BIRD USE OF THE CLUXEWE RIVER ESTUARY, VANCOUVER ISLAND, BRITISH COLUMBIA 1990-1991

Neil K. Dawe
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Abstract

The Cluxewe Conservation Area was formed to protect a portion of an ecologically important saltmarsh habitat adjacent to the Cluxewe River estuary. Preliminary inventories conducted by the Canadian Wildlife Service (CWS) of the estuarine system in 1979 and 1981 indicated that the estuary supported many species of migratory and resident birds as well as a diverse marsh flora.

In 1981, The National Second Century Fund acquired 43 ha of the Cluxewe saltmarsh. Subsequently, those lands were leased to the B.C. Ministry of Environment for 99 years. In 1990, a more thorough inventory to determine bird use of the estuary began on a weekly basis from 23 September 1990 through 22 September 1991.

Eighty-nine species of birds were recorded using the Cluxewe River estuary and saltmarsh during the 1990-1991 survey period; an additional 12 species were added to the avifauna from the notes taken by CWS biologists during their initial visits in 1979 and 1980 and from other naturalist sources.

The estuary supported a minimum of 3,348 birds for at least some stage in their life history over the 1990-1991 study period. The intertidal and spit habitats were used by the highest numbers of birds (22% each, n=22,780).

Spring 1991 bird use at the Cluxewe River estuary was dominated by waterfowl; gulls, shorebirds, and passerines followed in roughly equal proportions. Spring saw the third highest bird use over the survey period.

Summer 1991 had the lowest bird use of all the seasons at the estuary. Gulls were the primary user group; however, waterfowl and passerines were also seen in significant numbers.

During both the late autumn of 1990 and the early autumn of 1991, gulls accounted for roughly half of the total birds seen; waterfowl was the second highest user group followed by passerines. The proportion of shorebirds was highest in 1990. Late autumn ranked second in terms of bird use.

More birds used the estuary in the winter of 1990-1991 than any other season over the study period. Waterfowl dominated, followed by gulls; shorebirds and passerines were also significant user groups and were seen in roughly equal proportions.

An annotated species list discusses arrival and departure dates, high numbers, and habitat use by the 98 species of birds that are known to use the estuary. Three species were considered hypothetical.

Concluding comments discuss possible solutions for minimizing impacts to birds using the estuary, particularly from direct disturbance, and suggest further studies of the avifauna that would complete the picture of bird use of the Cluxewe River estuary and saltmarsh.

Résumé

L'aire de conservation de Cluxewe a été créée pour protéger une portion d'un habitat de marais salant d'importance écologique, qui est adjacent à l'estuaire de la rivière Cluxewe. Des relevés préliminaires effectués par le Service canadien de la faune (SCF) dans le système estuarien en 1979 et 1981 ont révélé que l'estuaire abritait de nombreuses espèces d'oiseaux migrateurs et résidants de même qu'une flore palustre diversifiée.

En 1981, The National Second Century Fund a fait l'acquisition de 43 hectares du marais salant de Cluxewe. Par la suite, ces terres ont été louées à bail au ministère de l'Environnement de la Colombie-Britannique pour une durée de 99 ans. La fréquentation de l'estuaire par les oiseaux a fait l'objet d'une étude plus exhaustive qui a débuté en 1990; des relevés hebdomadaires ont ainsi été réalisés entre le 23 septembre 1990 et le 22 septembre 1991.

Au cours de cette période, on a observé que 89 espèces d'oiseaux au total avaient utilisé l'estuaire et le marais de la rivière Cluxewe; les observations faites par les biologistes du SCF lors des relevés initiaux effectués en 1979 et 1980 ainsi que par d'autres naturalistes ont permis d'ajouter 12 autre espèces à l'avifaune.

Pendant la période d'étude de 1990-1991, au moins 4 240 oiseaux ont fréquenté l'estuaire à un stade ou à un autre de leur vie. Les habitats de la zone intertidale et de la flèche littorale ont été utilisés par la plus forte proportion d'oiseaux (22 % dans les deux cas, n=22 780).

Au cours du printemps 1991, les oiseaux aquatiques ont été les principaux oiseaux à fréquenter l'estuaire de la rivière Cluxewe, suivis des goélands, des oiseaux de rivage et des passereaux en proportions à peu près égales. Le troisième taux de fréquentation le plus élevé a été observé à cette période de l'année.

C'est durant l'été 1991 que l'estuaire a été le moins utilisé. Les goélands ont constitué le groupe le plus nombreux; toutefois, les oiseaux aquatiques et les passereaux ont également été aperçus en grand nombre.

À la fin de l'automne 1990 et au début de l'automne 1991, les goélands ont constitué à peu près la moitié du nombre total d'oiseaux observés; les oiseaux aquatiques venaient au deuxième rang, suivis des passereaux. La plus forte proportion d'oiseaux de rivage a été observée en 1990. La fin de l'automne a été la période de l'année où le deuxième taux de fréquentation le plus élevé a été enregistré.

Le taux de fréquentation de l'estuaire le plus élevé a été observé pendant l'hiver de 1990-1991. Les oiseaux aquatiques occupaient le premier rang, suivis des goélands. Les oiseaux de rivage et les passereaux ont également fréquenté le secteur en grand nombre et ce, dans des proportions à peu près égales.

Une liste annotée des espèces précise les dates d'arrivée et de départ des oiseaux, leur abondance et l'utilisation de l'habitat estuarien par 98 espèces d'oiseaux.

Dans la conclusion, on examine les solutions que l'on pourrait adopter pour réduire au minimum les impacts sur les oiseaux qui fréquentent l'estuaire, notamment ceux associés aux perturbations directes, et l'on propose que d'autres études de l'avifaune soient faites afin d'avoir une bonne idée de la fréquentation de l'estuaire et du marais salant de la rivière Cluxewe.

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Acknowledgements

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Introduction

Estuaries along coastal British Columbia are important to a diverse wildlife fauna, particularly resident and migratory birds (Dawe 1976, 1980, Dawe and Lang 1980, Dawe et al. 1994, Butler and Cannings 1989, Butler et al. 1989, Vermeer et al. 1992). This diverse fauna occurs as a result of two major factors: the variety of habitats that interact on these systems and the productivity of those habitats.

Habitats often associated with typical estuarine ecosystems include marine deep water areas, intertidal sand and gravel flats, cobble beaches, mudflats, spits, river and associated riparian habitats, brackish and saline estuarine marshes with their accompanying dendritic channels, and upland grass, forb, and shrub areas that grade to coastal forests.

This concentration of habitats with its accompanying edges and niches supports a tremendous diversity and abundance of wildlife. For example, inventories from the Little Qualicum River estuary, with an upland area of less than 40 ha, have reported minimums of 14 species of algae, 55 species of fungi, 22 species of bryophytes, 234 species of vascular plants, 29 species of molluscs, 62 orders of arthropods, 15 species of fishes, 4 species of amphibians, 4 species of reptiles, 220 species of birds, and 20 species of mammals (Dawe 1976, 1980, unpublished data).

Nutrients and sediments brought down from the watersheds by the rivers are deposited on the deltas providing rich substrates and growing conditions for estuarine marsh plants that, along with marine vegetation such as eelgrass (*Zostera* sp.) and algae, drive the detritus-based estuarine food web. Net primary production of these systems with their attendant marshes and algal beds rival, and in some cases exceed, the production of the tropical rain forests (Ricklefs 1979).

These estuarine ecosystems are important to the survival of both resident and migratory birds. Estuaries act as stepping stones to the millions of birds that migrate along the British Columbia coast each year providing areas where they can rest and feed during their northern and southern journeys.

In addition, British Columbia's estuaries support Canada's largest wintering populations of waterbirds. Estuaries, in concert with farmlands and freshwater wetlands, form part of a wetlands complex (Eamer 1985) that supports hundreds of thousands of wintering waterbirds. During periods of freezing, however, when farmlands and freshwater marshes are no longer accessible, estuaries become critical to the birds' survival (see Dawe 1980 and Eamer 1985). They are the only ice free areas that have enough food to support the birds over the freezing periods.

In British Columbia, most efforts to document bird-use of estuaries have focused on the larger systems such as the Fraser, Squamish, and Cowichan (Butler and Campbell 1987, Butler and Cannings 1989, Trethewey 1985, Blood et al. 1976); however, the importance of the smaller British Columbia estuaries should not be overlooked (see Butler et al. 1989). Collectively, these smaller systems contribute significantly to the maintenance of our migratory and resident bird populations.

The Canadian Wildlife Service (CWS) has long recognized the importance of these areas and over the past 15 years has gathered data on the bird use of many of our smaller estuaries. This report documents bird use and numbers on the Cluxewe River estuary and adjacent saltmarsh near Port McNeill, British Columbia over the period 23 September 1990 through 22 September 1991.

In addition, data collected during preliminary inventories conducted by the CWS before the designation of the Cluxewe River Conservation Area as well as observations by other naturalists have been included in this report. The results will be of interest to both the wildlife manager and the birdwatching public who want to know more about the avifauna of the Cluxewe River estuary and saltmarsh.

The Study Area

The Cluxewe River estuary and saltmarsh (50°36'3" N, 127°11' W) is situated on the northeast coast of Vancouver Island approximately 10 km west of Port McNeill, British Columbia (Figure 1). The mean temperature (at Port Hardy, B.C.) is 8°C. The area has a mean annual precipitation of 1730 mm (Anonymous 1977). The soil association for the Cluxewe saltmarsh and estuary is known as Varney Bay. These soils are gleysolic, fluvial in nature, and made up of silts and sandy loam which overlies gravel (see Clermont 1992).

Dawe and Wetmore (1980) and Kennedy (1982) describe the major estuarine marsh vegetation zones on the estuary. Briefly, near the river mouth a brackish marsh has formed with *Carex lyngbyei*, *Potentilla pacifica* and *Deschampsia cespitosa* as important components. A salt marsh has formed behind the beach berms with dominant vegetation that includes halophytes such as *Salicornia virginica*, *Triglochin maritimum*, and *Puccinellia* sp.

The significance of the Cluxewe River estuary and saltmarsh in terms of its environmental and social values and potential impacts to those values has been discussed by D. Arnold, Nature Conservancy of Canada (CWS files) and Dawe and Wetmore (1980) in an acquisition proposal prepared for the CWS, as well as Clermont (1992).

In the summer of 1981, 43 hectares of the saltmarsh and forested upland of the Cluxewe River estuary and saltmarsh were purchased by the National Second Century Fund of British Columbia. In 1982, the property was leased to the Provincial Ministry of the Environment and the Cluxewe Conservation Area was created. Management of the lands have been undertaken by the Wildlife Branch, Ministry of Environment, Lands and Parks (MOELP). Subsequently, because of its significant wildlife values, a Management Plan was prepared (Clermont 1992).

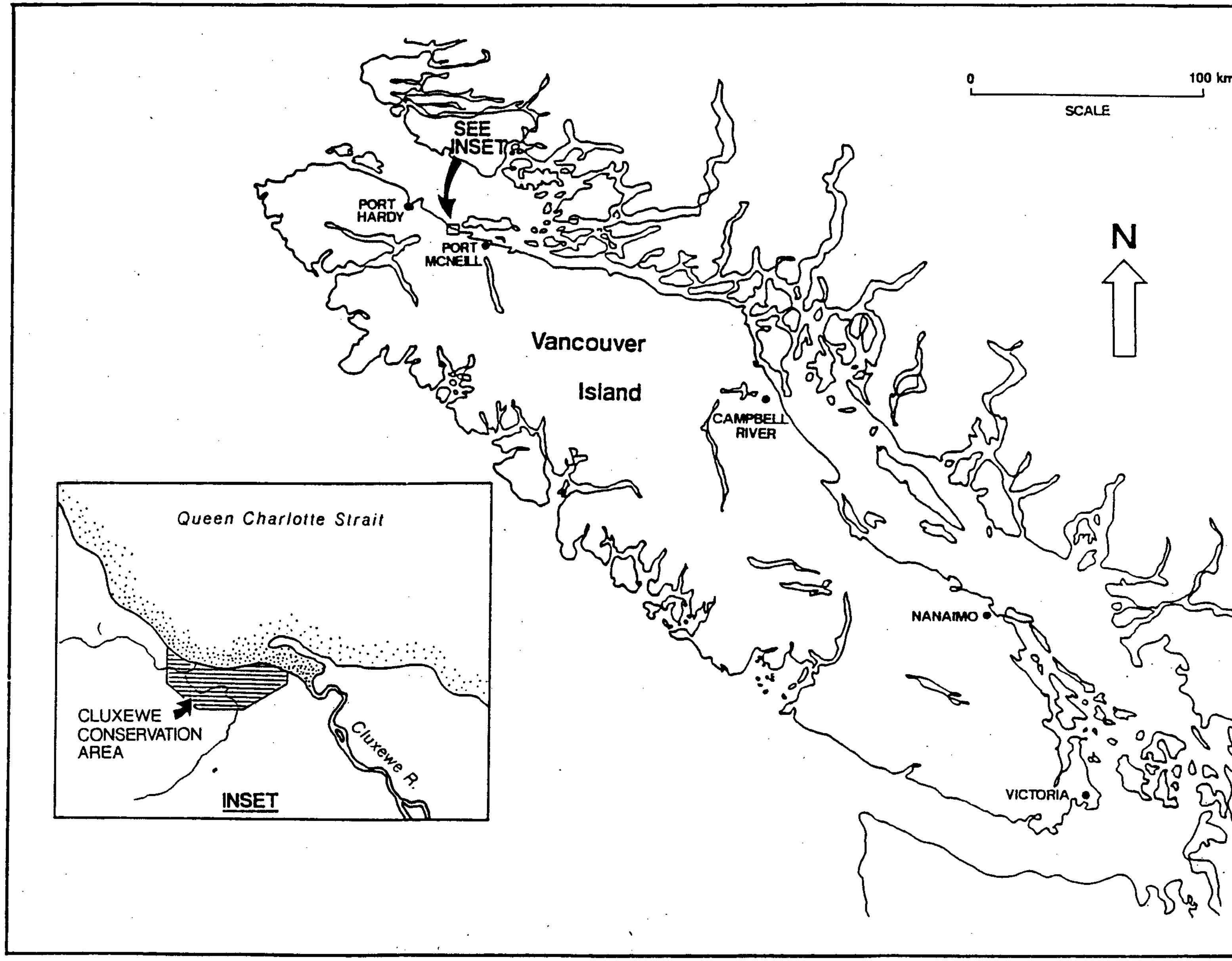
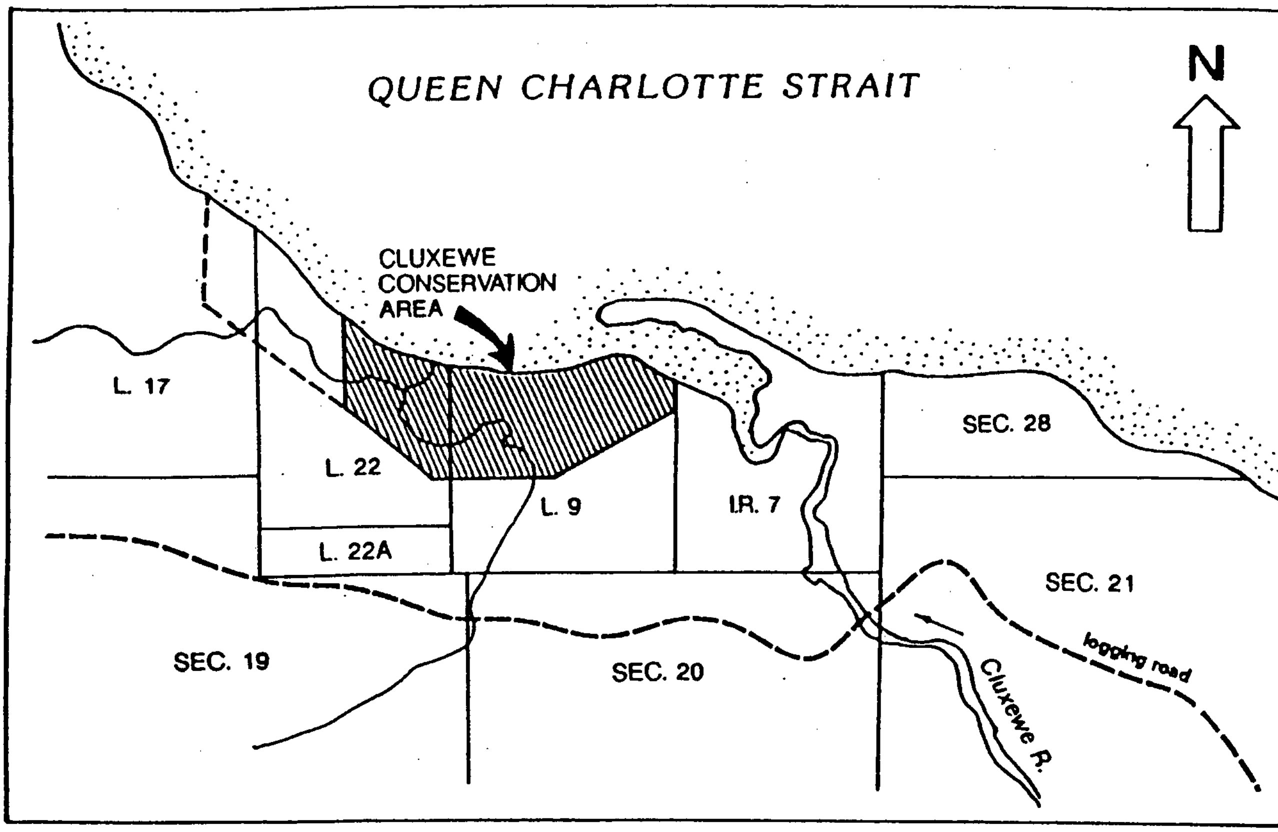


Figure 1. *Location of the Cluxewe River estuary study area (from Clermont 1992).*



LEGEND

[hatched box]	Cluxewe Conservation Area
[dashed box]	Unprotected Salt Marsh (Presently a Section 13 Crown Land transfer application)
I.R.7	Indian Reserve, Fort Rupert Band/Campground Development
L. 17	Crown Land under TFL 25, Western Forest Products
L. 22	Crown Land under TFL 25, Western Forest Products
L. 9	Crown Land under TFL 25, Western Forest Products
SEC.28	Private Land owned by Western Forest Products

Figure 2. *Land status of the Cluxewe Conservation Area and adjacent lands (from Clermont 1992).*

The remaining portions of the total 125 hectare estuarine system are part of the Klikseewy Indian Reserve which encompass most of the estuary and spit as well as private and Crown lands. Land status is shown in Figure 2.

Methods and Limitations

In response to growing site disturbances such as vandalism, illegal hunting and habitat degradation the MOELP appointed a property Warden, Annemarie Koch, to help monitor the site. Up until this point, the CWS had completed only preliminary wildlife surveys over 2 days in 1979 and 1980 (Dawe and Wetmore 1980). Now that a warden was in place, a long term survey was instigated under the direction of Tony Barnard (The Nature Trust) to determine the distribution and abundance of birds using the estuary. A study team was formed consisting of 12 participants with local knowledge of the area and weekly surveys were conducted from 23 September 1990 through 22 September 1991. The new warden, Annemarie Koch, acted as the survey leader under the direction of Barnard and later the senior author. For a list of participants and survey dates see Appendix I). Experience with birds varied between surveyors, however, and most members

Habitat Unit	Name	Habitat Description
1	Saltmarsh	Intertidal marsh, tidal channels. Free from the fresh water influence of the river.
2	Brackish Marsh	*Carex lyngbyei* and *Deschampsia cespitosa* marsh at the river mouth.
3	Estuarine Subtidal	Subtidal portion of estuary at river mouth.
4	Spit	Sand spit partially disturbed by campground.
5	Intertidal (Subtidal)	Sand and gravel intertidal area, deep-water marine.
6	Forest	Second growth forest, primarily Western Hemlock with some Western Red Cedar and Sitka Spruce.
7	Beach Berm	Sand and sediment beach dunes, narrow treed fringe.

Table 1. *Habitat Units covered during the Cluxewe River estuary and saltmarsh bird survey, 23 September 1990 through 22 September 1991 (see also Figure 3).*

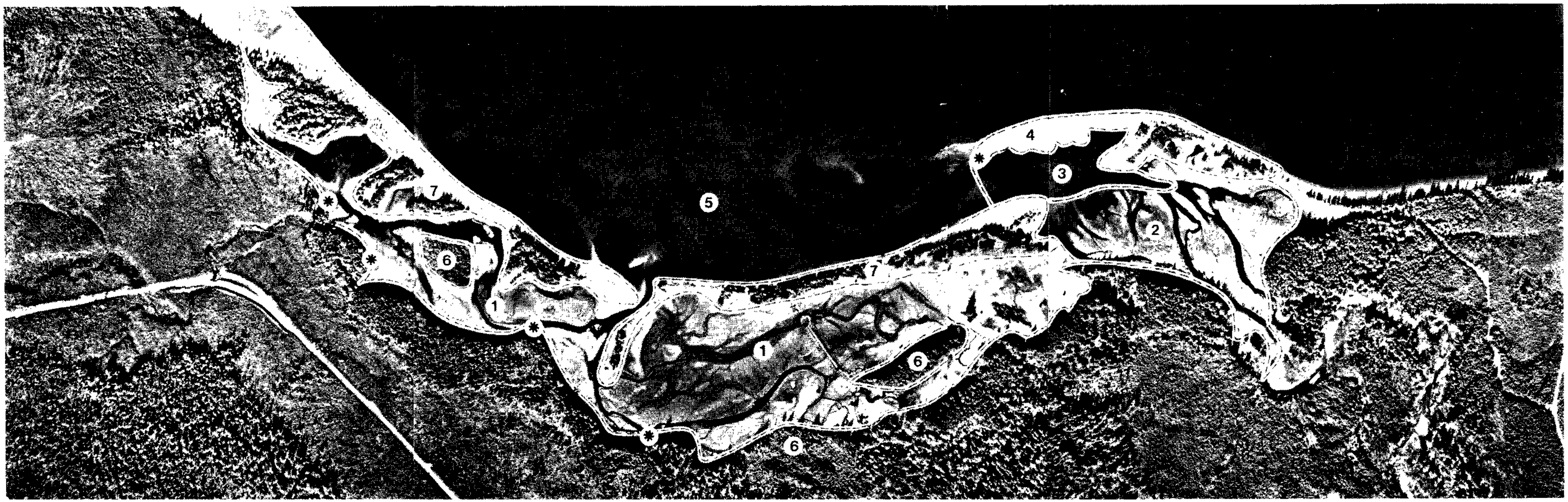


Figure 3. *Air photo of the Cluxewe River estuary showing the habitat units and observation stations used during the surveys. See Table 1 for habitat descritions.*

of the survey team had only recently begun birdwatching. Thus, their familiarity with all but the waterbirds was minimal, and this report should be read in that light. Where we found unusual or extraordinary observations that had not been documented with adequate field notes, they are noted as hypothetical and should be used with caution.

The study area was divided into 7 units that reflected the major habitat types in order to determine areas of high bird use within the estuary. See Table 1 for a list of the habitat units and their descriptions. Figure 3 shows the location of the habitat units on the estuary. Survey participants covered the study area on foot, and using binoculars and telescopes, counted and recorded all birds observed primarily from 5 viewing locations. In addition, the larger bird concentrations were marked directly on a copy of an air photo of the study area to determine the areas of highest bird use within each habitat type.

The numbers of birds recorded are considered to be generally accurate for the areas surveyed but are undoubtedly conservative due to inherent limitations (see Dawe 1982). Poor visibility due to weather, and birds underwater or shielded by vegetation during the period of observation would lead to an underestimation of the numbers of birds recorded. The data are based on observations at a particular point in time and do not necessarily reflect the total bird use of the area under observation. For example, birds dependent on the estuary only for a few days during spring and autumn migration could be missed altogether if observation periods occurred on either side of their arrival and departure. Also, data were not collected at night; however, low tides on the study area during the winter months occur mostly during the night. Thus, in winter, observations were not made when the intertidal areas and algal beds were exposed, i.e. at times when they would likely be used by birds such as dabbling ducks.

Survey data were summarized using BASIC programs written by Allan Keller, CWS, and modified for seasonal summaries and statistics by the senior author (see Appendices III and IV). The summarized data were analyzed and much of the first draft of the report written by Terri Martin under contract to the CWS. Her contribution was reviewed and edited by the senior author.

The annotated species list was assembled from the survey data as well as from (Dawe and Wetmore 1980) and field notes of the senior author and Karen E. Dawe (NKD & KED) during 3 preliminary visits to the estuary in 1979, 1980 and 1981. Additional records were obtained from the field notes of Gordon Twance (GT) and Terri Martin and Jeanine Siemens (TM & JS).

Results and Discussion

Bird Use of the Estuary

Over the study period, 92 species of birds were identified on the Cluxewe River estuary and saltmarsh, including 3 hypothetical species; an additional 12 species were included from other sources (see Methods and Limitations). A total of 22,780 birds was recorded over the study period.

Species	Number	Season	Species	Number	Season	Species	Number	Season
COLO	13	Win 90	RUDU	11	Win 90	BEKI	9	Aut 91
HOGR	9	Win 90	BAEA	26	Aut 90	RBSA	1	Win 90
RNGR	2	Aut 91	NOHA	1	Aut 90	NOFL	6	Spr 91
WEGR	5	Win 90	SSHA	1	Win 90	PIWO	1	Spr 91
CORM	5	Win 90	RTHA	1	Aut 90	GRJA	2	Aut 90
GBHE	6	Sum 91	FALC	1	Aut 90	STJA	5	Spr 91
TRUS	48	Win 90	RUGR	4	Sum 91	NOCR	120	Win 90
BRAN	300	Spr 91	SEPL	2	Sum 91	CORA	9	Aut 90
CAGO	96	Spr 91	KILL	2	Win 90	CBCH	5	Win 90
GWTE	48	Aut 91	BLOY	41	Win 90	RBNU	1	Aut 90
MALL	205	Spr 91	GRYE	5	Spr 91	BRCR	2	Aut 91
NOPI	52	Win 90	BLTU	261	Win 90	WREN	17	Aut 90
BWTE*	4	Win 90	SURF	4	Spr 91	ROWR*	3	Sum 91
NOSL	12	Spr 91	SAND	40	Win 90	GCKI	8	Spr 91
GADW	9	Aut 90	WESA	50	Aut 90	SWTH	1	Sum 91
AMWI	50	Aut 91	LESA	2	Spr 91	AMRO	26	Spr 91
SCAU	6	Spr 91	ROSA	27	Spr 91	VATH	13	Win 90
LESC	21	Spr 91	DUNL	20	Spr 91	EUST	185	Aut 90
HADU	50	Win 90	DOWI	12	Sum 91	RSTO	11	Win 90
OLDS	9	Win 90	SBDO	2	Spr 91	SAVS	1	Aut 90
SCOT	3	Aut 90	LBDO	1	Aut 91	FOSP	15	Spr 91
BLSC	8	Win 90	BOGU	281	Aut 90	SOSP	13	Aut 91
SUSC	77	Win 90	MEGU	22	Win 90	GCSP	2	Spr 91
WWSC	41	Aut 90	CAGU	2	Aut 91	DEJU	48	Aut 90
COGO	17	Win 90	HEGU	469	Aut 90	RWBL	6	Aut 90
BAGO	22	Win 90	GWGU	50	Aut 90	WEME	6	Aut 90
BUFF	241	Win 90	PIGU	5	Aut 91	PUFI	1	Spr 91
MERG	2	Aut 90	MAMU	2	Sum 91	RECR	40	Aut 90
HOME	22	Aut 90	CAAU	1	Sum 91	PISI	30	Win 90
COME	18	Sum 91	RHAU	2	Sum 91	AMGO	1	Sum 91
RBME	7	Aut 90	RUHU	3	Sum 91			
						Total	3348	

Table 2. *Estimated minimum numbers of birds dependent on the Cluxewe River estuary, September 1990 through September 1991, based on the maximum number of each species observed on migratory bird surveys. For species names, see Appendix II.*

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* Hypothetical

To estimate the minimum number of birds dependent on the Cluxewe River estuary, the maximum single day bird numbers for each species was summed (Table 2). A minimum of 3,348 birds depended on the Cluxewe River estuary for some aspect of their life history over the study period.

Habitat Use

Of the 7 habitat units defined (see Table 1 and Figure 3), the subtidal/intertidal area and the spit were used the most (each were used by 22% of all birds observed). The saltmarsh, beach berm and estuarine subtidal had roughly equal bird use at 17%, 16%, and 15% of the total birds observed, respectively.

Seasonal Numbers

Spring: Figure 4 shows the ratio of species group use on the estuary for the spring of 1991. Waterfowl were the dominant group with gulls, shorebirds and passerines following in roughly equal proportions.

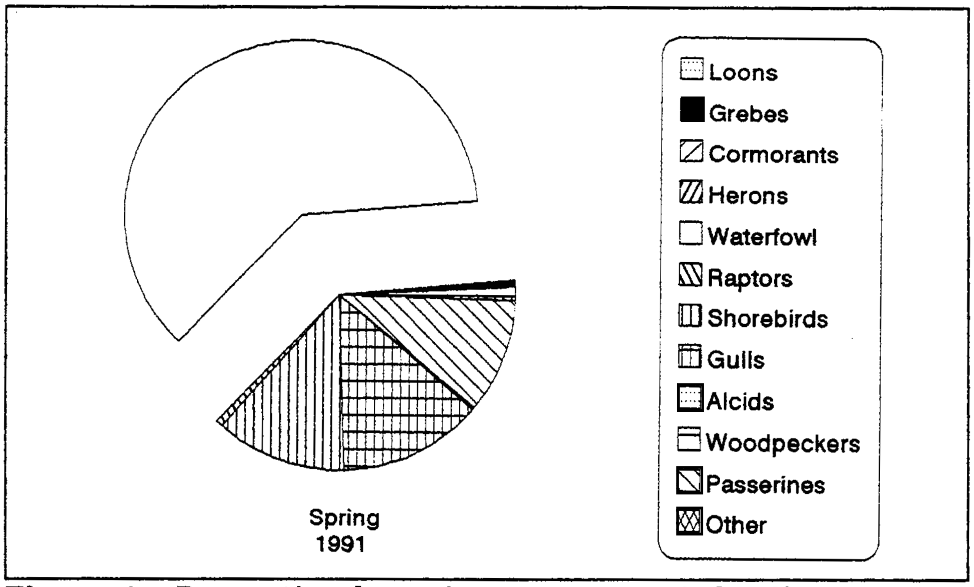

Figure 4. *Proportional species group use of the Cluxewe River estuary and saltmarsh, spring 1991.*

Summer: Figure 5 shows the ratio of species group use of the estuary for the summer of 1991. Gulls dominated, waterfowl and passerine numbers were second while shorebird use dropped to a distant fourth. Overall, the summer season had the lowest bird numbers at the estuary.

