Surf Scoter (*Melanitta perspicillata)* Survey
Stanley Park
1999-2000

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Summary

The Stanley Park Surf Scoter Survey was made possible through a co-operative arrangement between the Canadian Wildlife Service (CWS) and the British Columbia Institute of Technology (BCIT). The purpose of the study was to document the distribution and abundance of Surf Scoters *(Melanitta perspicillata)* observed along the Stanley Park foreshore in Vancouver, British Columbia from October 1999 to April 2000. An oil spill occurring on November 24, 1999 gave the survey another objective in the form of monitoring the effects of the spill on the distribution and abundance of Surf Scoter that utilise the foreshore of Stanley Park as wintering habitat.

The Stanley Park foreshore sees large concentrations of wintering Surf Scoters from late October to April/May. The rocky shoreline, extensive mussels beds and combination of winds and tide make the foreshore an important habitat for Surf Scoters.

Data were gathered and analysed from November 3, 1999 to April 15, 2000 to document the following:

- Trends in the abundance and distribution of Surf Scoter throughout the wintering season
- Observer variability in data collection
- Tidal influence on Surf Scoter abundance and distribution
- Sex ratios of Surf Scoter observed along the Stanley Park foreshore

The results of the data analysis show the following:

- **Distribution:** The Stanley Park foreshore was not utilised uniformly by Surf Scoters throughout the survey period. Certain areas of the foreshore were favoured more than others. The distribution of Surf Scoter varied throughout the survey period. Zones that were heavily used in fall saw little Surf Scoter utilisation towards the end of the survey in the spring. This is thought to have been due to the depletion of food sources.

- **Abundance:** The number of Surf Scoter utilising the Stanley Park foreshore varied greatly throughout the 1999-2000 wintering season, arriving in late October and remaining until the end of April. The greatest number of Surf Scoter were observed in early November and then again in the beginning of March. This is thought to be due to the utilisation of the Stanley Park foreshore as a resting spot for Surf Scoters as they migrate south in fall, or back to the northern breeding grounds in the spring. Fluctuations in the wintering population were thought to have been due to movements of birds in and out of the survey area.

  Two canola oil spills occurred in Burrard Inlet during the survey period. The first occurred on November 24, 1999 and the second occurred on February 11, 2000. Numbers recorded during the first survey after the first spill showed significantly lower numbers than recorded

in previous surveys. Numbers started to stabilise and in January were comparable to numbers observed by Rotinsky in the Stanley Park Survey, 1998-1999. The second oil spill was not as extensive and did not appear to have had a significant impact on numbers of Surf Scoter around the foreshore.

- **Observer Variance:** On the day chosen for testing, the observers encountered only one large flock of Surf Scoter. The counts made by each observer varied significantly and may have been caused by some of the flock dispersing before the second observer arrived. Because of this, discussion of observer bias is limited.

- **Tidal Influence:** A greater number of Surf Scoter were observed during the period +/- 1.5 hours from high tide than during the period when the tide was decreasing toward low tide. Distribution of Surf Scoter did not show significant differences with changing tide.

- **Sex Ratios:** The male to female ratio averaged over the survey was 1.5:1. The average proportion of males, females and juveniles in flocks was calculated to be 52%, 39% and 9%, respectively.

It is recommended that another year of study under the supervision of the CWS and BCIT be completed. Another season using similar methodology would be useful for comparative purposes.

Acknowledgments

The Stanley Park Surf Scoter Survey, 1999-2000, was supported by the Canadian Wildlife Service (CWS) and the British Columbia Institute of Technology (BCIT). Without their assistance, this study would not have been possible.

I would also like to acknowledge and thank Sean Boyd, CWS, and Daniel Catt, BCIT, for their guidance and support throughout the project. Brenda Rotinsky should also be recognized for her work done on the Barrow's Goldeneye Survey, 1998-1999, which lay much of the framework for this survey. Thank you also to Sam Iverson, Simon Fraser University (SFU), for providing me with additional background on Surf Scoters and for setting up the observational format used throughout the survey.

And finally, thank you to my brother Stephen, for his help with all things computerized.

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1.0 Introduction

1.1 Background

The Stanley Park Surf Scoter *(Melanitta perspicillata*) Survey, (1999-2000), was a result of a co-operative relationship between the Canadian Wildlife Service (CWS) and the British Columbia Institute of Technology (BCIT).

Current knowledge on the distribution and ecology of the Surf Scoter (abbreviated as SUSC) is limited. Few nests have been found, patterns of migration are difficult to discern and estimates on the proportion of young birds successfully recruiting into the adult population are lacking (Iverson, 1999). With so little information about these seaducks, it is difficult to adequately manage for their protection and preservation. Management of seaducks is critical at a time when many are facing mounting threats in the form of oil spills, increase in aquaculture, pollution, habitat destruction and fisheries (Savard, 1988).

The main focus of the Stanley Park Surf Scoter Survey, 1999-2000, was to record the distribution and abundance of Surf Scoter along the Stanley Park foreshore. More specifically, distribution observations focused on determining whether the flocks were randomly spread around the park or if they tended to congregate in certain sections on a regular basis and if they used certain areas consistently. Further observations were made to determine the effects of tidal stages on flock distribution and the variance in distribution and abundance according to season from early winter through to spring. The results of this year's findings were analysed and compared with distribution and abundance data collected by BCIT student, Brenda Rotinsky, in the 1998-1999 Barrow's Goldeneye Survey (Rotinsky, 1999).

Distribution and abundance data will also be used as baseline to monitor the effects of two canola oil spills which occurred on November 24, 1999 and February 11, 2000.

In terms of sex ratios, data were collected in order to establish an estimate of the overall ratio of adult males to females and subadults (juveniles) in flocks as they occurred around the seawall. Comparison was also made to see if sex ratios of Surf Scoter along the foreshore varied with time of year.

It is hoped that these efforts will provide good baseline data and contribute to the ongoing studies of Surf Scoter and their wintering habitat along the west coast of North America.

1.2 Surf Scoter Ecology

1.2.1 Range

Figure 1 shows the range of the Surf Scoter in North America. The breeding range of the Surf Scoter is confined almost entirely to the closed and open boreal forests of Canada and Alaska (Belrose, 1976). In the east, they are found in the open boreal forest of Labrador and eastern Quebec. From their interior breeding grounds, Surf Scoter head for either coast to winter; three to one favour the Pacific over the Atlantic (Belrose, 1976). They winter along the coast from Alaska and can be found as far south as Baja, California. Surf Scoter moult along the coast in August, and usually arrive at their coastal wintering range in late October where they will stay until late March before returning to their breeding grounds in the north (Johnsgard, 1975).

Figure 1: Range of Surf Scoter in North America (Johnsgard, 1975)

1.2.2 Wintering Habitat

Food sources are a key factor in winter habitat selection. Surf Scoter can be found feeding on organisms occurring mainly over rocky substrates and by rocky shorelines. Rocky shorelines are characterised by the number of organisms growing along the rocks which can be readily fed upon, such as molluscs, especially blue mussels *(Mytilus edulis)*. Rocky shorelines are variable in type, ranging from steep cliffs to gently sloping platforms (Savard, 1988). Figure 2 shows the rocky substrate around the foreshore of Stanley Park during low tide which makes it favourable wintering habitat for Surf Scoter and other species of sea bird, namely Barrow's Goldeneye (*Bucephala islandica*) and Common Goldeneye *(Bucephala clangula)*.

