelines for Great Blue Heron rookeries call for a 60 m buffer zone in an urban area; urban area is defined as it applies to lots one hectare or less that are being further subdivided.

A 200 m breeding season "quiet buffer" is also recommended as an additional buffer that should be used if land contouring or construction is taking place during nesting season.

Some issues specific to the current heronry site require resolution:

- The heronry established in 2001 at the current location near the Park Board offices in a heavily urbanized area. The immediate site and surrounding private lands have experienced very little development or physical change since that time.

- The colony has experienced rapid growth over the last five breeding seasons. Despite the urban disturbance factors, there were few outward signs of stress or disruption that impacted the breeding activities or reproductive rate in the rookery during the period 2001-2005. A chart showing the numbers of nest trees, nests, and fledged birds during this colony's history is shown in Appendix 3.
- Fenced areas for the major colony nest trees were established and have been expanded with the growth of the colony. There is some evidence to support the concept that fenced enclosures promote security and may impact the success of the colony.
- The site includes long-established businesses, recreational areas, and high-rise residences, all of which pre-date the heronry. All of these activities fall within existing buffer zone distances.

Scientific data on large numbers of heronries in BC suggest that urban colonies suffer declining reproductivity caused by human disturbance and attacks by eagles. There is scientific concern that over time the Stanley Park colony may also be subject to these disruptions. Therefore all possible measures must be taken to minimize the disturbance factors.

However, it is noted that herons can habituate and be productive in areas considered to be highly disturbed. In a 2001 Wildlife Working Report, Gebauer and Moul reported,

> Several studies have provided evidence that some heron colonies can become habituated to non-threatening human disturbance (Anderson 1978; Parker 1980, as cited in Butler 1992a; Webb and Forbes 1982; Vos et al. 1985; Gebauer 1995a). In British Columbia, a colony at Stanley Park is located in a highly disturbed area (Otter 1991) but has reproduced successfully in most years (i.e., 1977-1997), and another colony was established in a cedar hedge between a busy parking lot and an access road to Vancouver International Airport between 1981 and 1992 (Webb and Forbes 1982). Butler (1991b) described established colony sites in highly disturbed areas at an industrial site near Parksville, and in Beacon Hill and Cuthbert Holmes Parks in Victoria, and one pair raised young in a nest in a tree along a suburban street in Vancouver.

Further,

> Vennesland (pers. comm.) found that herons at isolated colonies in southwestern British Columbia reacted more strongly to human disturbance than at colonies in urban settings, and that response varied as the season advanced. Herons at the isolated Canadian Forces Base and Hatzic colonies reacted strongly to the approach of Vennesland at 100 m and 90 m, respectively,

> whereas urban colonies at Beacon Hill Park, Victoria, and Stanley Park, Vancouver, never responded."[8]

Buffers are relevant to this site given what we know of urban colonies, but they require modification to suit this situation.

The solution to the buffer question lies with the nature of the buffer. Rather than considering a buffer to be simply a geographic distance, it should be regarded as a zone to minimize disturbance around the colony.

The primary buffer elements required to minimize disturbance are:

- Restrict access to the areas under the heron rookery. This has already been accomplished with fencing. Additional fencing will be employed if the colony continues to grow.
- Maintain and enhance low vegetation buffers in the interior zone.
- Create a quiet zone around the colony during the nesting phase. This will require some public education and signage to create awareness of the need for noise restrictions.
- Restrict activities that may prove disturbing to the colony during the breeding season. A comprehensive list of these activities is provided in Table 1 and in the chart in Appendix 11.
- Improve monitoring protocols to determine if human activities or other factors (e.g. eagles) are having a negative effect on the colony.

Activity & Timing Restrictions for the Stanley Park Heronry

Management of the heronry must be done in an 'adaptive' manner Consideration must be given to the nature of the environment the herons have adopted, best management practices that are based on studies of similar colonies, and scientific knowledge of the habits and habitat of herons. Priorities include establishing limits to restrict clearly disruptive activities, monitoring the status of the heronry regularly, and intervening when necessary to protect the colony in unusual circumstances.

Several scientific papers have recommended restrictions on activities that may disruptive to the herons during the nesting season.[9] Table 1 lists restricted activities for the Stanley Park colony along with times and distances that the restrictions are in effect.

Figures 9, 10, and 11 show aerial views of the heronry with approximate radii of the activity restriction distances: 1000 m, 100 m, and 60 m. The centre of the heronry has been arbitrarily chosen as the interpretive sign on Stanley Park Drive. Aerial photographs were obtained from VanMap.

[8] The Status of the Great Blue Heron in British Columbia. M.B. Gebauer and I.E. Moul. March 2001. 66pp.
[9] Butler, 1991, Washington Dept of Wildlife

Table 1 Activity restrictions

Recommended Activity Guidelines *	Buffer Distance	Acceptable Timeframe	Comments
Tennis Courts Resurfacing or Pressure-washing	60 m	Sep 30-Feb 1	
Tennis Courts Regular Play	Open		
Large Group Organized Runs	Seasonal	Sep 1-Feb 28	
Field Sports	Seasonal	Sep 1-Feb 28	
Road Construction/Paving	100 m	Sep 30-Feb 1	
Heavy Equip Usage *	60 m	Sep 30-Feb 1	
Fenced Area Trail Closure	Seasonal	Feb 28-Aug 31	
Road Parking and Lot Access	None	Jan 1-Dec 31	
Low Volume Building Maintenance	60 m	Sep 30-Feb 1	
PB Office Rooftop Maintenance	Seasonal	Sep 1-Feb 28	
Low Impact Landscaping	10 m		Use of reduced volume machinery or hand tools (subject to approval)
Emergency/Hazard Tree Maintenance *	None	As Required	Approval required
Landscaping Equip Use	60M	Sep 30-Feb 1	Subject to approval
Tree Inspections	None	Sep 30-Feb 1	Consultation with Wildlife Staff required prior to inspection
Leaf Blowers	60 M	Sep 30-Feb 1	
Tree Maintenance/Pruning	100M	Sep 30-Feb 1	
Soil Treatment and Testing	Seasonal		Sampling as needed
Soil Treatment/Mulching	Seasonal	Sep 1-Feb 28	
Site Treatment/Debris Removal	Seasonal	Sep 1-Feb 28	
Fireworks, Explosions	1000 m	Jul 15-Feb 1	Annual review; multi-level government approval required
Night time Filming	60 m	Sep 30-Feb 1	Evaluated on case-by-case situation
Amplified music	60 m	Jul 15-Feb 28	

* Measures to protect human safety have priority

Figure 9 Approx 1000 m radius around heronry

Figure 10 Approx 100 m radius around heronry

Figure 11 Approx 60 m radius around heronry

Tree Management

The Stanley Park heronry was established in an area of extraordinary public activity. The herons nest in mature stands of trees and their activities may affect the structural integrity of these trees and hasten their decline.

In its present location, the greatest concern for the heronry is the protection of the nest trees. Both federal and provincial government laws protect nest trees. However, in a public place, human safety needs take priority over the needs of wildlife. Clear direction must be established to guide Park staff in the performance of their work.

This report identifies guidelines for management of park trees within and around the colony, for both routine and emergency tree maintenance. The report also highlights the time, locations, and types of tree maintenance allowed within a specified radius of the heronry.

The schedule for regular tree maintenance in the colony and the zones surrounding the colony is identified in Appendix 11. The appendix also identifies a wide range of additional activities that are restricted during the heron-nesting period at the Stanley Park site.

Restricted Access

As the heronry has grown, Park staff have added fencing to restrict human access under and around the nest trees. This has provided additional security for the herons, particularly during the early nest building stage and for young post-fledging birds.

Fenced areas are also designed to provide for human safety in the areas close to the heronry by excluding people from areas subject to falling branches, nest material, and excrement and other organic matter. Fencing also reduces and perhaps eliminates the requirement for tree maintenance during the critical nesting season.

Regular Maintenance

The tree management procedure calls for all maintenance work on heron nest trees and surrounding vegetation to be done prior to the herons' arrival in the spring and after their departure from the site in autumn, at the end of the nesting season. Management and maintenance of trees within the core areas or the buffer zone will not occur during the heron breeding season. Trees and vegetation will not be removed within the prescribed 60 m radius (See BC Ministry of Environment Guidelines) other than for emergency maintenance.

Emergency Maintenance

Unforeseen environmental events, such as windstorms and heavy rainfall, may result in trees within the zone around the heron colony becoming potentially hazardous to human safety. Tree damage that occurs directly within the colony and in an area of restricted human traffic will not be attended to until the end of the breeding season. At that time a decision will be made concerning remediation.

Emergency situations vary, but where possible, an evaluation will be conducted by a certified arborist before action is taken. The evaluation will also include the number, size, and species of trees that require treatment. The evaluation will identify the degree of risk to public safety and the minimum treatment necessary to reduce the risk to an acceptable level.

Qualified arborists that have completed training in wildlife and danger tree removal will perform removal of hazard trees. Emergency tree maintenance or removal will be undertaken to mitigate the hazard situation in the most direct manner possible and resulting in the least impact for the heronry.

Replacement Trees

The Park Board has a replacement tree policy that requires the replacement of additional trees to restore the habitat to the best ability

possible. Native trees or trees that would be most appropriate to the heron colony would be used.

Monitoring

The Supervisor for the Stanley District, who coordinates tree management activities for Stanley Park, will retain records for tree maintenance, emergency management, and evaluations. The records will provide information on the justification for any work done, the location and extent of work performed, and the outcomes.