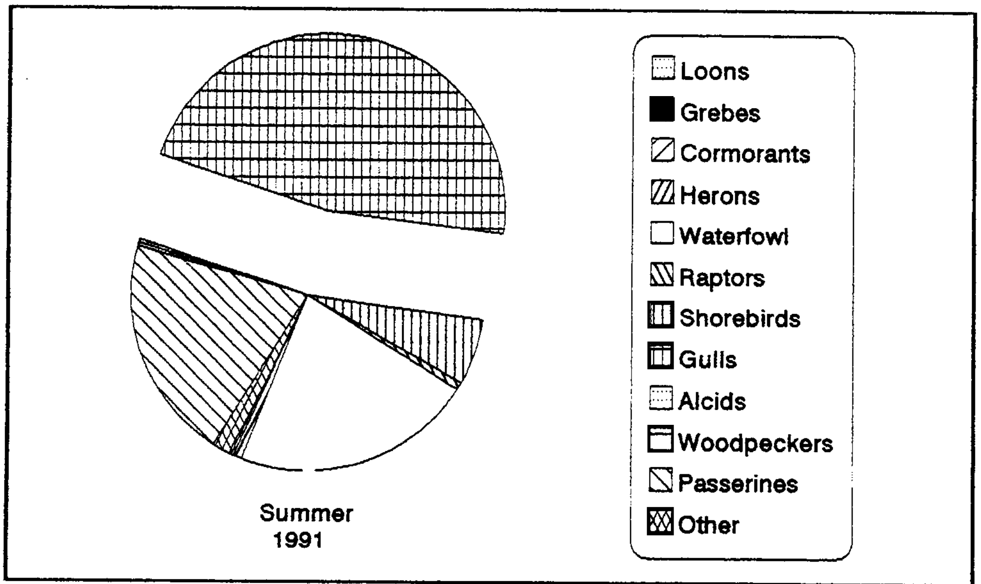

Figure 5. *Proportional species group use of the Cluxewe River estuary and saltmarsh, summer 1991.*

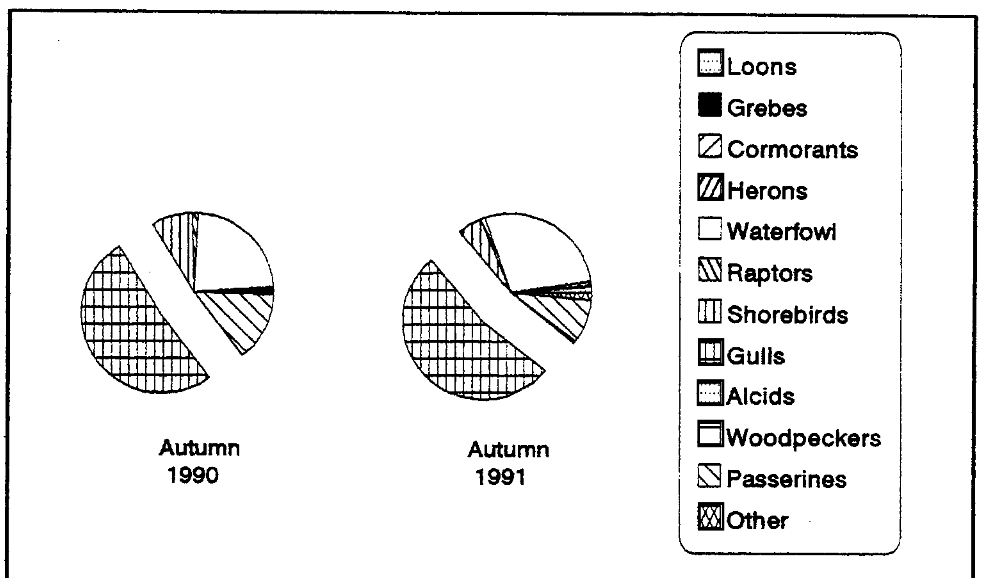

Figure 6. *Proportional species group use of the Cluxewe River estuary and saltmarsh, late autumn 1990 and early autumn 1991.*

Autumn: Figure 6 shows the ratio of species group use of the estuary for the late autumn of 1990 and the early autumn of 1991. For both periods, bird use was dominated by gulls, followed by waterfowl, passerines, then shorebirds. The late autumn period had the second highest numbers of birds using the estuary.

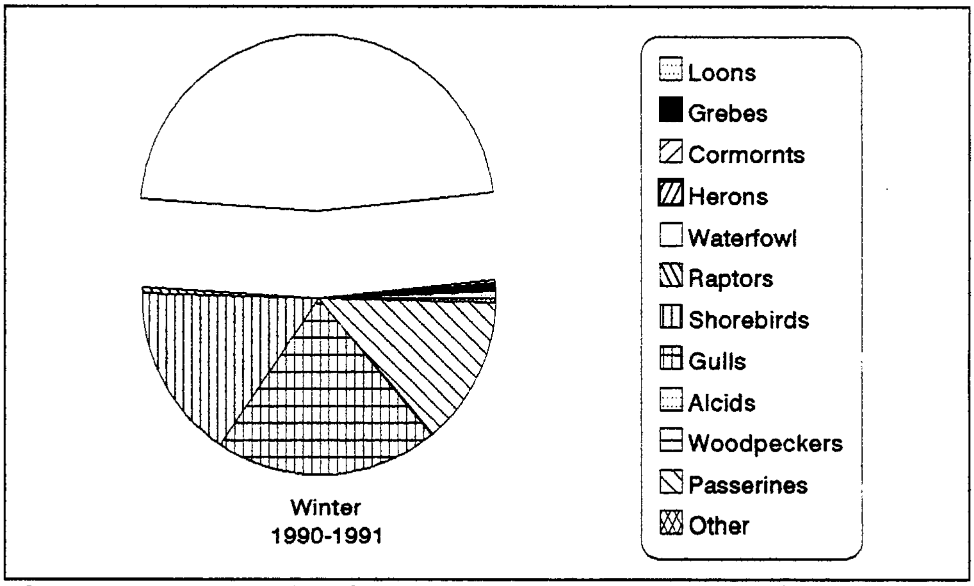

Figure 7. *Proportional species group use of the Cluxewe River estuary and saltmarsh, winter 1990-1991.*

Winter: Figure 7 shows the ratio of species group use of the estuary for the winter of 1990-1991. Waterfowl were the highest user group; gulls, shorebirds and passerines followed. More birds used the Cluxewe River estuary during winter than any other season.

Species Composition

The following annotated species list is organized taxonomically according to bird families as shown in Figures 4,5,6, and 7. It includes summarized data from the survey period, as well as additional data from those sources noted in the methods. Within families, species are discussed in decreasing order of highest use of the estuary during the surveys, followed by those species for which we have additional information. A taxonomic checklist of the birds of the Cluxewe River estuary can be found in Appendix II.

Loons: We recorded 153 loons (<1% of the total birds) over the survey; 95% were identified as the Common Loon, while the remainder was recorded as loon species. Although the Common Loon was seen in every season, 34% of the total loons were noted in winter when a peak of 13 birds occurred on 13 January 1991; spring followed with 29% of the loons. Most loon use was in the intertidal area (94%).

Grebes: Three species of grebes were identified over the survey period with a combined total of 81 birds (<0.5% of all birds seen). Twenty percent of the grebes remained unidentified, recorded simply as grebe species. The Horned Grebe was the most abundant (48% of the total grebes), noted primarily during the winter (62%) when a peak of 9 birds occurred on 27 January 1991. Horned Grebes were also seen during the spring (28%) while autumn numbers were low. There were no summer sightings. Earliest arrival date for the Horned Grebe was 15 September 1991 and latest departure date was 12 May 1991. The Horned Grebe was observed exclusively in the intertidal area.

The Western Grebe was the second most abundant of the grebes comprising 26% of the grebe total. This species was seen in all seasons in low numbers, except during the early autumn of 1991. Numbers were highest in the winter, when a peak of 5 grebes occurred on 20 January 1991. The intertidal area was used by 95% of the birds; 1 Western Grebe was noted in the saltmarsh.

We saw 3 Red-necked Grebes over the study period. One bird was observed on 24 February 1991 and 2 birds were noted on 8 September 1991. Both records were from the intertidal area.

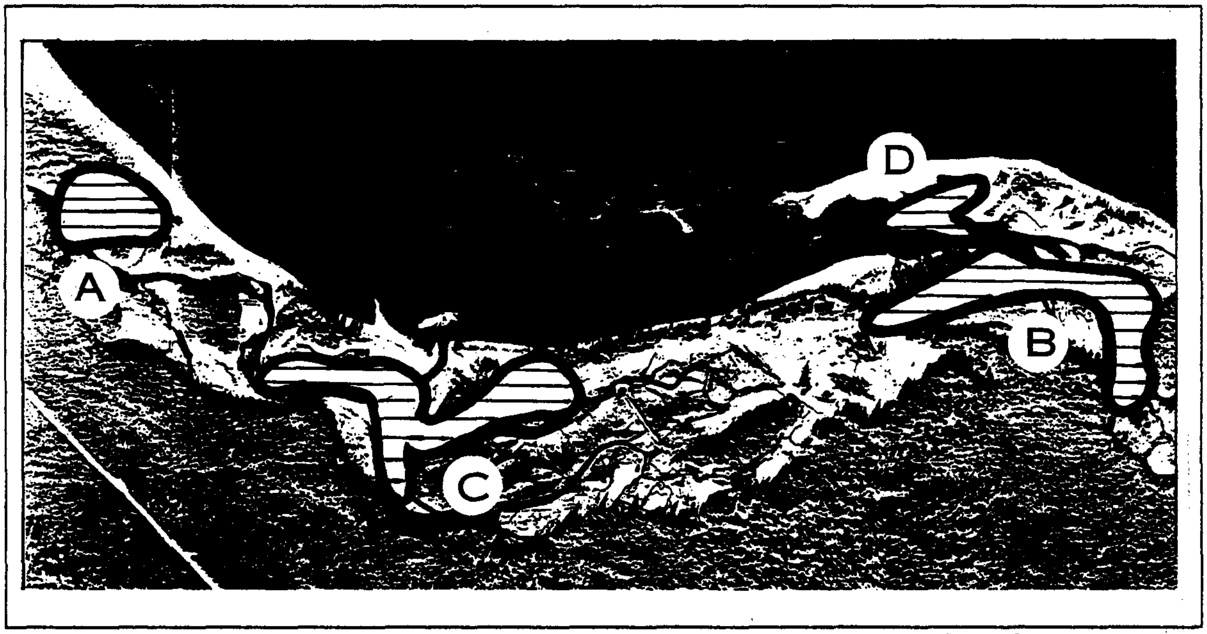

Figure 8. *Major concentrations of the Great Blue Heron on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total herons seen. A-34% B-20% C-17% D-11%.*

Storm-Petrels: Ten Fork-tailed Storm-Petrels were seen outside the study period on 8 August 1981 (NKD & KED).

Cormorants: We observed a total of 20 cormorants over the study period, totalling <0.1% of all birds seen. Only 2 of the birds were identified to species; the remainder was recorded as cormorant species. Cormorant numbers were highest in the winter when 75% were noted. Most of the cormorants (70%) preferred the intertidal area.

One Double-crested Cormorant was seen on 9 December 1990 using the spit.

There are 2 records for the Pelagic Cormorant: 1 bird was seen on 17 February 1991 and 1 bird was noted outside of the study period on 25 July 1979 by Dawe and Wetmore (1980).

Herons: The Great-blue Heron was the only heron reported during the study. It was seen in every season with autumn (1990 and 1991), winter and summer reporting the highest numbers respectively; a peak of 6 birds occurred on 18 August 1991. The Great Blue Heron was found in all 7 of the habitat units; the saltmarsh was used by 51% of the birds followed by the brackish marsh (20%) and the estuarine subtidal area (11%). Figure 8 shows the major concentrations of the Great Blue Heron within the various habitats.

Swans: We recorded a total of 347 Trumpeter Swans during the survey (1.5% of the total birds). Swans were first observed on 2 November 1990 and were last seen on 16 March 1991 (both of these dates were reported by GT to the survey participants and did not fall on the weekly scheduled survey dates). Following the swans' arrival, their frequency of occurrence was 100%; a peak of 48 swans occurred on 2 December 1990. For seasonal fluctuations in swan numbers, see Figure 9. On 23 January 1980, 9 swans were observed near the river mouth (NKD & KED), 2 of which wore blue neck collar bands (06UJ and 07UJ) indicating they were likely Alaskan breeders. Preferred swan habitat varied depending on the season: in the autumn the intertidal area was used by the highest numbers of swans, the estuarine subtidal unit was favoured in the winter and the brackish marsh had the heaviest swan use in the spring (see Figure 10). Overall the estuarine subtidal area was the preferred swan habitat with 38% of the swan use. See Figure 11 for the major concentrations of the Trumpeter Swan within the various habitats.

Geese: Two species of geese comprised 7% of the total birds seen during the survey; 1.5% of the geese were left unidentified (all reported from the intertidal area). The Brant was the most abundant goose with a total of 948 birds reported. Small numbers of Brant (3 to 11 birds) were seen sporadically throughout the winter of 1990-1991; their frequency of occurrence then was 42%. With the exception of 17 March 1991, when an unknown number of Brant were seen (GT), these geese were not seen during March and the first half of April. The first of the spring migrants arrived on 20 April 1991-36 Brant. From this date, numbers continued to build to peak at 300 Brant on 19 May 1991.

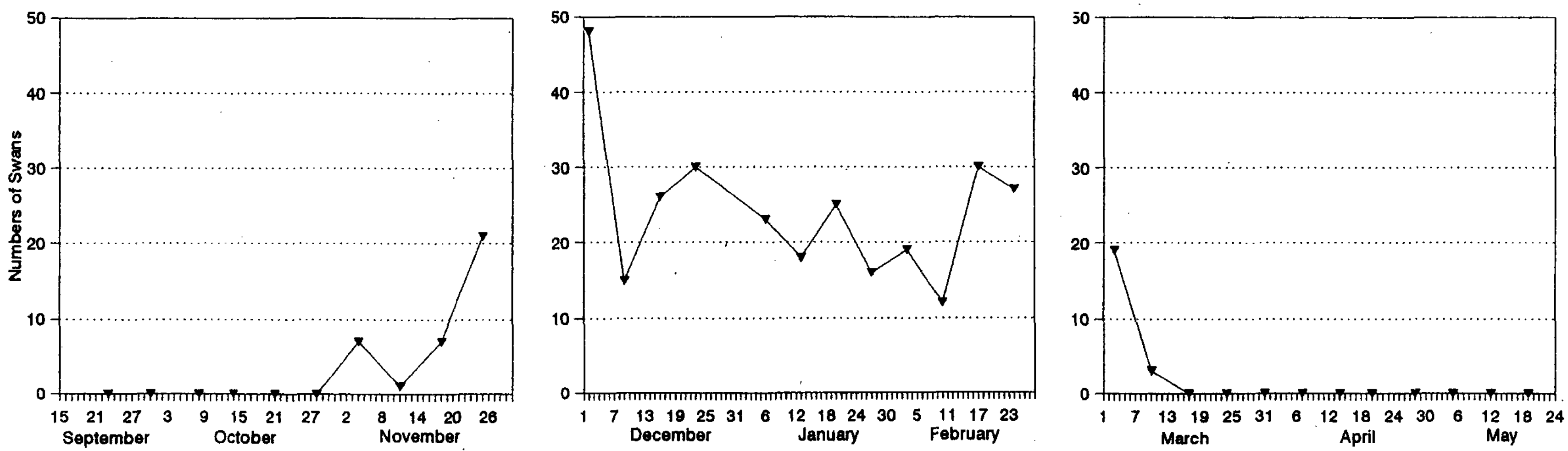

Figure 9. *Seasonal fluctuations in numbers of Trumpeter Swans on the Cluxewe River estuary, autumn 1990 through spring 1991.*

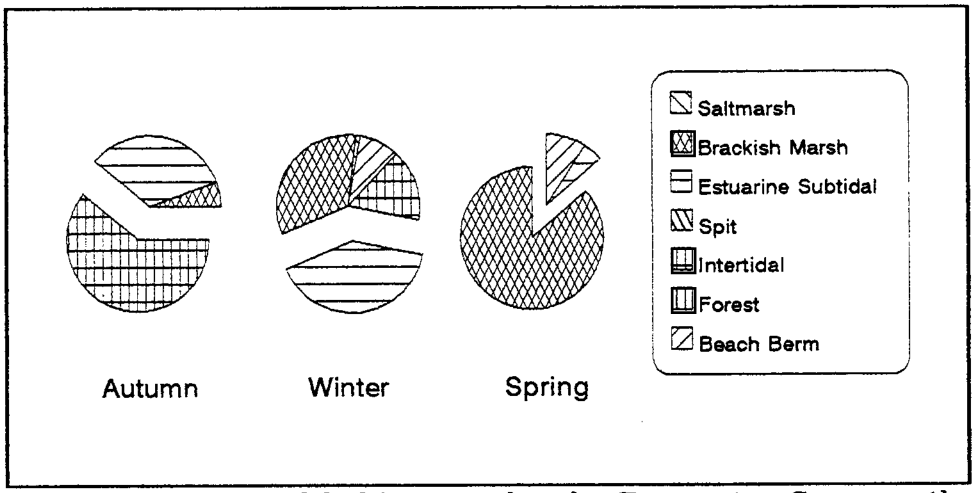

Figure 10. *Seasonal habitat use by the Trumpeter Swan on the Cluxewe River estuary, autumn (1990 and 1991 combined) through spring 1991.*

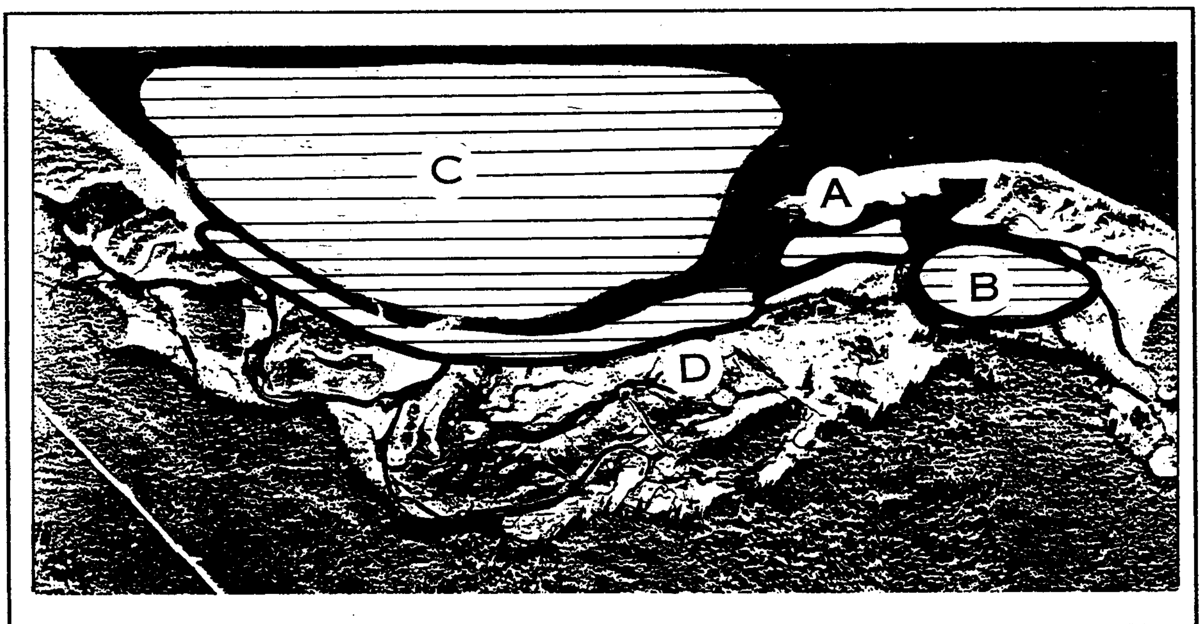

Figure 11. *Major concentrations of the Trumpeter Swan on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-38% B-35% C-15% D-11%.*

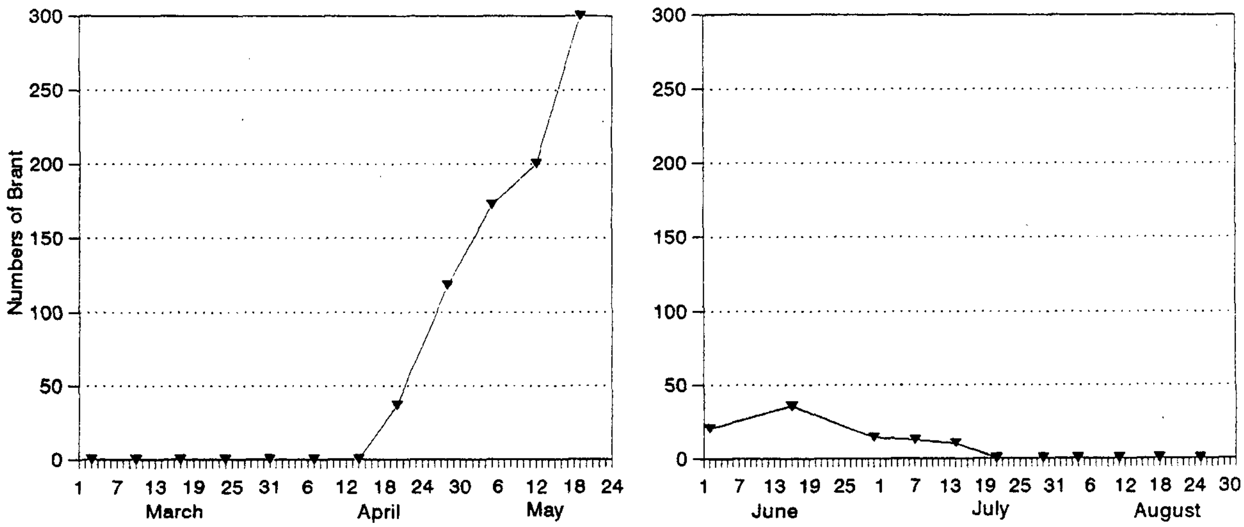

Figure 12. *Seasonal fluctuations in numbers of Brant on the Cluxewe River estuary, spring and summer, 1991.*

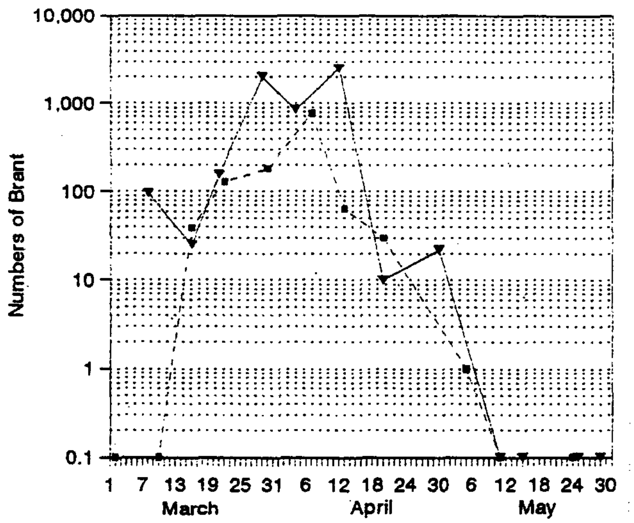

Figure 13. *Seasonal fluctuations in numbers of Brant on the Englishman River estuary, spring 1980 (solid line) and spring 1989 (dashed line; from Dawe et al. 1994).*

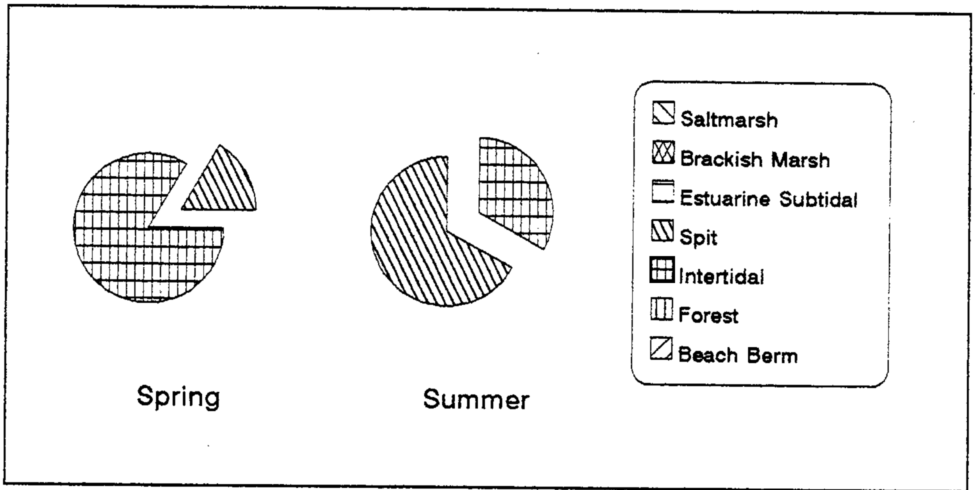

Figure 14. *Seasonal habitat use by the Brant on the Cluxewe River estuary, Spring and Summer 1991.*

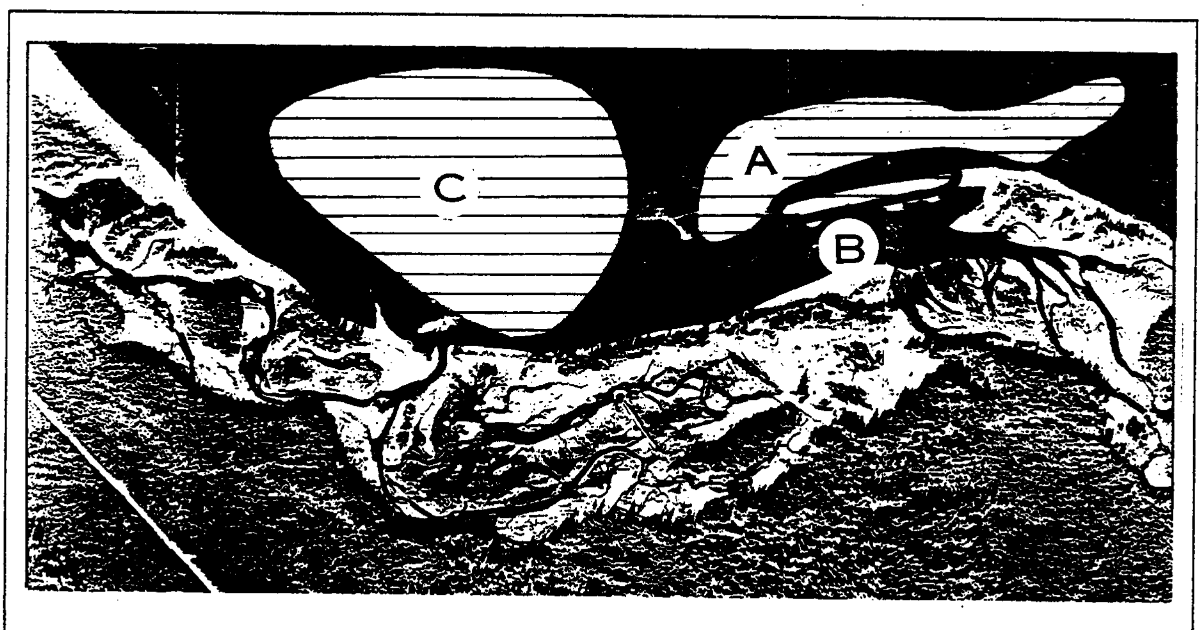

Figure 15. *Major concentrations of Brant on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-60% B-22% C-18%.*

All Brant had left the Cluxewe River estuary for their northern breeding grounds by 14 July 1991 (Figure 12). Dawe et al. (1994) found Brant migration to start almost a full month earlier on the Englishman River estuary in Parksville, B.C. (see Figure 13 for comparison). Brant peak in the Parksville-Qualicum Beach area during the first 2 weeks of April (Dawe and Nygren 1991). Preferred habitat for the Brant on the Cluxewe River estuary was the intertidal area (78%) while the remaining 22% of the Brant were recorded using the spit; see Figure 14 for