Figure 2: Rocky substrate exposed at low tide in zone 51 along the Stanley Park foreshore during the Stanley Park Surf Scoter Survey, 1999-2000 (Photo: Christine Williams, 2000)

1.2.3 Food and Foraging

Surf Scoter feed primarily on molluscs, especially blue mussels and to a lesser extent on crustaceans, insects and freshwater or terrestrial plants (Johnsgard, 1975). Surf Scoter appear to be most active in the morning and evening hours coming close to shore as possible and diving for food in the shallows where animal life is most abundant (Savard, 1988). Figure 3 shows a typical conglomerate of blue mussels and barnacles on a rock exposed by low tide along the Stanley Park foreshore. A number of other sea bird species also compete for similar food sources. Barrow's Goldeneye were most often seen diving in groups with Surf Scoters. To a lesser extent, greater and lesser Scaup (*Aythya sp.*), Bufflehead *(Bucephala albeola)* and occasionally Harlequin *(Histrionicus histrionicus)* ducks were seen with Surf Scoter flocks.

Figure 3: Cluster of mussels on a rock along the Stanley Park foreshore (Photo: Christine Williams, 2000).

2.0 Study Area

2.1 Study Area Location

The site for the 1999-2000 Surf Scoter Survey was Stanley Park, located in the Lower Mainland of British Columbia 5 minutes from Vancouver's downtown core. Figure 4 shows an aerial view of Stanley Park and its location to downtown and the north shore.

Figure 4: Aerial view of Stanley Park, Vancouver, BC. Location of the Stanley Park Surf Scoter Survey, 1999-2000 (Photo: S. Schulhof).

Figure 5 shows the location of Stanley Park within the context of the greater Vancouver area. To get to Stanley Park from downtown Vancouver, head west along Georgia Street and turn into the park just opposite Lost Lagoon.

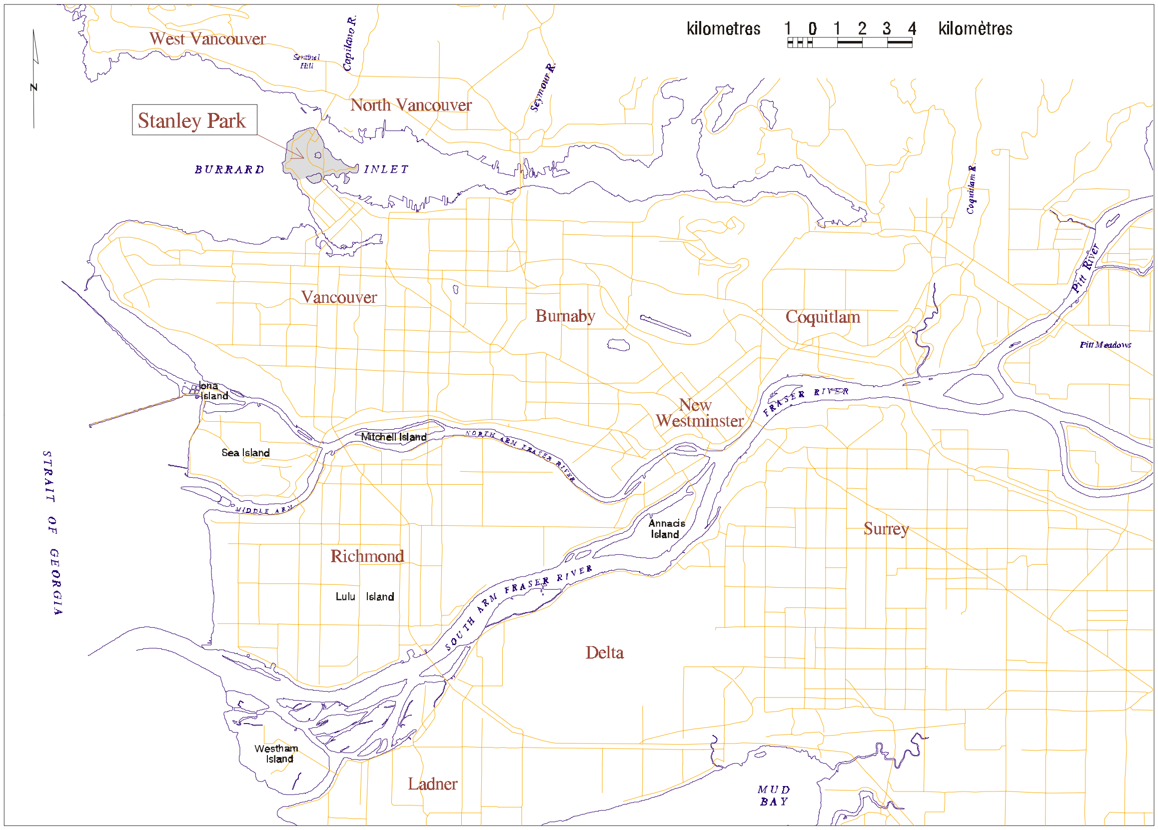

Figure 5: Map of Stanley Park shown within the context of the greater Vancouver area. (Stephen Williams, Geological Survey of Canada, 1999)

2.2 Study Area Description

2.2.1 Stanley Park – Terrestrial Environment

Stanley Park was established in 1888 as Vancouver's first natural reserve and is touted as the third largest of its kind in North America. The park's 405-hectare area comprises the peninsula that juts out into Burrard Inlet. The western half is almost completely forested with a mixture of Douglas-fir *(Pseudosuga menziesii*), western hemlock *(Tsuga heteropylla)* and western red cedar (*Thuja plicata*). Stanley Park is almost entirely surrounded by ocean and features a 10-km seawall that is the location of the study area. The park averages 8 million visitors per year (Cunning Crow Designs, 1999). Figure 6 is a photograph taken on the north side of the seawall.

Figure 6: North side of seawall looking west showing zones 56 to 54 with flock of Surf Scoter and Barrow's Goldeneye (Photo: Christine Williams).

2.2.2 Stanley Park – Marine Environment

Burrard Inlet runs along the northern edge of Vancouver from Stanley Park to Boundary Road (Figure 5). From Main Street eastward, activities of the industrial port are carried out, ranging from cargo transportation and shipping to industrial processing and cruise ship operations. In 1996, the port handled 72 million tonnes of cargo and 700,000 cruise ship passengers. Included in this port are terminals where canola oil is transferred onto tankers. Both oil spills occurred at these terminals. This same waterfront is home to the city's largest population of water birds, 7500 during peak times in the fall and winter (Tourism Vancouver, 1999). The combination of a high traffic port and key wintering bird habitat lends to the importance of monitoring the abundance and distribution of sea birds around the foreshore of Stanley Park in case a major environmental disturbance occurs. Figure 7 is a photograph of some of the industrial area on the north shore facing the Stanley Park seawall.

Figure 7: Industrial activity on the north shore, Vancouver, BC opposite Stanley Park (Photo: Christine Williams, 2000).

2.3 Survey Zones

The survey area is comprised of the foreshore of Stanley Park from Coal Harbour to the end of Second Beach (Figure 8). Zone delineations are adapted from those used by the Burrard Inlet Environmental Action Program (BIEAP) during the BIEAP Bird Survey Project (Watts and Breault, 1996).