Activity monitoring of the colony is a stewardship program conducted by the Stanley Park Ecology Society, in conjunction with the Vancouver Park Board wildlife staff and local volunteers with an interest in the heronry. The heron-monitoring group will meet regularly over the heron season to review events and practices. Park tree management staff will participate with the heron-monitoring group to provide regular updates on activities.

Roosting and Post Fledging Areas for the Colony

Pre-nesting and post-fledging sites are variable and occur in many multi-use public areas and recreational zones. Pre-nesting, the herons congregate near the heronry in recognizable trees and landforms that are used regularly during the lead up to the nesting season and during the early nesting period. The herons can be seen loafing on rooftops at 2033, 2061, 2095 and 2099 Beach Avenue, and converging in tall conifers near the heronry and Park Board office. When flushed from the heronry, these are the structures they fly to and as such this may constitute a staging area and the boundary of the colony.

Post-fledging, herons have been observed roosting on neighbourhood rooftops, lamp standards, trees, buildings, and even sailboat masts in False Creek.

Foraging Habitat

Access to a food supply is likely the single most important factor in choosing the location of a heron colony. Chicks' energy needs are greatest when they are between 26 and 41 days old[10] and during this time both parents need to forage almost constantly.

In the waters around the Lower Mainland, ocean conditions in the spring and summer bring a combination of ideal conditions for raising young: higher prey abundance and more low tides occurring during the daylight hours. These conditions coincide with the time when the chicks require the most energy for growth and maintenance.

[10] Time of breeding in relation to food availability of female great blue herons (Ardea herodias) Robert w. Butler. The Auk 110(4):693-701, 1993

The Stanley Park heronry is located approximately 200 m from English Bay Beach and 850 m from Coal Harbour. It is within 2.5 km of any part of the Stanley Park shoreline. False Creek lies approximately 2 km to the south of the heronry, and Jericho Beach is approximately 4 km southwest.

Most herons forage within 3-5 km of the nesting site[11], probably to maximize the number of trips they can make and minimize the energy required for hunting and transporting food for the chicks. However, they have been known to travel distances of up to 15-29 km to forage.[12] Herons maintain various distances from each other when foraging; individual territory sizes may vary considerably depending on prey abundance and time of year.

Although herons have been observed foraging along the foreshore of English Bay and Coal Harbour, and in Lost Lagoon and Beaver Lake, there is no documentation of local foraging habitat. Even during summer, the numbers of foraging birds observed are relatively few considering the size of the heronry and numbers of birds in recent years. They may be travelling to Spanish Banks, Coal Harbour, False Creek, Burrard Inlet, UBC, Jericho Beach, the Fraser River, and farther afield to forage. There is a significant lack of knowledge of the area being used to sustain the heronry given its extremely high rate of growth.

Potential prey species in Lost Lagoon and Beaver Lake include sticklebacks, sculpins, carp, catfish, ducklings and goslings, and frogs. Terrestrial prey species in the Park includes rats, mice, voles, and shrews.

Recommendations for Habitat Restoration & Enhancement

Where possible, all activities involving nest trees and heron habitat should be performed outside the breeding season, especially the sensitive courtship phase. Recommendations for evaluating, enhancing, and restoring heron habitat include:

- Identify nesting territory boundaries.
- Identify heron nesting trees as protected.
- Identify nest trees with nesting designation specific to VPB, using tags affixed to the trees. (Similar to provincial wildlife tree program.)
- Identify foraging habitat within the Park and nearby shores; determine if the herons are capable of supporting themselves and their young given the land base and current land usage.
- Identify prey species mix in the foraging area.

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[12], [9] Management Recommendations for Washington's Priority Species: Great Blue Heron. http://www.wdfw.wa.gov/hab/phs/vol4/gbheron.htm

- Quantify the amount of guano produced daily by heron adults and young and calculate amounts for the current colony.
- Quantify the chemical nature of the excrement. Evaluate the effect on the trees and other vegetation.
- Continue with soil testing at time-sensitive stages
- Evaluate tree health; arborists should perform tree assessments spring and fall. These trees will be subject to greater stress than normal and will likely require explanations that can be supported in open session. Information should be logged and filed for future reference.
- Plan for future growth and changes to the heronry. Evaluate areas with similar conditions to the heronry such as tree mix, proximity to food source, and protection from predators and disturbance. These may be potential alternative nesting sites for herons in the event they abandon the current site.
- If necessary, replant landscaped areas with plants that have a higher tolerance to conditions at the heronry.
- Contingency Review: anticipate the demise of the trees over time, especially with regard to protection of the public.

Options to consider for soil rehabilitation include:

- Wash foliage of nest trees and landscape vegetation after the heron colony has been vacated at the end of the season.
- De-acidify the soil with lime or other non-toxic substance.
- Put a liner down. Cover with wood chips and remove at the end of the nesting season. Remove debris after the season is concluded.
- Mulch areas underneath heronry – cover the ground with 6-8” of mulch to intercept most of the guano before it reaches the ground; remove it at the end of each season. This action is pending consultation with Pacific Soil Analysis (PSAI.)
- Restore the ground under the heronry by re-seeding with hardy native grasses or groundcover.
- Expand the fence enclosure as needed to protect nesting trees and public. Currently it is designed to allow pedestrian traffic along the path from the Park Board office parking lot during non-nesting times. During nesting season it will be closed to restrict foot traffic. The fence may be advantageous as security for the colony residents.
- Enhance growth of non-nesting trees suffering effects of defoliation.
- Schedule tree health inspections before nesting season so reparative work can be done outside the season.

4. Reduction of Disturbance to the Heronry

The greatest threats to heron colonies are from humans and eagles; these two factors have been cited in numerous cases of colony abandonment.

Many heron colonies are highly sensitive to human disturbance or to changes in their surroundings. Habitat fragmentation and loss from urban encroachment results in smaller colonies that have lower nest productivity. Human activities such as logging, construction, and destruction of wetlands disrupt colonies. While herons are known to nest in urban areas, this is likely due to reduction in available habitat due to urban encroachment and also because humans and herons use the same resources – water, fish, trees, and fields.

Depredation by eagles is considered the second biggest threat to heron populations and often results in abandonment of nests or entire colonies.

Herons are most sensitive to disturbance during the pre-nesting and early nesting phases. Establishing a second nest after an initial failure is more likely to be successful if it is done early; if the herons do not make a second attempt to nest after moving a colony, an entire generation can be lost, which contributes to the overall decline in populations.

The Nature of the Colony

The Stanley Park herons have a long history of coexisting with humans and with other urban wildlife and captive zoo animals. They are habituated to everyday human activities and may not recognize some forms of human disturbances, such as light or noise, as threats. Many of the herons that immigrate to this colony also seemingly habituate easily; this is a historically recorded phenomenon.

The herons also have a history of coexisting with urban eagles. Eagle attacks have been reported on the Stanley Park heronry almost every year since 2002, and it is likely the attacks are coming from eagles that nest closest to the heronry. It is a common occurrence for herons and eagles to coexist despite the risk to heron colonies; it has been suggested that nesting near resident eagles offers some protection from marauding non-resident eagles.

Factors for Disturbance of Heron Habitats

Ambient Noise

Types of ambient noise are discussed in the Urban Nature of Colony section. While the herons seem tolerant of some level of noise, sudden loud or prolonged noises may disturb them sufficiently to cause them to flush or temporarily abandon their nests at vulnerable times.

Traffic and Parking

In the Lower Mainland, herons foraging along roadways have been hit by cars; the Wildlife Rescue Association of B.C. has treated birds that were found near roads and which had been injured by vehicles. In winter, herons can be observed foraging near ditches beside busy highways.

At the Stanley Park site, fledglings have wandered into the parking lots near the heronry, and have been observed in nearby lanes and even on cars in the West End.

Buildings

It is unlikely tenants and ambient sounds from nearby buildings are sources of disturbance to the herons, but there are some tenants who find the heronry noises and smells distressing. Some tenants have complained about the "constant" noise emanating from the heronry, stating it never lets up and forces them to make changes to their living habits, such as closing their windows on warm days and nights.

In 2004, a heron monitor received anecdotal reports of a person firing an air gun into the heronry early one morning in attempts to deter the birds from nesting; this was supported by the observation of a local tenant who saw the birds flushing from the nesting site at approximately the same time. There are no reliable eyewitnesses that can verify or identify the alleged shooter.

Penalties of up to $50,000 may be levied for offences committed under Section 34 of the BC Wildlife Act, such as killing or injuring birds and damaging nests. Incidents of deliberate disturbance of nests, trees, birds, or their nesting sites should be reported to BC MOE conservation officers immediately.

Aircraft

During the summer months, from June to August, there may be low flying aircraft flying over the heronry – news helicopters, or small planes carrying advertising banners or participating in local air displays. During the last two years, a low-flying blimp has hovered over English Bay during the summer months.

There are no reports of herons being disturbed by aircraft. However, this needs to be monitored.

Human Activities, Public Events

Enclosure Fencing

In early February 2004, fencing was installed prior to the commencement of nesting activity as a means to safeguard the colony; quick action was required to protect the colony from human activity in order to prevent conflict. The fence served both to minimize disturbance to the herons, and

to reduce the chance of people being struck by falling debris or organic matter. While it was observed that the herons exhibited skittish, flighty behaviour that may have been due to the presence of the fence, they commenced mating and nest-building activity in the third week of February. The fence has since proved to be a demonstrable security factor for the colony.