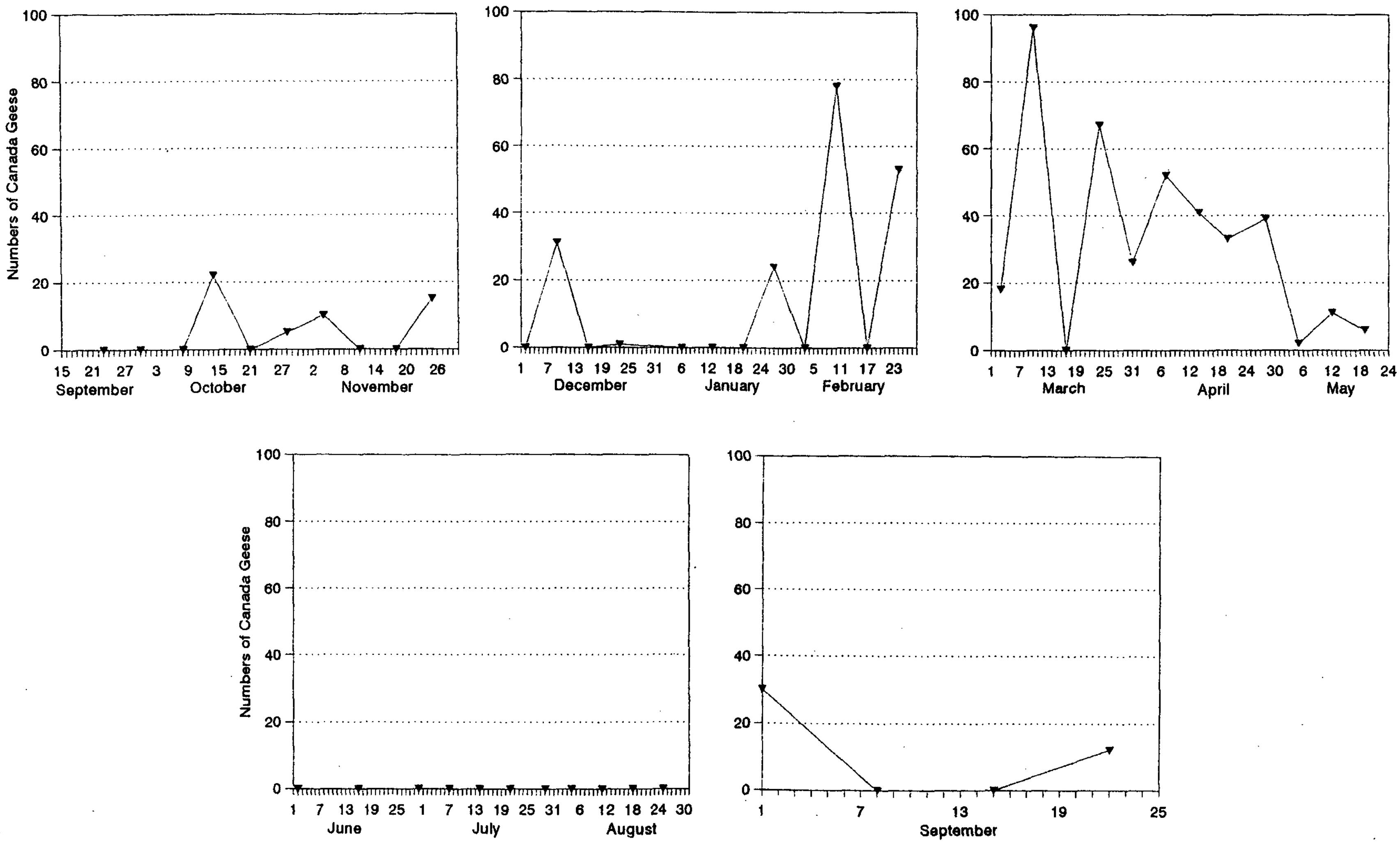

Figure 16. *Seasonal fluctuations in numbers of Canada Geese on the Cluxewe River estuary, September 1990 to September 1991.*

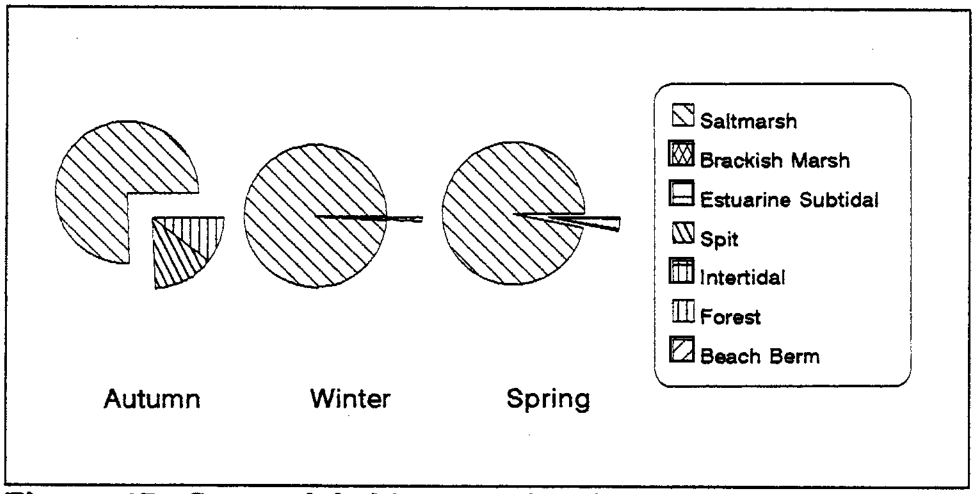

Figure 17. *Seasonal habitat use by the Canada Goose on the Cluxewe River estuary, autumn (1990 and 1991 combined) through spring 1991.*

seasonal habitat use. Brant depend on gently sloping beaches, such as the spit, for feeding, loafing and maintenance activities. Unfortunately, spring migration coincides with the arrival of campers to the spit. By 24 March 1991 the campground was full and the spit from this date on was occupied with people and dogs, thereby preventing Brant and other birds from using the area. On numerous occasions, the surveyors reported reduced numbers of birds using the spit on the days when heavy camper use was evident (see Appendix I for surveyor's remarks). Figure 15 shows the major concentrations of Brant within the habitats.

Canada Goose numbers totalled 672 birds. The probability of seeing a Canada Goose on the estuary ranged from 0% in the summer of 1991 to 92% in the spring of 1991 when 58% of the total geese were seen; for seasonal fluctuations see Figure 16. A peak of 96 birds occurred on 10 March 1991. Canada Geese were observed using all habitat units except the intertidal area, but the saltmarsh was the preferred habitat overall used by 94% of the birds and in every season (see Figure 17). Waterfowl using the Cluxewe River estuary are subjected to hunting pressure. Hunters with their dogs were observed, or their gunshots heard, regularly throughout the autumn and winter in the estuarine subtidal and spit areas. On 25 November 1990, hunters were met at the gate with 4 Canada Goose kills and on 13 January they were seen from the saltmarsh carrying 3 Canada Geese and 1 unidentified duck. Surveyors reported reduced numbers of bird sightings on the days hunters were encountered.

Dabbling Ducks: Over the study period, 8 species of dabbling ducks were recorded representing 11% of the total birds seen. The Mallard was by far the most abundant of the dabblers, followed by Green-winged Teal and Northern Pintail respectively. Five percent of the dabbling ducks remained unidentified, and were recorded as dabbler species. Numbers continued to build throughout the autumn and winter, peaking in the spring of 1991 when 42% of the total

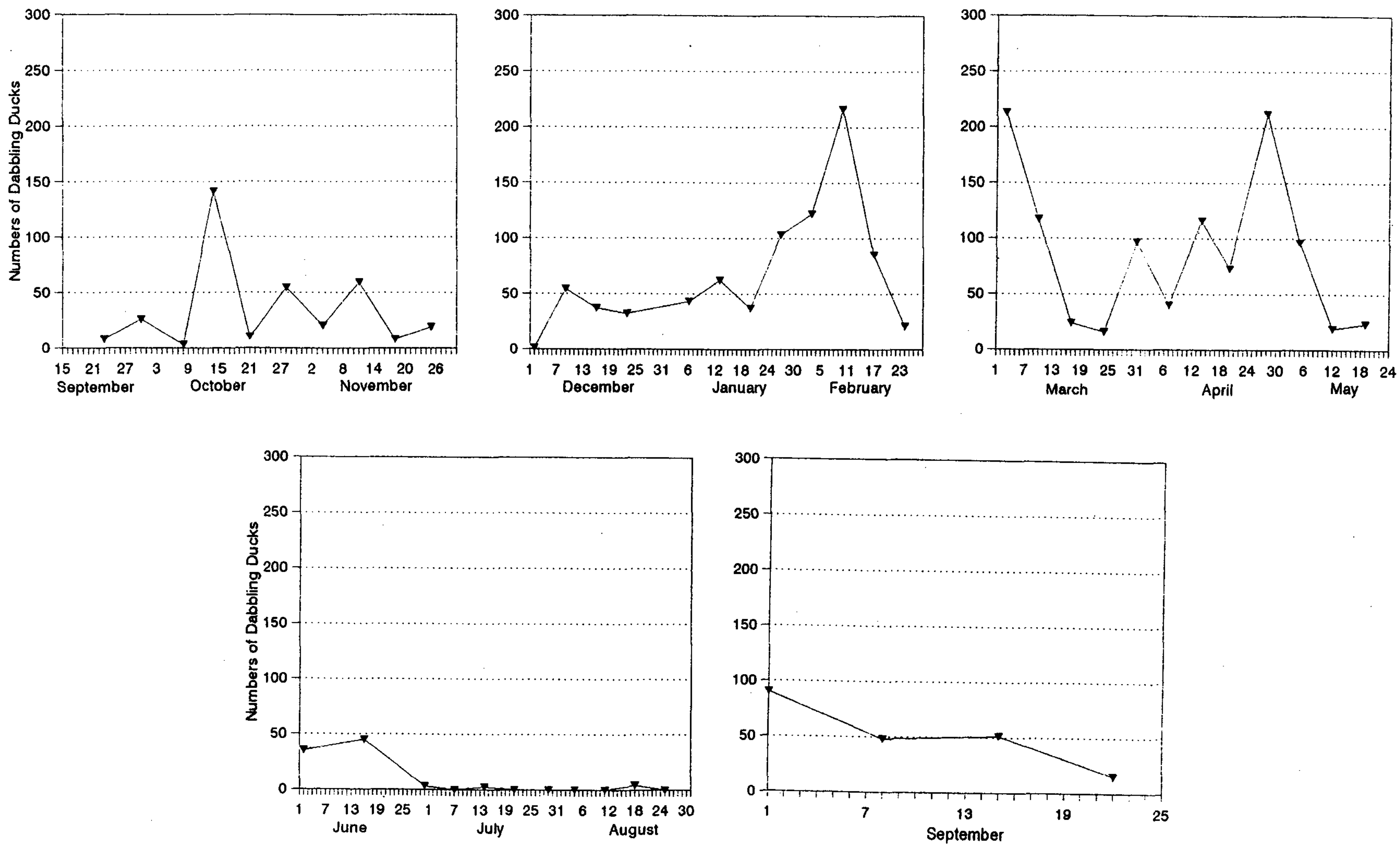

Figure 18. *Seasonal fluctuations in numbers of dabbling ducks on the Cluxewe River estuary, September 1990 to September 1991.*

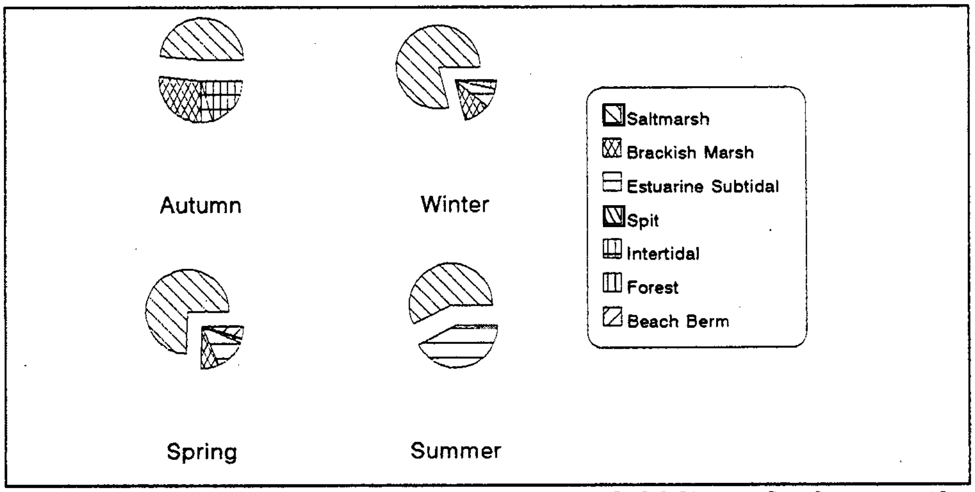

Figure 19. *Seasonal habitat use by dabbling ducks on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

dabbling ducks were seen. For seasonal fluctuations in their numbers see Figure 18. The saltmarsh was the preferred habitat used by 70% of the Mallards; during the autumn of 1990 and 1991, the brackish marsh and the intertidal areas were also used in significant proportions (Figure 19). When hunting pressures increase it is likely that the intertidal areas are used more frequently as a disturbance free refuge (see Eamer 1985).

The Mallard accounted for 72% of the dabbling duck total. This species was a year-round resident, its numbers increasing through the autumn of 1990 and winter of 1990-1991, and peaking in spring (see Figure 20). A high of 205 birds occurred on 3 March 1991. Mallard habitat preferences were almost identical for the autumn, winter and spring seasons: the saltmarsh had 75% of the bird use, followed by estuarine subtidal (8 to 12%) and brackish marsh (7 to 11%). The summer season differed slightly with only 2 habitats used: saltmarsh and estuarine intertidal. For seasonal habitat fluctuations in Mallard numbers see Figure 21 and for major concentrations within the habitats see Figure 22.

The Green-winged Teal was the second most abundant dabbling duck comprising 10% of the dabbling duck total. Seasonal fluctuations in the numbers of Green-winged Teal differed dramatically from the overall trend seen in the dabbling ducks as a whole (Figure 23); highest Green-winged Teal numbers were in the autumn of 1991 while lowest numbers were in the spring of 1991. During the survey, a peak of 48 Green-winged Teal occurred on 8 September 1991; however, 220 Green-winged Teal were observed in the saltmarsh on 23 January 1980 (NKD & KED), nearly as many birds on 1 observation as was seen during the entire year of the survey. The earliest autumn arrival was 1 September 1991, although outside the study period, at least 30 Green-winged Teal were seen using the mudflat area at the western end of the saltmarsh on 29 August 1994 (TM & JS); the latest spring departure was 5 May 1991. Overall, the preferred habitat for Green-winged Teal was the saltmarsh (73%) but seasonally, this proportion varied significantly (Figure 24). During the winter of 1990-1991 the saltmarsh was used almost exclusively, while in the spring, the estuarine subtidal area

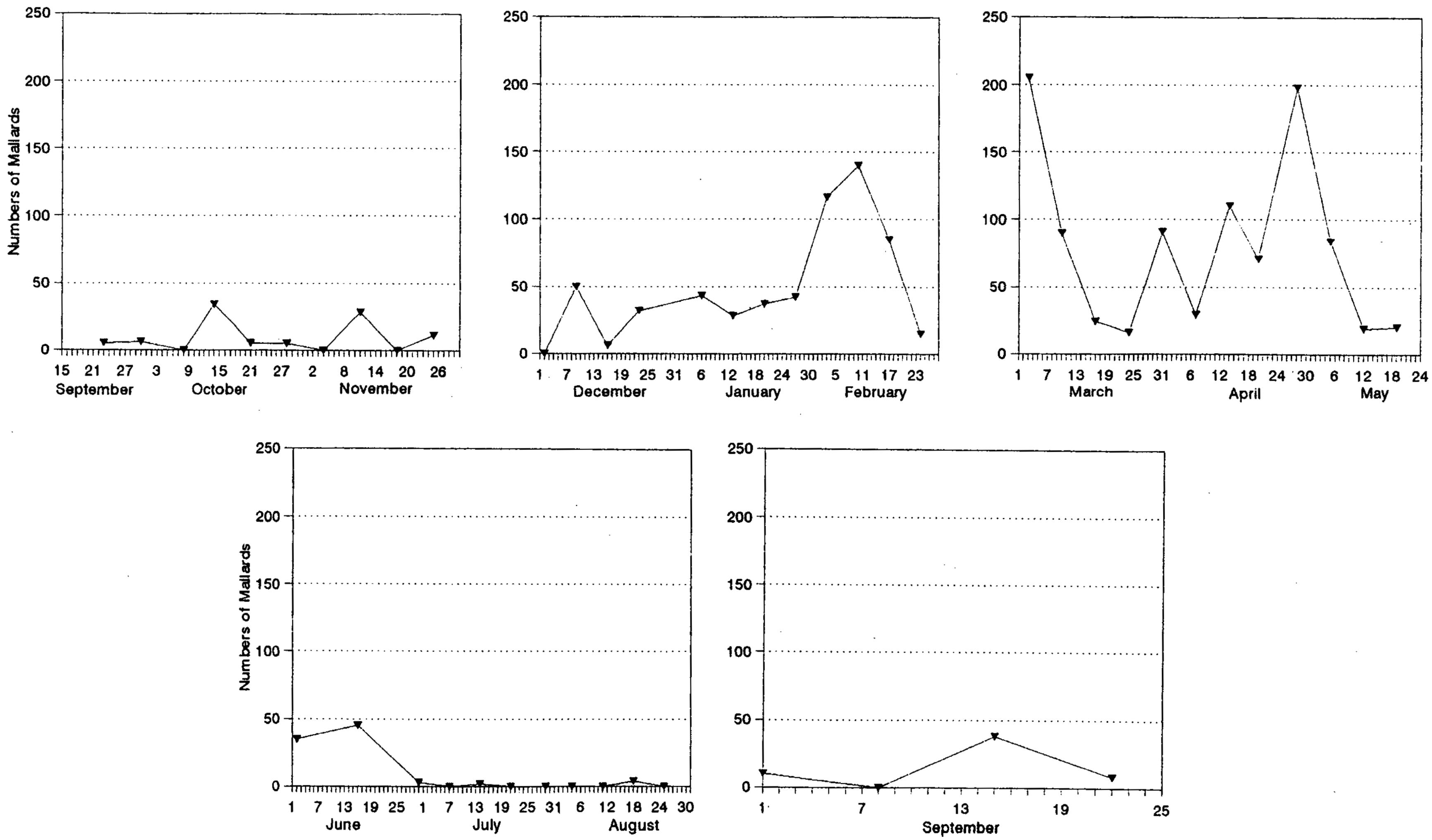

Figure 20. *Seasonal fluctuations in numbers of Mallards on the Cluxewe River estuary, September 1990 to September 1991.*

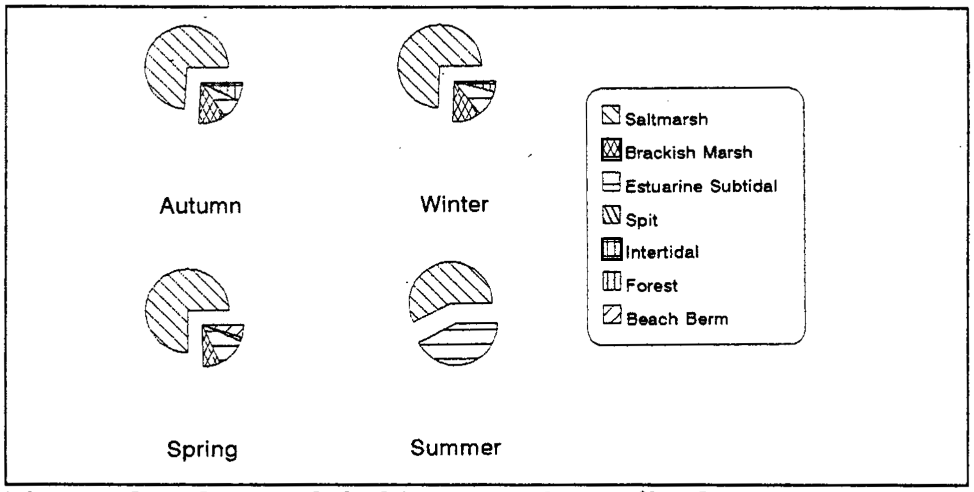

Figure 21. *Seasonal habitat use by Mallard on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

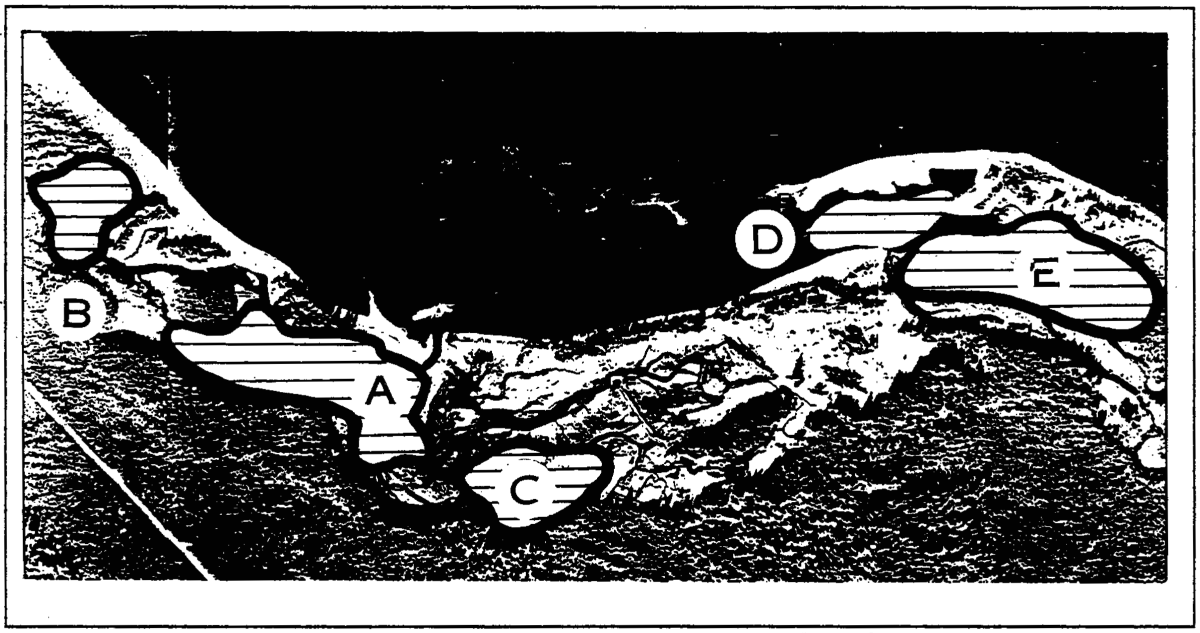

Figure 22. *Major concentrations of the Mallard on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-30% B-20% C-14% D-11% E-11%.*

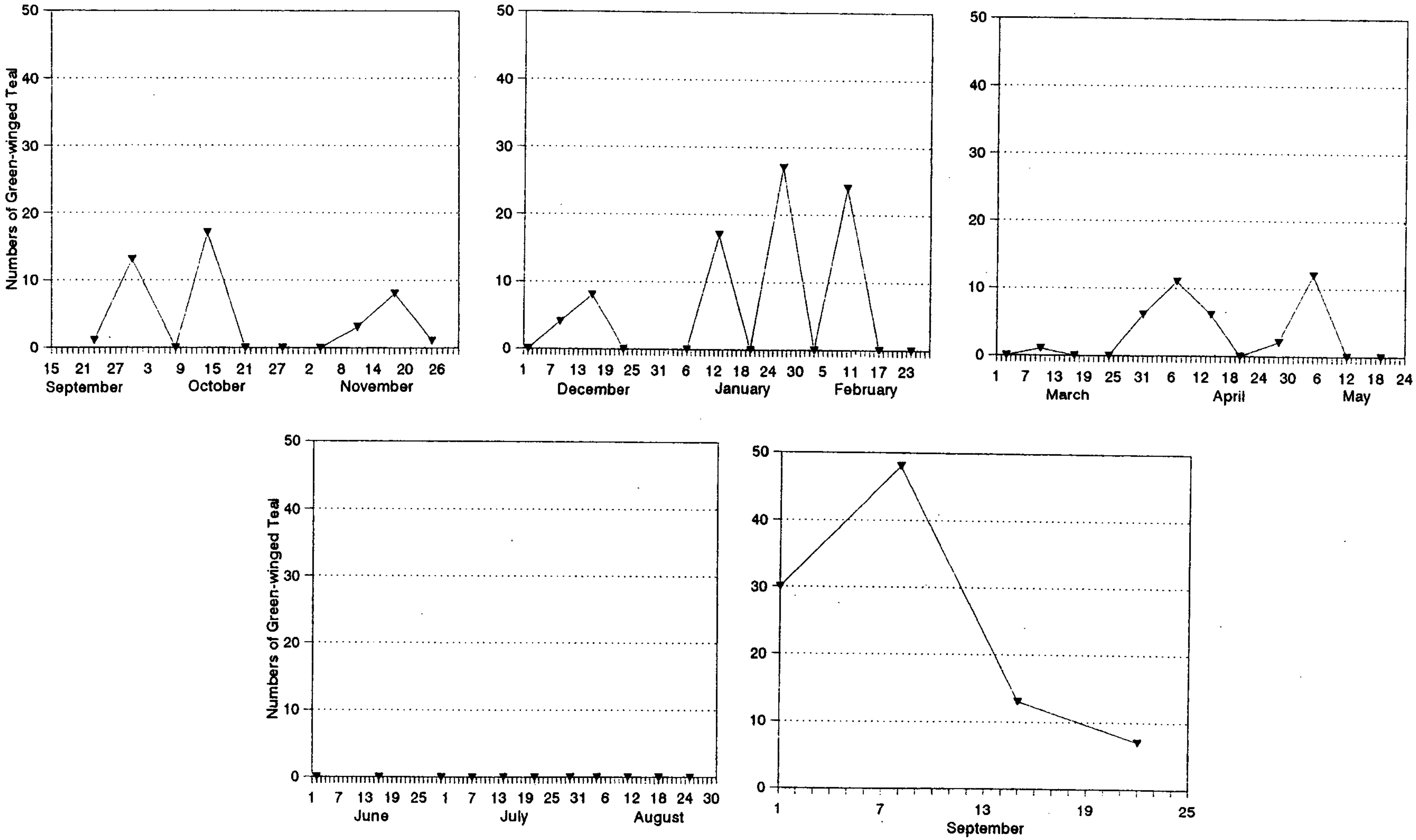

Figure 23. *Seasonal fluctuations in numbers of Green-winged Teal on the Cluxewe River estuary, September 1990 to September 1991.*

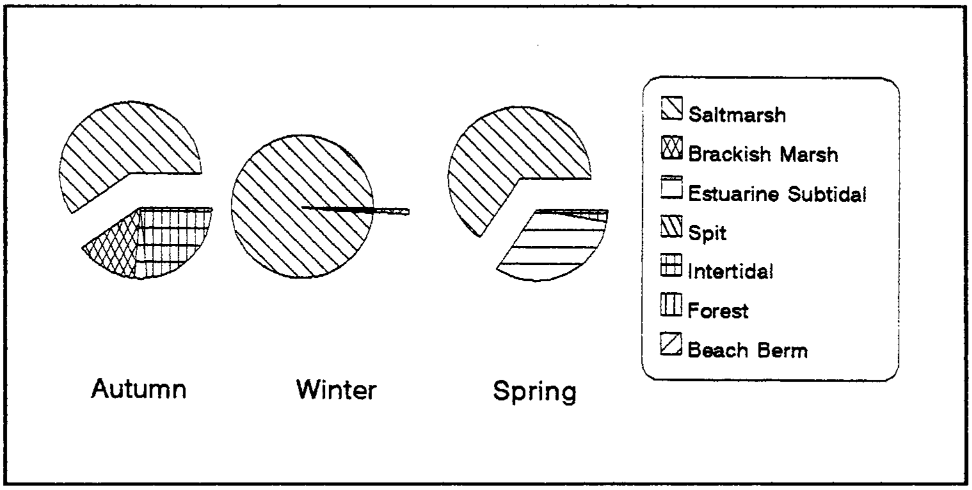

Figure 24. *Seasonal habitat by Green-winged Teal on the Cluxewe River estuary, autumn (1990 and 1991) combined through spring, 1991.*

Figure 25. *Major concentrations of the Green-winged Teal on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-73% B-22%.*

was used by a significant proportion of teal. During the combined autumns of 1990 and 1991 the intertidal area saw substantial use. See Figure 25 for major concentrations of the Green-winged Teal within various habitats.

The Northern Pintail was the third most abundant dabbling duck comprising 6% (144 birds) of the dabbling duck total. Pintail numbers were highest during the winter of 1990-1991 when 63% were observed; a peak of 52 birds occurred on 10 February 1991. The earliest fall arrival was 23 September 1990, although outside of the study period 2 pintail were seen with the above mentioned teal on 29 August 1994 (TM & JS); the latest spring departure was 3 March 1991. Like the teal, pintail favoured the saltmarsh where 63% of the birds were observed, followed by the brackish marsh (22%) and intertidal (15%). See Figure 26 for major concentrations of Northern Pintail within various habitats.

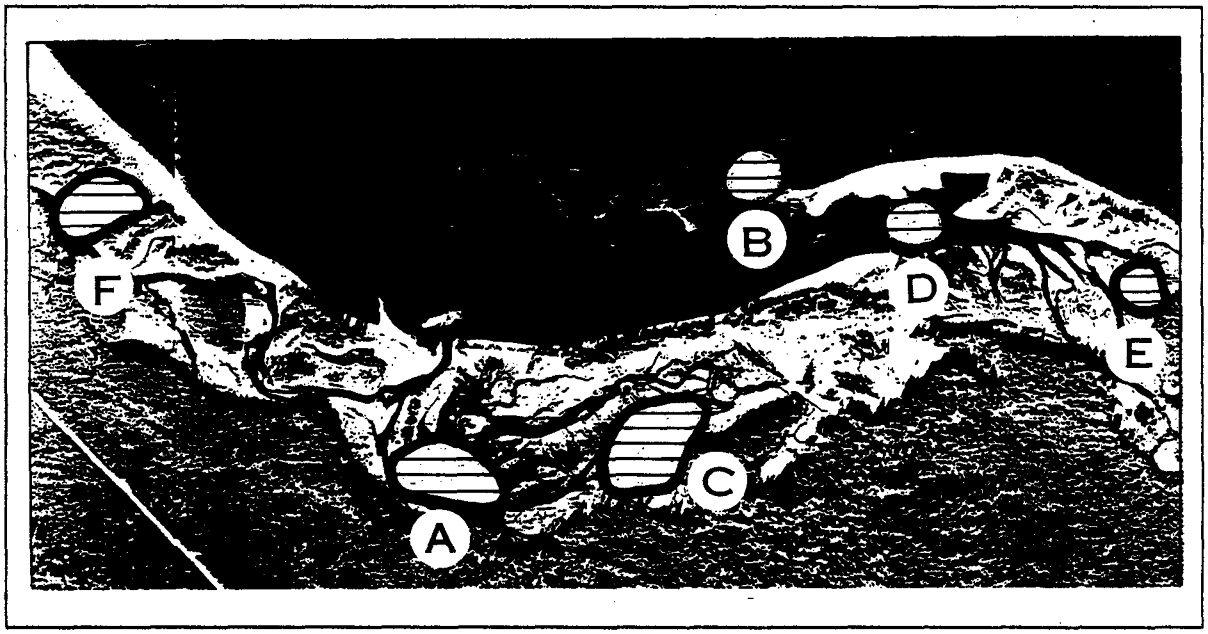

Figure 26. *Major concentrations of the Northern Pintail on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-40% B-14% C-12% D-12% E-12% F-10%.*

A total of 126 American Wigeon, or 5% of the dabbling duck total, was seen almost exclusively during the autumn seasons; 1 bird was noted in the saltmarsh on 19 May 1991. In the autumn of 1990 when 60% of the wigeons were seen, their frequency of occurrence was 50%. There was only 1 record in the autumn of 1991: 50 American Wigeon were observed on 1 September in the intertidal area, which was also the earliest arrival and the peak numbers for this species; the latest departure was 19 May 1991. The intertidal area was the preferred habitat used by 40% of the birds, followed by the saltmarsh (37%) and the brackish marsh (24%).