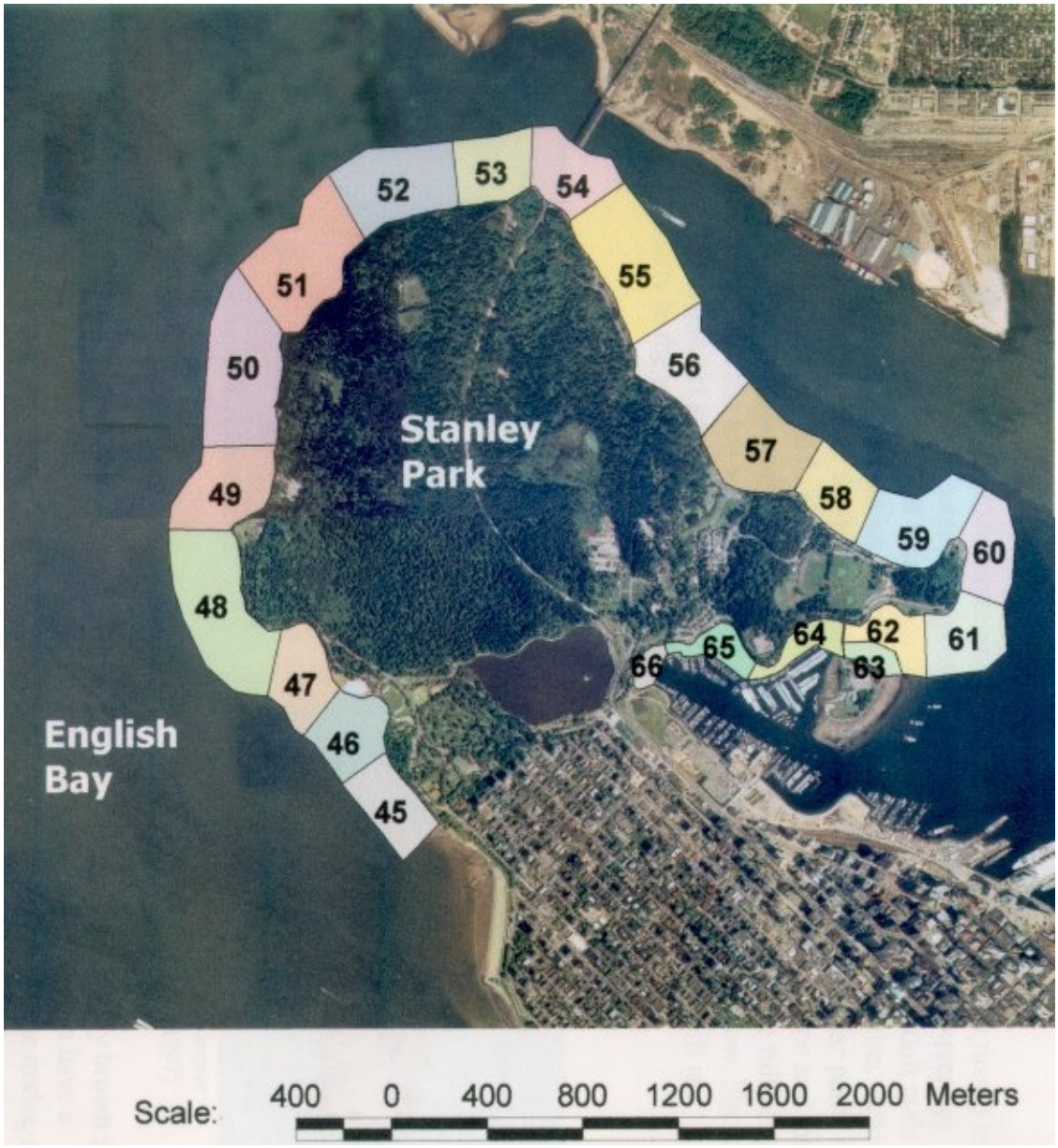

Figure 8: Stanley Park Surf Scoter Survey, 1999-2000, study area along the Stanley Park foreshore, Vancouver, BC, showing study zone delineations (Watts and Breault, 1996).

3.0 Materials and Methods

3.1 Materials

- Spotting Scope 45 x (BCIT)
- Tripod (BCIT)
- Tally wackers (2)
- Binoculars (8x)
- National Geographic Guide to the Birds of North America (2nd edition, 1997)
- Field Notebook

3.2 Sex and Age Determination

Scoters were identified as Black (*Melanitta nigra*), White-Winged (*Melanitta fusca*) or Surf Scoter when possible. Sex and age (adult and juvenile) determinations were also recorded when possible. Figure 9 shows a typical adult male scoter. Adult males are velvety black overall with scarlet to orange legs and feet. Males also have a conspicuous white forehead patch as well as a long white triangular patch on the nape. Both the nape and forehead patch may vary greatly in size and shape and may be an indication of age, although this is not known for certain. The adult male bill has a swollen appearance at the top and sides with a pattern of reddish orange, yellow, black and white with a distinct squarish black patch near the base. The top of the bill is feathered nearly to the nostrils (Todd, 1979).

Figure 9: Adult male Surf Scoter
(Photo: National Audubon, 1997)

Figure 10: Adult female Surf Scoter
(Photo: National Audubon, 1997)

Figure 10 shows the female Surf Scoter. Coloration of the female is essentially brown in color with the crown somewhat darker than the rest of the plumage. They also have a faint white nape patch and two indistinct whitish facial patches which, like the males, are subject to variation amongst individuals.

Figure 11: Male Surf Scoter, first year (Photo: F. Todd, 1979)

Differentiating subadult male Surf Scoter from adult female Surf Scoter was difficult in the early stages of the survey. Ageing Surf Scoter is difficult due to the lack of knowledge regarding the different plumage sequences and because the coloration of Surf Scoter appears to be subject to much individual variation (Todd, 1979). In mid-December and on through January it became progressively easier to identify subadult males by their change in plumage and the onset of orange coloring in the bill. The presence of two types of subadults was gradually recognised. Todd (1979) similarly identified these two age classes and presented in Figures 11 and 12. Figure 11 shows a first year bird, with only slight bill coloration and blotchy black plumage. Figure 12 shows a male Surf Scoter presumably approaching a second winter with the bill coloration and adult plumage pretty much established but lacking the white forehead patch.

Figure 12: Male Surf Scoter approaching second winter (Photo: F. Todd, 1979)

It was not possible in this survey to differentiate adult female Surf Scoter from juvenile female Surf Scoter, and were grouped together under the collective term “brown” ducks. It is thought that the ratio of juvenile males and females is the same, so juvenile females were attributed the same number counted for juvenile males. This estimated number of

juvenile females was not subtracted from the brown duck counts, contributing to an overestimation of adult female Surf Scoter.

3.3 Orthophoto Map

Zone boundary locations were recorded using a Trimble GeoExplorer II GPS unit and transferred to an orthophoto of Stanley Park using ArcView 3.0a.

3.4 Survey Methods

3.4.1 Distribution and Abundance

From November 3, 1999 to April 16, 2000, surveys were conducted weekly on the foreshore of Stanley Park to obtain abundance and distribution data on Surf Scoters. Christine Williams conducted 24 of the surveys. Christine Williams and Sam Iverson (SFU graduate student) conducted five surveys together. On each survey day, observations were made by walking the 10-km stretch of the sea wall from Zone 45 to Zone 66 and took, on average, 3 ½ to 4 hours to complete. On each survey day, survey start and end time, weather, wind and tide were recorded. For each individual Surf Scoter sighted in the water, the following data were recorded: Study zone, time, species, sex, geometry group type and predominate activity. Data recorded for flocks were flock total, distance shore, the number of males, females and juveniles, geometry group type and primary activity.

3.4.2 Observer Variance

To determine any bias on the part of the principle technician throughout the survey, one survey day was conducted whereby Sam Iverson started the survey 15 minutes ahead of Christine Williams, making total counts of Surf Scoter observed along the Stanley Park seawall. Counts of males, females and juveniles (where possible) were also made. These were recorded for the zone in which the observations were made. The counts made by each were compared to determine if bias existed between the two observers.

3.4.3 Tidal Influence

To determine the effects of tide on Surf Scoter activity, four survey days were selected in which observations were made +/- 1.5 hours from high tide by Sam Iverson while Christine Williams made a survey as the tide was decreasing, a maximum of 1.5 –3.5 hours from low tide.