Sun Run

The run is a prolonged and unusual occurrence; it is unexpected and therefore one that the birds are not habituated to. The timing of the run occurs at a significant stage in the nesting cycle in late April, around the time when eggs have recently hatched or are just about to hatch. Chicks are at a very early stage in their development and are at their weakest. Even if temporarily abandoned, recently-hatched chicks may suffer from exposure to the elements, or they may be subject to predation by eagles, gulls, crows and ravens.

Some of the factors that make this an unusual disturbance include:

- Up to 50,000 people running under and through the heronry.
- Installation of security fencing along the base of the trees that creates a visual change to the birds' environment and audible disturbance.
- A public address system that blares music and carries for significant distances.
- Increased traffic flow occurring prior to and after the run.

As a result of concerns registered by the Committee, the Sun Run has been rerouted to circumvent the nesting area. Routes for this and other runs need to be evaluated for their effect on heron nesting activity.

Celebration of Lights fireworks displays

Generally, at the time of the fireworks displays, the chicks are at an age where they rely very little on their parents; most have fledged, and the ones that haven't are fed at infrequent intervals by their parents. However, some late-nesting herons may have younger birds still requiring parental care at the end of July; these young birds are already at risk due to their late arrival, and the fireworks may have an impact on whether they survive to fledge or not.

According to one source at Nahkeeta Northwest Wildlife Services in Washington, fireworks have been a problem at some colonies, causing abandonment and fallen nests.

Monitors have observed the herons during the fireworks, and also have observed the heronry during a large-scale police response with loud sirens and noise along Beach Avenue and Lagoon Drive. The herons became

quiet for a few moments as they do if an eagle approaches, then resumed their normal calls.

Tennis courts

Tennis activity occurs year-round, subject to the weather. While the herons do not seem to be adversely impacted by it, the potential for disruption from this area includes use of loud machinery for pressure washing and resurfacing of courts during peak nesting season in March and April. Since 2003, tennis court maintenance practices have been altered to ensure maintenance is performed outside the nesting season. See Appendix 11 for guidelines for timing of activities related to tennis court maintenance.

Tennis tournaments are held in July and August, outside the critical time for the nesting season. However, to ensure disturbance to young herons is minimized, redirecting the public address system or reducing the volume of announcements should be considered.

Predators and Domestic Animals

One theory for the choice of location of the Stanley Park heronry and its compact dense nature is the protection from eagle predation.

Eagles

Eagles are considered the most significant predators of herons, and attacks are the second most cited reason for abandonment of heron colonies.

Eagle nests in the Park are monitored by the Stanley Park Ecology Society. There are four eagle nests in Stanley Park, and three more within a 5 km radius of the heronry. There is no way of predicting or preventing attacks by eagles, and while trends of eagle numbers can be measured, there is no way of knowing the effect an increase in eagle populations will have on the heronry. Eagle populations have been increasing since the 1960s and the number of eagle attacks on heronries has also increased; it is possible that herons have always been subject to heavy predation by eagles but, due to the increased visibility of both eagles and herons, these attacks are being observed and reported more frequently. Appendix 12 shows the locations of Bald Eagle nests in Vancouver.

It has been suggested that nesting adult eagles may prevent juvenile eagles from entering their territory, therefore adult eagles provide protection from attack by other eagles. As well, an additional layer of protection may be had from the crows and gulls that consistently mob the eagles who get too close to their nests.

Eagle predation was significant at the Zoo/Aquarium location; attacks on the main colony tree nests were commonplace in the early summer. The

It is believed that only two pairs of eagles nested within Vancouver city boundaries in the 1960s. In 2005, the Stanley Park Ecology Society monitored 12 eagle nests within city boundaries.

Four eagle nests are located in Stanley Park; all but one produced offspring in 2005. It is thought that one pair of eagles may be responsible for all attacks on the Stanley Park heronry.

Since 2002, the number of herons known to have been killed in Stanley Park due to eagle attacks is between 12 and 14, and at least six nests caused to be abandoned.

level of attack by eagles was probably greater than it is at the present location. There is no information on mortality at this location.

In 2002, the Nelson Street tree was abandoned due to repeated eagle attacks; three nests failed, and each nest contained at least one chick. In 2005, this tree was re-colonized by herons.

Raccoons

These animals are mainly a threat when eggs are present in the nests. There have been limited attacks on young herons but there have been raids in trees with nests containing eggs. In 2002, three nests in the Douglas fir tree were reported to suffer from raccoon raids, which led to their abandonment; the two remaining nests in that tree successfully fledged chicks. The tree has not been colonized since that year. The herons may have adapted to raccoons by restricting their nesting mainly to deciduous trees and by increasing their density, thus providing extra protection from the slow-moving raccoons.

Gulls, ravens, and crows

While the literature states that these birds are predators of heron chicks and eggs, there have been no reports of this happening at the current Stanley Park heronry.

Dogs and Coyotes

Few coyotes remain in Stanley Park as the population has declined in recent years. There have not been any reports that dogs or coyotes are a problem to nesting herons; however, fledglings on the ground may be at risk of attack from coyotes or unleashed dogs. The fencing may be an advantage as it provides a modicum of security from large dogs.

Natural Environment

Storms and high winds have resulted in nest losses and the loss of nests and several young chicks.

Recommendations for Minimizing Disturbance

There are times during the nesting season that are more critical to the herons' success than others; such times must be taken into consideration when restricting activities or occurrences.

Recommendations include:

- Extension of acknowledged breeding season. The seasonal breeding cycle is generally considered to run from February to August, but the Stanley Park herons have been observed in the nesting area from January to September.
- Establish a timeline to reduce potential conflict between human activities and nesting time for the herons. Appendix 11 outlines a

proposed timeline for operations, maintenance, and recreational activities. Specifics include:

  - Restricting game activities involving floating or projectile objects (e.g., kites, footballs, discs) that may "spook" adult or young herons, or may be regarded as threatening to birds or nests.
  - Alteration of the Sun Run route to avoid proceeding under the major nest trees. As a result of requests from the Committee, the Sun Run route has been altered to bypass the heronry, starting with the 2006 event.
  - Limit roadwork, construction, and landscaping activities to times outside the nesting season within a radius that protects trees used for nesting and staging.
  - Limit major events such as parades, fireworks, and low-flying planes during sensitive times in the nesting season. The fireworks event should be monitored closely as it may still be a prime source of nesting disturbance. There is little evidence to support recommendations for change at this time. Continue to monitor the site.
  - Maintenance of tennis courts be performed outside sensitive nesting times, preferably before and after nesting.
  - Use of car horns, alarms, and public address systems. Establish a noise buffer to restrict noise levels of human activities and types of recreation allowed.
  - Limit activities that alter the landscape, especially landscaping activities involving noisy machinery such as power mowers, saws, leaf blowers, or vacuums; restrict use of power landscaping tools within a specified radius.
  - Evaluate use of PA system during tennis events. As the degree and timing of any disturbance is questionable, no alteration may be necessary.

- Trees along the corridor from the existing heronry to Nelson Street and beyond may be colonized as the heronry grows. Expansion of the fencing may be necessary along the perimeter. Regular review of the areas used by the herons is needed.
- Consider maintaining vegetation cover when drawing up landscaping plans to offer visual and sound barriers for nesting birds
- Consider approaching property owners and management of nearby buildings to increase awareness and sensitivity of herons' life cycle.

5. Security and Stewardship for the Site

Buffer Areas and Protection for Nest Trees

Management of nest trees is done by the Board of Parks and Recreation; arborists perform regularly scheduled inspections, emergency reviews, and treatments. Park Board policy establishes clear directions regarding human safety issues concerning the trees, and tree removal policy is implemented where necessary.

Soil treatment in landscaped areas is performed by Parks and Recreation maintenance staff. Areas affected by the herons' excrement may require extensive soil evaluation to determine if there is a need for preventive or remedial measures to maintain tree health.

Remediation measures employed in October 2004 and November 2005 included application of dolomite lime to the soil beneath the heronry and removal of the accumulated guano-coated twigs and debris from the ground. On October 2005 a test wash was done to remove heron excrement from foliage.

Soil samples have been collected on three occasions, one in 2004, and two in 2005. The results indicate that changes to the soil are occurring, but there is no information to support whether these changes are temporary or whether they have an effect on the roots of trees and other vegetation. The studies examined soil chemistry only; full soil profiles have not been performed to determine composition, drainage, or other soil properties.

Protection of Foraging Habitat

Although foraging areas have not been mapped out, anecdotal evidence exists of herons foraging along the beaches and shores around Stanley Park. Many of these areas are heavily trafficked by people and dogs. Measures to safeguard heron foraging habitat during the breeding season are recommended.

Heronry management plans generally recommend restricting pesticide use within 500 ft (152 m) of foraging grounds. It is Park Board policy to avoid using pesticides and to employ integrated pest management in public parks; this has had beneficial effects on all species using the Park. An exception is the use of fungicides on golf courses. As the heronry is 200 m from the Pitch and Putt course, they are likely protected from any substance used. However, as it is possible the herons use of the golf course to forage for rodents and small mammals, this should be monitored in future.