Although 30 Eurasian Wigeon were noted, they were all seen together in a mixed flock of Northern Pintail, Mallard, Green-winged Teal and American Wigeon (30 birds) on 14 October 1990 in the estuarine subtidal area. Campbell et al.

(1990) note that Eurasian Wigeon are generally found in small numbers within larger flocks of American Wigeon. This number of Eurasian Wigeon anywhere in British Columbia would be extraordinary, particularly in the company of so few American Wigeon. It exceeds the single largest group documented in the province: 22 male Eurasian Wigeon counted in a flock of 2,000 American Wigeon at Reifel Island (Campbell et al. 1990). As a comparison, during a bird survey on the Englishman River estuary in Parksville, Vancouver Island (see Dawe et al. 1994) American Wigeon were the most abundant dabbling duck with over 12,300 birds observed and only 47 Eurasian Wigeon were reported over the course of the survey. The maximum daily total was 7 birds. Since adequate field notes are not available we have considered this Eurasian Wigeon record hypothetical.

The remaining dabbling ducks (Northern Shoveler, Gadwall and Blue-winged Teal) were seen in small numbers and collectively accounted for <2% of the dabbling duck total.

We have 3 spring records for the Northern Shoveler with a total of 16 birds: 20 April 1991-2 birds in the intertidal area, 28 April 1991-12 birds using the brackish marsh and 19 May 1991-2 birds were loafing on the tip of the spit. Outside of the survey, 2 Northern Shovelers were seen surface filtering in the mudflat area in the western portion of the saltmarsh with other dabblers on 29 August 1994 (TM & JS). One of the shovelers showed a dark area before the bill bordered with faint white line indicating a male in supplementary plumage that lasts until late winter.

Nine Gadwall were seen on 11 November 1990: 1 bird was using the saltmarsh while the remaining 8 were in the estuarine subtidal area.

On 16 December 1990, 4 Blue-winged Teal were observed in the saltmarsh with small numbers of dabbling ducks and Bufflehead. This is a very late date for this species anywhere in the province (see Campbell et al. 1990); since field notes were not made we have considered this record as hypothetical.

Diving Ducks: Thirteen species of diving ducks comprised 21% of the total birds seen during the study period. Buffleheads were by far the most abundant diving duck followed by scoters and Harlequin Ducks. Fourteen percent of the diving ducks remained unidentified and were recorded primarily as duck species. Numbers peaked during the winter of 1990-1991 when 46% of the diving ducks were seen followed by spring (24%) and late autumn (19%); for seasonal fluctuations see Figure 27. Overall, diving ducks preferred the intertidal area where 72% of all the diving ducks were observed; the estuarine subtidal habitat (favoured in the spring) was a distant second (19%). For seasonal habitat use by diving ducks see Figure 28.

The Bufflehead was the most abundant diving duck accounting for 41% of the total. Earliest fall arrival was 28 October 1990 and the latest spring departure was 19 May 1991. Bufflehead were found in the greatest numbers (48%) during the winter of 1990-1991 when a peak of 241 birds was recorded on 27 January 1991. On that day, 71% of the total numbers were found together in a mixed flock with other diving ducks, swans, grebes and cormorants in the intertidal area; the remaining Bufflehead were scattered in other subtidal locations, the estuarine subtidal unit and throughout the saltmarsh. We have 2

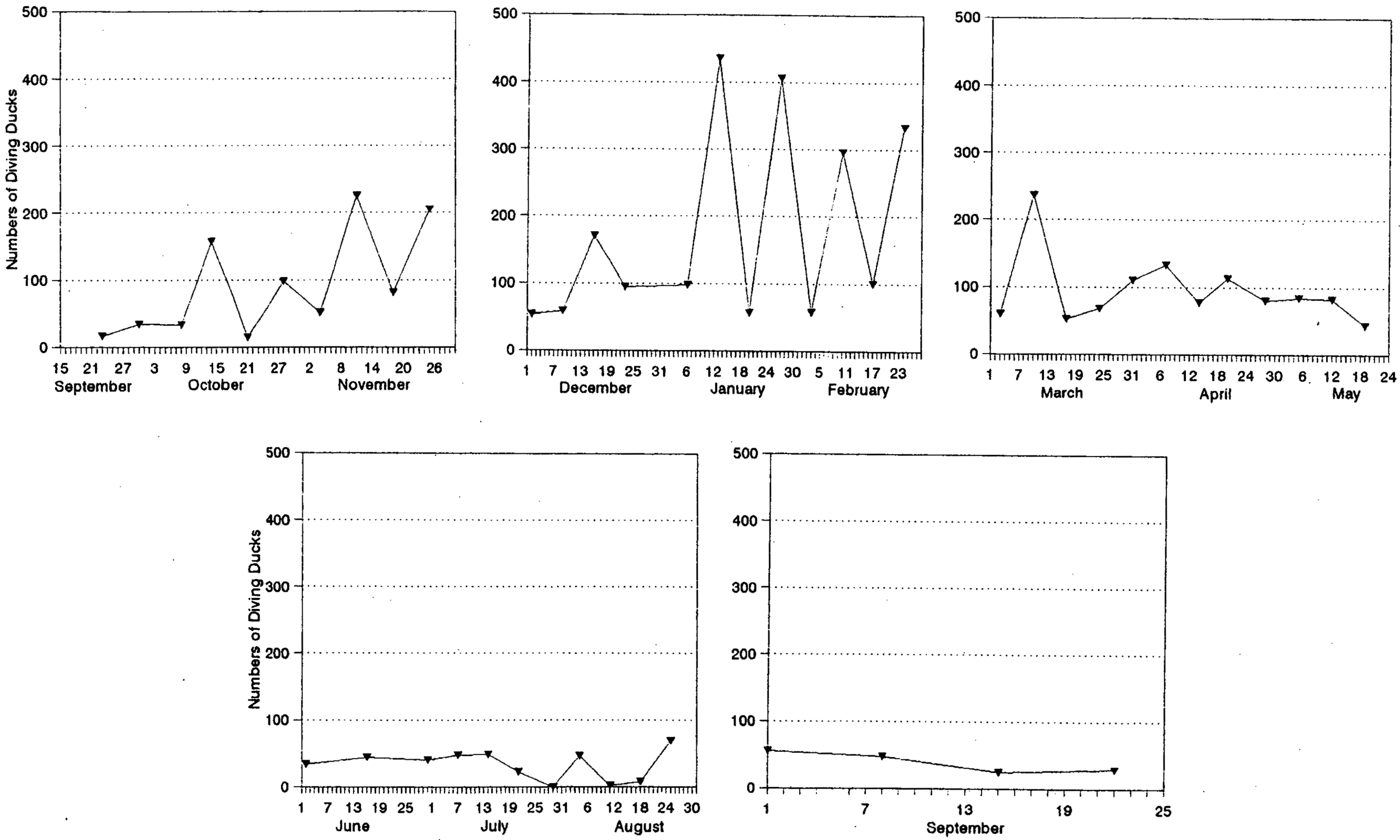

Figure 27. *Fluctuations in numbers of diving ducks on the Cluxewe River estuary, September 1990 to September 1991.*

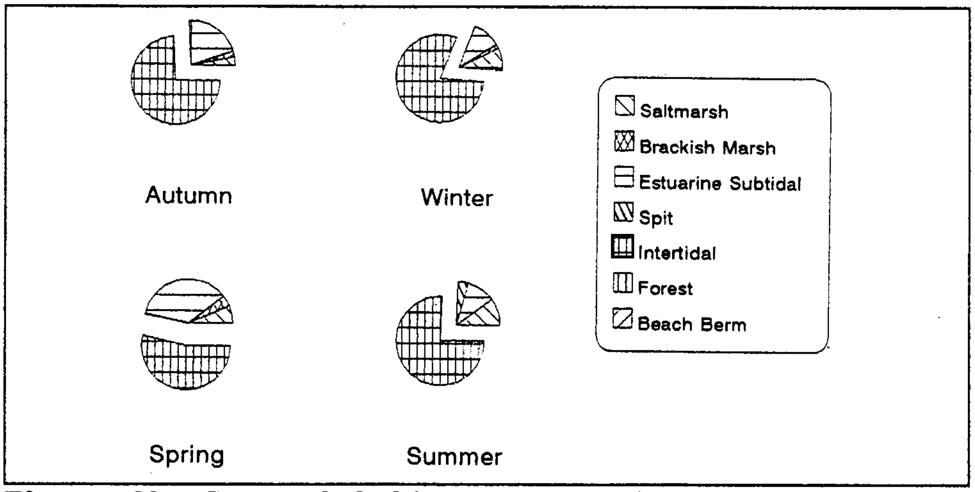

Figure 28. *Seasonal habitat use by diving ducks on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

records of Bufflehead on the Cluxewe River estuary over the summer: 16 June 1991-15 birds and 14 July 1991-8 birds. Campbell et al. (1990) give 2 possible explanations: small numbers of coastal birds remain behind after spring migration and may be unfit birds and small flocks of males can be found in coastal locations between mid May and June after they leave their breeding territories once the females have started incubation. Unfortunately the sex of the birds in the flocks was not recorded, but the date of the first flock coincides with the latter explanation. The intertidal area was the Bufflehead's preferred habitat (53% of the birds used this area overall); however, during the spring of 1991 the estuarine subtidal habitat was used the most by the bufflehead (51%). See Figure 29 for areas of major concentration of Bufflehead within habitats.

The scoters (Black, Surf and White-winged) were the second most abundant group accounting for 17.6% of the diving duck total. Surf scoters were by far the most frequently seen of the 3 species comprising 75% of the scoter numbers. Migration dates for this species are difficult to determine due to the numbers of summering birds, likely pre-breeders, that remain along the coast and are later joined by males that have left the breeding grounds to moult at sea (Campbell et al. 1990). Fall arrivals appear around the end of September with numbers building through to winter when 40% of the total was recorded; a peak of 77 Surf Scoters occurred on 27 January 1991. Most Surf Scoters have left for the breeding grounds by the end of March 1991. During June and the first half of August 1991, between 3 and 47 Surf Scoters were recorded; the frequency of occurrence during that time was 73% (summer numbers accounted for 28% of the Surf Scoters seen). The Surf Scoter preferred the intertidal area where 92% of the birds were recorded; the remaining birds used the estuarine subtidal habitat. See Figure 30 for Surf Scoter concentrations within the habitats of the estuary.

Twenty-one percent of the scoters were White-winged. Numbers were highest during the autumn of 1990 when 56% of the White-winged Scoters were recorded and their frequency of occurrence was 70%; a peak of 41 birds was

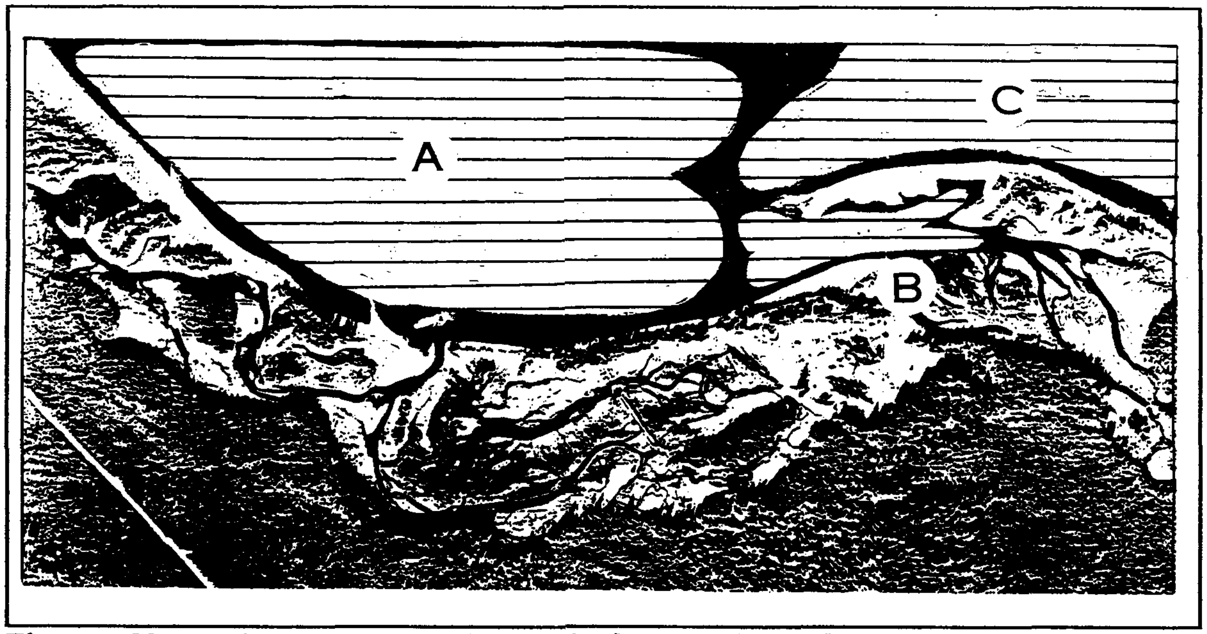

Figure 29. *Major concentrations of the Bufflehead on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-32% B-30% C-21%.*

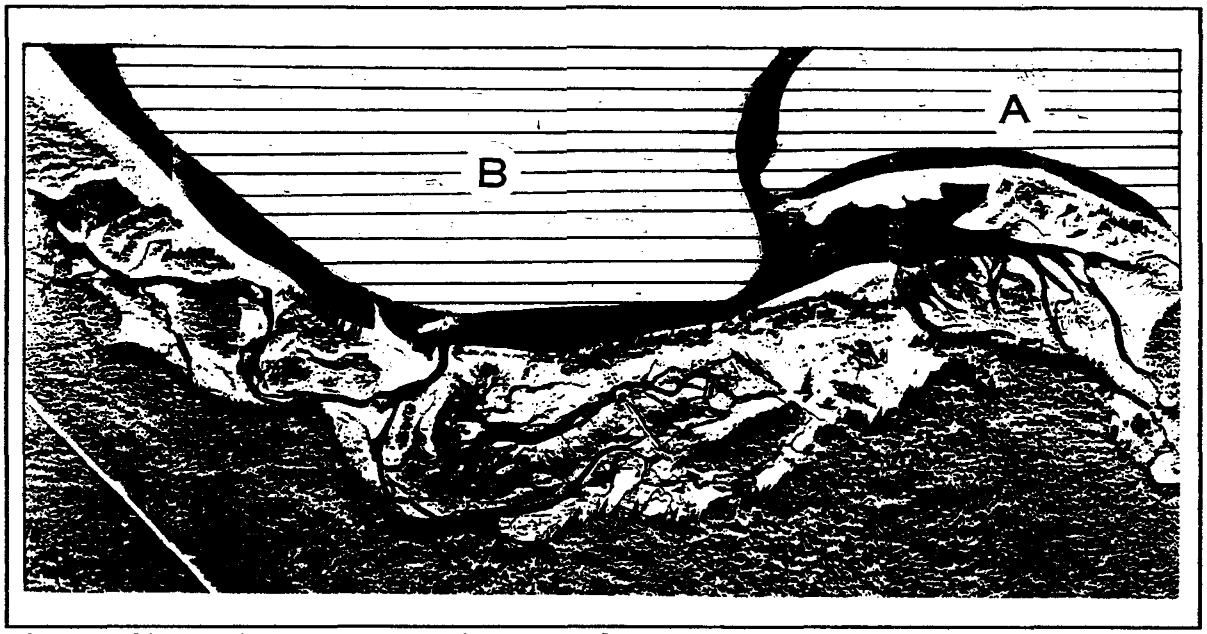

Figure 30. *Major concentrations of the Surf Scoter on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-67% B-25%.*

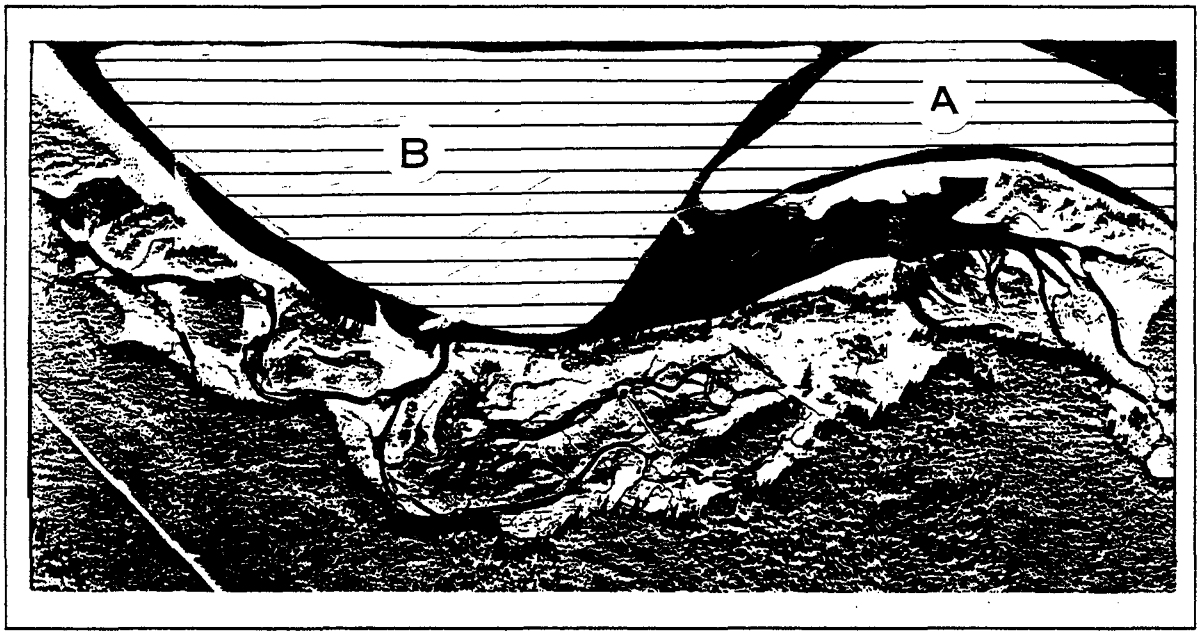

Figure 31. *Major concentrations of the White-winged Scoter on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-66% B-15%.*

noted on 14 October 1990. From that date, seasonal numbers dropped steadily through the winter of 1990-1991 (27%) to the summer of 1991 (6%); there were no records of White-winged Scoters during the autumn of 1991. Like the Surf Scoter, it is difficult to ascertain exact migration dates; generally fall migrants arrive from late September to early November while spring migration occurs in April and May. Summer records are largely due to first-year birds remaining at the coast (Campbell et al. 1990). Overall the intertidal area was preferred by 81% of the birds. White-winged Scoters were also recorded using the brackish marsh (11%); the saltmarsh and spit habitats were used by small numbers. See Figure 31 for areas of major concentration within the habitats for the White-winged Scoter.

There was only 1 record for the Black Scoter: 8 birds were noted in the intertidal area on 20 January 1991.

The Harlequin Duck accounted for 17% of the total diving ducks ranking them as the third most abundant member of this group. Numbers peaked during the winter of 1990-1991 when 36% were seen followed by autumn 1990 (32%) and spring 1991 (24%). Nonbreeding summer birds make the migration dates difficult to determine; however, the frequency of occurrence for the Harlequin Duck was

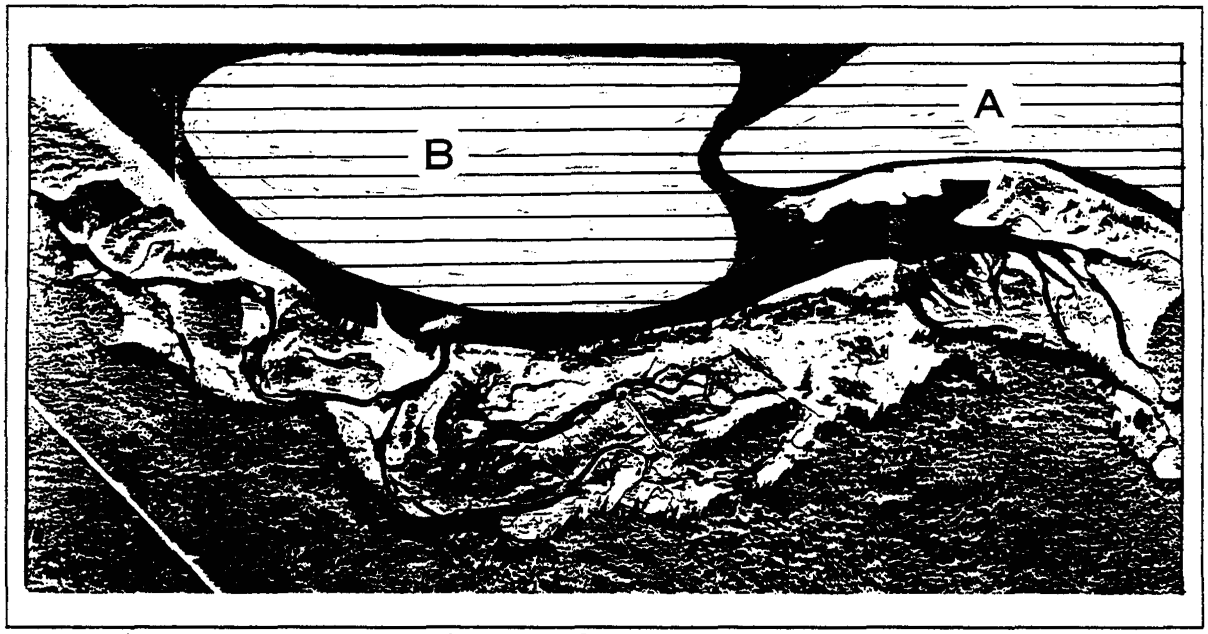

Figure 32. *Major concentrations of the Harlequin Duck on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-78% B-18%.*

100% between 30 September 1990 and 16 June 1991. The intertidal area was used by 96% of the birds while the remainder were seen in the estuarine subtidal and brackish marsh habitats. See Figure 32 for areas of major concentration of the Harlequin Duck within habitats.

The goldeneyes tied with the mergansers as the fourth most abundant diving duck group, each group representing 4% of the total numbers. Of the 2 goldeneye species, the Common Goldeneye was seen the most frequently (59%). Earliest arrival date for the Common Goldeneye was 25 November 1990 and the latest spring departure was 12 May 1991. A peak of 17 birds was recorded on 10 February 1991. Although the Common Goldeneye used 4 of the habitat units, the intertidal and estuarine subtidal areas were preferred by 58% and 28% of the birds respectively; the remainder were recorded in the salt and brackish marshes. See Figure 33 for areas of major concentration of the Common Goldeneye within habitats.

The Barrow's Goldeneye was seen at the Cluxewe River estuary between 23 December 1990 and 5 May 1991. A peak of 22 birds observed on 23 December 1990 occurred outside of the season when most of the birds were noted; spring numbers were the highest (59%) compared to winter numbers (41%). Only 2 habitat types were frequented by the Barrow's Goldeneye: estuarine subtidal (71%) and intertidal (29%).

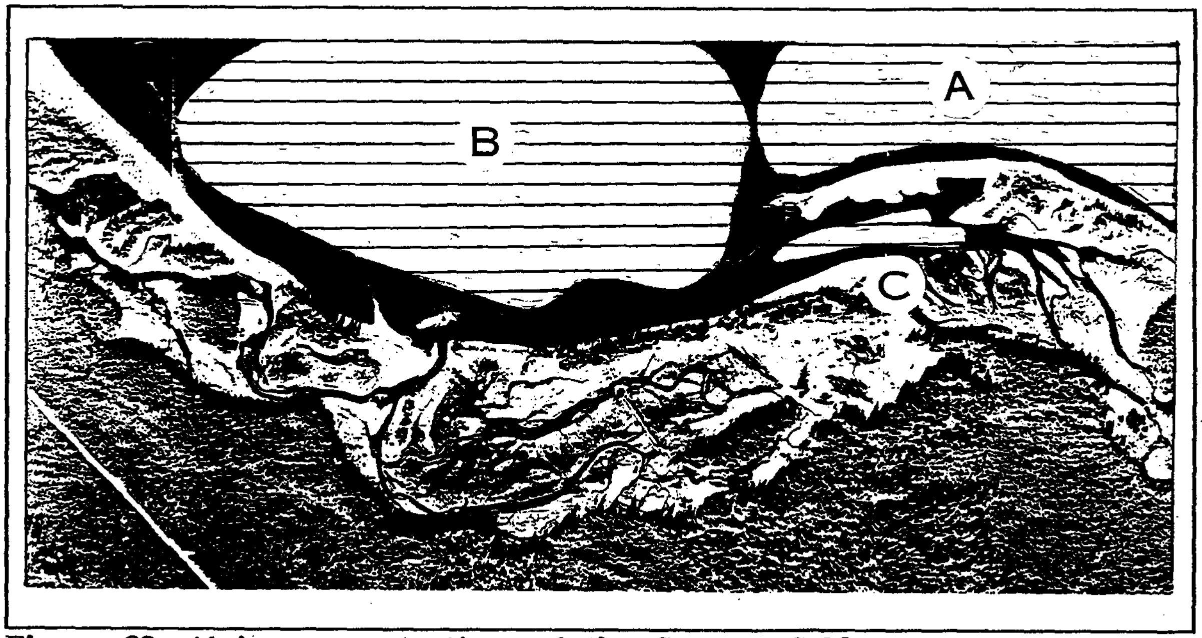

Figure 33. *Major concentrations of the Common Goldeneye on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-37% B-21% C-19%.*

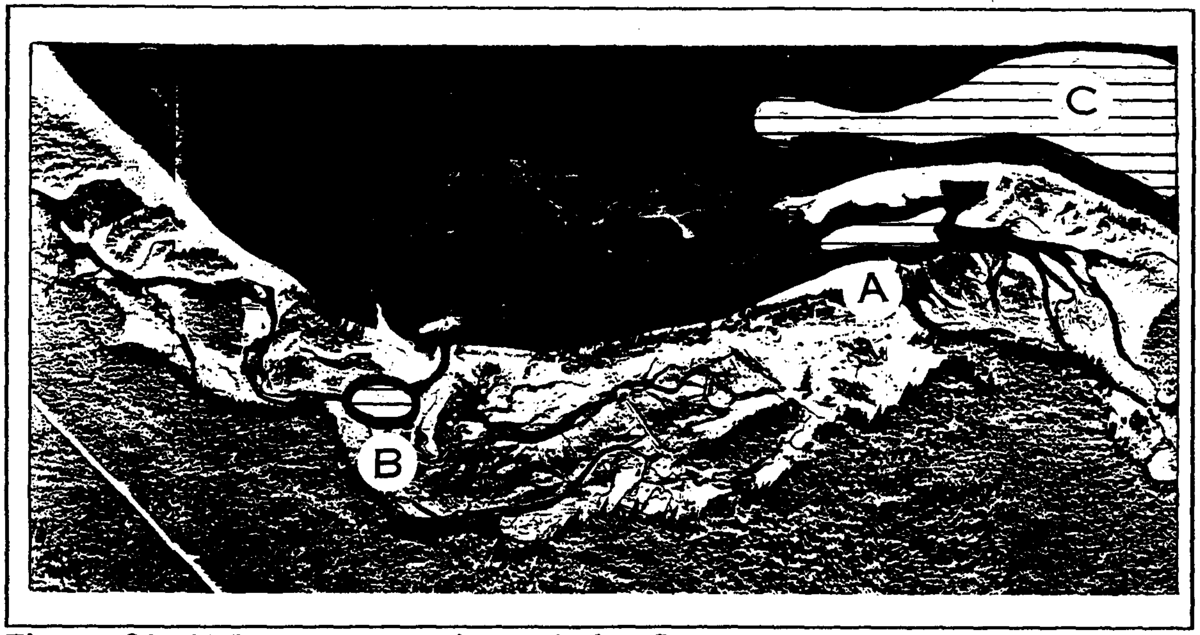

Figure 34. *Major concentrations of the Common Merganser on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-44% B-19% C-13%.*

All 3 species of mergansers (Hooded, Common and Red-breasted) were observed during the study period. The Common Merganser is a resident bird on the estuary and, with a total of 109 birds seen (58%), it was the most abundant of the 3 species. The probability of seeing a Common Merganser ranged from 20% during the autumn of 1990 to 67% in the spring of 1991; during this time records were of 1 to 4 birds. Although frequencies of occurrence for this species were comparatively low over the summer of 1991 (46%), the number of individuals seen at one observation increased from 4 to 18 birds (the maximum of 18 birds occurred on 2 days: 25 August 1991 and 8 September 1991 and were likely the same group). On 30 June 1991, 2 adults and 8 young were observed on the spit. Common Mergansers used a variety of habitats: the estuarine subtidal was preferred by 48% of the birds followed by the saltmarsh (26%) and the intertidal (14%); the brackish marsh and spit were used equally (6%). See Figure 34 for areas of major concentration of the Common Merganser within habitats.