3.4.4 Sex Ratios

Observations were made to determine overall sex ratios for Surf Scoter wintering around the Stanley Park foreshore. In flocks where it was difficult to make an exact count of

males, females and juveniles, random samples were taken from the flock to estimate the average male, female, juvenile ratio of the flock.

3.5 Data Analysis

Analysis was conducted on data collected from November 3, 1999 to April 16, 2000. Data were analysed using Microsoft Excel computer programs.

3.5.1 Distribution and Abundance

Analysis of abundance and distribution involved totalling counts of Surf Scoter observed on each survey day along the Stanley Park seawall. A total count of all the Surf Scoters seen throughout the study period from November 3, 1999 to April 16, 2000 was also calculated.

Analysis for distribution involved averaging the number of Surf Scoter seen in each zone throughout the study period. Analysis will also be made to determine if the zones were utilised to the same extent throughout the wintering season.

Comparison was made in abundance of Surf Scoter during the 1999-2000 survey with averaged numbers recorded by Brenda Rotinksy in the 1998-1999 Barrow's Goldeneye Survey.

3.5.2 Observer Variance

Observer variance data were analysed by comparing the flock estimates, counts of males females/juveniles observed by zone obtained by the two different technicians.

3.5.3 Tidal Influence

Data taken during rising and decreasing tide survey periods were compared to quantify tidal influence on distribution and abundance. These survey times were then used to calculate tidal heights from the Vancouver Reference Port using the Canadian Tide and Current Tables (2000).

3.5.4 Sex Ratios

Data will be analysed to determine overall male, female and juvenile ratios of Surf Scoter utilising the foreshore of Stanley Park for the study period.

4.0 Results and Discussion

4.1 Limitations of Survey Techniques

There were several shortcomings that may have affected the results of data collection. In late November, before the resident winter population had established itself, flocks of Surf Scoter often averaged in the thousands. Figure 13 is a photograph taken on November 3, 1999 illustrating the irregular and large flock of Surf Scoter that was estimated at 1300 birds. These large flocks reduced the ability to make accurate counts of males and females. In large flocks, the females, being less vivid in color than the males, may have been overlooked and not counted.

Movements of birds by flying from one study zone to another or to different locations away from Stanley Park may have affected numbers.

Figure 13: Around 1300 Surf Scoter in zone 53 on November 17, 1999 of the Stanley Park Surf Scoter Survey, 1999-2000 (Photo: ChristineWilliams, 2000).

4.2 Abundance

The Stanley Park foreshore was utilised steadily by a resident wintering population of Surf Scoter. Figure 14 shows the total number of Surf Scoter observed on each survey date from November 3, 1999 to April 16, 2000. See Appendix 1 for the complete listing of Surf Scoter abundance and distribution data throughout the study period. There was considerable fluctuation in the number of Surf Scoter observed from one survey to the next. The principle reason for this fluctuation was thought to be due to the natural movements of Surf Scoter.

High numbers in late October and through until the end of November suggest the presence of staging Surf Scoter that continue to migrate further south or to other destinations on the coast. The numbers decrease dramatically from November to December and marks the establishment of the resident wintering population.

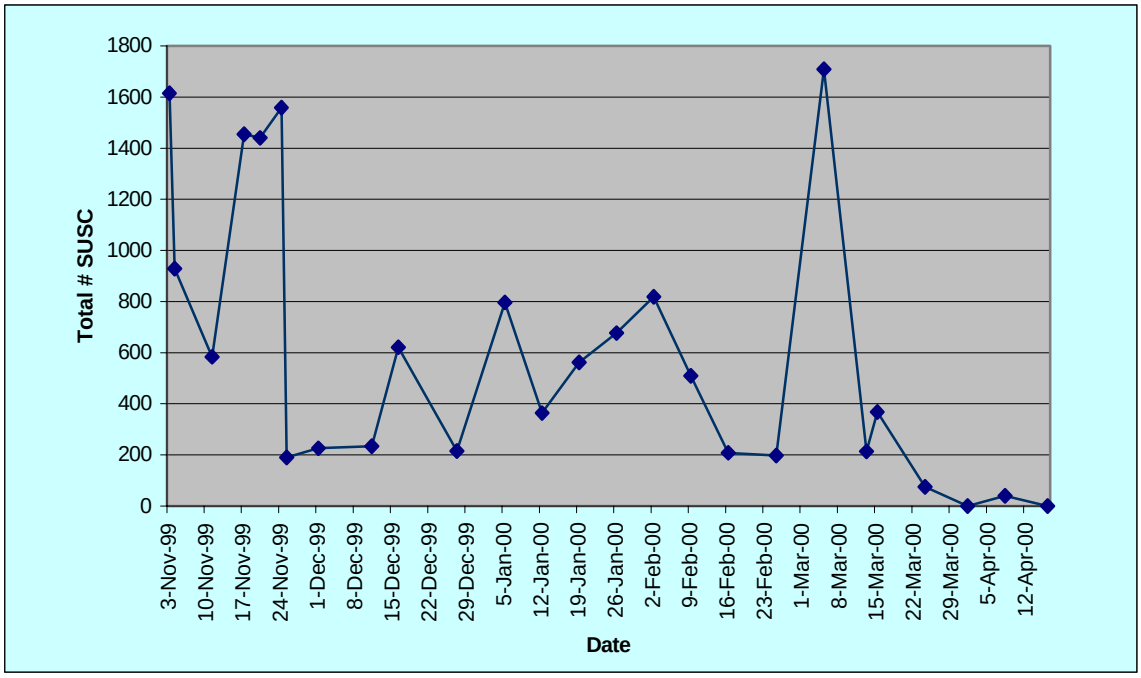

Figure 14: Surf Scoter abundance observed along the Stanley Park foreshore from November 3, 1999 to April 16, 2000.

Figure 15 illustrates a comparison of average numbers of Surf Scoter observed by Brenda Rotinsky in the Stanley Park Barrow's Goldeneye Survey, 1998-1999 with this year's Surf Scoter Survey. The graph shows a similar trend in numbers between the two years. This year's survey started with higher numbers of Surf Scoter and then saw a sharp drop from November to December. By January, however, numbers were almost the same as recorded last. The trend of both years sees numbers declining from January to February, with last year showing a greater decline than this year. This year has seen a slight upsurge in March, perhaps marking the staging Surf Scoter on their way back to their northern breeding grounds.

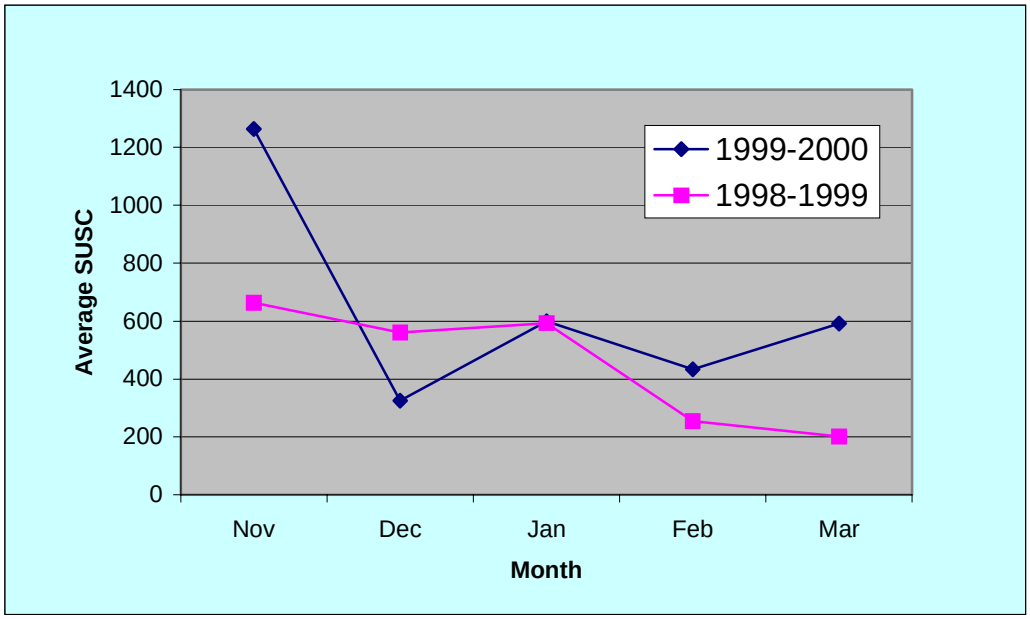

Figure 15: Comparison of monthly average number of Surf Scoter observed along the Stanley Park foreshore, during the 1998-1999 Stanley Park Barrow's Goldeneye Survey and the 1999-2000 Stanley Park Surf Scoter Survey.