Control of Human Activities and Other Events

Human Health

As with most birds, herons have been associated with several disease-causing pathogens, but many of these do not pose a risk to humans. However, the large quantity of bird excrement under the heronry could serve as a reservoir for pathogenic organisms and pose a risk to immune-compromised people. Some pathogens, such as *Histoplasmosis*, may take a few years to build up to harmful amounts. During Vancouver's dry season there is a potential for aerosolization and mobilization of pathogenic particles if the ground beneath the heronry is disturbed, for instance, by animals or falling debris. The public needs to be informed and advised to use normal precautions that they would use in any situation where quantities of animal feces build up.

With the prolonged presence of a large flock of nesting birds such as exists at the heron colony, it can be easy for people to forget that these are wild animals and can pose a risk to humans if they interact too closely. People have suffered stabbing injuries from handling these birds without proper protection; there is even one report of a man being killed by a stab in the head from a Great Blue Heron.

The fence around the heronry was erected in part to protect passers-by from debris falling from the nest trees. To most heronry observers, the need to stay clear of falling objects or substances is quite obvious, and there have been no reports of injuries suffered by people.

Recommendations for Site Security, Nest Tree Protection, and Human Health

- Concerns have been expressed about the effects of the herons on tree health. Recommend the public be made aware of interventions and the rationale for preventing deterioration of nest trees and surrounding vegetation; also, discussion of the potential deterioration and possible outcomes of the heronry should be presented to the public as part of education about the evolution of a heronry.
- Protection of nesting habitat and foraging areas from human and domestic animal encroachment:
    - Conduct a site review of foraging areas
    - Establish protective zones for the heronry and for foraging habitat; floating islands have been valuable in some areas.
    - Manage off-leash dogs in foraging grounds or where foraging herons are seen during low tides; install signs to increase public awareness of the importance of foraging grounds; increase voluntary compliance with avoidance of foraging areas by humans and dogs

- Determine if remediation measures need to be undertaken on soils in and around the heronry. Have comprehensive soil testing performed to determine soil composition and drainage properties. Confirm with soil testing agency re: sampling protocol and frequency of testing.
- Implement remediation measures for the ground underneath nest trees as necessary; potential measures include application of neutralizing substance to acidic soils or temporary application of mulch during nesting season to intercept guano. Remove debris from the ground beneath the heronry at the end of each nesting season
- Involve local post-secondary institutions (BCIT, Langara, SFU, UBC - Forestry, Landscape Architecture, Earth Sciences) in ecological testing of the site: flora and fauna distribution, soil testing, and climatologic parameters such as sunshine, precipitation, temperature, wind, barometric pressure
- Continue to follow up with Coastal Health Authority to monitor human health concerns for the heronry zone

Figure 12 Heron at Lost Lagoon

Photo courtesy of J. Gray

6. Monitoring of the Heron Colony

A key element of the monitoring program for this colony is stewardship. Park Board staff in areas such as arboriculture, wildlife, and special events will be more actively involved in stewardship activities.

The heronry has expanded beyond the ability of a few volunteers to accurately monitor the herons' behaviour, nesting habits, or reactions to disturbances, and any unusual occurrences such as attacks by predators.

Program Design

Objectives of the monitoring program include observing breeding activities and the number of nests, birds, and chicks, and monitoring the overall health of the birds and their habitat. In order to meet these objectives, a pool of dedicated and knowledgeable volunteers is needed to accurately observe, record, and interpret the birds' activity and events in their environment.

Activity Monitoring

As there is little knowledge of what constitutes a disturbance to urban herons and what factors might precipitate abandonment, it is important to closely monitor the impact of events around the heronry, both usual and unusual. With the sharp increase in numbers of nesting birds, the risk to the population increases dramatically if abandonment occurs at any time after the majority of eggs have hatched.

The heronry has been monitored regularly if informally during four of its five years at the current location. In 2004, the BC MOE established a formal set of guidelines for monitoring the birds. During the breeding season, the following parameters are monitored when possible: weather at the time of the visit, adult bird activities such as loafing (standing around), stick delivery, copulatory behaviour, incubation, and exchange of duties (incubating and foraging). The status of nests is also monitored: whether they are visible, occupied, active, or failed. Presence of chicks and an estimation of their age are recorded using standard codes provided by the Ministry. An example of a monitoring data sheet is provided in Appendix 7.

The Stanley Park heronry is probably the best-monitored heronry currently in existence. Due the efforts of dedicated volunteers, interested neighbours, and knowledgeable employees in the Park Board office and Stanley Park Ecology Society, the history and phenomenal growth of the heronry at this site is well documented.

Productivity Surveys

Productivity surveys measure the number of offspring raised and fledged for each pair of nesting birds.

As the colony grows in size, productivity has become more difficult to assess. With relatively few monitors, it takes longer to find and observe the nests, and even longer to observe and record activity in individual nests. Nest visibility decreases as the season progresses and foliage grows, and newer nests are often built in areas of dense foliage.

For those monitoring the nests from the ground, incubating parents can be difficult to see until the birds change position or tend to the eggs. Eggs can't be observed, and chicks can only be seen when they have reached an age where they can stand and move to the side of the nest. After the tree foliage has grown in, much of it dies from the barrage of heron excrement sprayed from above, which allows easier visibility of the nests, adult birds, and larger chicks.

Figure 13 Young chicks in nest

Photo courtesy of J. Gray

Those monitoring from nearby buildings can observe nests, eggs, and chicks until approximately mid-May. When the trees are fully in leaf, only a few nests can be observed from above.

A strategically placed webcam may help with monitoring of the nests, but is subject to limitations: it cannot cover the full scope of the heronry, and leaf cover obliterates the view of many of the nests.

Circumstantial evidence can be used to estimate productivity in conjunction with direct observation of eggs and chicks; as the parents throw empty eggshells over the side of the nest, a regular survey of shells on the ground can be predictive of where and how many chicks have hatched. However, this does not give any indication of chick survival.

Regular counts of mortalities are an important part of productivity surveys. Often, dead chicks fall to the ground or are removed from the nests by the adults; Park employees routinely drive past the heronry on their morning rounds and collect any dead wildlife they find. Ground monitors leave dead chicks where they are, recording their presence and the time and date they are found. It is not known how many are removed from the area by scavengers.

Nest Surveys and Mapping

Monitors conduct a count of nests on each trip and record new nests and nest losses and their causes if known, e.g., calamitous events such as falls due to broken tree limbs, windstorms, or demolition by the herons for use in other nests.

Maps have been created using monitors' observations of the nesting site. These are updated and distributed on an as-needed basis.

Global Positioning System (GPS) mapping may be useful for definition of colony size and location of nest trees. It serves little purpose for identification of individual nests or numbers of nests in specific trees.

Activity Monitoring

A Park Board wildlife technician makes daily rounds as part of normal work duties, and will record and report any unusual events as well as records of heron and chick mortalities.

Installation of a video camera is planned for an apartment building across from the heronry; arrangements for a video camera and computer are being made available through the Park Board and SPES.

General activity monitoring will continue as previously, with monitors making spot checks of the heronry. The current monitors can commit to routine monitoring as with the previous two years. It is important to recognize their work and the contributions they have made.

Monitoring protocol for the 2006 season is outlined in Appendix 8.

Reports and Information Distribution

The lead volunteer monitor will be the primary receiver of data reports from the field monitors. The SPES Wildlife Manager will continue to produce and distribute regular heronry updates using input from the monitors, as has been done during the last two seasons. The Wildlife Manager will continue to serve as the liaison and submit productivity information to the Ministry of Environment.

Seasonal Review

An ad hoc Heronry Committee consisting of the authors of this report will meet or exchange information monthly throughout the nesting season. At

the end of the nesting season (September or October), monitoring data will be collected and a final report will be drafted.

Directed Studies

The heronry presents opportunities for studies, both formal and informal.

The Zoo heronry was studied on an ad hoc basis. Sporadic counts of trees and nests were done, but productivity monitoring was not performed at either the Brockton Point or Zoo heronries.

In the 1970s and ’80s, CWS biologists made regular visits to sample eggs for toxins such as dioxins and pesticides. The results from these and studies done at the UBC heronry contributed to changes in the regulation and production of these chemicals, primarily in the pulp and paper industry.

Further knowledge is needed in the following areas:

Number of people visiting the site. Those monitoring the heronry have observed a large increase in the number of people around the heronry. People are being attracted to the heronry by several means: it has been featured in local community and national newspapers, on local and national television news, specialty television programs, and on several websites as a place of interest for birders and tourists. Most importantly, news of the heron colony has spread by word of mouth – through local residents, birders, and local hotel staff. To date, no observations have been made of the herons’ tolerance or reactions to the increase numbers of people.

Non-breeding activity and behaviours. At present there is no formal monitoring of herons beyond the heronry or outside the nesting season. From September to April, casual observations of foraging juvenile and adult herons are being recorded by volunteers who participate in monthly Beached Bird Surveys along the beaches in and around Vancouver. Routes include the beaches and shorelines along Ambleside, from the foot of Main Street through Coal Harbour, Stanley Park, around False Creek to the foot of the Burrard Street Bridge, and from the foot of Macdonald Street to the Vancouver Yacht Club.

Wintering habits and habitat. While the herons are non-migratory, they may be wintering far from the heronry, perhaps in farmers’ fields south of Vancouver. Without knowledge of their foraging habits and diet during the fall and winter months, it is difficult to know what habitat they occupy.

Breeding season foraging habitat. There is very little knowledge of where the herons are foraging during the breeding season. In order to know how much growth the heronry can sustain, it is important to know the size and nature of the ecosystem on which the herons depend. This can be

accomplished to some degree by tracking the direction the herons are seen leaving and arriving from foraging expeditions, and monitoring where herons are seen foraging.