Fifty-three Hooded Mergansers were seen between 4 November 1990, when a peak of 22 birds was noted, through 17 March 1991. The highest numbers occurred during the fall (56% of the total) with winter numbers dropping to 36%. The most frequently used habitat was the intertidal area used by 60% of the birds, followed by the estuarine subtidal (25%) and the saltmarsh (15%).

The Red-breasted Merganser was the rarest of the 3 mergansers with a total of 18 birds recorded over the study period. Earliest arrival date was 28 October 1990, when a peak of 7 birds occurred, and the latest spring departure was 24 February 1991. Most of the Red-breasted Mergansers (78%) were noted in the intertidal area; the remaining 4 birds used the estuarine subtidal habitat.

During the spring of 1991, 47 scaup were seen: 87% were identified as Lesser Scaup while the remainder were recorded as scaup species. Earliest arrival date for scaup was 10 March 1991 and the latest departure was 7 April 1991; a peak of 21 Lesser Scaup was observed on 31 March. A combined total of 75% of the scaup used the intertidal zone while the remainder favoured the estuarine subtidal area.

There are 7 records for the Ruddy Duck on the estuary totalling 45 birds; they were recorded between 25 November 1990 and 10 March 1991. All of the records were from the intertidal area where the ducks were observed in small flocks along with other diving ducks, grebes, gulls and loons. Numbers peaked at 11 birds on 13 January 1991. Campbell et al. (1990) note that it is extremely unusual to see this duck anywhere along the coast north of Campbell River. The frequency of occurrence during the winter of 1990-1991 was 42% on the Cluxewe River estuary. Marine habitats with soft mud bottoms are favoured, where the Ruddy Duck can extract small invertebrates.

Eighteen Oldsquaw were recorded, ranking this species as the least abundant diving duck during the study period. Earliest arrival was 27 January 1991 and the latest departure was 10 March 1991; a peak of 9 birds was noted on 24 February 1991. Oldsquaw used the intertidal area exclusively.

Raptors: One hundred and eighty-two raptors were seen during the survey representing <0.5% of all birds seen. The Bald Eagle was by far the most abundant of the birds of prey comprising 94% of the raptor total. Bald Eagles were reported in every season with numbers reaching their highest levels during the autumn of 1990 (40%) as birds concentrated to take advantage of pink, coho and chum salmon carcasses as they became available. A peak of 26 eagles was recorded on 28 October 1990, the same day the surveyors reported dead salmon every 5 to 10 meters in the estuary after heavy flooding the day before. Winter 1990-1991 and spring 1991 proportions were equal at 21%. Eleven percent of the Bald Eagles were observed during the summer of 1991 and were most likely of a resident pair; a possible nest site was reported on 17 March 1991 in the forest approximately midway along the south border and Dawe and Wetmore (1980) report an active nest located on the beach dunes just east of the inlet to the saltmarsh. Over the course of the study, every habitat unit was used by the Bald Eagle; however, the forest area was their preferred habitat in every season. The second most frequented habitat was the beach berm (22%) followed by the saltmarsh (13%).

Pink salmon account for the majority of the fall spawners on the estuary, especially during large, even-year runs. The autumn of 1990 was such a year with pink escapement numbering 45,000 fish; 500 coho and 50 chum were also counted. The lowest number of pink salmon recorded since 1965 was 20 fish in 1981 (Bob Allen pers. comm.) Birds like the Bald Eagle, that rely heavily on salmon carcasses as part of their fall and winter diet, would be expected to be seen in far fewer numbers on the estuary during low spawning years. The Salmonid Enhancement Program conducted through the Quatse Hatchery currently enhances the Cluxewe River for all 6 salmonids (steelhead, coastal cutthroat trout, and pink, coho, chinook and chum salmon; Clermont 1992).

We have a total of 5 records (each of a single bird) of the Red-tailed Hawk over all seasons, except the summer of 1991. Although Red-tailed Hawks were observed in 3 different habitat types (saltmarsh, forest and beach berm), 4 of the records were within the vicinity of the forested area on the west side of the Cluxewe Conservation Area.

There are 3 records for the Northern Harrier: 11 November 1990-1 bird was seen along the beach berm and 1 September 1991-1 bird was seen using the forested area. One bird was seen on 9 August 1981 outside the study period (NKD & KED).

There are also 2 records for the Sharp-shinned Hawk: 16 December 1990-1 bird was observed in the west saltmarsh close to the forest and 31 March 1991-1 bird was located in a treed area close to the channels on the west side of the estuary.

One Cooper's Hawk was seen outside of the study period on 23 January 1980, exact location not reported (NKD & KED).

Grouse: The Ruffed Grouse was seen 3 times totalling 6 birds, all from the forested areas: 8 October 1990-1 bird, 29 July 1991-4 birds and 4 August 1991-1 bird. Campbell et al. (1990) identify Ruffed Grouse habitat as second growth deciduous and mixed deciduous-coniferous woods with nearby water. They are also known to fare the best in brushy areas, preferring lower elevations with little human disturbance.

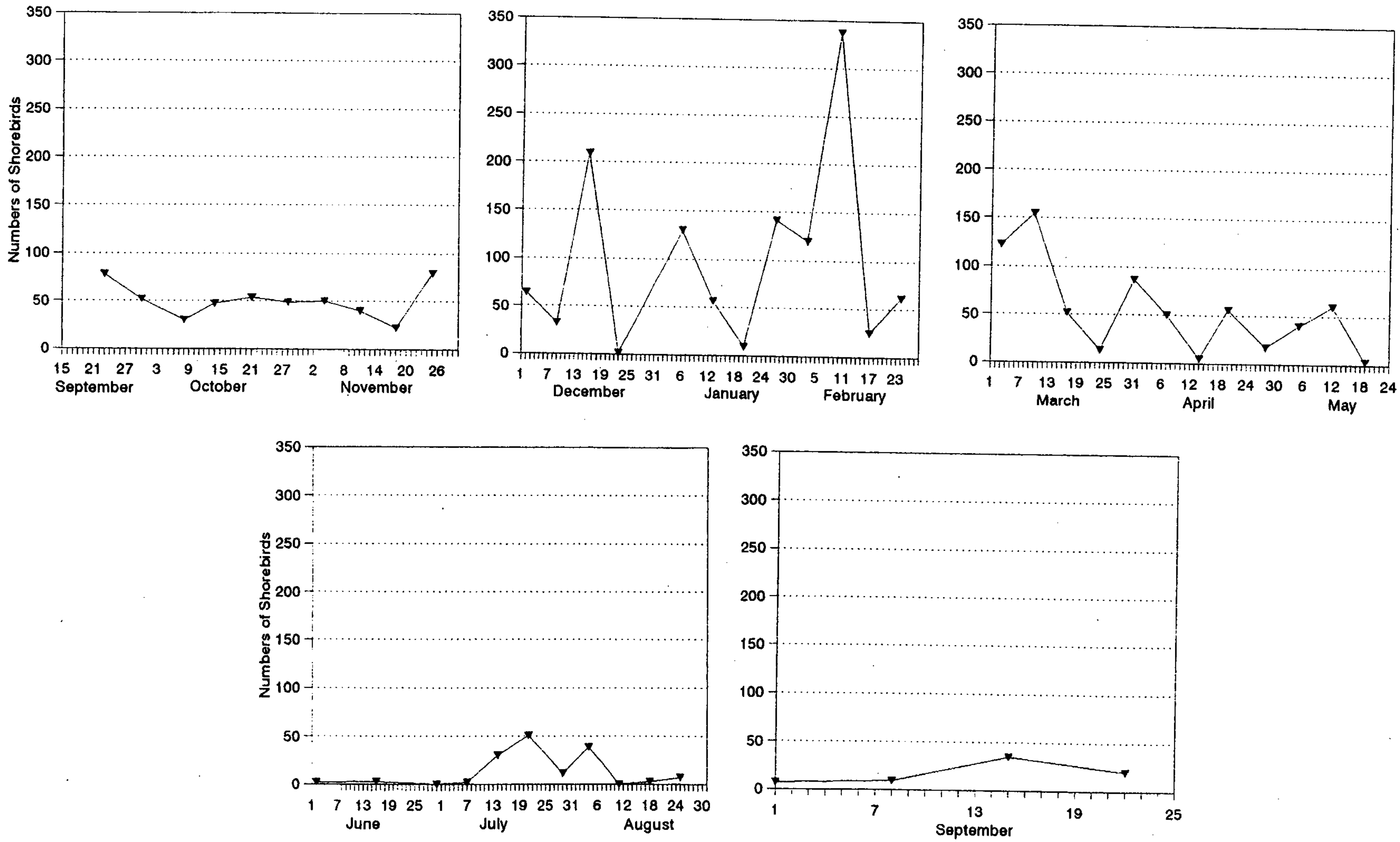

Figure 35. *Seasonal fluctuations in numbers of shorebirds on the Cluxewe River estuary, September 1990 to September 1991.*

Shorebirds: We recorded a total 2,570 shorebirds (a little over 5% of all birds seen) representing 13 species, using the Cluxewe River estuary during some part of their life history. Five percent of the shorebirds (129 birds) remained unidentified, recorded simply as shorebird species. The winter of 1990-1991 saw the highest numbers of shorebirds (40%), largely due to the high proportions of Black Turnstones and Black Oystercatchers on the estuary. Spring 1991 numbers were the second highest (28%) followed by autumn 1990 (20%). For seasonal fluctuations in shorebird numbers see Figure 35. Overall, the highest numbers of shorebirds (59%) used the spit habitat (the spit was the preferred habitat during the combined autumns, winter and spring) while the beach berm ranked the second most favoured habitat (23% of the bird use). The estuarine subtidal habitat attracted the highest number of shorebirds in the summer (44%); however, use of the spit (22%) remained a significant proportion (see Figure 36).

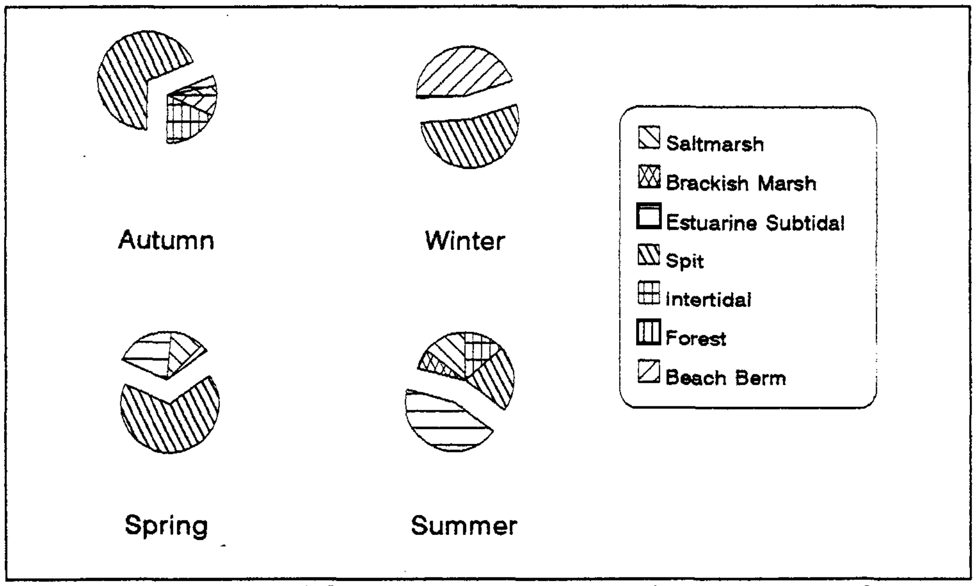

Figure 36. *Seasonal habitat use by shorebirds on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

The Black Turnstone was by far the most abundant shorebird comprising 69% (1,774 birds) of the shorebird total. Earliest arrival was 15 September 1991 and the latest spring departure was 28 April 1991. A peak of 261 turnstones occurring on 10 February 1991. Outside of the study period 500 turnstones were reported on 23 January 1980 (NKD & KED). There was 1 summer record for the Black Turnstone: 1 bird was noted on the spit, 4 August 1991. For seasonal fluctuations see Figure 37. In each season, the spit was used by the most turnstones (52% in winter to 71% in the combined fall seasons). In spring, the estuarine subtidal area was used by 30% of the birds while in winter the beach berm was used extensively by 47% of total turnstone numbers (see Figure 38 for seasonal habitat use and Figure 39 for areas of major concentration of the Black Turnstone within habitats). The surveyors noted that the campground on the spit was full by 24 March 1991, the increased numbers of dogs and people

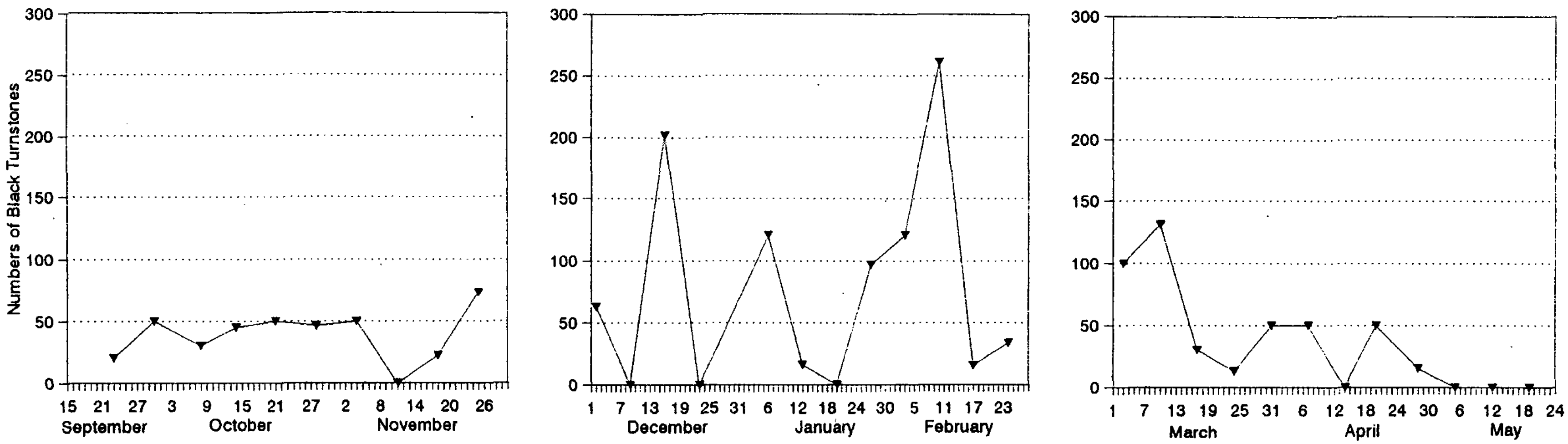

Figure 37. *Seasonal fluctuations in numbers of Black Turnstones on the Cluxewe River estuary, September 1990 to September 1991.*

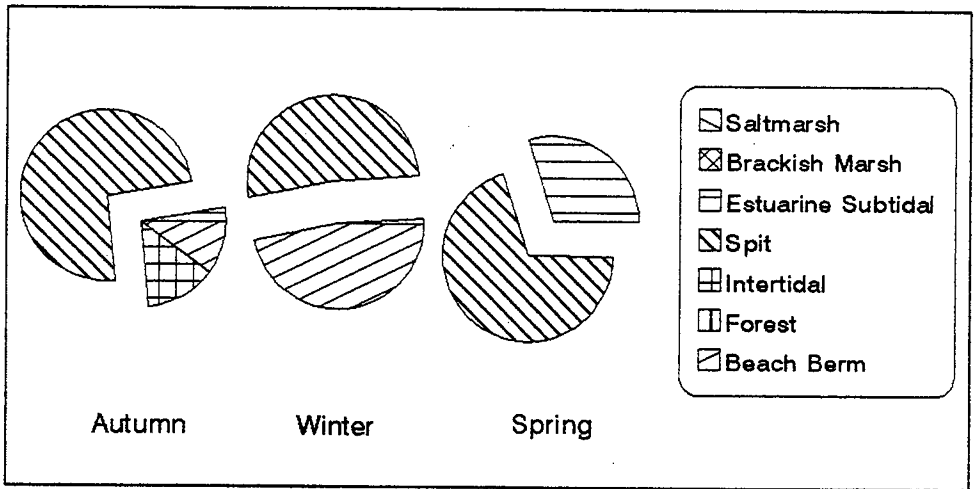

Figure 38. *Seasonal habitat use by the Black Turnstone on the Cluxewe River estuary, autumn (1990 and 1991 combined) through spring (1991).*

Figure 39. *Major concentrations of the Black Turnstone on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-71% B-27%*

reducing bird activity at that location. The start of the spring camping season overlaps the tail end of the Black Turnstone's migration by a full month or more. For example, Dawe (1976) notes the peak turnstone migration at Qualicum Beach as the first week of May. This disturbance is likely to affect these birds year after year forcing them to a less suitable habitat; Gill et al. (1983) found that this species remains faithful to specific wintering localities. Paulson (1993) has noted a decrease in regional wintering populations based on Christmas Bird Count data over the 1984-1988 period for the Pacific Northwest.

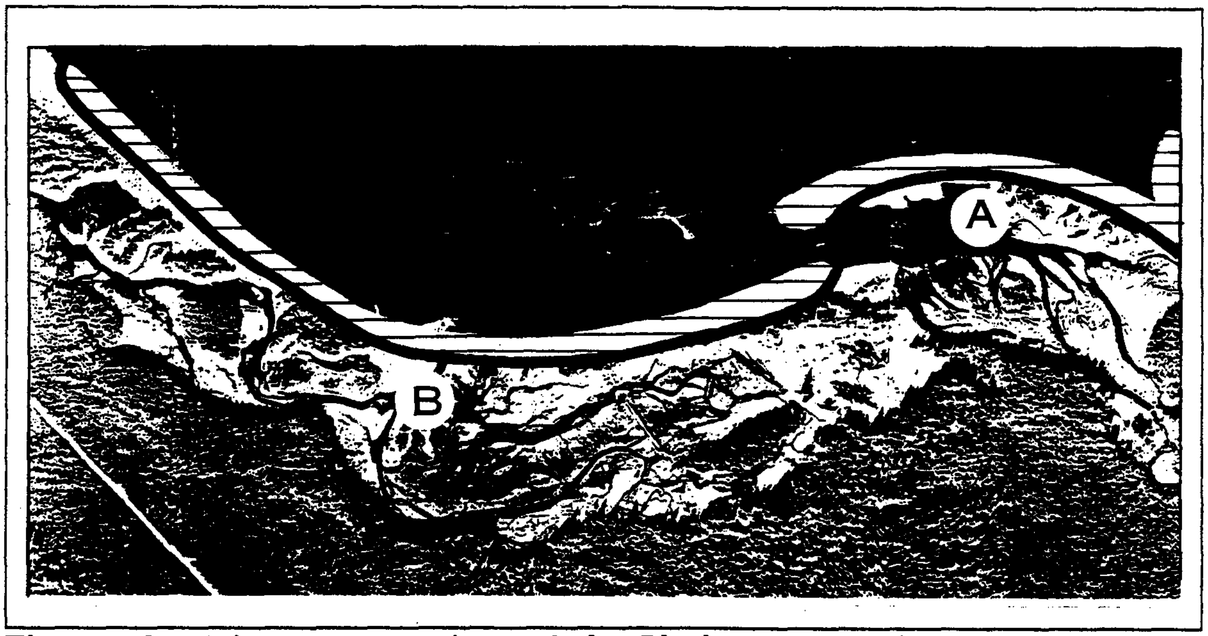

Figure 40. *Major concentrations of the Black Oystercatcher on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-74% B-26%*

The Black Oystercatcher ranked as the second most abundant shorebird comprising 10% of the shorebird total (256 birds). Earliest autumn arrival was on 25 November 1990 and most birds had left the area by 17 March 1991; a few stragglers were seen sporadically until 20 April 1991. A peak of 41 birds occurred on 13 January 1991. Most (75%) of the oystercatchers were observed during the winter of 1990-1991 followed by spring 1991 (22%) while autumn 1990 had only 6 birds reported. Winter and spring habitat use was similar: the spit was the preferred oystercatcher habitat at 74% and 72% of the oystercatcher use respectively while the beach berm was used by 26% and 28% of the birds respectively. See Figure 40 for areas of major concentration of the Black Oystercatcher within habitats. There are no summer records for the Black Oystercatcher on the estuary.

The Western Sandpiper was the third most abundant shorebird comprising 8% of the total (212 birds). All records were from the fall migration: earliest arrival was on 14 July 1991 and the latest departure was on 21 October 1990.

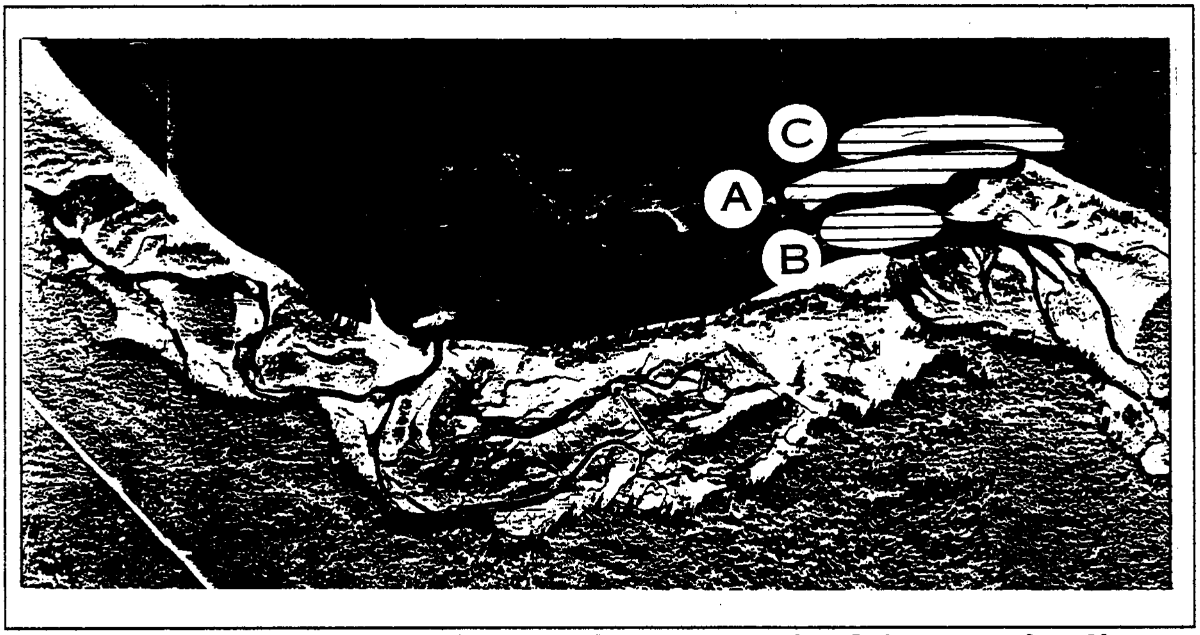

Figure 41. *Major concentrations of the Western Sandpiper on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-49% B-27% C-23%.*

There was 1 winter record: 2 December 1990-1 bird. A peak of 50 birds occurred on 23 September 1990. Two coastal habitat types are frequented by the Western Sandpiper: rich tidal mudflats, like those found on the Fraser River estuary, are ideal for foraging and birds are often observed huddled together just above the tide line (Campbell et al. 1990). At the Cluxewe River estuary, late summer arrivals were found most frequently in the estuarine subtidal area (49%) and on the spit (29%). Those birds arriving in the autumn favoured the spit (48%) and the intertidal area (34%). Interestingly, Western Sandpipers were not observed in the saltmarsh, the habitat with the largest area of exposed mud. See Figure 41 for areas of major concentration of the Western Sandpiper within habitats.

There were 5 records of Sanderling with a total of 95 birds. Most of the Sanderlings were observed between 27 January and 12 May 1991 with a peak of 40 birds occurring on both 10 February and 12 May 1991. There were 2 summer records: 16 June 1991-2 birds were observed in the saltmarsh, likely nonbreeders or late migrants. Three birds were seen on 8 August 1981, outside the study period (NKD & KED). Sanderling habitat preference showed an interesting pattern: those birds observed at the estuary during the winter (roughly half of the total) used the beach berm habitat exclusively while birds noted in the spring were seen only using channel habitat on the west side of the saltmarsh. Paulson (1993) found that although this species prefers broad sandy beaches, small wintering flocks can also be found on mud flats, gravelly beaches and rocky shores.

The Rock Sandpiper was seen only on 31 March 1991 when 2 flocks totalling 27 birds were observed on the spit.

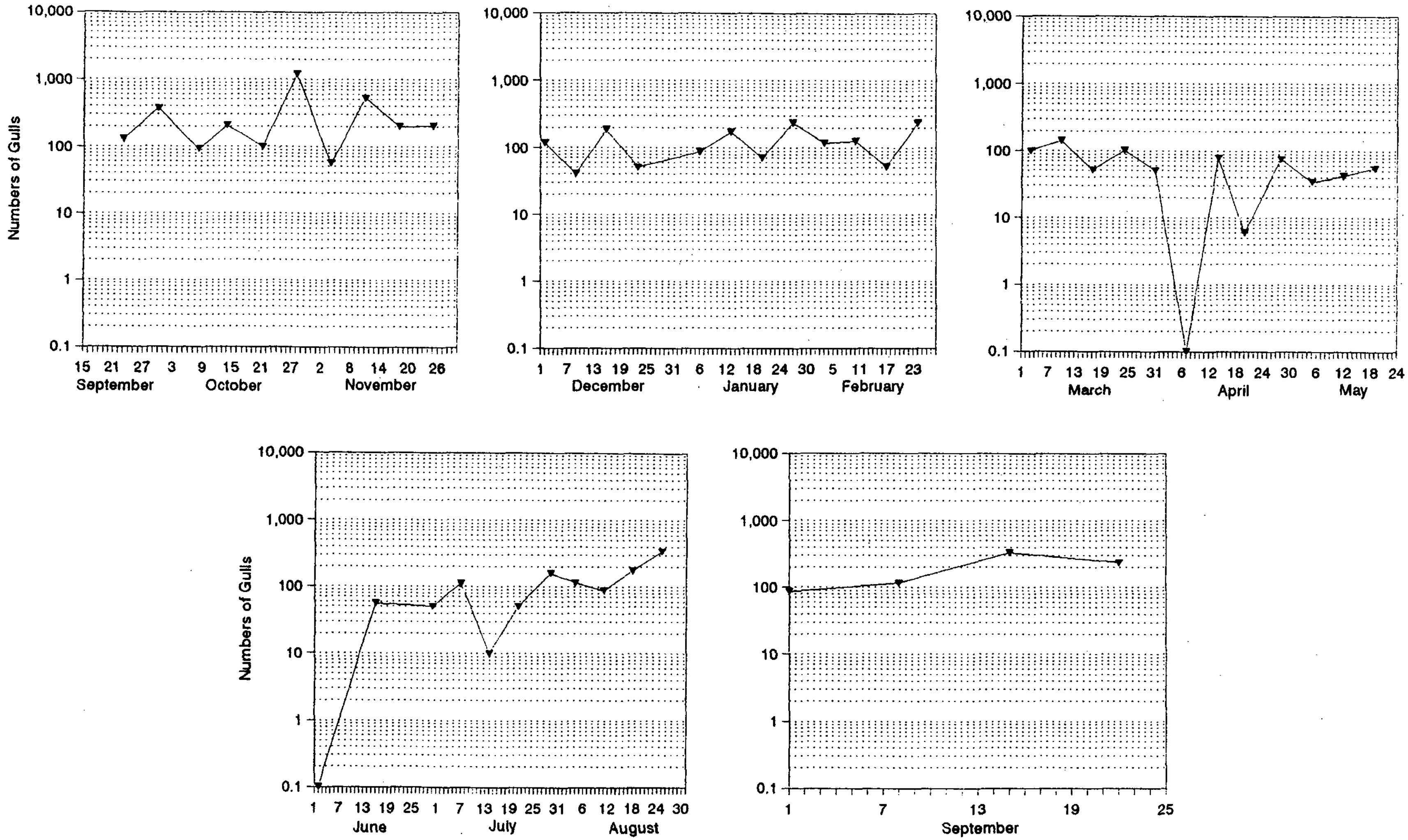

Figure 42. *Seasonal fluctuations in numbers of gulls on the Cluxewe River estuary, September 1990 to September 1991.*

Twenty-five Greater Yellowlegs were recorded over the study period. Spring migration dates for 1991 were: 14 April-5 birds, 20 April-5 birds and 12 May-1 bird. There were 2 June records for the Greater Yellowlegs, most likely stragglers or nonbreeders. Fall migration extended over a longer period due to the age differential migration; earliest arrival was 7 July 1991 and the latest departure date was 30 October 1990 with a peak of 4 birds on 25 August 1991. All of the Greater Yellowlegs were seen in the saltmarsh.

There were only 2 records for Dunlin on the estuary: 3 fall migrants were observed in the estuarine subtidal area on 28 October 1990 and 20 spring migrants were seen in the saltmarsh on 12 May 1991.

Fifteen dowitchers were observed; 80% (seen in 1 flock on 4 August 1991 in the estuarine subtidal area) were unidentified to species, recorded as dowitcher species. There was 1 record each for the Short-billed and Long-billed Dowitcher, both from the saltmarsh habitat: 2 Short-billed Dowitchers were seen on 19 May 1991 and 1 Long-billed Dowitcher was observed on 1 September 1991.

The Killdeer was seen infrequently with a total of 6 birds observed. Two birds were noted on each of the following days: 9 December 1990 in the saltmarsh, 6 January 1991 using the spit and 18 August 1991 in the saltmarsh.

Four Surfbirds were observed on the spit, 31 March 1991, along with Rock Sandpipers, Black Oystercatchers and Black Turnstones.