4.3 Distribution

From data gathered (see Appendix 1 for distribution and abundance data for Surf Scoter), Surf Scoter are not evenly distributed along the Stanley Park foreshore. Figure 16 shows the average number of Surf Scoter observed by zone from November 3, 1999 to April 16, 2000. This graph shows that some areas were not used at all by Surf Scoter while other areas were used intensively during the wintering season.

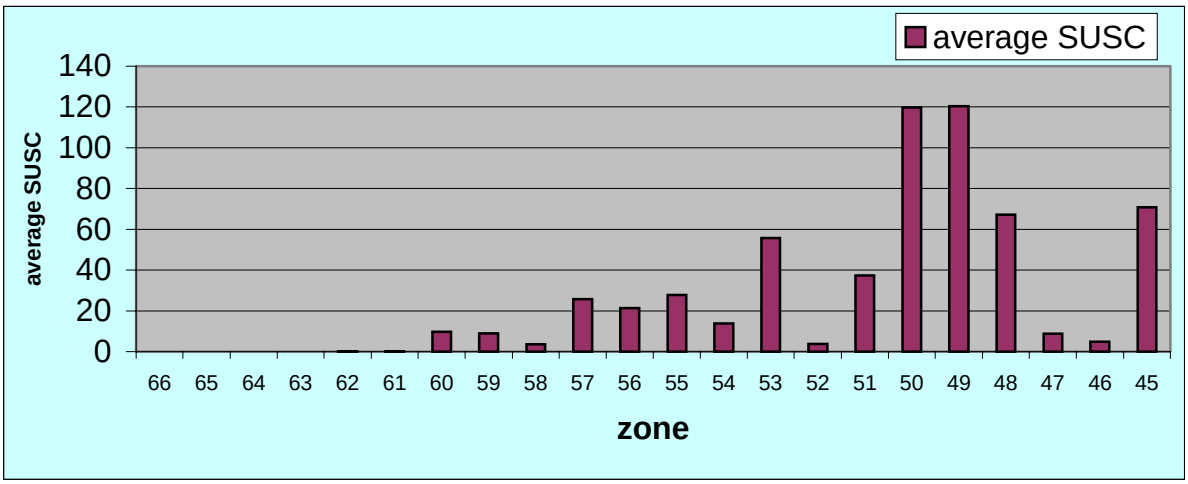

Figure 16: Average number of Surf Scoter observed by study zone along the Stanley Park foreshore from November 3, 1999 to April 16, 2000, during the Stanley Park Surf Scoter Survey, 1999-2000.

The least used sites were 61-66. These are areas of high boat traffic and moorage sites along the east side of Stanley Park in Coal Harbour. These sites are also sheltered in Burrard Inlet away from the open ocean. The most heavily used sites are 49 and 50. Both these zones are on the west side of Stanley Park that have low boat traffic, are open to the ocean and have extensive mussel bed available for feeding. These findings are similar to those collected by Rotinsky (1999).

The distribution of Surf Scoter observed along the Stanley Park foreshore was not consistent throughout the winter (Figure 17). Surf Scoter used different areas along the foreshore at different times in the season. Figure 17 shows that during November and December, high numbers of Surf Scoter were observed feeding at zone 50, which then decreased dramatically in January and February, with numbers shifting into zone 49. Greater numbers of Surf Scoter were observed in zone 45 in November and December but saw low numbers for the rest of the season. For the month of March, there were large concentration of Surf Scoter in zones 48 and 49, with very few or no Surf Scoter being observed in any of the other zones. This movement may suggest the depletion of food sources. The large concentrations seen in November reflect the Surf Scoter using Stanley Park as a staging point on their migration from the north to their wintering grounds further south. In March, another peak in numbers is seen and reflects staging Surf Scoter

on their return to their northern breeding grounds. During this time when large numbers of Surf Scoter were staging, the tendency was to stay in one large flock as opposed to breaking into smaller groups and dispersing around the foreshore as was seen with the wintering population.

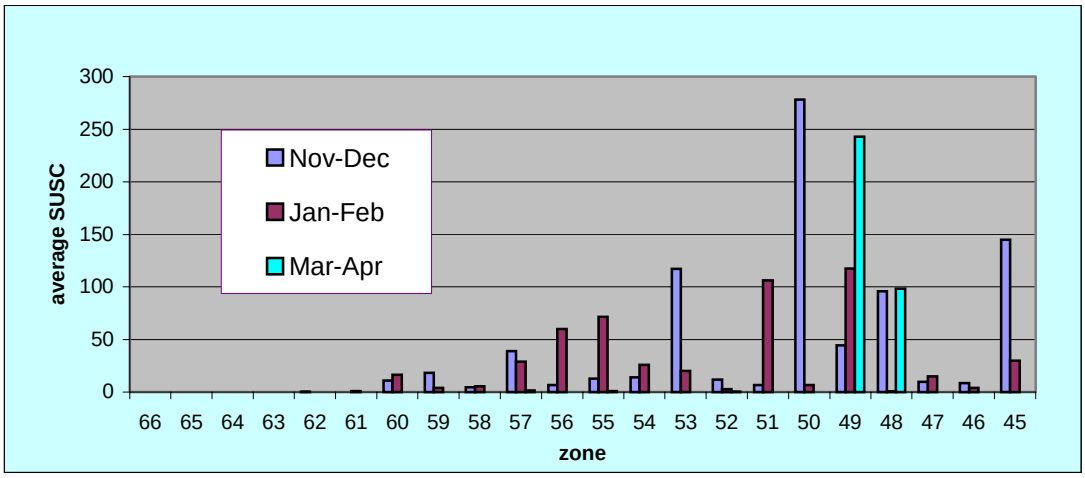

Figure 17: Average number of Surf Scoter observed in two month increments showing zone use along the Stanley Park foreshore, during the Stanley Park Surf Scoter Survey, 1999-2000.

4.4 Observer Variance

On March 5, 2000 observer variance testing was conducted (Figure 18). The conditions for (see Appendix 2 for observer variance results) this testing, however, were unsatisfactory as the observers only encountered one principle flock of Surf Scoter located in zone 49. The difference in numbers between the two observers was thought to have been due to a sea kayaker disturbing a large amount of the Surf Scoter flock before the second observer arrived. It is thought now that testing for observer variance should have been done earlier in December or January when there were more flocks distributed around the foreshore. The arrival of staging Surf Scoter in March resulted in large numbers congregating in one principle zone which didn't effectively test the precision of the observers.