Local prey species. Dr. Robert Butler studied the diet of *A.h. fannini* in the Fraser Valley and it is likely most of the prey species identified can be found in the waters around Stanley Park (see Ecology in Section 1). However, local variations in prey species may exist.

Recommendations for Heronry Monitoring

Activity Monitoring

- Recruit an additional four monitors to accurately record the heronry activity during peak nesting time, when nests are still being constructed, and eggs are hatching.
- Provide training and orientation to ensure technical/scientific aptitude to facilitate timely and consistent data collection. Monitors will require access to computers.

  Possible sources of additional monitors include:

  - SPES – a half-time position may be available
  - Park Rangers
  - Members of service clubs such as Scouts, Rotary Club, or the Vancouver Natural History Society
  - Post-secondary students who have specific project requirements; these might be recruited from a community college or university program.

Factors for Disturbance

- Record ambient noise levels in the immediate vicinity of the heronry to establish baseline knowledge of what the birds' tolerance levels are. Identify the nature and quality of sudden or unusual noises; include car or emergency vehicle alarms, public address systems, power tools, construction noises, fireworks explosions, helicopter, and airplane noises.
- Record the numbers and types of vehicles. Include cars, motorcycles, buses, and trucks. The loan of a car counter from the City of Vancouver is currently being arranged.
- Monitor numbers of people and types of activities in heronry area: recreational sports, bird watching and photography, fitness activities, etc.

Foraging Habitat

- Survey the marine life and known heron prey species in the waters near the heronry (Seawall, Spanish Banks, Burrard Inlet, False Creek) throughout the year.
- Map the nature of the foreshore areas (BIEAP, GVRD, BCIT, UBC, CWS, SFU)
- Record flight patterns during nesting season; this may provide some knowledge of the foraging areas most frequently used.

Foraging Behaviour

- Observe and record foraging behaviour during nesting season and non-nesting season. Record where the herons go and distances covered, sightings of herons on the shorelines, in local bodies of water (Lost Lagoon and Beaver Lake), in fields, and in residential areas.
- Flight patterns. Canadian Wildlife Service masters students might be recruited, and UBC and SFU both have ecology and animal behavioural programs.

Monitoring of individual herons would likely require banding or other identification methods; permits would be required for any invasive procedure involving the birds.

Habitat

- Plan for potential future heronry sites. Review vegetated areas surrounding the colony, proximity to foraging areas, proximity to human activity areas, known predators etc.

Figure 14 Heron tending eggs

Photo courtesy of Andrew Waddy

7. Heronry Site Management

Rescue and Rehabilitation

The incidence of grounded birds has increased with the increase in the heronry population. In the 2004 and 2005 nesting seasons, fledglings were observed on the ground beneath the heronry within the fenced enclosure, sometimes for days at a time; the added security of the fenced enclosure may be a factor in the number of birds seen on the ground.

It is important to establish clear lines of communication and a protocol to be followed for reporting and handling of sick, injured, or healthy birds on the ground. Information must be provided to enable the public to make a decision about whether help is needed and if so, where to get it. The public also requires education about handling herons, specifically that they risk injury by approaching or trying to capture the birds.

Current situation

People concerned about grounded herons commonly make reports to the Park Board office staff, Park Rangers, Lost Lagoon Nature House staff, the SPCA, the city pound, the police, and the Wildlife Rescue Association. Clear direction must be provided for those finding injured birds, and the procedure for handling injured birds must be clarified and organized.

- The Park Board employs a part time wildlife technician, who is responsible for monitoring the status of wildlife in Stanley Park. The technician responds to calls about injured, sick, and dead wildlife, delivers live animals to a care facility, and removes dead animals to be disposed of or held for autopsy.
- The Park Board employs Park Rangers in season that monitor Park activities and respond to wildlife emergencies. There are more than 25 rangers on duty from April to September, every day from 7:00 a.m. to 11:00 p.m. The office phone is not staffed and messages are not checked regularly, but they have cell phones and have a policy of responding to all calls. The Rangers have access to vehicles and can deliver injured animals to an animal care facility if schedules and staffing permit. About 50% of the Rangers are trained to deal with wildlife.
- Lost Lagoon Nature House staff and volunteers do not handle wildlife. The only intervention they can make is to contact the Park Rangers or Park Board staff after verifying an animal is in distress.
- Peripheral agencies have varying involvement in wildlife issues:

- The SPCA's policy is to refer callers to local wildlife rehabilitation agencies, as they do not have the staff or facilities to handle wild animals.
- The police do not respond to animal calls unless people are in danger; they often will refer callers to the Park Rangers or Park Board staff.
- The Wildlife Rescue Association cares for any and all injured wildlife, but does not pick up animals; they request that any injured animal be placed in a cardboard box and transported to their facility in Burnaby.

The current system is incomplete in that it lacks 24-hour coverage for responding to emergencies involving the heronry. There is a need to establish an integrated network of people and agencies that have clearly-delineated roles and effective lines of communication.

All involved parties should agree on some basic principles:

- If an uninjured juvenile heron of fledging age is pacing on the ground in or near a heron colony, it should be left as is but checked on daily by Park staff and Rangers.
- In the event of the death of a heron in Greater Vancouver, the body is to be removed for disposal if cause of death is known, or for examination if it is unknown, e.g., to rule out infectious diseases.
- For injured or sick herons on the ground or buildings, there should be a policy of acting when necessary. If the heron is pre-fledge age or injured it should be immediately transferred to a rehabilitation facility when possible.

Agencies involved in rescue and care of injured or dead herons should primarily include:

- Parks Department wildlife technician
- Stanley Park Rangers
- Stanley Park Ecology Society
- Heronry monitoring volunteers

Peripheral agencies such as the Vancouver Aquarium, Wildlife Rescue Association, and the SPCA need to be integrated into a rescue and rehabilitation strategy to provide support to the primary agencies.

Any rescued birds delivered to a rehabilitation facility provide a good opportunity for future tracking through banding or other methods; the Stanley Park Ecology Society would benefit from obtaining a banding permit to take advantage of opportunities such as this.

8. Public Education & Interpretation Programming

The lives of herons are intimately connected with tangible things that are important to those living in the Lower Mainland – the ocean, beaches, fish, parks and forests – and they represent several intangible concepts as well – ecology, nature, urbanization, and pollution.

The heronry allows people to connect with these birds on a personal level, and it also presents an opportunity for them to learn about broader concepts such as environmental stewardship, the web of life, and management of species at risk.

At the Zoo location, public education signs were posted with graphics describing the birds and their habits, and scopes were placed at strategic locations. In 1989, an observation post was constructed for public viewing of the heronry. In 1992, an observation blind was constructed in a tree adjacent to the large Douglas fir that held the majority of nests.

At the current location, signs left over from the Zoo heronry were erected in 2004, but were stolen before they could be permanently installed. One sign was retained and installed near the sidewalk on Stanley Park Drive, close to the majority of the nesting trees.

In June 2005 the Park Board hosted a "Rain or Shine Fest." A table was set up with maps and brochures with heronry information, and three telescopes were set up under an awning to allow visitors of all sizes to observe the herons. The two principal heronry monitors provided factual and anecdotal information to the many visitors who came to the booth. Despite the largely inclement weather, the booth was a success, with most visitors stopping to look, talk, and ask questions.

SPES and the staff at the Nature House have conducted occasional Discovery Walks; these are advertised at the Nature House and the SPES website, also in local community newspapers.

Program Delivery

The interest in the signs, Discovery Walks, and the Rain or Shine Fest booth and telescopes demonstrate that it is necessary to establish and expand public education programs for the heronry. Such a program must be efficient, effective, and humane, and within reasonable cost.

The most urgent item needed for the heronry is improved signage, and it needs to be in place by March 2006 to serve the increased public.

There are several options for establishing education and interpretation programs for the heronry, with varying costs as suggested in the following examples

Option 1. High cost

A permanent or portable interpretive booth

A reliable, consistent presence of knowledgeable paid staff to provide interpretation and information

Use of current technology such as a ground level video camera

A permanent website with a webcam for viewing live action over the Internet

Multi-language printed brochures and other materials

Option 2. Medium cost

Provision of 3-4 hrs of interpretation every 2-3 days by staff at Stanley Park Ecology Society

A small, weatherproof display kiosk (30 x 40 inch) with panels for posting background information, updates, and maps

Rental and installation of a coin-operated telescope

Improved signage that is comprehensive and professional in appearance, with an updated heron life cycle flow chart.

Glossy quantity-printed brochures (generic) for present and future distribution

DVDs available for viewing at the Nature House or for distribution to school programs

A seasonal “heron cam” with access via a link from the SPES website

Option 3. Low cost

Recruit volunteer staff to provide information and interpretation as available

Portable scopes

Brochures created in-house by SPES and available at the heronry

Inclusion of heron information in current School Programs provided by SPES

Funding and Support for Program Activities

The Stanley Park Ecology Society has introduced two initiatives for fund-raising, and some of the proceeds will be directed toward heronry improvements. The Great Blue Ball, an annual fundraiser, is in the planning stages at this time. More details will be available following the strategic planning session of the Board of Directors.