We have only 1 record of the Semipalmated Plover: 4 August 1991-2 birds were observed on the west side of the saltmarsh with 4 Western Sandpipers.

Although the Least Sandpiper is frequently seen in mixed flocks with the Western Sandpiper, it was only observed once during spring migration when Western Sandpipers were not observed. On 28 April 1991, 2 birds were noted on the spit. Outside of the survey period 9 Least Sandpipers out of a total of 37 peeps were observed on 29 August 1994 using the mudflat on the west side of the saltmarsh (TM & JS).

Also outside of the survey period, 3 Whimbrel and 1 Spotted Sandpiper were observed by Dawe and Wetmore (1980) on 25 July 1979. The Whimbrel were observed high on the west beach, likely feeding on the abundant amphipods there. Exact location of the Spotted Sandpiper was not reported.

Gulls: Five species of gulls accounted for 32% of all birds seen on the Cluxewe River estuary ranking them as the second most abundant group. Numbers were highest during the Autumn of 1990 when 43% of all the gulls were observed, no doubt drawn by the large numbers of spawning pink salmon. On 28 October, the surveyors reported large numbers of dead salmon after flooding the previous day in the area of the spit. This abundance of food coincided with peak gull numbers: 33% of all the gulls seen were recorded on that day alone. Gull numbers declined during the winter of 1990-1991 (21%) and reached their lowest point in the spring of 1991 (10%). For seasonal fluctuations in gull numbers see Figure 42. More gulls used the spit habitat than any other area in the estuary (36%); during the spring and summer seasons the spit had the most gull use. The beach berm was preferred second overall (27%) and was the favoured gull habitat during the winter months. The estuarine subtidal ranked as the third preferred habitat overall (23%) and was extensively used during the autumn seasons (see Figure 43). See Figure 44 for areas of major concentrations of gulls within habitats. Species accounts for the gulls may not be an accurate reflection of the actual species composition using the estuary as 85% of the gulls remained unidentified (none of the summer sightings were identified to species). There are many reasons for this: high concentrations of gulls (like the 1,182 birds seen on 28 October 1990) are difficult to count let alone identify, lack of light during the winter left little time for species identification, poor visibility was frequently reported by the surveyors (choppy water conditions, wind and rain) and high proportions of juveniles further complicate matters. For a complete list of the surveyors comments refer to Appendix I.

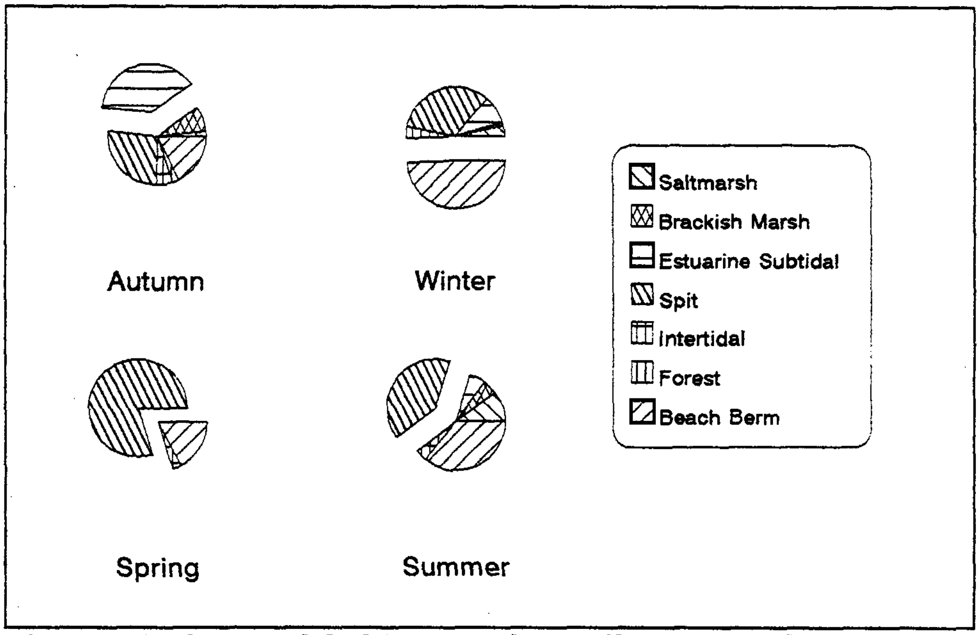

Figure 43. *Seasonal habitat use by gulls on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

Of those gulls identified, the Herring Gull was the most abundant (689 birds or 9.5% of the gull total). Most (95%) were observed on 2 days during the autumn of 1990. On 23 September-90 birds were reported and a peak of 469 birds occurred on 28 October. High fall numbers correspond with the trend noted by Campell et al. (1990) and Sanger (1970, 1973) of Herring Gulls to concentrate on land in autumn followed by an offshore dispersal during the winter and a return to shore in spring. The other 2 records were of small flocks: 10 February 1991-19 birds and 10 March 1991-17 birds. All of the habitats were frequented by this species but the estuarine intertidal area was favoured by 65% of the Herring Gulls. There is a possibility that many of these Herring Gulls were misidentified Thayer's Gulls.

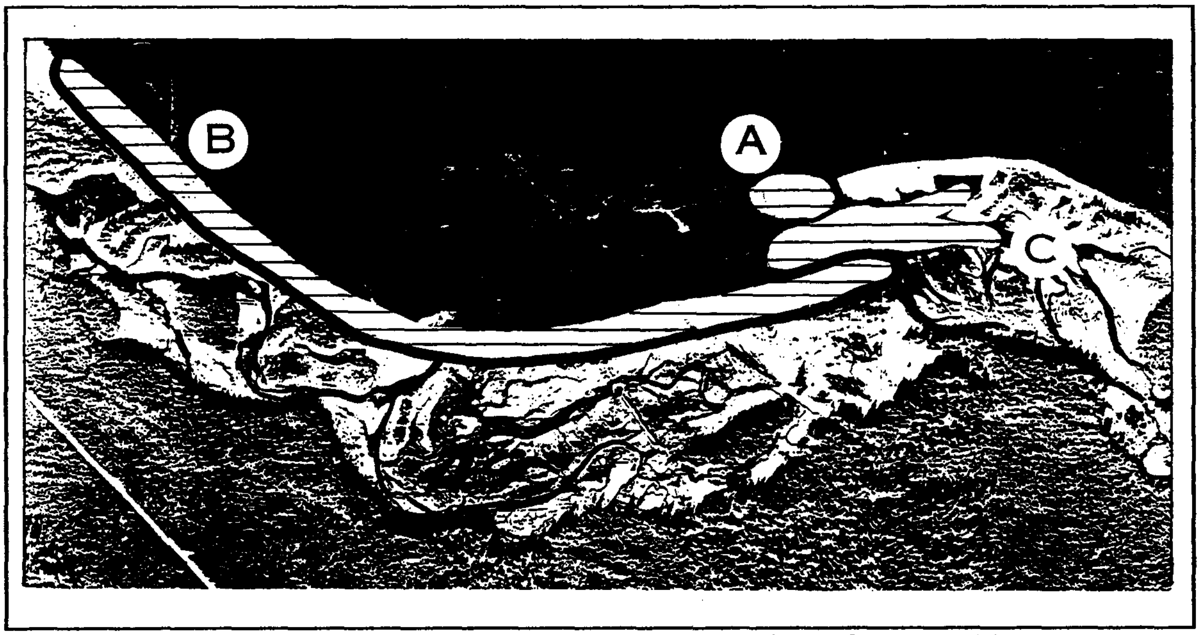

Figure 44. *Major concentrations of gulls on the Cluxewe River estuary, September 1990 to September 1991, shown as proportions of total birds seen. A-33% B-27% C-23%.*

There was only 1 record for the Bonaparte's Gull: 281 birds were recorded during autumn migration on 28 October 1990. The estuarine subtidal habitat was used by 78% of the birds followed by the brackish marsh (13%) and the spit (9%).

Although the Glaucous-winged Gull is described by Campbell et al. (1990) as *the* "sea gull" of the coast found in all coastal habitats at all seasons, only 66 birds were identified on the Cluxewe River estuary during the survey. This species is known to congregate around Pacific herring and salmon spawns and it is therefore likely that a large proportion of the unidentified gulls seen throughout this time were Glaucous-winged. The 2 records we have are both from the autumn season: 8 October 1990-50 birds and 15 September 1991-16 birds. Dawe and Wetmore (1980) observed 3 birds outside of the survey period on 25 July 1979. The estuarine sutidal area was used by 76% of the Glaucous-winged Gulls.

A total of 42 Mew Gulls were recorded during the survey. We only have 1 record for 11 birds during the migration period on 15 September 1991. However, the surveyors reported that Mew Gulls may have been present on 28 October 1990 when 1/3 of the total gulls were seen and this species is known to frequent salmon spawning areas. There were 2 winter records: 9 birds were observed on 27 January 1991 and a peak of 22 birds on 10 February 1991. Dawe and Wetmore (1980) had the only summer record: 1 bird was observed on 25 July 1979. During the survey, 52% of the gulls were observed using the spit with small numbers reported in the saltmarsh, intertidal area and estuarine subtidal habitats respectively.

There is 1 record for the California Gull: 2 birds were observed in the intertidal area on 15 September 1991.

Alcids: Four species of alcids totalling 17 birds were observed at the Cluxewe River estuary. Small numbers were recorded in all seasons with the exception of winter 1990-1991. All alcids were spotted in subtidal areas. The Pigeon Guillemot was the most abundant; 2 of the alcids remained unidentified.

A total of 9 Pigeon Guillemots were observed using the estuary. Although present along the coast throughout the year, this species is mostly reported from April through September when it can be locally numerous (Campbell et al. 1990). All of the records for guillemots at the Cluxewe estuary fall within this time frame: 20 April 1991-2 birds, 16 June 1991-2 birds and 15 September 1991-5 birds. The latter record corresponds with post-breeding dispersals for the Pigeon Guillemot.

There was 1 record each for the remaining alcid species: 3 Marbled Murrelets were seen on 4 August 1991, 2 Rhinocerous Auklets were observed on 18 August 1991 and 1 Cassin's Auklet was noted on 21 July 1991. Outside the study period, 4 Marbled Murrelets and 4 Rhinocerous Auklets were seen on 8 August 1981 (NKD & KED).

Owls: The only owl record we have for the Cluxewe River estuary is from outside of the survey period: a Western Screech Owl was heard on 23 January 1980 (NKD & KED).

Nightjars: The Common Nighthawk was seen only outside the study period: 8 August 1981-2 (NKD & KED).

Hummingbirds: A total of 9 hummingbirds were observed during the study period; 8 were Rufous while 1 bird (most likely a Rufous as well) was unidentified and recorded as hummingbird species. Spring migrants (males arrive well in advance of the females to the breeding grounds) were first seen on 20 April 1991 and stayed until 7 July 1991. The daily maximum of 3 birds occured on 2 June of this period. Five of the hummingbirds were noted in the forest (this species breeds in coniferous forests, thickets and on brushy slopes, foraging in adjacent meadows) while the remaining observations were from the spit.

Kingfishers: The Belted Kingfisher, a resident, was seen a total of 122 times over the course of the survey. Although the highest concentrations occured during the summer of 1991 (27%) and winter of 1990-1991 (23%), a peak of 9 kingfishers was observed in the autumn on 15 September 1991. The probability of seeing a Belted Kingfisher on the Cluxewe estuary is 100% at any time of the year. Every habitat unit was used by this species; however, the saltmarsh was preferred in every season (50% autumn 1990 and 1991 to 70% summer 1991). The intertidal area was used the least; only 1 bird was observed at this location.

Woodpeckers: Three species of woodpeckers totalled 36 birds. The Northern Flicker was the most common woodpecker accounting for 89% of the woodpecker numbers. Flickers were observed singly or in groups of 2; an exception was on 20 April 1991 when a peak of 6 birds was seen. The probability to 60% during the late autumn of 1990. Forested areas were their preferred habitat where 78% were noted; 13% were observed using the spit.

We have 2 records for the Red-breasted Sapsucker: 27 January 1991-1 bird was seen in the forest and 15 September 1991-1 bird was noted on the spit.

The Pileated Woodpecker was seen only once: 1 bird was observed in the forest on 17 March 1991.

Outside of the survey period, a juvenile male Hairy Woodpecker was heard then watched along the forest edge on 29 August 1994 (TM & JS).

Passerines: Although portions of the forested sections at the Cluxewe River estuary were surveyed, the focus of the study was primarily to determine waterbird use. Consequently, information on the passerines is limited. Therefore, over the course of the study songbird numbers are low with many of the family groups scantily represented or missing entirely from the species list (especially the flycatchers, warblers and vireos that tend to dominate the summer scene at other locations along the coast). Dawe and Wetmore (1980) state that although their visits were but cursory examinations, summer bird use was dominated by songbirds, many undoubtedly nesting in the area. This study found summer passerine use tied as the second most abundant user group; over the whole study period they were the third most abundant (13% of all birds seen). Unlike the Englishman River estuary study (see Dawe et al. 1994), there were few other sources from which to draw passerine data; further study in this area would help to complete the picture. Nine families, 28 species and 3,075 birds (5% remained unidentified and were recorded as passerine species) were tallied. Numbers were equally high during the winter of 1990-1991 and during the late and early autumn periods combined (32% of the total number of passerines each). For seasonal fluctuations in passerine numbers see Figure 45. The beach berm ranked first as the preferred habitat used by 28% of the passerines, followed by the saltmarsh (20%) and the spit (18%). For seasonal habitat preferences refer to Figure 46. The crows and jays were by far the most abundant passerine family with the starlings a distant second, which undoubtedly skews the habitat preferences. Those groups were followed by the diverse emberizidae family representing the wood warblers, sparrows and blackbirds.

Flycatchers: The only records we have for flycatchers using the estuary come from Dawe and Wetmore (1980): 3 Pacific-slope Flycatchers and 1 Olive-sided Flycatcher were reported on 25 July 1979. Exact location of these sightings was not recorded.

Crows and Jays: Four species of corvids accounted for 48% of the passerine total, ranking them as the most abundant family. Not surprisingly, the Northwestern Crow was seen in the highest numbers (94% of the corvid total). Crows were recorded in every season with numbers peaking during the winter of 1990-1991 (48%); the maximum of 120 crows occurred on 27 January 1991. The probability of seeing crows on the estuary ranged from 75% during the early autumn of 1991 to 100% in both the late autumn of 1990 and the spring of 1991. The beach berm was preferred by 37% of the birds, followed by the spit (27%).

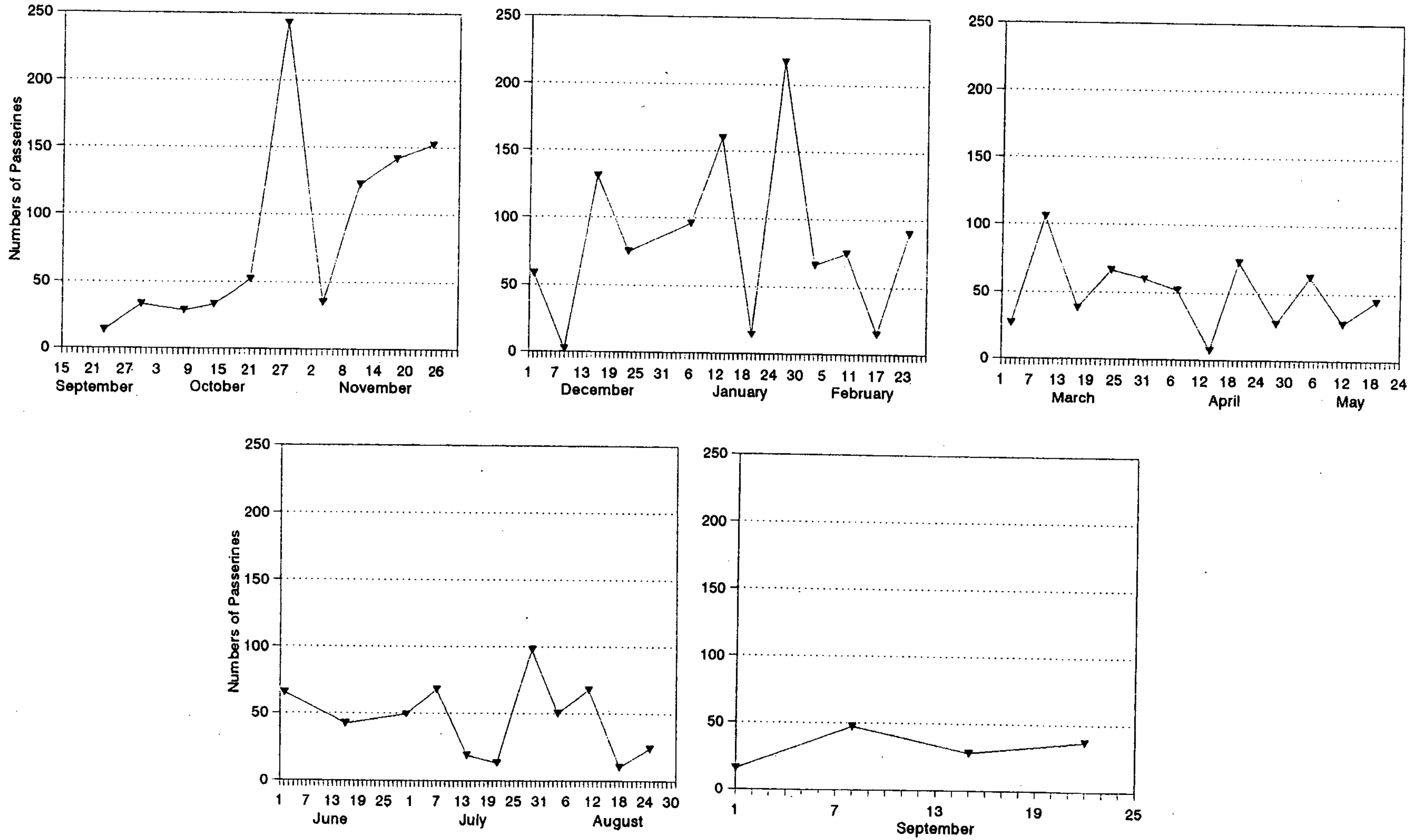

Figure 45. *Seasonal fluctuations in passerine numbers on the Cluxewe River estuary, SWeptember 1990 to September 1991.*

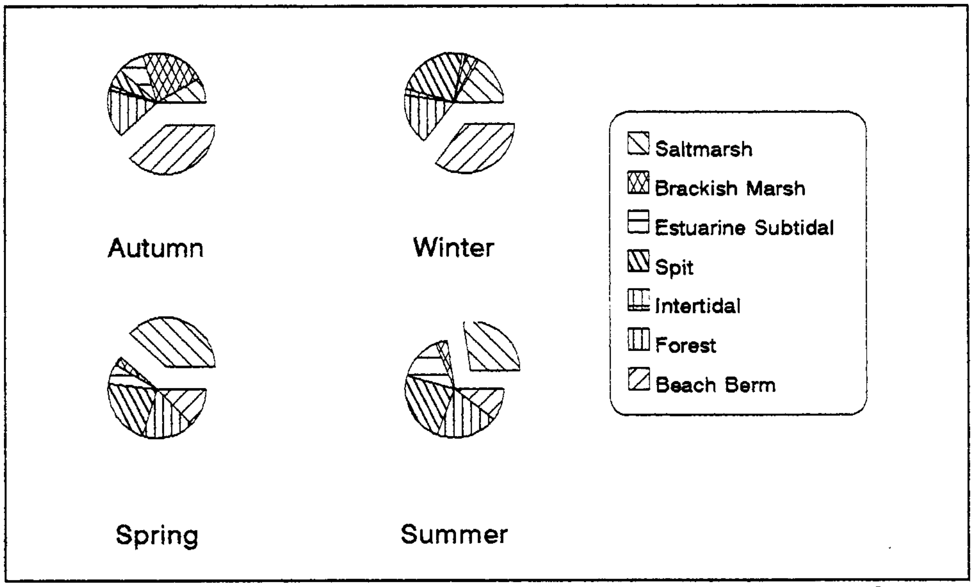

Figure 46. *Seasonal habitat use by passerines on the Cluxewe River estuary, autumn (1990 and 1991 combined) through summer (1991).*

The Common Raven was seen 48 times during the survey. Like the crow, they were noted in every season with 58% of them observed during the late autumn of 1990. A maximum of 9 birds occurred on 23 September 1990 and the probability of seeing a raven during the autumn was at its highest (80%). Ravens were also habitat generalists, recorded in most of the units; the beach berm ranked first with 38% of the raven use followed by the saltmarsh and forest (29% and 23% respectively).

Forty-six Steller's Jays were observed with records from every season. Numbers were highest during the spring of 1991 (35%); a peak of 5 birds occurred on 31 March. The Steller's Jay was found in 3 different habitats; the forest had 76% of the bird use, 9 birds were observed in the saltmarsh and 2 birds used the spit.

The Gray Jay was the least frequently seen of the corvids with only 1 record from the forest habitat: 8 October 1990-2 birds.

Chickadees: The Chestnut-backed Chickadee was seen infrequently with 48 birds in total. Numbers were highest during the winter of 1990-1991 (48% of the total) and lowest during the spring and summer of 1991 (4% and 6% respectively). A peak of 5 chickadees was recorded on both 6 and 27 January 1991; their frequency of occurrence ranged from 8% when numbers were the lowest to 100% during the early autumn of 1991.

on 11 November 1990.

Creepers: We have 2 records for the Brown Creeper: 12 May 1991-1 bird was observed using the spit and 15 September 1991-2 birds were recorded in the forest.

Wrens: Two species of wrens totalling 60 birds were seen during the survey; however, 83% remained unidentified and were recorded as wren species. The Winter Wren had 2 records: 15 September 1991-1 bird was in the saltmarsh and 7 July 1991-1 bird was located along the forest edge. On 30 June 1991, 3 Rock Wrens were reportedly observed along the forest edge close to the most southern channel. The latter is an extraordinary record and unfortunately field notes were not taken; thus, we regard this record as hypothetical and have excluded it from the checklist.

Kinglets and Thrushes: The muscicapid family was represented by 4 species with a cummulative total of 218 birds or 7% of all the passerines. The American Robin was the most abundant member of this group (77%). A total of 167 robins were recorded; highest concentrations occured during the spring of 1991 (78%) with a maximum of 26 birds tallied on 7 April 1991. Earliest spring arrival was 3 March 1991 and latest departure was 28 October 1990. Robins preferred the saltmarsh habitat where 75% were recorded; 16% used the spit and 9% were recorded in the forest.

The Varied Thrush was the second most abundant member of this group with a total of 32 birds observed over the study period. Highest concentrations occured during the winter of 1990-1991 (66%) when a peak of 13 birds occured on 23 December. Earliest arrival was 15 September 1991 and the latest departure was on 19 May 1991. Forested areas were the Varied Thrush's preferred habitat with 72% of the numbers recorded there; they were observed in all other areas with the exception of the intertidal zone and the estuarine subtidal zone.

Another winter resident, the Golden-crowned Kinglet was seen infrequently with 4 records totalling 18 birds. All of the sightings were between 15 September 1991 and 10 March 1991 (when the daily maximum of 10 birds occured). Two habitats were used exculsively by this species: forest (61%) and the spit (39%).

We have 1 record for the Swainson's Thrush on the estuary: 1 bird was seen on 7 July 1991 at the edge of the brackish marsh close to the spit.

Waxwings: The only records we have for the Cedar Waxwing are from outside of the study period: 3 birds were noted on 25 July 1979 (Dawe and Wetmore 1980) and 5 birds were seen on 9 August 1981 (NKD & KED).

Starlings: The gregarious European Starling was the second most abundant passerine with 695 birds seen comprising 23% of the passerine total. Flocks of starlings can be seen at any time of the year on the estuary; the highest numbers recorded during the survey occured during the autumn of 1990 when a peak of 185 birds occured on 28 October 1990. The probability of seeing starlings on the estuary ranged between 25% during the winter of 1990-1991 and of 1991 to 55% during the summer of 1991. With the exception of the forest, starlings were recorded in every habitat unit. The saltmarsh (prime feeding area) and the beach berm (both a feeding and perching area) were the preferred habitats used by 37% and 34% of the birds respectively; the intertidal area was used the least (1%).

Warblers, Sparrows and Blackbirds: The emberizid family was represented by 7 species of sparrows and 2 blackbirds for a collective total of 326 birds ranking them as the third most abundant passerine group (11%). Sparrows, especially the Dark-eyed Junco, accounted for the largest proportion of this group (92%). Habitat and seasonal use vary widely, see individual species accounts.

Warblers: Warblers were not seen during the survey; however, there are records for the Common Yellowthroat at the Cluxewe River estuary. Dawe and Wetmore (1980) observed 3 yellowthroats on 25 July 1979 and on 28 and 29 August 1994, 1 male yellowthroat was observed in the salal along the forest edge, 1 female or immature was seen in the dune grass at the western edge of the beach berm and numerous call notes were heard from the eastern section of the saltmarsh (TM & JS).

Sparrows: The Dark-eyed Junco was the most numerous of the sparrows with 155 birds reported. This species was primarily an overwintering bird. Flocks started arriving in November 1990 and a peak of 48 juncos occurred on 11 November. After the autumn migration, when 46% of the total juncos were seen, winter numbers dropped to 32%. Over the summer, there were 3 records of single juncos suggesting that they may breed on the estuary. Habitat preference varied according to the season: all of the spring and summer records were from the forest, during the autumns combined, 59% of the birds were noted using the beach berm (forest, intertidal and saltmarsh areas were used roughly equally) while during the winter the spit saw the heaviest use (65%); the remaining observations were from the forest.

The Rufous-sided Towhee was the second most abundant of the sparrows with a total of 55 birds recorded. The highest numbers occurred during the winter of 1990-1991 (51%) when a peak of 11 birds was noted on 27 January 1991; autumn 1990 numbers followed (40%). There were no records during the summer or autumn of 1991. Towhees used a variety of habitats: the intertidal area was used by 35% of the birds, followed by the spit (29%) and the saltmarsh (24%).

A total of 54 Fox Sparrows were reportedly seen on the estuary. While the Fox Sparrow probably occurs on the estuary, most of these sparrows were likely Song Sparrows and have been considered as such (see below and Methods). Numbers were highest during the spring of 1991 (57%); autumn 1991 was the only season without sightings. A peak of 15 birds occurred on 15 May 1991. The forested sections were used by 37% of these sparrows, followed by the saltmarsh (33%) and the spit (30%).

During the survey there was only 1 record of the Song Sparrow: on 15 September 1991, a total of 13 birds were seen in the saltmarsh, estuarine subtidal birders from the Comox-Strathcona Natural History Society, were helping out with the survey; thus, it is likely that the ubiquitous Song Sparrow was missed on the other days of the survey period. Outside of the survey, Dawe and Wetmore (1980) tallied 8 birds on 25 July 1979, 8 birds were again noted on 23 January 1980 (NKD & KED) and the Song Sparrow was seen and heard throughout the beach berm, saltmarsh and intertidal areas on 28, 29 August 1994 (TM & JS). During the latter visit, 5 sparrows were giving alarm calls from atop a stump in the east saltmarsh; as the observers approached, a black bear with cub poked her head up through the *Deschampsia* then proceeded to make a hasty retreat to the forest edge.

The remaining 3 species of sparrows had only 1 record each: 8 October 1990-1 Savannah Sparrow was noted in the forest, 17 March 1991-2 Golden-crowned Sparrows were seen on the spit. On 20 April 1991-1 Lapland Longspur was reportedly noted in the forest; this extraordinary record was not documented and has been considered as hypothetical. Outside the survey period, Savannah Sparrow call notes and 1 song were heard from the east saltmarsh close to the area where the bears were sighted on 28 August 1994 (TM & JS).

Blackbirds: A total of 17 Red-winged Blackbirds were observed with a peak of 6 birds seen in the saltmarsh on 25 November 1990; 4 were seen in the saltmarsh on 13 January 1991. During the winter and spring seasons the Red-winged Blackbird was noted as singles using the saltmarsh, beach berm and on 1 occasion the estuarine subtidal area.

There are 2 records for the Western Meadowlark totalling 9 birds: 25 November 1990-6 birds were seen along the beach berm and on 10 February 1991-3 birds were seen on the spit.

Finches: Four species of finches collectively totalled 164 birds accounting for 5% of the passerine total. The Pine Siskin was the most common and the most abundant, followed by the Red Crossbill. All of the finch sightings were from the forested areas of the estuary. Described as nomadic in fall and winter and an irruptive species by Ehrlich (1988) the Pine Siskin was seen a total of 97 times throughout the study. The autumn of 1990 saw only 1 bird on 4 November while numbers peaked during the summer of 1991 when 49% were seen and their frequency of occurence was 46%; a peak of 30 birds was observed on 27 January 1991.

Sightings of the Red Crossbill are also variable (Ehrlich 1988) as these birds depend heavily on coniferous cone crop levels. During the survey, 2 flocks were noted: 25 November 1990-40 birds and on 23 December 1990-25 birds.

There is 1 record each for the remaining 2 species: 1 Purple Finch was seen 17 March 1991 and 1 American Goldfinch was seen on 18 August 1991.

Conclusions

Bird Use and Recreational Activities

The Cluxewe River estuary is an important area for migratory and resident birds. However, because of fairly continuous disturbance on the site throughout most of the year, the area does not appear to be reaching its full potential in terms of supporting numbers of birds.

For example, surveyors noted that hunting began at the estuary on 30 September and continued through 20 January. Hunting was noted at the brackish marsh near the river mouth and in the saltmarsh. Campground activity on the spit began on 24 March, when the campground was full, and continued through to 15 September. Surveyors also noted fishermen in and around the river as well as many people walking with dogs along the spit and in the saltmarsh.