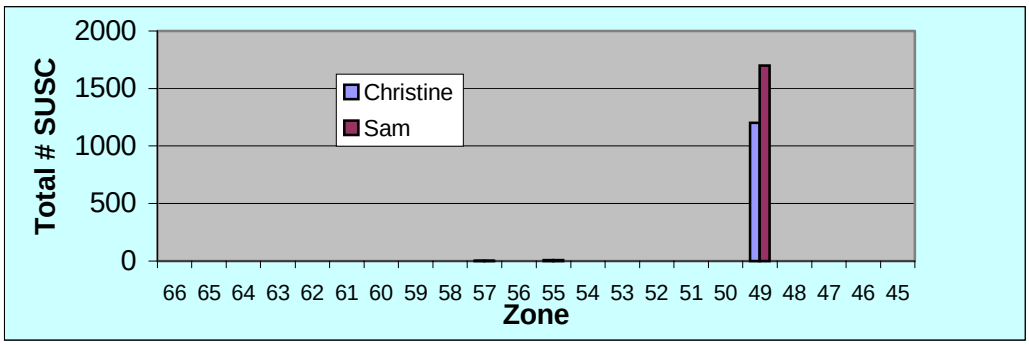

Figure 18: Total number of Surf Scoter observed by Sam Iverson and Christine Williams along the Stanley Park foreshore, Vancouver, BC, on March 5, 2000.

4.5 Tidal Influence

Testing for tidal influence was conducted on January 12, January 26 and February 9. Results for these days are illustrated in Figures 19, 21 and 22 (see Appendix 3 for tidal data results). Observations of Surf Scoter made during the high tide survey period (+/- 1.5 hours from high tide) and decreasing tide (1.5-3.5 hours from low tide) saw distribution remaining almost the same for all three surveys conducted. Greater numbers of Surf Scoter were observed during the high tide period. Tidal heights for the high tide periods averaged around 4.7 meters. Tidal heights for the high period averaged from 2.2 meters to 3.2 meters.

Testing to determine tidal influence was the principle objective, but because the high tide surveys were conducted in the morning and decreasing tide surveys were done in the afternoon, time of day may also have had some bearing on results.

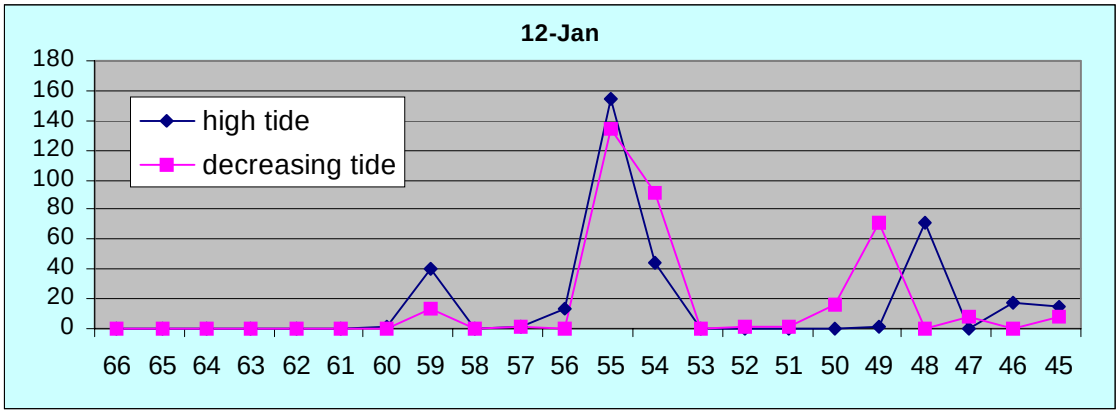

Figure 19: Tidal influence on distribution and abundance of Surf Scoter observed on January 12, 2000.

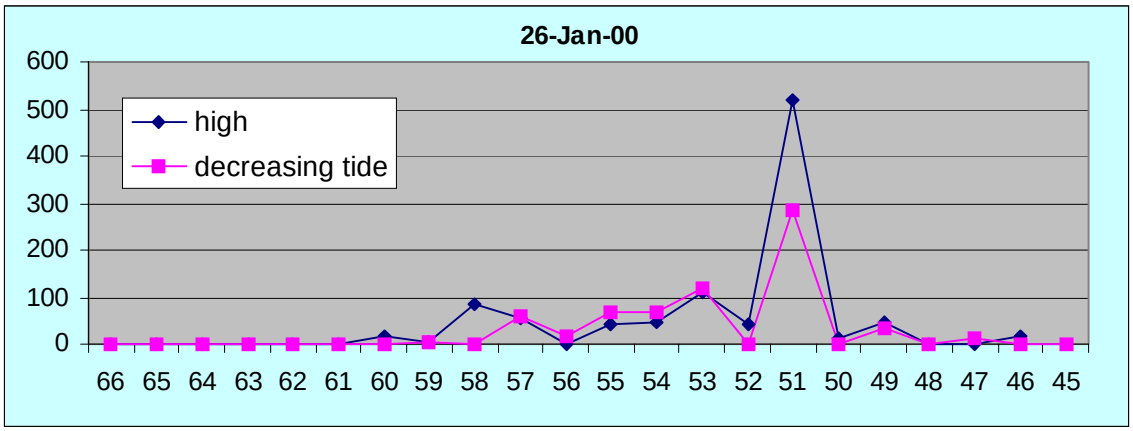

Figure 20: Tidal influence on distribution and abundance of Surf Scoter observed on January 26, 2000.

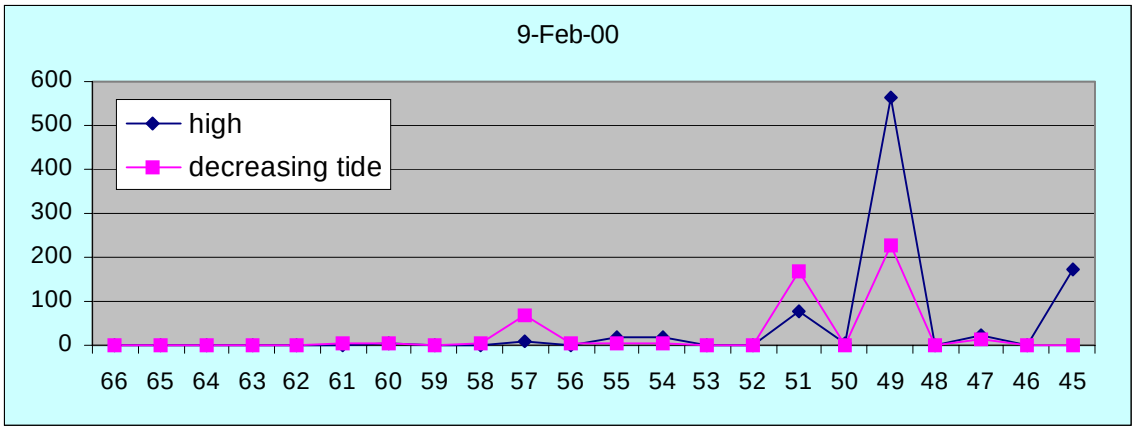

Figure 21: Tidal influence on distribution and abundance of Surf Scoter on February 9, 2000.

4.6 Sex Ratios

The skewed sex ratios of Surf Scoter is well documented and is attributed to two reasons: The higher mortality of females while on the breeding grounds (Iverson, 1999) and the differential migration between males and females which sees females moving further south than males (Boyd, 2000).

The predicted scenario for the sex ratios of Surf Scoter around the Stanley Park foreshore as the wintering season progressed, was that the large groups of 500 or more that were seen in late October and early November would break down into more numerous and smaller sized flocks with each flock having a greater male to female ratio. It was also estimated that of these flocks, around 10 % would be juveniles.