SPES has already implemented their "Adopt a Nest" program; details can be found on the Stanley Park Ecology Society's website at: http://www.stanleyparkecology.ca/programs/urbanWildlife/herons/Adopt_Nest.php

Other possibilities for fundraising include:

- School and public nature tours of the heronry, with single or group fees charged.
- Generation of funds from tourists, with donation boxes located in strategic places such as the Park Board office, Lost Lagoon Nature House, and the Stanley Park Dining Pavilion.
- A donation link on the SPES website
- Photography opportunities
- Postcard or calendar sales at the Lost Lagoon Nature House

Appendices

Appendix 1. Glossary

Brood: to sit and keep warm, as with eggs.

Clutch: total number of eggs laid by a female bird in one nest attempt.

Colony: aggregate of plants, animals, etc. growing or living close together.

Forage: The act of looking or searching for food or provisions.

Fledgling: A young bird that has recently acquired its flight feathers.

Flush: To dart out or fly from cover.

Guano: A substance composed chiefly of the dung of sea birds or bats.

Hatchling: A newly hatched bird, amphibian, fish, or reptile.

Heronry: A place where herons nest and breed; also called a rookery or colony.

Juvenile: Not fully-grown or developed; young.

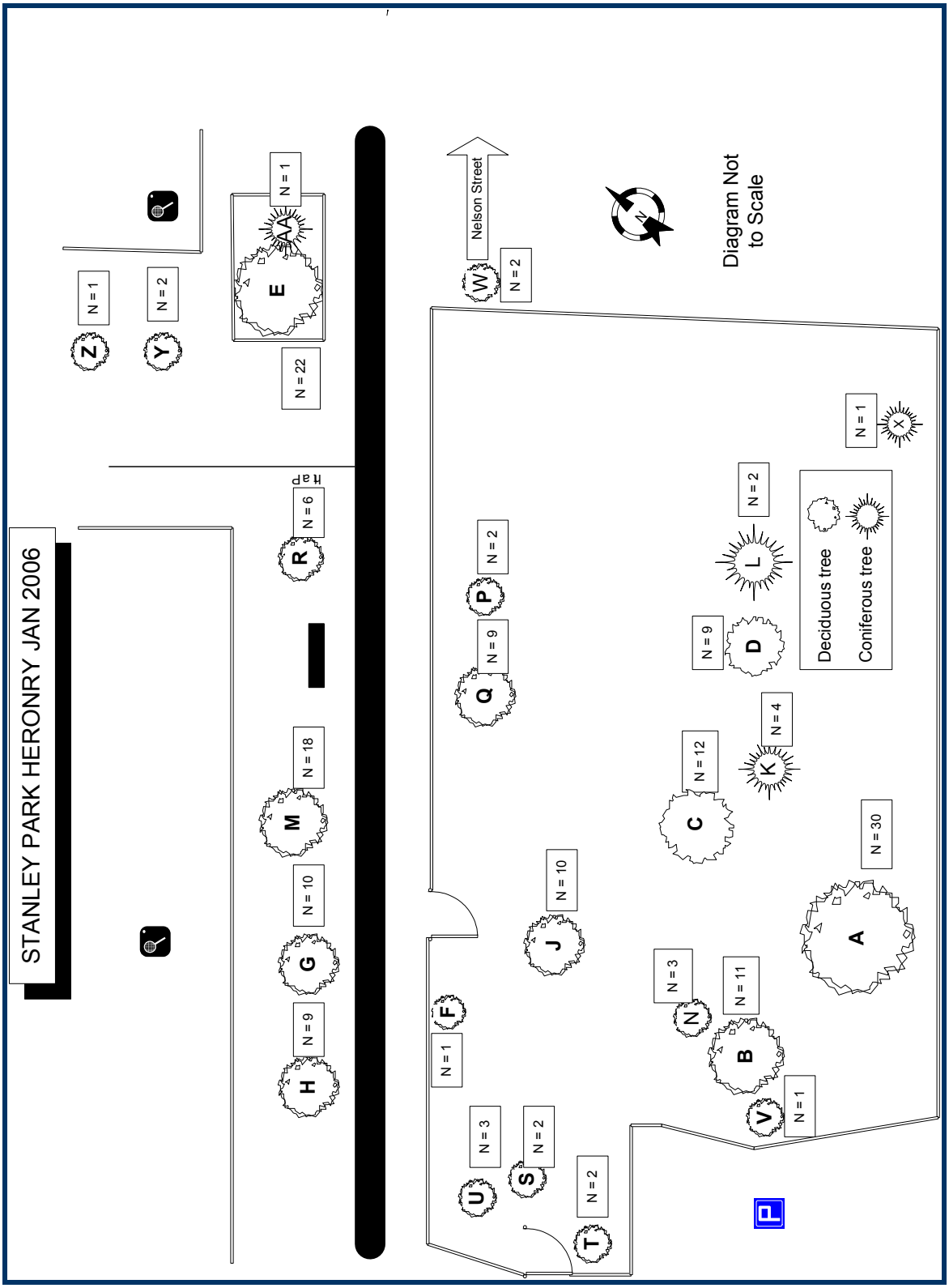
Loaf: To pass time at leisure; idle.

Nestling: a young bird that has not left the nest.

Productivity: Measure of amount of production over a given time; number of surviving offspring per unit, e.g., per breeding pair or nest.

Staging area: a place where birds (or other animals) gather prior to initiating an activity.

Appendix 2. Heronry diagram and activities



Month/Year	Activities/Events	Numbers
Mar 16/02	Monitoring started; pairs in nests	13 nests in 4 trees
Mar 30/02	Chick seen in Douglas fir nest	
Apr 13/02	Dead chick on ground near Doug fir	
May 28/02	Nelson Street and Douglas fir tree mostly abandoned	
Jan 5, Feb 8/03	Single birds in nests; no courting activities observed	
Mar 6/03	Pairs in nests	
Mar 23/03	No eggs observed, incubating activity*	
Mar 30/03		10 nests in 3 trees
Apr 27/03	Evidence of chicks - eggshells on ground	
Feb 22/04	Birds congregating, pairs in nests	
Mar 22/04	Incubating activity	
Mar 28-30/04	15 nests with eggs	39 nests in 9 trees
April 19/04	2 chicks reported	
Jan 27/05	First pair observed at heronry	
Feb 10/05	Birds congregating, pairs in nests	
Feb 15/05		42 herons in 25 nests
Mar 22/05	Incubating activity in >50 nests	103 nests; 17 trees
April 12/05	First chick reported	
April 19/05		28 chicks observed
Sep 4/05	Three nests with chicks still in them	
Jan 1/06	Single heron(s) near nest site	
Jan 14/06	Six herons in trees in fenced enclosure	
* No observations were made from above the heronry during 2002-03; ground monitor not able to observe eggs in nests.		

Appendix 3. Beach Avenue Heronry Historical Data

Area

In its five years, the heronry has contracted and then expanded again as the numbers of birds grew. During the 2005 nesting season, the majority of the nests were contained in an area approximately 70m by 60m, and except for nests in a tree at the end of Nelson Street, all nests at this time are located within a 50 m radius of the interpretive sign on Park Drive. This outlying tree is approximately 190 m northeast of the sign.

The fence enclosing the majority of the nest trees was erected prior to the 2004 nesting season; at that time there was only one nest tree outside the enclosure. The enclosure was enlarged twice in 2005 to accommodate new nest trees. In January 2006, a separate fence was constructed around the large London plane tree beside the tennis courts.

In November 2005, the fenced enclosure was enlarged to encompass seven nest trees that stood between the fence and the parking lot, and Park Lane. The area now enclosed by the fence contained 122 of the nests in existence (about 70%) at the end of the 2005 nesting season within an area of about 1000 m^2. These nests accounted for approximately half of the chicks that fledged in 2005.

Colony size

The size of the colony has grown rapidly since 2001, and most notably in 2004-05, when nest numbers have more than doubled from previous years. Table 1 shows the numbers of nests and trees each year, and the average number of nests per tree.

In 2005, the heronry was active earlier than in the past and by the end of the season the number of nests had increased 250%. The birds expanded further, once again reclaiming the Nelson Street tree, and extending northwest between the tennis courts.

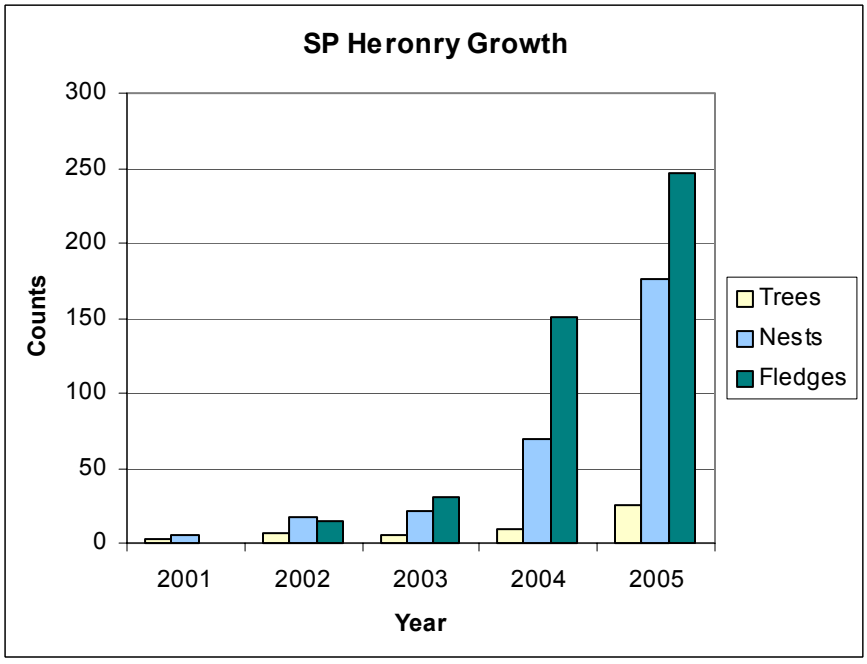
Density

Average nest density has fluctuated greatly depending on the number of nests and area occupied. During the first two years, nests were few and spread over a large area. The nests occupied a relatively small area during the following two years. By the end of 2004, the number of nests had more than tripled, with the herons concentrating in a relatively small area, resulting in the highest density so far. In 2005, nest numbers increased in most trees within the fenced enclosure, and new trees were colonized along the north side of Park drive and along the path between the tennis courts

The remainder of the trees between the tennis courts may experience increased habitation during the upcoming season. It is also possible the Douglas fir east of the tennis court will be recolonized, and other tall trees between the fenced enclosure and Nelson Street may also be colonized if the heronry continues to expand. Plans should be in place to meet this contingency.