These activities appear to be having some effect on the bird use of the estuary as noted earlier in this report. For example, both Canada Goose and Dabbling Duck numbers are fairly low during the fall and early winter, but rise near the end of January after the hunting season ends. Black Turnstones also appear to be affected by users of the campground on the spit. In addition, the total maximum high counts of waterbirds on the Conservation Area is less than half that of the Englishman River estuary (Dawe et al. 1994) and just over 60% that of the Quatse River estuary (Dawe et al. In Press), despite the fact that the estuaries are somewhat similar in size. The Englishman and Quatse estuaries also have relatively high recreational or industrial activites occurring near their boundaries except for hunting, which further suggests the hunting disturbance is having an effect on bird use.

The primary goal of the Cluxewe Conservation Area is to sustain the natural habitats and resources while maintaining existing recreational uses (Clermont 1992). Thus while the activities mentioned above may not need to be stopped, perhaps their apparent effects can be ameliorated through mitigative actions. For example, at certain times of the year when bird use is high, parts of the Conservation Area could be closed to hunting and non-consumptive use. That would give the waterbirds a disturbance-free area in which to seek refuge for their activities such as loafing, feeding, and maintenance. Coupled with this, an educational program could be started at the campground, geared to inform campers of the importance of the area to wildlife and how the campers might minimize their impacts to the area.

Future Studies

A survey to document songbird use of the Conservation Area would round out the picture of migratory and resident bird use of the Cluxewe River estuary. A songbird survey over the period of at least a full year would provide for their management into an overall plan.

It would also be worthwhile to determine the effect present recreational activities are having on the bird use of the area; that would allow an assessment of the effectiveness of any seasonal restrictions placed on those activities.

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Appendices

Appendix I. *List of surveyors and their initials, survey dates, and sundry remarks for the Cluxewe River estuary.*

Surveyors	Initials
Field, Jane	JF
Harvey, Liz	LH
Innes, Doug	DI
Innes, Marion	MI
James, Wendy	WJ
Joyce, Stephen	SJ
Koch, Annemarie	AK
Lueke-Joyce, Theresa	TLJ
Madsen, Bob	BM
Manders, Tina	TM
Palmer, Mark	MP
Palmer, Patty	PP

Remarks - Late Autumn 1990

23 September MP, PP	Fishermen present, wading in the water on outside of the spit (observation area #4).
30 September MP, PP	Duck hunters present in south end of estuary near spit (with dog).
8 October AK	Evidence of duck hunters (shells, footprints) at west end of estuary. Pink and chum salmon still running. Two fishermen in brackish area by spit.
14 October AK, MP, TLJ	No remarks.
21 October MP, PP	Area "quieter" than usual, fewer birds, frightened easily. Couldn't get to viewing location #3 due to very high tide.
28 October SJ, TLJ	Gordon Twance reported seeing 200 ducks in location #4 between 7 am and 8 am this morning. Heavy flooding the day before in spit area; dead salmon every 5 to 10 meters. Water at viewing spot in location #3 too high to cross creek (was almost fordable in gumboots). Waders are probably going to be necessary during the winter. I didn't get a good view of the corner of habitat unit #1 from the suggested viewing location there, so I scanned that area from near the entry where the sign is. Gunshots (4) were heard from the northwest while we were at viewing location #2.

4 November XXX	Gordon Twance noted first arrivals of TRUS (6) on 2, November. More bird activity at low tide. Hunters at location #3.
11 November SJ, TLJ	Lots and lots of gunshots heard today; hunters observed near viewing location #3. Lack of light after 1500 hours leaves little time to determine gull spp.
18 November MP, PP	Hunters in estuary.
25 November TLJ, SJ	Hunter with 4 CAGO met at gate (these were not included in tally for the day). Most gulls seen were juveniles (not enough light time to count juveniles and adults).

Remarks - Winter 1990-1991

2 December	Visibility very poor due to weather (mixed MP, PP rain/snow/sleet, rough in estuary, extremely rough outside spit with 4'+ waves). Three hunters trucks in parking lot. Decoys, 2 hunters and dog seen in estuary. Numerous gunshots heard.
9 December AK, LH	No remarks.
16 December SJ, TLJ	No remarks.
23 December AK	Three hunters on the estuary were definitely reducing normal bird sightings.
6 January MP, PP	Car/truck tracks in fresh snow at parking area indicated someone had already been in the estuary that am.- hunters? Bird life scarce in estuary area (but tide out and little later also).
13 January TLJ	Three hunters with decoys observed from location #1; SJ, they were carrying 3 CAGO and 1 duck as they left (these were not recorded in the day's tally). Calm water allowed counting of all the "black specks" between spit and rock point, therefore 128 diving ducks not identified.
20 January WJ, BM, AK	Two hunters near location #2. Very quiet overall, noticeable lack of bird activity. Weather unusually fine.

27 January SJ, TLJ	No vehicles or tracks in parking lot. Clam diggers with dog seen later from spit (they were in habitat unit #1 from 1400 to 1600). Five BRAN spotted moving in to spit around 1430, then swam back out, perhaps due to our presence?
3 February MP, PP	Poor visibility due to extremely heavy rain on and off and spray from the ocean outside of the spit (habitat unit #5).
10 February SJ, TLJ	No remarks.
17 February XX	Birds moved in on flooding tide. Swans up higher on shore than usual; 2 immatures sighted.
24 February TLJ	BRAN were closer to spit, even with people out there SJ, (they always swam out to sea each previous time we approached). COLO seen with spotted breeding plumage visible. RSTO songs heard - spring!

Remarks - Spring 1991

3 March MP, PP	No remarks.
10 March SJ, TLJ	No remarks.
17 March XX	Gordon Twance saw BRAN in the morning. No sign of TRUS but Gordon Twance saw them on 16 March. Possible BAEA nest by location #1. CAGO sighted by others toward Suquash.
24 March PP	People and dogs on outside of beach berm (walked MP, through estuary). MALL and CAGO very skittish, fly if at all startled. Lots of geese droppings around edges of estuary (locations #1 through #3. About 10 people walking 2 dogs on spit; campsite full of campers and picnickers. Not as many birds on shore of spit as usual.
31 March LH, AK	Campers along the spit area increasing in number. TRUS seem to be gone.
7 April JF, AK	Typical spring weather. Photographer near location #3.

14 April MP, PP	Lots of campers in campground at spit, not as much bird life as usual in that area. CAGO and MALL very flighty and easily spooked. Most MALL, BUFF, teal, goldeneye now paired; some CAGO appeared paired too.
20 April XX	Lots of bird activity. New sightings of yellowlegs and shorebirds.
28 April MP, PP	Most ducks paired up. MALL extremely skittish and fly at slightest sound.
5 May MP, PP	Three cars in parking lot at estuary; 6 people and 1 dog south of location #1 (walking across estuary). Bear prints and scats on tidal flats between locations #2 and #3.
12 May JF, AK	Very quiet on the saltmarsh and spit. Many campers at location #4. Bear sighted near location #1.
19 May XX	No remarks.

Remarks - Summer 1991

2 June AK	Very quiet, birds seem more secretive than usual. Small bear grazing. No bands visible on BRAN near location #2.
16 June AK	Bear in the bush near the parking lot. Very breezy and difficult to spot the birds.
30 June LH, AK	Deer sighted in marsh near location #3. *Triglochin* and *Salicornia* in bloom. Lots of bird activity in the forest; can't identify them all by call.
7 July MP	Bear tracks just inside Nature Trust fence in mud near location #1; bear scats between location #2 and #3. Lots of people and dogs in campsite and on spit.
14 July JF, AK	Steady rain.
21 July LH, AK	Lots of sounds in the woods. First clear day after much rain. Small deer grazing near location #3.
29 July XX	Bear tracks in estuary. Lots of people and dogs in campground.

4 August AK	Birds are feeding in the shallow water. Salmon should be here soon.
11 August on MP, PP	Estuary very quiet. Lots of people and dogs walking spit. Several small boats trolling just offshore on outer side of spit (habitat unit #5).
18 August AK	Campsite full with 3 boats moored in rivermouth. Bear tracks in estuary. Boletus mushrooms out.
25 August MP, PP	Several people walking on spit. Small boat anchored in habitat unit #3, near end of spit.

Remarks - Early Autumn 1991

1 September LH, AK	Unusual hawk sightings: the RTHA was obviously hunting, NOHA was being pursued by a CORA. Bird activity up in the marsh. Campers thinning out at the spit. Gordon Twance says it hasn't been a good year for pinks.
15 September DI, MI, TM, LH, AK	Two bear sightings, 1 otter. Campers thinning out on spit.
22 September MP, PP	Lots of bear droppings in woods beside estuary. Car tracks in parking area; Gordon Twance reported hunters in estuary earlier.

Appendix II. *Cluxewe River estuary bird check-list.*

Species Code	Species Name	Scientific Name
COLO	Common Loon	*Gavia immer*
HOGR	Horned Grebe	*Podiceps auritus*
RNGR	Red-necked Grebe	*Podiceps grisegena*
WEGR	Western Grebe	*Aechmophorus occidentalis*
FTSP	Fork-tailed Storm-Petrel	*Oceanodroma furcata*
DCCO	Double-crested Cormorant	*Phalacrocorax auritus*
PECO	Pelagic Cormorant	*Phalacrocorax pelagicus*
GBHE	Great Blue Heron	*Ardea herodias*
TRUS	Trumpeter Swan	*Cygnus buccinator*
BRAN	Brant	*Branta bernicula*
CAGO	Canada Goose	*Branta canadensis*
GWTE	Green-winged Teal	*Anas crecca*
MALL	Mallard	*Anas platyrhyncos*
NOPI	Northern Pintail	*Anas acuta*
NOSL	Northern Shoveler	*Anas clypeata*
GADW	Gadwall	*Anas strepera*
AMWI	American Wigeon	*Anas americana*
LESC	Lesser Scaup	*Aythya affinis*
HADU	Harlequin Duck	*Histrionicus histrionicus*
OLDS	Oldsquaw	*Clangula hyemalis*
BLSC	Black Scoter	*Melanitta nigra*
SUSC	Surf Scoter	*Melanitta perspicillata*
WWSC	White-winged Scoter	*Melanitta fusca*
COGO	Common Goldeneye	*Bucephala clangula*
BAGO	Barrow's Goldeneye	*Bucephala islandica*
BUFF	Bufflehead	*Bucephala albeola*
HOME	Hooded Merganser	*Lophodytes cucullatus*
COME	Common Merganser	*Mergus merganser*
RBME	Red-breasted Merganser	*Mergus serrator*
RUDU	Ruddy Duck	*Oxyura jamaicensis*
BAEA	Bald Eagle	*Haliaeetus leucocephalus*
NOHA	Northern Harrier	*Circus cyaneus*
SSHA	Sharp-shinned Hawk	*Accipter striatus*
COHA	Cooper's Hawk	*Accipter cooperii*
RTHA	Red-tailed Hawk	*Buteo jamaicensis*
RUGR	Ruffed Grouse	*Bonasa umbellus*
SEPL	Semipalmated Plover	*Charadrius semipalmatus*
KILL	Killdeer	*Charadrius vociferus*
BLOY	Black Oystercatcher	*Haematopus bachmani*
GRYE	Greater Yellowlegs	*Tringa melanoleuca*
SDSA	Spotted Sandpiper	*Actitis macularia*
WHIM	Whimbrel	*Numenius phaeopus*
BLTU	Black Turnstone	*Arenaria melanocephala*

Cluxewe River estuary bird check-list (Cont'd).

Species Code	Species Name	Scientific Name
SURF	Surfbird	*Aphriza virgata*
SAND	Sanderling	*Calidris alba*
WESA	Western Sandpiper	*Calidris mauri*
LESA	Least Sandpiper	*Calidris minutilla*
PESA	Pectoral Sandpiper	*Calidris melanotos*
ROSA	Rock Sandpiper	*Calidris ptilocnemis*
DUNL	Dunlin	*Calidris alpina*
SBDO	Short-billed Dowitcher	*Limnodromus griseus*
LBDO	Long-billed Dowitcher	*Limnodromus scolopaceus*
BOGU	Bonaparte's Gull	*Larus philadelphia*
MEGU	Mew Gull	*Larus canus*
CAGU	California Gull	*Larus californicus*
HEGU	Herring Gull	*Larus argentatus*
GWGU	Glaucous-winged Gull	*Larus glaucescens*
CATE	Caspian Tern	*Sterna caspia*
PIGU	Pigeon Guillemot	*Cepphus columba*
MAMU	Marblet Murrelet	*Brachyrampus marmoratus*
CAAU	Cassin's Auklet	*Ptychoramphus aleuticus*
RHAU	Rhinoceros Auklet	*Cerorhinca monocerata*
WSOW	Western Screeh-Owl	*Otus kennicottii*
CONI	Common Nighthawk	*Chordeiles minor*
RUHU	Rufous Hummingbird	*Selasphorus rufous*
BEKI	Belted Kingfisher	*Ceryle alcyon*
RBSA	Red-breasted Sapsucker	*Sphyrapicus ruber*
NOFL	Northern Flicker	*Colaptes auratus*
PIWO	Pileated Woodpecker	*Dryocopus pileatus*
OSFL	Olive-sided Flycatcher	*Contopus borealis*
PSFL	Pacific-slope Flycatcher	*Empidonax difficilis*
GRJA	Gray Jay	*Perisoreus canadensis*
STJA	Steller's Jay	*Cyanocitta stelleri*
NOCR	Northwestern Crow	*Corvus caurinus*
CORA	Common Raven	*Corvus corax*
CBCH	Chestnut-backed Chickadee	*Parus rufescens*
RBNU	Red-breasted Nuthatch	*Sitta canadensis*
BRCR	Brown Creeper	*Certhia americana*
WIWR	Winter Wren	*Troglodytes troglodytes*
GCKI	Golden-crowned Kinglet	*Regulus satrapa*
SWTH	Swainson's Thrush	*Catharus ustulatus*
AMRO	American Robin	*Turdus migratorius*
VATH	Varied Thrush	*Ixoreus naevius*
CEWA	Cedar Waxwing	*Bombycilla cedrorum*
EUST	European Starling	*Sturnus vulgarus*
COYE	Common Yellowthroat	*Geothlypis trichas*
RSTO	Rufous-sided Towhee	*Pipilo erythrophthalmus*

Cluxewe River estuary bird check-list (Cont'd).

Species Code	Species Name	Scientific Name
SAVS	Savannah Sparrow	*Passerculus sandwichensis*
FOSP	Fox Sparrow	*Passerella iliaca*
SOSP	Song Sparrow	*Melospiza melodia*
GCSP	Golden-crowned Sparrow	*Zonotrichia atricapilla*
DEJU	Dark-eyed Junco	*Junco hyemalis*
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*
WEME	Western Meadowlark	*Sturnella neglecta*
PUFI	Purple Finch	*Carpodacus purpureus*
RECR	Red Crossbill	*Loxia curvirostra*
PISI	Pine Siskin	*Carduelis pinus*
AMGO	American Goldfinch	*Carduelis tristis*

Hypothetical Species

BWTE	Blue-winged Teal	*Anas discors*
EUWI	Eurasian Wigeon	*Anas penelope*
ROWR	Rock Wren	*Salpinctes obsoletus*

Appendix III

Cluxewe River estuary bird surveys: Seasonal bird numbers, September 1990 to September 1991

Note: In this Appendix, the mean has been calculated as the total number of birds of species-x counted over the season, divided by the total number of counts where species-x occurred. Counts of zero have not been included in the total number of counts nor are they included as minimum values. Thus the last 5 columns in the Appendix summarize the species occurrence on the estuary. For example, the probability of seeing a Common Loon in Autumn on the Cluxewe River estuary is about 80%. If you see the species, you are likely to see an average of about 4 birds and more than 9 would be exceptional.

Cluxewe River Estuary Bird Surveys for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#LOO	0	2	1	2	4	9	1	7	1	5	32	9	1	3.6	2.9	90.0
LOON	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
COLO	0	2	0	2	4	9	1	7	1	5	31	9	1	3.9	2.9	80.0
#GRE	0	1	0	1	3	5	0	2	1	2	15	5	1	2.1	1.5	70.0
GREB	0	1	0	1	0	0	0	0	0	2	4	2	1	1.3	0.6	30.0
HOGR	0	0	0	0	0	3	0	0	0	0	3	3	3	3.0	0.0	10.0
WEGR	0	0	0	0	3	2	0	2	1	0	8	3	1	2.0	0.8	40.0
#COR	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
CORM	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
#HER	3	4	1	1	0	1	0	1	2	0	13	4	1	1.9	1.2	70.0
GBHE	3	4	1	1	0	1	0	1	2	0	13	4	1	1.9	1.2	70.0
#SWA	0	0	0	0	0	0	7	1	7	21	36	21	1	9.0	8.5	40.0
TRUS	0	0	0	0	0	0	7	1	7	21	36	21	1	9.0	8.5	40.0
#GEE	0	0	0	22	0	22	10	8	0	15	77	22	8	15.4	6.5	50.0
GOOS	0	0	0	0	0	17	0	8	0	0	25	17	8	12.5	6.4	20.0
CAGO	0	0	0	22	0	5	10	0	0	15	52	22	5	13.0	7.3	40.0
#DAB	8	26	3	141	10	54	20	59	8	19	348	141	3	34.8	42.0	100.0
DABL	0	0	0	10	3	27	0	5	0	7	52	27	3	10.4	9.6	50.0
GWTE	1	13	0	17	0	0	0	3	8	1	43	17	1	7.2	6.7	60.0
MALL	5	6	0	34	5	5	0	28	0	11	94	34	5	13.4	12.3	70.0
NOPI	2	4	3	16	0	0	20	0	0	0	45	20	2	9.0	8.4	50.0
GADW	0	0	0	0	0	0	0	9	0	0	9	9	9	9.0	0.0	10.0
EUWI	0	0	0	30	0	0	0	0	0	0	30	30	30	30.0	0.0	10.0
AMWI	0	3	0	34	2	22	0	14	0	0	75	34	2	15.0	13.5	50.0
#DIV	16	34	33	157	14	97	51	225	81	205	913	225	14	91.3	78.3	100.0
DIVE	0	0	0	0	0	0	0	11	0	0	11	11	11	11.0	0.0	10.0
HADU	0	9	30	26	4	43	26	45	21	49	253	49	4	28.1	15.6	90.0
SCOT	0	0	0	0	0	0	3	0	0	0	3	3	3	3.0	0.0	10.0
SUSC	3	9	0	10	0	10	0	8	0	25	65	25	3	10.8	7.4	60.0
WWSC	13	15	3	41	8	5	0	0	14	0	99	41	3	14.1	12.7	70.0
COGO	0	0	0	0	0	0	0	0	0	4	4	4	4	4.0	0.0	10.0
BUFF	0	0	0	0	0	17	0	152	42	101	312	152	17	78.0	60.6	40.0
MERG	0	1	0	0	2	1	0	0	0	1	5	2	1	1.3	0.5	40.0
HOME	0	0	0	0	0	0	22	0	4	2	28	22	2	9.3	11.0	30.0
COME	0	0	0	0	0	1	0	0	0	3	4	3	1	2.0	1.4	20.0
RBME	0	0	0	0	0	7	0	0	0	0	7	7	7	7.0	0.0	10.0
RUDU	0	0	0	0	0	0	0	0	0	9	9	9	9	9.0	0.0	10.0
DUCK	0	0	0	80	0	13	0	9	0	11	113	80	9	28.3	34.5	40.0
#RAP	1	1	1	10	0	27	1	18	5	7	71	27	1	7.9	9.2	90.0
BAEA	1	1	1	9	0	26	1	17	5	7	68	26	1	7.6	8.7	90.0
NOHA	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
RTHA	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
FALC	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
RUGR	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0

Cluxewe River Estuary Bird Surveys for Autumn 90 (Cont'd)

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#SHO	78	52	30	47	54	49	50	40	22	80	502	80	22	50.2	18.3	100.0
BLOY	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
GRYE	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
BLTU	20	50	30	45	50	46	50	0	22	73	386	73	20	42.9	16.6	90.0
WESA	50	0	0	2	2	0	0	0	0	0	54	50	2	18.0	27.7	30.0
DUNL	0	0	0	0	0	3	0	0	0	0	3	3	3	3.0	0.0	10.0
SHOR	8	0	0	0	2	0	0	40	0	1	51	40	1	12.8	18.4	40.0
#GUL	130	367	92	206	100	1192	56	524	201	205	3073	1192	56	307.3	341.4	100.0
GULL	0	355	0	206	100	442	56	524	201	205	2089	524	56	261.1	164.1	80.0
BOGU	0	0	0	0	0	281	0	0	0	0	281	281	281	281.0	0.0	10.0
HEGU	130	12	42	0	0	469	0	0	0	0	653	469	12	163.3	209.9	40.0
GWGU	0	0	50	0	0	0	0	0	0	0	50	50	50	50.0	0.0	10.0
BEKI	1	1	3	1	1	3	1	2	1	4	18	4	1	1.8	1.1	100.0
WOPE	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	10.0
#WOO	0	1	0	1	1	0	1	1	0	1	6	1	1	1.0	0.0	60.0
NOFL	0	1	0	1	1	0	1	1	0	1	6	1	1	1.0	0.0	60.0
#PAS	13	33	28	33	52	243	35	123	142	152	854	243	13	85.4	75.7	100.0
GRJA	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
STJA	0	4	0	2	1	0	0	0	1	1	9	4	1	1.8	1.3	50.0
NOCR	1	23	2	23	16	46	8	63	100	23	305	100	1	30.5	31.1	100.0
CORA	9	2	5	5	0	2	1	1	0	3	28	9	1	3.5	2.7	80.0
CBCH	1	0	0	1	0	1	0	3	0	4	10	4	1	2.0	1.4	50.0
RBNU	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
WREN	0	0	17	1	0	0	0	0	2	0	20	17	1	6.7	9.0	30.0
AMRO	0	3	0	0	0	1	0	0	0	0	4	3	1	2.0	1.4	20.0
EUST	0	0	0	0	35	185	5	0	12	50	287	185	5	57.4	73.6	50.0
RSTO	1	1	1	0	0	6	0	6	0	7	22	7	1	3.7	2.9	60.0
SPAR	1	0	0	0	0	1	0	0	0	1	3	1	1	1.0	0.0	30.0
SAVS	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
FOSP	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
DEJU	0	0	0	0	0	0	20	48	0	3	71	48	3	23.7	22.7	30.0
RWBL	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
WEME	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
RECR	0	0	0	0	0	0	0	0	0	40	40	40	40	40.0	0.0	10.0
PISI	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	10.0
PASS	0	0	0	0	0	1	0	1	27	8	37	27	1	9.3	12.3	40.0
#TOT	250	522	193	622	239	1702	233	1012	471	717	5961	1702	193	596.1	468.3	100.0

Cluxewe River Estuary Bird Surveys for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#LOO	0	2	4	3	0	13	3	11	1	9	1	6	53	13	1	5.3	4.3	83.3
LOON	0	0	0	0	0	0	0	2	0	0	0	1	3	2	1	1.5	0.7	16.7
COLO	0	2	4	3	0	13	3	9	1	9	1	5	50	13	1	5.0	4.0	83.3
#GRE	0	1	2	2	0	8	5	9	0	3	1	9	40	9	1	4.4	3.4	75.0
GREB	0	0	1	0	0	0	0	0	0	2	0	3	6	3	1	2.0	1.0	25.0
HOGR	0	0	1	0	0	8	0	9	0	1	0	5	24	9	1	4.8	3.8	41.7
RNGR	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
WEGR	0	1	0	2	0	0	5	0	0	0	1	0	9	5	1	2.3	1.9	33.3
#COR	0	1	1	0	0	5	0	2	0	1	1	4	15	5	1	2.1	1.7	58.3
CORM	0	0	1	0	0	5	0	2	0	1	0	4	13	5	1	2.6	1.8	41.7
DCCO	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
PECO	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
#HER	0	2	1	1	1	3	1	5	2	1	0	3	20	5	1	2.0	1.3	83.3
GBHE	0	2	1	1	1	3	1	5	2	1	0	3	20	5	1	2.0	1.3	83.3
#SWA	48	15	26	30	23	18	25	16	19	12	30	27	289	48	12	24.1	9.6	100.0
TRUS	48	15	26	30	23	18	25	16	19	12	30	27	289	48	12	24.1	9.6	100.0
#GEE	0	31	8	4	0	0	0	29	0	89	0	57	218	89	4	36.3	32.0	50.0
BRAN	0	0	8	3	0	0	0	5	0	11	0	4	31	11	3	6.2	3.3	41.7
CAGO	0	31	0	1	0	0	0	24	0	78	0	53	187	78	1	37.4	29.3	41.7
#DAB	1	54	37	32	43	62	37	103	122	216	85	21	813	216	1	67.8	58.1	100.0
DABL	1	0	19	0	0	1	0	18	0	0	0	5	44	19	1	8.8	9.0	41.7
GWTE	0	4	8	0	0	17	0	27	0	24	0	0	80	27	4	16.0	9.9	41.7
MALL	0	50	6	32	43	28	37	42	116	140	85	15	594	140	6	54.0	42.1	91.7
NOPI	0	0	0	0	0	16	0	16	6	52	0	1	91	52	1	18.2	20.0	41.7
BWTE	0	0	4	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
#DIV	53	58	171	94	97	436	56	406	57	296	100	333	2157	436	53	179.8	146.4	100.0
HADU	4	20	13	27	24	33	15	25	10	50	25	41	287	50	4	23.9	13.0	100.0
OLDS	0	0	0	0	0	0	0	1	0	3	0	9	13	9	1	4.3	4.2	25.0
BLSC	0	0	0	0	8	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
SUSC	0	6	8	10	20	47	4	77	3	29	22	31	257	77	3	23.4	22.5	91.7
WWSC	9	0	3	0	0	0	2	16	0	16	0	2	48	16	2	8.0	6.7	50.0
COGO	0	0	10	0	16	0	3	10	6	17	3	5	70	17	3	8.8	5.5	66.7
BAGO	0	0	0	22	6	0	0	0	0	4	0	0	32	22	4	10.7	9.9	25.0
BUFF	40	16	87	35	18	211	31	241	28	105	46	56	914	241	16	76.2	75.1	100.0
MERG	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
HOME	0	15	0	0	0	0	0	0	0	0	4	0	19	15	4	9.5	7.8	16.7
COME	0	1	1	0	0	4	1	4	2	1	0	0	14	4	1	2.0	1.4	58.3
RBME	0	0	1	0	0	0	0	2	0	2	0	1	6	2	1	1.5	0.6	33.3
RUDU	0	0	9	0	0	11	0	8	0	3	0	3	34	11	3	6.8	3.6	41.7
DUCK	0	0	39	0	3	130	0	22	8	66	0	185	453	185	3	64.7	68.6	58.3
#RAP	1	1	5	0	3	15	2	4	1	6	1	1	40	15	1	3.6	4.2	91.7
HAWK	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
BAEA	1	1	4	0	1	15	2	4	1	5	1	1	36	15	1	3.3	4.2	91.7
SSHA	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
RTHA	0	0	0	0	1	0	0	0	0	1	0	0	2	1	1	1.0	0.0	16.7

Cluxewe River Estuary Bird Surveys for Winter 90 (Cont'd)

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#SHO	64	32	209	1	130	57	9	142	120	338	25	62	1189	338	1	99.1	97.5	100.0
KILL	0	2	0	0	2	0	0	0	0	0	0	0	4	2	2	2.0	0.0	16.7
BLOY	0	30	7	1	0	41	9	32	0	37	10	26	193	41	1	21.4	14.8	75.0
BLTU	63	0	202	0	120	16	0	97	120	261	15	34	928	261	15	103.1	84.4	75.0
SAND	0	0	0	0	0	0	0	13	0	40	0	0	53	40	13	26.5	19.1	16.7
WESA	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
SHOR	0	0	0	0	8	0	0	0	0	0	0	2	10	8	2	5.0	4.2	16.7
#GUL	120	40	185	50	88	172	70	237	120	127	52	237	1498	237	40	124.8	69.8	100.0
GULL	120	40	185	50	88	172	70	228	120	86	52	237	1448	237	40	120.7	69.3	100.0
MEGU	0	0	0	0	0	0	0	9	0	22	0	0	31	22	9	15.5	9.2	16.7
HEGU	0	0	0	0	0	0	0	0	0	19	0	0	19	19	19	19.0	0.0	8.3
#ALC	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
ALCI	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
BEKI	1	2	1	1	3	4	3	5	2	3	2	1	28	5	1	2.3	1.3	100.0
#WOO	1	0	2	0	0	1	2	3	0	0	0	0	9	3	1	1.8	0.8	41.7
YBSA	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
NOFL	1	0	2	0	0	1	2	2	0	0	0	0	8	2	1	1.6	0.5	41.7
#PAS	58	2	131	75	96	160	14	217	66	75	15	90	999	217	2	83.3	62.8	100.0
STJA	0	0	1	0	0	1	0	1	0	0	0	0	3	1	1	1.0	0.0	25.0
NOCR	40	0	91	20	77	110	10	120	66	63	8	71	676	120	8	61.5	38.3	91.7
CORA	0	0	0	1	0	0	0	3	0	3	0	0	7	3	1	2.3	1.2	25.0
CBCH	4	1	0	1	5	1	0	5	0	3	0	3	23	5	1	2.9	1.7	66.7
WREN	0	0	0	2	2	1	1	0	0	0	1	0	7	2	1	1.4	0.5	41.7
GCKI	0	0	0	0	2	0	0	6	0	0	0	0	8	6	2	4.0	2.8	16.7
VATH	2	0	0	13	6	0	0	0	0	0	0	0	21	13	2	7.0	5.6	25.0
EUST	2	0	0	0	0	33	0	38	0	0	0	0	73	38	2	24.3	19.5	25.0
RSTO	0	0	0	0	1	6	0	11	0	0	0	10	28	11	1	7.0	4.5	33.3
SPAR	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
FOSP	0	0	0	3	0	0	2	0	0	0	5	0	10	5	2	3.3	1.5	25.0
DEJU	10	1	26	10	0	0	1	0	0	0	1	0	49	26	1	8.2	9.8	50.0
RWBL	0	0	0	0	0	4	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
WEME	0	0	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	8.3
RECR	0	0	0	25	0	0	0	0	0	0	0	0	25	25	25	25.0	0.0	8.3
PISI	0	0	0	0	0	0	0	30	0	0	0	3	33	30	3	16.5	19.1	16.7
PASS	0	0	13	0	1	4	0	3	0	3	0	3	27	13	1	4.5	4.3	50.0
#TOT	347	241	783	293	484	954	227	1189	510	1176	313	853	7370	1189	227	614.2	360.5	100.0