From data collected, this trend did appear (see Appendix 4 for monthly averages of number of flocks, total Surf Scoter, proportion of male, female and juvenile Surf Scoter observed from November 3, 1999 to April 16, 2000). Figure 22 outlines the averaged numbers of male, female and juvenile Surf Scoter observed on a monthly basis from November 3, 1999 to April 16, 2000.

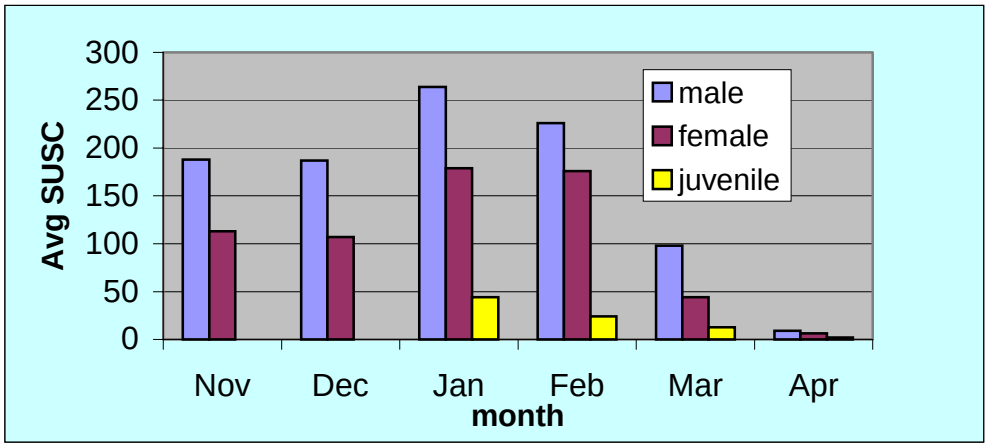

Figure 22: Monthly averages of male, female and juvenile Surf Scoter observed from November 3, 1999 to April 16, 2000 along the Stanley Park foreshore during the Surf Scoter Survey, 1999-2000.

From the data collected and averaged over the six-month period, the ratio of male Surf Scoter to female Surf Scoter was 1.5:1. Determining ratios of juvenile Surf Scoter observed in this survey period was limited due to the inexperience of the observer and the difficulty in differentiating adult females from juvenile males during the months of November and December when juvenile plumage closely resembled the adult females. During these months, the term, “brown” duck, was used to describe both adult female Surf Scoter and male and female juveniles, therefore the number of female Surf Scoter

seen in November and December in Figure 22 included juvenile numbers also. Estimates of numbers of juveniles is not firmly presented in this report, but attempts were made to estimate number of juveniles once identifying features such as bill and plumage became more obvious from late December onwards.

Figure 23 outlines the average percentage of males, females and juveniles observed in flocks around the foreshore from January 5 to April 16. The average percentages of male, female and juvenile that made up flock composition were 52%, 39% and 9% respectively.

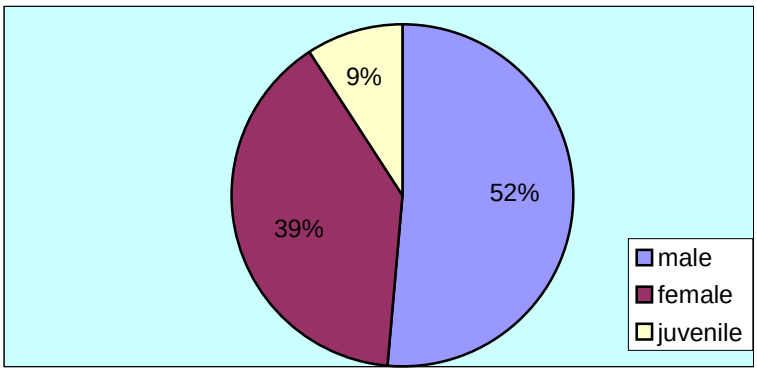

Figure 23: Average composition of flocks observed from January 5 to April 16, 2000 along the Stanley Park foreshore during the Stanley Park Surf Scoter Survey, 1999-2000.

As can be seen in Figure 24, the number of Surf Scoter flocks increased from an average of eight flocks in November to a high of 24.8 flocks in February. March sees a drastic decline in number of flocks, most likely due to the Surf Scoter returning from other wintering areas and using the Stanley Park foreshore as a resting spot before heading further north. Another possible reason is that the population that wintered around Stanley Park might consolidate in fewer, larger groups, before heading north.

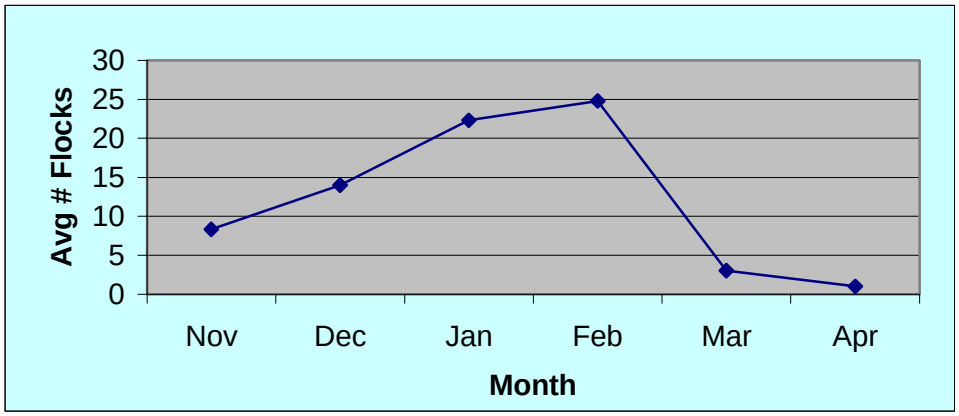

Figure 24: Average number of Surf Scoter flocks observed along the Stanley Park foreshore from November to April, 1999-2000.

5.0 Conclusions

The Stanley Park Surf Scoter Survey, 1999-2000, was successful in documenting the distribution and abundance of Surf Scoter along the Stanley Park foreshore during the 1999-2000 wintering season. The survey was able to show the effects of tidal influence on distribution and abundance of Surf Scoter, male to female sex ratios and the proportion of juveniles that started to appear in late December. The data collected suggested the following:

Abundance

The abundance of Surf Scoter around Stanley Park followed a distinct pattern. In the late fall, large numbers were observed and were thought to be staging Surf Scoter on their way to other breeding grounds. December to February saw a drop in these initial numbers to mark the establishment of what was presumed to be the wintering population around Stanley Park. Within this wintering time period, there were large fluctuations in the number of Surf Scoter observed and was attributed to the natural movements of the birds. Once again in the early spring, the numbers of Surf Scoter rose dramatically, indicating the arrival of staging Surf Scoter on their way back to the northern breeding grounds. The month of April saw very small numbers or no Surf Scoter at all. It is predicted that some Surf Scoter will remain around the seawall for the summer months.

Distribution

Surf Scoter were not evenly distributed around Stanley Park. Surf Scoter showed a strong preference for zone 50 and zone 49. Rotinsky's findings in the Stanley Park Barrow's Goldeneye Survey, 1998-1999 found that these areas were characterised by generally lower boat traffic, greater food availability and closer proximity to the open ocean.

Distribution did not remain constant throughout the survey period from November 3, 1999 to April 16, 2000. Certain zones saw heavy usage and then, presumably when the food source (mussels) had depleted, Surf Scoter would then move to another zone.

Tidal Influence

A greater number of Surf Scoter were observed at +/- 1.5 hours from high tide than during periods of decreasing tide. Change in tide had no marked effect on distribution.

Sex Ratios

The average male to female sex ratio observed over survey from November 3, 1999 to April 16, 2000 was 1.5:1. The percentage estimate of the juveniles in flocks observed from January 5 to April 16, 2000 was 9%.