Year	# Trees	# Nests	Avg # Nests/Tree	Fledges	Productivity (fledges/nest)	Estimated Area (m^2)	Density nests/m^2
2001	3	6	2	N/A	N/A	N/A	N/A
2002	7	18	2.5	15	0.83	7100	0.0025
2003	5	21	4	31	1.47	600	0.035
2004	10	70	7	151	2.18	2300	0.030
2005	25	176	7	247	1.40	10500	0.017
						3600*	*0.049

* area and density of heronry without outlying tree.



Appendix 4. Proposed Fencing Amendments

The fence was erected in February 2004, and extended in 2004 and again in November 2005. In January 2006 a separate fence was installed to enclose tree E, a large London plane with 21 nests. The fencing limits human incursions under the majority of the nest trees, and also serves to protect humans from risks associated with nesting behaviour – falling sticks, guano, and other debris. Herons may make more use of the areas enclosed by fencing if they perceive it as secure from human incursion.

Additional fencing may need to be constructed as needed to protect herons and humans, and should be done during non-nesting season only.

- Consider the possibility of providing fencing along the south side of the tennis courts, from the sidewalk to the tennis court fence, enclosing trees G, H, M, and R (see heronry diagram in Appendix 2 for reference). A fence constructed here might also provide a good site for information distribution. Most people view the heronry on both sides of Stanley Park Drive from this area. Permanent signage and printed updates (even plexiglassed, weather protected for updates on display) would be popular for pedestrians.
- The trees in between the two groups of tennis courts (Trees Y and Z) have one and two nests respectively and do not warrant fencing this year. The tree at the foot of Nelson St had three nests in 2005 of which two remain at this time; this tree likely will not require fencing in 2006. It is in a slightly inaccessible place, bounded on two sides by roadways and on the third by dense brush. A path approaching the tree ends approximately 10 m east of the tree; a barrier could be erected to prevent foot traffic at the base of the nest tree.

Appendix 5. IBA Criteria

The BirdLife International partnership is working to identify and document those sites that are vital to the long-term conservation of the world's birds. These sites are called Important Bird Areas (IBAs). In Canada, the IBA program was initiated in 1996, in conjunction with the launch of parallel programs in the United States and Mexico. The Canadian partner in BirdLife International is Bird Studies Canada (BSC) and the Canadian Nature Federation (CNF).

The goal of the IBA program is to identify and conserve a worldwide network of sites necessary to ensure the long-term viability of naturally occurring bird populations. Conservation work in selected sites is undertaken by CNF <www.cnf.ca> in conjunction with their provincial affiliates. Sites were identified by Bird Studies Canada with the aid of a Technical Steering Committee, using a set of criteria that are consistent with other IBA programs throughout the world, while at the same time being applicable to the Canadian context. This document details the criteria that were used between 1997 and 2001 by BSC to identify IBAs in Canada.

The IBAs identified as of April 2001 are the end product of four years' work. Over those four years 1,246 potential sites were considered for IBA status. Of these, 597 have been accepted as IBAs by the Technical Steering Committee. As with other IBA programs around the world, the criteria are organized into four categories: 1) Threatened Species, 2) Restricted Range Species, 3) Biome-restricted/representative Species and 4) Congregatory Species. Each IBA is also identified as being globally, continentally, or nationally significant. If an IBA site falls under one or more of the four categories, the highest level of significance determines the overall significance. For instance if a site was identified at the global level for a congregatory species and at the national level for a threatened species the site would be identified as globally significant.

The general objective of this category is to identify sites that regularly hold significant numbers of a species that has been identified as threatened or at risk of extinction. The criteria for global and national levels of significance are as follows:

Global - A1

The site regularly holds significant numbers of a globally threatened bird species.

National - C1

The site regularly holds significant numbers of a bird species, subspecies or biogeographical species which is considered threatened in Canada.

In general, a "significant number" was considered to be 1% or more of the relevant population, although in a few cases less than this was accepted. Regular occurrence at a site was generally defined as the yearly presence of a species, if known. If information on the species abundance was known for several years the data from the most recent five years was used in many but not all cases.

Species were considered globally threatened if they were listed as Critical, Endangered and Vulnerable in Threatened Birds of the World (BirdLife International 2000). Prior to the publication of this document, its predecessor, Birds To Watch 2 was used (Collar *et al.* 1994). Although these documents also identify some species as Near-threatened, this level was not used by the Canadian IBA program. Species were considered nationally threatened if they were designated as Endangered, Threatened or Vulnerable by the Committee on the Status of

Endangered Wildlife in Canada (COSEWIC), the body that ranks and assigns status to at risk species in Canada (www.cosewic.gc.ca). Scientists from Environment Canada and non-governmental organizations together form COSEWIC. At the end of the year 2000 the name of the lowest at-risk status, Vulnerable was changed to Special Concern.

Unlike at the global and national levels there is no organizational body that identifies threatened species at the North American level, thus a continental level was not used in this category. Together, national and global rankings probably include all the bird species that should be covered.

Species identified as globally or nationally at-risk are highlighted in purple and blue in the <IBA Threshold Table>, where population estimates were available. The number that is 1% of a species population is called the threshold, since if a species was present at the threshold level or greater then the site can be identified as an IBA. Throughout the IBA site summaries, the terms "globally endangered", "nationally vulnerable" etc. refer to the status levels assigned by the above bodies.

There are 168 IBAs identified under the threatened species category.

Category 2: Restricted-range Species

Species that have a very limited distribution are vulnerable to habitat loss or natural disturbances. Some endemic species are abundant within their range and are not considered threatened; nonetheless it is important to include the best or representative sites for these species within the IBA network. Subspecies or disjunct populations restricted to small areas are also of concern. The criteria for global, continental and national levels of significance under this category are as follows:

Global - A2

The site regularly holds significant numbers of a bird species whose global breeding range is less than 50,000 km^2.

National - C2

The site contains species with small total breeding ranges (ie greater than 100,000 km^2 but less than 250,000km ^{2}) and important populations within North America (ie more than 50% of the North American distribution). At the national level, distinctive subspecies with breeding ranges of less than 50,000 km^2 are also included.

Most bird species occurring in Canada have large breeding ranges and thus this criterion had limited application in this country - this category is more relevant to parts of the tropics and island countries. However, species that do meet these criteria are Whooping Crane at the global level, and Iceland Gull, Ivory Gull, Ross? Goose, Common Ringed Plover and 14 subspecies at the national level. The 14 subspecies are: Northern Goshawk subspecies *laingi*, Peregrine Falcon ssp. *pealei*, Blue Grouse ssp. *sitkensis*, Northern Saw-whet Owl ssp. *brooksi*, Hairy Woodpecker ssp. *picoides*, and Steller's Jay ssp. *carlottae* all found on the Queen Charlotte Islands, BC, Rock Ptarmigan ssp. *welchi*, Ovenbird ssp. *furvoir*, Red Crossbill ssp. *pusilla* all found in Newfoundland, Rock Ptarmigan ssp *captus* (northern Ellesmere Island), White-tailed Ptarmigan ssp. *saxitalis* (Vancouver Island), Ipswich Savannah Sparrow ssp. *princeps* (Sable Island, Nova Scotia), and Common Redpoll ssp. *rostrata* (Baffin Island).

No species met the criteria at the continental level (those with breeding ranges greater than 50,000 km^2 but less than 100,000 km^2, and with > 50% of population within North America). Coastal breeding species which have linear breeding distributions were excluded from the analysis because they are mostly covered under the congregatory species category.

For those species listed above that were not already considered congregatory species, the 1% threshold was not used because these species or subspecies were mostly without population estimates. Instead, a target of at least one site in Canada for each restricted-range population was used. Where a choice of sites was possible the best available, often in already protected areas, was chosen.

Appendix 6. Soil Testing Results

Stanley Park Heronry Soil Testing Results							
	Dec 13 2004			Oct 5 2005	Nov 23 2005		
Parameter	**Site 1**	**Site 2**	**Site 3**	**Site 1**	**Site 1**	**Site 2**	**Site 3 (control)**
pH	**4.6**	**4.5**	**4.8**	**4.5**	**3.9**	**3.8**	**4.4**
Carbon to Nitrogen ratio (C/N)	**16.3**	**19.6**	**19.2**	**17.3**	**19.4**	**21.8**	**19.0**
Salts (mmhos/cm)	**0.70**	**0.48**	**0.90**	**3.2** minor excess	**0.5**	**1.0**	**0.5**
Organic matter (%)	**16.2**	**12.1**	**14.1**	**10.1**	**8.4**	**11.6**	**9.2**
Total Nitrogen (%)	**0.58**	**0.36**	**0.43**	**0.34**	**0.25** moderate	**0.3** moderate	**0.28** moderate
Phosphorus (ppm)	**364** high	**318** high	**471** high	**723** very high	**73** moderate	**181** slightly high	**86** moderate
Potassium (ppm)	**270**	**175**	**690** high	**380** slightly high	**55 low**	**120** moderate	**95** low
Calcium (ppm)	**1075**	**875** moderate	**1150**	**1100**	**400** very low	**210** very low	**320** very low
Magnesium (ppm)	**90** low	**55** low	**210**	**125**	**175**	**250**	**220**
Copper (ppm)	**30** high	**9** moderate	**8** moderate	**1.9** low	**10**	**4.4** moderate	**10**
Zinc (ppm)	**20**	**11** moderate	**14** moderate	**5.8** low	**8** moderate	**7** low	**18**
Iron (ppm)	**50** low	**85**	**85** moderate	**134**	**85** moderate	**65** moderate	**48** low
Manganese (ppm)	**65** slightly high	**35**	**38**	**74** slightly high	**38** moderate	**23** low	**69**
Boron (ppm)	**0.2** low	**0.3** low	**0.2** low	**0.2** low	**0.3** low	**0.3** low	**0.2** low

Appendix 7. Monitoring Data Sheet

2006 Great Blue Heron Data Sheet - Colony Reproductive Record							
Colony Name: Stanley Park			Nest Status Codes	Bird Activity Codes			Age Codes
Colony Code:			YNG - young in nest	INC - incubation			**1 -** 1 to 2 wks old
Comments			NV - not visible	EX - adult exchange			**2 -** 2 to 4 wks old
			FN - failed nest	STK - stick exchange			**3 -** 4 to 6 wks old
Date		2006	STD - adult standing	COP - copulatory behaviour			**4 -** 6 to 8 wks old
Weather							
Tree Location	Tree code	# nests	# nests occupied	# Adults	# Young	Age of Young	Nest Activities/Comments
	A						
	B						
	C						
	D						
	E						
	F						
	G						
	H						
	J						

Appendix 8. Monitoring Protocol

Recommended protocol for monitoring the heronry in 2006:

- Monitor the heronry on a regular basis, preferably once per week for each monitor with daily coverage from mid-March through the end of July. It is estimated that 6 monitors will be required for complete coverage.
- Ensure monitor coverage during predicted times of special or unusual activities, e.g., eagle attacks are reported to occur early in the morning and again in the early evening (reported to be around 5:00 a.m. and 5:00 p.m.) and during fireworks events.
- Record observations using standardized forms and language. Include any notable or unusual occurrences.
- Take photographs of the trees and nests during each visit. Photos of the heronry should be taken from the same location on each monitoring trip.
- Report any unusual occurrences requiring intervention to the proper agency or authority.
- Monitor website camera for any unusual activity at special times.

Equipment:

- Identification tags; these will be generic to protect monitors from unwanted attention
- Binoculars and telescopes
- Data sheet for recording observations
- Waterproof paper for inclement day
- Laminated diagram of the heron trees
- Durable markers
- Bird identification book, e.g., National Geographic
- Clipboards
- Storage for materials – at Park Board office or Ranger A-frame

Appendix 9. Wildlife Monitoring Station

The proposed Wildlife Monitoring Station (WMS) will be a lightweight, portable tent that will serve two main purposes.

- The WMS will gather species at risk (herons) nesting information as well as other designated species (Bald Eagles)
- The WMS will promote interest and knowledge of the species and the Ecology Society among the public visiting the park

WMS Location

The WMS will be in use for the heron and eagle nesting seasons (Feb-Sept). The nesting sites generated a lot of public interest in 2004 among park visitors. People were commonly seen looking up under both areas. The WMS would be placed only in high pedestrian traffic spaces (Dining Pavilion Eagles nest only) and have sufficient space surrounding it to accommodate a group. The nest will rotate between the two places on set days. (i.e. Sun to Wed – herons / Thurs to Sat – Eagles).

WMS Attendants and Operation

The WMS will be volunteer-based. Its operation will be weather-dependent and limited by the number of volunteers available. There will also be a specific WMS research coordinator, who will receive an honorarium (see budget) to oversee/ liaise with SPES volunteer coordinator and WMS volunteers. It is envisioned that WMS attendants would operate in four-hour blocks between the hours of 11am and 7pm, from between 20 and 56 hours (40 to 112 volunteer hours) per week. There would not be fewer than 2 people present at the WMS at anytime. WMS attendants will collect nest data and observations as well as engage interested passersby, informing them about the birds, the society, and membership and volunteer opportunities.

The Physical WMS

The WMS will be a 9-16 square metre open tent structure, with “tent walls” with donor recognition, SPES Logo, website etc on one or two sides. The WMS will be equipped with a scope and binoculars to encourage members of the public to take a closer look at the birds as well as display material (egg shells, bones, skulls, display board and printed material). The display board will be durable and light. It may be nothing more than a SPES created laminated poster(s) on a portable, collapsible stand(s), or affix to the inside of one of the tent walls. The stand and all of the materials should be easy to transport and require no more than 2 volunteers to move in a single trip. The table and chairs will be lightweight and collapsible as well. When the station is monitoring the herons it could be stored at the park board office (closes at 4:30). When the station is monitoring the Eagles nest it could be stored at the Pavilion.

Appendix 10. Wildlife Monitoring Station Draft Budget

Tent (Source: www.canadiantire.ca)	$300.
Woods 10 x 10-ft. Gazebo	
Digital Camera with Zoom Lens (Source: future shop flyer)	$1200.
Fuji FinePix S7000, 6.1 Megapixel 6X optical zoom	
Scope (Source: www.telescopes.ca) $300-$1200.	$660.
Bushnell Digital Imaging 20x60mm Spotting Scope (193N262)	
Bushnell Digital Imaging 20x60mm Spotting Scope with LCD Screen, Battery Pack and Power Adapters (193N263)	$1104.
Bushnell 20-60x60mm Multi-Position SpaceMaster Spotting Scope with Free Full length Tripod (193N268)	$269.
4 Binoculars (Source: www.telescopes.ca)	$1000.
Pentax 16 X 50 XCF**,** Bushnell Trophy 10x42, Bausch Lomb Legacy 8-24x50	
2 collapsible chairs	$100.
Small collapsible table	$50.
Heronry / eagle specific posters to provide information about the species and the monitoring	$200.
Honorariums	$1000.
Lead heronry observer to receive a $50 per week honorarium, help manage the weekly pool of 14 – 20 volunteers and manage data collection	
Volunteer appreciation events	$250.
Start / End celebrations	
Heron / Eagle updates printing	$500.
Twice monthly Heron and Eagle updates, designed and printed in house	
Wildlife Map	$2000.
Brochure development and design	
Printing costs of 10,000 full colour brochures outlining common wildlife species in Stanley Park, where they can most likely be encountered, and some useful natural history information	$3500.
Volunteer Expenses	$1500.
Training manual development and printing	
Volunteer supplies – 25 sets of t-shirts and hats	
Stationary and Miscellaneous expenses	
Total Budget	**$12800**

Appendix 11. Heronry Activity Timeline

Stanley Park Heronry Management Plan

February 2006

Recommended timeframes for activities within defined areas around heron colony

Activity (Applicable Buffer Distance)	January	February	March	April	May	June	July	August	September	October	November	December
Road Construction and Paving (100 m)	■	■	■	■						■	■	■
Tennis Court Pressure Washing/Resurfacing	■	■	■	■						■	■	■
Heavy Equipment Use (60 m)	■	■	■	■						■	■	■
Tree Maintenance/Pruning (100 m)	■	■	■	■					■	■	■	■
Filming (60 m)	■	■	■	■					■	■	■	■
Site Treatment / Debris Removal	■	■	■	■					■	■	■	■
PB Office Rooftop Maintenance	■	■	■	■					■	■	■	■
Landscaping Construction Projects (60 m)	■	■	■	■					■	■	■	■
Field Sports	■	■	■	■					■	■	■	■
Large Group Organized Runs (60 m)	■	■	■	■					■	■	■	■
Site treatment / Mulching	■	■	■	■					■	■	■	■
Fenced Area Pedestrian Access	■	■	■	■					■	■	■	■
Low Volume Building Maintenance (60 m)	■	■	■	■		■	■	■	■	■	■	■
Tennis Courts Regular/Tournament Play	■	■	■	■	■	■	■	■	■	■	■	■
Site Treatment / pH Balance	■	■	■	■	■	■	■	■	■	■	■	■
Tree Inspections	■	■	■	■	■	■	■	■	■	■	■	■
Tree Emergency Maintenance/Hazard Tree Care	■	■	■	■	■	■	■	■	■	■	■	■
Road/ Parking Lot Access	■	■	■	■	■	■	■	■	■	■	■	■

Appendix 12. Bald Eagle Nest Locations in Vancouver

During the 2005 nesting season, the Stanley Park Ecology Society monitored twelve Bald Eagle nests within Vancouver city boundaries. Two more nest locations have been identified since then.

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