6.0 Recommendations

It is the recommendation of the Stanley Park Surf Scoter Survey, 1999-2000 that another year of study under the supervision of the CWS and BCIT be completed. To give the data collected this year greater validity, and as grounds for comparison, another season using similar methodology and observational objectives would be useful.

Estimates of juveniles are crucial in determining recruitment. This in turn helps gauge the health of a population. One of the biggest challenges of the survey this year was in identifying juveniles. It would be of interest to try and determine other identifying features before the onset of plumage and bill changes so that counts of juveniles might be made earlier in the season.

The occurrence of two canola oil spills in the Burrard Inlet has once again reinforced the importance of gathering baseline data. To this end, it is necessary to make careful record of the distribution and abundance of all species of sea bird observed along the Stanley Park foreshore for the entire wintering season.

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List of Appendices

Appendix 1: Distribution and abundance of Surf Scoter observed along the Stanley Park foreshore from November 3, 1999 to April 16, 2000.

Zone	3-Nov	4-Nov	11-Nov	17-Nov	20-Nov	24-Nov	25-Nov	1-Dec	11-Dec	16-Dec	27-Dec	5-Jan	12-Jan
66	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0
62	0	0	1	0	0	0	1	0	0	0	0	0	0
61	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	38	0	0	85	100	0
59	0	0	0	0	0	0	0	134	8	60	0	0	24
58	0	0	0	0	0	0	0	1	22	28	0	5	0
57	0	0	1	0	80	0	68	35	27	218	0	0	1
56	0	0	0	0	0	0	25	0	0	1	51	134	0
55	70	0	0	39	0	0	0	0	4	12	20	172	144
54	0	56	0	0	0	0	78	10	7	0	3	3	91
53	0	0	0	1272	0	0	0	0	0	10	8	4	0
52	0	1	8	0	58	0	6	1	0	2	0	0	1
51	0	4	0	0	0	12	0	3	2	100	0	0	0
50	1400	0	160	0	1300	0	0	4	157	25	12	5	16
49	0	0	0	0	0	298	1	0	7	164	20	350	71
48	142	865	40	0	0	0	7	0	0	0	0	0	0
47	0	0	0	43	0	46	0	0	1	2	17	0	8
46	0	0	0	88	2	0	5	0	0	0	0	0	0
45	11	3	374	13	0	1202	0	0	0	0	0	24	8
Total	1623	929	584	1455	1440	1558	191	226	235	622	216	797	364

19-Jan	26-Jan	2-Feb	9-Feb	16-Feb	25-Feb	5-Mar	13-Mar	15-Mar	24-Mar	1-Apr	8-Apr	16-Apr	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0	3
0	0	5	3	0	0	0	0	0	0	0	0	0	8
6	2	14	4	4	2	0	0	0	0	0	0	0	255
0	5	3	0	0	0	0	0	0	0	0	0	0	234
26	1	3	6	4	0	0	0	0	0	0	0	0	96
44	58	20	69	9	30	2	7	1	0	0	0	0	670
324	17	0	6	0	0	0	0	0	0	0	0	0	558
31	67	116	4	16	22	6	1	0	0	0	0	0	724
4	70	33	5	1	0	0	0	0	0	0	0	0	361
18	121	0	0	1	18	0	0	0	0	0	0	0	1452
0	0	3	2	17	0	0	1	0	0	0	0	0	100
28	286	281	170	84	1	0	0	0	0	0	0	0	971
15	0	8	0	2	8	0	0	0	0	0	0	0	3112
44	36	119	229	21	71	1700	0	0	0	0	0	0	3131
0	0	0	0	1	4	0	205	367	75	0	41	0	1747
15	14	21	12	15	36	0	0	0	0	0	0	0	230
0	0	13	0	15	5	0	0	0	0	0	0	0	128
7	0	180	0	18	1	0	0	0	0	0	0	0	1841
562	677	819	510	209	198	1708	214	368	75	0	41	0	15621

Appendix 2: Distribution and abundance of Surf Scoter observed by Christine Williams and Sam Iverson along the Stanley Park foreshore on Sunday, March 5, 2000.

Zone	Observer 1	Observer 2
66	0	0
65	0	0
64	0	0
63	0	0
62	0	0
61	0	0
60	0	0
59	0	0
58	0	0
57	2	2
56	0	0
55	6	6
54	0	0
53	0	0
52	0	0
51	0	0
50	0	0
49	1200	1700
48	0	0
47	0	0
46	0	0
45	0	0
Total	1208	1708

Appendix 3: Stanley Park Surf Scoter Survey, 1999-2000, tidal influence data collected on Wednesday, January 12, Wednesday, January 26, Wednesday, February 9, 2000.

	12-Jan		26-Jan		9-Feb	
zone	High (am)	Low (pm)	High (am)	Low (pm)	High (am)	Low (pm)
66	0	0	0	0	0	0
65	0	0	0	0	0	0
64	0	0	0	0	0	0
63	0	0	0	0	0	0
62	0	0	0	0	0	0
61	0	0	0	0	0	3
60	2	0	15	2	3	4
59	40	14	4	5	1	0
58	0	0	83	1	0	6
57	2	1	56	58	8	69
56	14	0	1	17	0	6
55	155	135	43	67	19	4
54	44	91	47	70	20	5
53	0	0	111	121	0	0
52	0	1	43	0	0	2
51	0	1	518	286	77	170
50	0	16	12	0	5	0
49	1	71	45	36	562	229
48	71	0	0	0	0	0
47	0	8	0	14	22	12
46	18	0	15	0	0	0
45	15	8	9	0	171	0
total	362	346	1002	677	888	510

Appendix 4: Averages of male, female and juvenile Surf Scoter and flock sizes observed along the Stanley Park foreshore from November 3, 1999 to April 16, 2000.

November	3-Nov	11-Nov	17-Nov	24-Nov	Average
Flock Total	1622	584	1455	1518	1295
Adult Male	142	203	170	238	188
Adult Female/Juv M & F (Brown Duck)	82	153	101	116	113
Male - Brown Duck Ratio					1.7:1
#Flocks					8.3
December	1-Dec	11-Dec	16-Dec	27-Dec	Average
Flock Total	226	237	622	216	325
Adult Male	146	150	395	58	187
Adult Female/Juv M & F (Brown Duck)	80	76	226	46	107
Male to Brown Duck Ratio					1.7:1
#Flocks					14
January	5-Jan	12-Jan	19-Jan	26-Jan	Average
Flock Total	652	353	463	687	539
Adult Male	222	204	272	358	264
Adult Female	120	129	175	290	179
Juvenile Male	5	19	24	39	22
Juvenile Female	5	19	24	39	22
Male to Female Ratio					1.5:1
#Flocks					22.3
February	2-Feb	9-Feb	16-Feb	25-Feb	Average
Flock Total	819	510	209	198	434
Adult Male	382	311	115	94	226
Adult Female	342	186	88	88	176
Juvenile Male	26	13	7	2	12
Juvenile Female	26	13	7	2	12
Male to Female Ratio					1.3:1
#Flocks					24.8
March	5-Mar	13-Mar	15-Mar	24-Mar	Average
Flock Total	1708	214	368	75	591
Adult Male	180	97	74	40	98
Adult Female	133	107	42	27	44
Juvenile Male	24	12	6	8	12.5
Juvenile Female	24	12	6	8	12.5
Male to Female Ratio					2:01
# Flocks					3
April	1-Apr	8-Apr	16-Apr	no survey	Average
Flock Total	0	49	0		16
Adult Male	0	28	0		9
Adult Female	0	17	0		6
Juvenile Male	0	4	0		1
Juvenile Female	0	4	0		1
Male to Female Ratio					1.5:1
#Flocks					1