Cluxewe River Estuary Bird Surveys for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#LOO	1	14	2	10	3	3	0	8	0	0	1	3	45	14	1	5.0	4.6	75.0
LOON	0	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
COLO	1	11	2	10	3	3	0	8	0	0	1	3	42	11	1	4.7	3.9	75.0
#GRE	0	5	2	2	1	2	0	5	0	2	1	0	20	5	1	2.5	1.6	66.7
GREB	0	0	0	2	0	0	0	0	0	2	0	0	4	2	2	2.0	0.0	16.7
HOGR	0	5	0	0	0	0	0	5	0	0	1	0	11	5	1	3.7	2.3	25.0
EAGR	0	0	0	0	0	2	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
WEGR	0	0	2	0	1	0	0	0	0	0	0	0	3	2	1	1.5	0.7	16.7
#COR	0	4	0	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
CORM	0	4	0	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
#HER	0	1	0	0	0	2	1	2	1	0	0	1	8	2	1	1.3	0.5	50.0
GBHE	0	1	0	0	0	2	1	0	1	0	0	1	6	2	1	1.2	0.4	41.7
GRHE	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#SWA	19	3	0	0	0	0	0	0	0	0	0	0	22	19	3	11.0	11.3	16.7
TRUS	19	3	0	0	0	0	0	0	0	0	0	0	22	19	3	11.0	11.3	16.7
#GEE	18	96	0	67	26	52	41	69	157	174	211	306	1217	306	18	110.6	90.7	91.7
BRAN	0	0	0	0	0	0	0	36	118	172	200	300	826	300	36	165.2	97.9	41.7
CAGO	18	96	0	67	26	52	41	33	39	2	11	6	391	96	2	35.5	28.2	91.7
#DAB	213	117	24	16	97	40	116	73	212	96	19	23	1046	213	16	87.2	69.8	100.0
DABL	0	26	0	0	0	0	0	0	0	0	0	0	26	26	26	26.0	0.0	8.3
GWTE	0	1	0	0	6	11	6	0	2	12	0	0	38	12	1	6.3	4.5	50.0
MALL	205	90	24	16	91	29	110	71	198	84	19	20	957	205	16	79.8	66.0	100.0
NOPI	8	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
NOSL	0	0	0	0	0	0	0	2	12	0	0	2	16	12	2	5.3	5.8	25.0
AMWI	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
#DIV	59	236	52	68	110	132	77	113	80	84	82	43	1136	236	43	94.7	51.5	100.0
SCAU	0	0	0	6	0	0	0	0	0	0	0	0	6	6	6	6.0	0.0	8.3
LESC	0	1	12	0	21	7	0	0	0	0	0	0	41	21	1	10.3	8.5	33.3
HADU	8	24	7	21	30	14	13	16	17	12	21	6	189	30	6	15.8	7.3	100.0
OLDS	0	5	0	0	0	0	0	0	0	0	0	0	5	5	5	5.0	0.0	8.3
SUSC	0	32	0	6	2	0	0	0	0	0	0	0	40	32	2	13.3	16.3	25.0
WWSC	0	6	0	0	10	0	0	3	0	0	0	2	21	10	2	5.3	3.6	33.3
COGO	0	6	6	9	7	4	0	3	0	0	2	0	37	9	2	5.3	2.4	58.3
BAGO	0	5	0	0	0	17	10	0	6	8	0	0	46	17	5	9.2	4.8	41.7
BUFF	39	107	23	26	40	86	54	87	54	62	57	33	668	107	23	55.7	26.2	100.0
HOME	0	2	4	0	0	0	0	0	0	0	0	0	6	4	2	3.0	1.4	16.7
COME	6	1	0	0	0	4	0	4	3	2	2	2	24	6	1	3.0	1.6	66.7
RUDU	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
DUCK	6	45	0	0	0	0	0	0	0	0	0	0	51	45	6	25.5	27.6	16.7
#RAP	3	4	4	3	2	5	2	7	0	1	5	2	38	7	1	3.5	1.8	91.7
BAEA	3	4	4	3	1	5	2	6	0	1	5	2	36	6	1	3.3	1.7	91.7
SSHA	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
RTHA	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3

Cluxewe River Estuary Bird Surveys for Spring 91 (Cont'd)

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#SHO	122	155	52	13	87	50	5	56	17	40	60	3	660	155	3	55.0	46.9	100.0
BLOY	6	22	22	0	6	0	0	1	0	0	0	0	57	22	1	11.4	9.9	41.7
GRYE	0	0	0	0	0	0	5	5	0	0	0	1	11	5	1	3.7	2.3	25.0
BLTU	100	131	30	13	50	50	0	50	15	0	0	0	439	131	13	54.9	41.2	66.7
SURF	0	0	0	0	4	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
SAND	0	0	0	0	0	0	0	0	0	0	40	0	40	40	40	40.0	0.0	8.3
LESA	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	8.3
ROSA	0	0	0	0	27	0	0	0	0	0	0	0	27	27	27	27.0	0.0	8.3
DUNL	0	0	0	0	0	0	0	0	0	0	20	0	20	20	20	20.0	0.0	8.3
SBDO	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
SHOR	16	2	0	0	0	0	0	0	0	40	0	0	58	40	2	19.3	19.2	25.0
#GUL	100	143	51	103	50	0	78	6	75	34	42	55	737	143	6	67.0	38.0	91.7
GULL	100	126	51	103	50	0	78	6	75	34	42	55	720	126	6	65.5	34.9	91.7
HEGU	0	17	0	0	0	0	0	0	0	0	0	0	17	17	17	17.0	0.0	8.3
#ALC	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
PIGU	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
RUHU	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
BEKI	3	1	1	1	1	1	1	5	1	2	2	2	21	5	1	1.8	1.2	100.0
#WOO	1	0	1	0	0	1	0	6	1	0	1	0	11	6	1	1.8	2.0	50.0
NOFL	1	0	0	0	0	1	0	6	1	0	1	0	10	6	1	2.0	2.2	41.7
PIWO	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#PAS	26	106	38	66	60	52	7	73	27	62	27	44	588	106	7	49.0	26.7	100.0
STJA	0	0	3	0	5	1	0	1	0	0	2	1	13	5	1	2.2	1.6	50.0
NOCR	16	44	12	49	1	17	4	3	6	22	9	3	186	49	1	15.5	15.9	100.0
CORA	0	0	1	0	0	0	2	0	0	0	0	0	3	2	1	1.5	0.7	16.7
CBCH	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
BRCR	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
WREN	0	0	1	0	2	4	0	1	0	0	1	1	10	4	1	1.7	1.2	50.0
GCKI	0	8	0	0	0	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
AMRO	4	0	1	5	20	26	0	23	8	16	10	18	131	26	1	13.1	8.7	83.3
VATH	4	0	0	0	0	0	1	1	0	0	0	1	7	4	1	1.8	1.5	33.3
EUST	0	45	0	10	15	0	0	40	0	8	0	0	118	45	8	23.6	17.5	41.7
RSTO	0	2	0	1	1	1	0	0	0	0	0	0	5	2	1	1.3	0.5	33.3
SPAR	1	0	0	0	0	0	0	0	12	0	0	0	13	12	1	6.5	7.8	16.7
FOSP	0	0	2	0	1	2	0	3	0	15	3	5	31	15	1	4.4	4.8	58.3
GCSP	0	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
DEJU	0	0	15	0	15	1	0	0	0	0	1	0	32	15	1	8.0	8.1	33.3
LALO	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
RWBL	1	0	0	1	0	0	0	0	1	1	0	0	4	1	1	1.0	0.0	33.3
PUFI	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
PISI	0	0	0	0	0	0	0	0	0	0	0	15	15	15	15	15.0	0.0	8.3
PASS	0	5	0	0	0	0	0	0	0	0	0	0	5	5	5	5.0	0.0	8.3
#TOT	565	885	227	349	437	340	328	427	571	495	451	482	5557	885	227	463.1	166.7	100.0

Cluxewe River Estuary Bird Surveys for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	0	0	0	0	2	0	2	1	5	2	1	1.7	0.6	27.3
COLO	0	0	0	0	0	0	0	2	0	2	1	5	2	1	1.7	0.6	27.3
#GRE	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
WEGR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#HER	1	1	0	1	0	2	1	3	0	6	4	19	6	1	2.4	1.8	72.7
GBHE	1	1	0	1	0	2	1	3	0	6	4	19	6	1	2.4	1.8	72.7
#GEE	20	35	14	12	10	0	0	0	0	0	0	91	35	10	18.2	10.1	45.5
BRAN	20	35	14	12	10	0	0	0	0	0	0	91	35	10	18.2	10.1	45.5
#DAB	35	45	3	0	2	0	0	0	0	4	0	89	45	2	17.8	20.6	45.5
MALL	35	45	3	0	2	0	0	0	0	4	0	89	45	2	17.8	20.6	45.5
#DIV	34	44	40	47	48	22	0	46	2	8	69	360	69	2	36.0	20.2	90.9
HADU	15	10	0	0	0	0	0	15	0	2	0	42	15	2	10.5	6.1	36.4
SUSC	6	15	25	47	35	17	0	31	0	3	0	179	47	3	22.4	15.0	72.7
WWSC	4	0	2	0	0	0	0	0	0	3	1	10	4	1	2.5	1.3	36.4
BUFF	0	15	0	0	8	0	0	0	0	0	0	23	15	8	11.5	4.9	18.2
COME	9	4	13	0	0	5	0	0	0	0	18	49	18	4	9.8	5.8	45.5
RBME	0	0	0	0	5	0	0	0	0	0	0	5	5	5	5.0	0.0	9.1
DUCK	0	0	0	0	0	0	0	0	2	0	50	52	50	2	26.0	33.9	18.2
#RAP	1	2	3	2	2	4	1	1	2	1	0	19	4	1	1.9	1.0	90.9
BAEA	1	2	3	2	2	4	1	1	2	1	0	19	4	1	1.9	1.0	90.9
RUGR	0	0	0	0	0	0	4	1	0	0	0	5	4	1	2.5	2.1	18.2
#SHO	2	3	0	2	30	51	11	39	0	3	7	148	51	2	16.4	18.7	81.8
SEPL	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	9.1
KILL	0	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	9.1
GRYE	2	1	0	2	0	1	0	0	0	1	4	11	4	1	1.8	1.2	54.5
BLTU	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	9.1
SAND	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	9.1
WESA	0	0	0	0	30	50	1	24	0	0	3	108	50	1	21.6	20.3	45.5
DOWI	0	0	0	0	0	0	0	12	0	0	0	12	12	12	12.0	0.0	9.1
SHOR	0	0	0	0	0	0	10	0	0	0	0	10	10	10	10.0	0.0	9.1
#GUL	0	56	50	111	10	50	159	115	88	176	340	1155	340	10	115.5	94.3	90.9
GULL	0	56	50	111	10	50	159	115	88	176	340	1155	340	10	115.5	94.3	90.9
#ALC	0	2	0	0	0	1	0	1	0	2	2	8	2	1	1.6	0.5	45.5
PIGU	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	9.1
MAMU	0	0	0	0	0	0	0	1	0	0	2	3	2	1	1.5	0.7	18.2
CAAU	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	9.1
RHAU	0	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	9.1
HUMM	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
RUHU	3	2	1	0	0	0	0	0	0	0	0	6	3	1	2.0	1.0	27.3
BEKI	2	2	2	5	3	5	4	2	2	4	2	33	5	2	3.0	1.3	100.0
#WOO	1	0	2	0	1	1	0	1	0	1	0	7	2	1	1.2	0.4	54.5
NOFL	1	0	2	0	1	1	0	1	0	1	0	7	2	1	1.2	0.4	54.5

Cluxewe River Estuary Bird Surveys for Summer 91 (Cont'd)

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#PAS	65	42	49	68	19	13	98	50	68	10	24	506	98	10	46.0	27.7	100.0
STJA	2	3	1	2	1	2	0	4	0	1	0	16	4	1	2.0	1.1	72.7
NOCR	3	6	21	15	12	1	34	12	26	2	22	154	34	1	14.0	10.8	100.0
CORA	1	0	0	1	0	0	0	0	2	5	0	9	5	1	2.3	1.9	36.4
CBCH	0	0	0	2	0	0	1	0	0	0	0	3	2	1	1.5	0.7	18.2
WREN	2	0	0	0	0	2	2	1	0	1	0	8	2	1	1.6	0.5	45.5
ROWR	0	0	3	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	9.1
MAWR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
HETH	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
AMRO	12	2	3	4	2	5	1	2	0	0	0	31	12	1	3.9	3.5	72.7
EUST	40	0	0	40	0	0	60	30	40	0	2	212	60	2	35.3	19.0	54.5
SPAR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
FOSP	3	4	1	0	2	2	0	0	0	0	0	12	4	1	2.4	1.1	45.5
DEJU	0	1	0	0	1	1	0	0	0	0	0	3	1	1	1.0	0.0	27.3
RWBL	1	1	0	1	0	0	0	0	0	0	0	3	1	1	1.0	0.0	27.3
PISI	1	25	20	0	1	0	0	1	0	0	0	48	25	1	9.6	11.9	45.5
AMGO	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	9.1
#TOT	164	234	164	250	125	149	278	261	162	217	449	2453	449	125	223.0	90.7	100.0

Cluxewe River Estuary Bird Surveys for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#LOO	1	6	5	6	18	6	1	4.5	2.4	100.0
COLO	1	6	5	6	18	6	1	4.5	2.4	100.0
#GRE	0	4	1	0	5	4	1	2.5	2.1	50.0
GREB	0	2	0	0	2	2	2	2.0	0.0	25.0
HOGR	0	0	1	0	1	1	1	1.0	0.0	25.0
RNGR	0	2	0	0	2	2	2	2.0	0.0	25.0
#HER	4	5	1	1	11	5	1	2.8	2.1	100.0
GBHE	4	5	1	1	11	5	1	2.8	2.1	100.0
#GEE	30	0	0	12	42	30	12	21.0	12.7	50.0
CAGO	30	0	0	12	42	30	12	21.0	12.7	50.0
#DAB	90	48	51	15	204	90	15	51.0	30.7	100.0
GWTE	30	48	13	7	98	48	7	24.5	18.4	100.0
MALL	10	0	38	8	56	38	8	18.7	16.8	75.0
AMWI	50	0	0	0	50	50	50	50.0	0.0	25.0
#DIV	55	47	24	28	154	55	24	38.5	14.9	100.0
HADU	0	0	8	19	27	19	8	13.5	7.8	50.0
SUSC	55	29	16	3	103	55	3	25.8	22.2	100.0
BUFF	0	0	0	6	6	6	6	6.0	0.0	25.0
COME	0	18	0	0	18	18	18	18.0	0.0	25.0
#RAP	3	5	4	2	14	5	2	3.5	1.3	100.0
BAEA	1	5	4	2	12	5	1	3.0	1.8	100.0
NOHA	1	0	0	0	1	1	1	1.0	0.0	25.0
RTHA	1	0	0	0	1	1	1	1.0	0.0	25.0
#SHO	7	9	35	20	71	35	7	17.8	12.8	100.0
GRYE	1	0	0	0	1	1	1	1.0	0.0	25.0
BLTU	0	0	20	0	20	20	20	20.0	0.0	25.0
WESA	5	9	15	20	49	20	5	12.3	6.6	100.0
LBDO	1	0	0	0	1	1	1	1.0	0.0	25.0
#GUL	85	115	329	234	763	329	85	190.8	112.4	100.0
GULL	85	115	300	234	734	300	85	183.5	100.9	100.0
MEGU	0	0	11	0	11	11	11	11.0	0.0	25.0
CAGU	0	0	2	0	2	2	2	2.0	0.0	25.0
GWGU	0	0	16	0	16	16	16	16.0	0.0	25.0
#ALC	0	0	5	0	5	5	5	5.0	0.0	25.0
PIGU	0	0	5	0	5	5	5	5.0	0.0	25.0
BEKI	4	4	9	5	22	9	4	5.5	2.4	100.0
#WOO	0	0	2	0	2	2	2	2.0	0.0	25.0
YBSA	0	0	1	0	1	1	1	1.0	0.0	25.0
NOFL	0	0	1	0	1	1	1	1.0	0.0	25.0

Cluxewe River Estuary Bird Surveys for Autumn 91 (Cont'd)

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#PAS	16	47	28	37	128	47	16	32.0	13.2	100.0
STJA	1	1	3	0	5	3	1	1.7	1.2	75.0
NOCR	13	31	0	30	74	31	13	24.7	10.1	75.0
CORA	0	0	1	0	1	1	1	1.0	0.0	25.0
CBCH	1	5	2	2	10	5	1	2.5	1.7	100.0
BRCR	0	0	2	0	2	2	2	2.0	0.0	25.0
WREN	1	9	0	0	10	9	1	5.0	5.7	50.0
WIWR	0	0	1	0	1	1	1	1.0	0.0	25.0
GCKI	0	0	2	0	2	2	2	2.0	0.0	25.0
AMRO	0	1	0	0	1	1	1	1.0	0.0	25.0
VATH	0	0	4	0	4	4	4	4.0	0.0	25.0
EUST	0	0	0	5	5	5	5	5.0	0.0	25.0
SOSP	0	0	13	0	13	13	13	13.0	0.0	25.0
#TOT	295	290	494	360	1439	494	290	359.8	95.0	100.0

Appendix IV

Cluxewe River estuary bird surveys: Seasonal bird use by habitat, September 1990 to September 1991

Note: In this Appendix, the mean has been calculated as the total number of birds of species-x counted over the season, divided by the total number of counts where species-x occurred. Counts of zero have not been included in the total number of counts nor are they included as minimum values. Thus the last 5 columns in the Appendix summarize the species occurrence on the estuary. For example, the probability of seeing a Bald Eagle in Autumn on the Beach Berm of the Cluxewe River estuary is about 50%. If you see the species, you are likely to see an average of about 4 birds and more than 12 would be exceptional.

Bird Surveys of Beach Berm Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#HER	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
GBHE	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
#RAP	0	1	0	3	0	12	0	3	0	5	24	12	1	4.8	4.3	50.0
BAEA	0	1	0	2	0	12	0	2	0	5	22	12	1	4.4	4.5	50.0
NOHA	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
RTHA	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
#SHO	0	0	30	0	0	0	0	0	0	9	39	30	9	19.5	14.8	20.0
BLTU	0	0	30	0	0	0	0	0	0	9	39	30	9	19.5	14.8	20.0
#GUL	0	0	20	0	0	254	0	145	64	65	548	254	20	109.6	92.5	50.0
GULL	0	0	0	0	0	254	0	145	64	65	528	254	64	132.0	89.8	40.0
HEGU	0	0	20	0	0	0	0	0	0	0	20	20	20	20.0	0.0	10.0
BEKI	0	0	0	0	0	0	0	1	0	2	3	2	1	1.5	0.7	20.0
#WOO	0	0	0	0	1	0	0	1	0	0	2	1	1	1.0	0.0	20.0
NOFL	0	0	0	0	1	0	0	1	0	0	2	1	1	1.0	0.0	20.0
#PAS	7	1	12	5	16	155	0	104	0	71	371	155	1	46.4	57.5	80.0
NOCR	0	1	2	0	16	1	0	63	0	0	83	63	1	16.6	26.7	50.0
CORA	7	0	0	5	0	2	0	0	0	0	14	7	2	4.7	2.5	30.0
CBCH	0	0	0	0	0	1	0	1	0	3	5	3	1	1.7	1.2	30.0
WREN	0	0	10	0	0	0	0	0	0	0	10	10	10	10.0	0.0	10.0
EUST	0	0	0	0	0	150	0	0	0	50	200	150	50	100.0	70.7	20.0
RSTO	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	10.0
SPAR	0	0	0	0	0	1	0	0	0	1	2	1	1	1.0	0.0	20.0
DEJU	0	0	0	0	0	0	0	40	0	2	42	40	2	21.0	26.9	20.0
WEME	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
PASS	0	0	0	0	0	0	0	0	0	7	7	7	7	7.0	0.0	10.0
#TOT	8	2	62	8	17	421	0	254	64	152	988	421	2	109.8	143.5	90.0

Bird Surveys of Beach Berm Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#COR	0	0	0	0	0	0	0	1	0	1	0	0	2	1	1	1.0	0.0	16.7
CORM	0	0	0	0	0	0	0	1	0	1	0	0	2	1	1	1.0	0.0	16.7
#HER	0	0	0	0	0	1	0	1	0	0	0	1	3	1	1	1.0	0.0	25.0
GBHE	0	0	0	0	0	1	0	1	0	0	0	1	3	1	1	1.0	0.0	25.0
#SWA	0	0	0	15	0	3	0	8	0	0	0	0	26	15	3	8.7	6.0	25.0
TRUS	0	0	0	15	0	3	0	8	0	0	0	0	26	15	3	8.7	6.0	25.0
#GEE	0	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
CAGO	0	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
#DAB	0	0	0	0	0	8	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
MALL	0	0	0	0	0	8	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
#DIV	0	0	1	0	0	0	0	17	0	3	0	0	21	17	1	7.0	8.7	25.0
COGO	0	0	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	8.3
BUFF	0	0	0	0	0	0	0	17	0	0	0	0	17	17	17	17.0	0.0	8.3
DUCK	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#RAP	1	0	0	0	0	3	0	3	0	2	0	0	9	3	1	2.3	1.0	33.3
BAEA	1	0	0	0	0	3	0	3	0	1	0	0	8	3	1	2.0	1.2	33.3
RTHA	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	8.3
#SHO	0	0	107	1	0	23	9	130	0	267	0	0	537	267	1	89.5	102.2	50.0
BLOY	0	0	7	1	0	7	9	20	0	7	0	0	51	20	1	8.5	6.3	50.0
BLTU	0	0	100	0	0	16	0	97	0	220	0	0	433	220	16	108.3	84.0	33.3
SAND	0	0	0	0	0	0	0	13	0	40	0	0	53	40	13	26.5	19.1	16.7
#GUL	20	0	108	0	10	44	0	211	21	95	1	224	734	224	1	81.6	85.4	75.0
GULL	20	0	108	0	10	44	0	211	21	54	1	224	693	224	1	77.0	85.7	75.0
MEGU	0	0	0	0	0	0	0	0	0	22	0	0	22	22	22	22.0	0.0	8.3
HEGU	0	0	0	0	0	0	0	0	0	19	0	0	19	19	19	19.0	0.0	8.3
BEKI	0	0	0	0	1	1	0	0	1	0	0	0	3	1	1	1.0	0.0	25.0
#WOO	0	0	1	0	0	1	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
NOFL	0	0	1	0	0	1	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
#PAS	0	0	62	20	49	48	0	73	20	37	4	38	351	73	4	39.0	21.8	75.0
NOCR	0	0	62	20	49	47	0	32	20	37	4	38	309	62	4	34.3	17.7	75.0
EUST	0	0	0	0	0	0	0	38	0	0	0	0	38	38	38	38.0	0.0	8.3
PASS	0	0	0	0	0	1	0	3	0	0	0	0	4	3	1	2.0	1.4	16.7
#TOT	21	1	279	37	60	132	9	444	42	405	5	263	1698	444	1	141.5	163.1	100.0

Bird Surveys of Beach Berm Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#COR	0	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
CORM	0	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
#SWA	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
TRUS	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
#DAB	0	1	0	0	0	0	0	0	0	38	0	7	46	38	1	15.3	19.9	25.0
MALL	0	1	0	0	0	0	0	0	0	38	0	7	46	38	1	15.3	19.9	25.0
#RAP	3	1	0	0	0	0	1	0	0	1	0	0	6	3	1	1.5	1.0	33.3
BAEA	3	1	0	0	0	0	1	0	0	1	0	0	6	3	1	1.5	1.0	33.3
#SHO	0	16	0	0	0	0	0	0	0	0	0	0	16	16	16	16.0	0.0	8.3
BLOY	0	16	0	0	0	0	0	0	0	0	0	0	16	16	16	16.0	0.0	8.3
#GUL	0	123	0	0	0	0	4	0	0	0	0	0	127	123	4	63.5	84.1	16.7
GULL	0	123	0	0	0	0	4	0	0	0	0	0	127	123	4	63.5	84.1	16.7
#PAS	17	41	0	2	0	0	4	0	1	10	0	0	75	41	1	12.5	15.2	50.0
NOCR	16	40	0	0	0	0	2	0	0	9	0	0	67	40	2	16.8	16.5	33.3
CORA	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	8.3
VATH	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	8.3
RSTO	0	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
RWBL	1	0	0	1	0	0	0	0	1	1	0	0	4	1	1	1.0	0.0	33.3
#TOT	20	187	0	2	0	0	9	0	1	49	0	7	275	187	1	39.3	67.2	58.3

Bird Surveys of Beach Berm Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
GBHE	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#RAP	0	0	1	1	0	0	0	0	0	0	0	2	1	1	1.0	0.0	18.2
BAEA	0	0	1	1	0	0	0	0	0	0	0	2	1	1	1.0	0.0	18.2
#GUL	0	0	0	100	0	0	0	15	0	50	249	414	249	15	103.5	103.1	36.4
GULL	0	0	0	100	0	0	0	15	0	50	249	414	249	15	103.5	103.1	36.4
BEKI	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	9.1
#PAS	0	0	1	9	0	0	30	0	8	0	6	54	30	1	10.8	11.2	45.5
NOCR	0	0	1	7	0	0	30	0	6	0	6	50	30	1	10.0	11.4	45.5
CORA	0	0	0	1	0	0	0	0	2	0	0	3	2	1	1.5	0.7	18.2
RWBL	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#TOT	0	0	2	111	0	0	30	15	9	50	255	472	255	2	67.4	90.6	63.6

Bird Surveys of Beach Berm Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#GUL	40	0	0	85	125	85	40	62.5	31.8	50.0
GULL	40	0	0	85	125	85	40	62.5	31.8	50.0
#PAS	0	0	0	4	4	4	4	4.0	0.0	25.0
NOCR	0	0	0	4	4	4	4	4.0	0.0	25.0
#TOT	40	0	0	89	129	89	40	64.5	34.6	50.0

Bird Surveys of Forest Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#GEE	0	0	0	0	0	0	10	0	0	0	10	10	10	10.0	0.0	10.0
CAGO	0	0	0	0	0	0	10	0	0	0	10	10	10	10.0	0.0	10.0
#RAP	1	0	1	1	0	14	0	14	0	1	32	14	1	5.3	6.7	60.0
BAEA	1	0	1	1	0	14	0	14	0	1	32	14	1	5.3	6.7	60.0
RUGR	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
#GUL	0	0	15	0	0	0	0	75	0	1	91	75	1	30.3	39.3	30.0
GULL	0	0	0	0	0	0	0	75	0	1	76	75	1	38.0	52.3	20.0
HEGU	0	0	15	0	0	0	0	0	0	0	15	15	15	15.0	0.0	10.0
BEKI	0	0	1	1	0	1	0	0	0	0	3	1	1	1.0	0.0	30.0
WOPE	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	10.0
#WOO	0	1	0	1	0	0	1	0	0	0	3	1	1	1.0	0.0	30.0
NOFL	0	1	0	1	0	0	1	0	0	0	3	1	1	1.0	0.0	30.0
#PAS	2	8	14	3	1	4	11	8	30	49	130	49	1	13.0	15.2	100.0
GRJA	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
STJA	0	4	0	2	1	0	0	0	1	1	9	4	1	1.8	1.3	50.0
NOCR	0	0	0	0	0	0	0	0	0	3	3	3	3	3.0	0.0	10.0
CORA	0	0	5	0	0	0	0	1	0	1	7	5	1	2.3	2.3	30.0
CBCH	1	0	0	1	0	0	0	2	0	1	5	2	1	1.3	0.5	40.0
RBNU	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
WREN	0	0	5	0	0	0	0	0	2	0	7	5	2	3.5	2.1	20.0
AMRO	0	3	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	10.0
RSTO	1	1	1	0	0	3	0	3	0	1	10	3	1	1.7	1.0	60.0
SAVS	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
DEJU	0	0	0	0	0	0	10	0	0	1	11	10	1	5.5	6.4	20.0
RECR	0	0	0	0	0	0	0	0	0	40	40	40	40	40.0	0.0	10.0
PISI	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	10.0
PASS	0	0	0	0	0	1	0	1	27	1	30	27	1	7.5	13.0	40.0
#TOT	3	9	32	6	1	19	22	97	30	52	271	97	1	27.1	29.2	100.0

Bird Surveys of Forest Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
GBHE	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#DIV	0	0	1	0	0	0	0	0	0	0	6	0	7	6	1	3.5	3.5	16.7
BUFF	0	0	0	0	0	0	0	0	0	0	6	0	6	6	6	6.0	0.0	8.3
DUCK	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#RAP	0	0	1	0	0	12	2	1	0	1	0	0	17	12	1	3.4	4.8	41.7
BAEA	0	0	1	0	0	12	2	1	0	1	0	0	17	12	1	3.4	4.8	41.7
#GUL	0	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
GULL	0	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
BEKI	0	1	0	1	0	0	1	0	0	0	0	0	3	1	1	1.0	0.0	25.0
#WOO	1	0	0	0	0	0	2	2	0	0	0	0	5	2	1	1.7	0.6	25.0
YBSA	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
NOFL	1	0	0	0	0	0	2	1	0	0	0	0	4	2	1	1.3	0.6	25.0
#PAS	4	2	19	51	13	9	4	39	0	9	11	11	172	51	2	15.6	15.5	91.7
STJA	0	0	1	0	0	1	0	1	0	0	0	0	3	1	1	1.0	0.0	25.0
NOCR	0	0	1	0	0	1	0	0	0	0	4	0	6	4	1	2.0	1.7	25.0
CORA	0	0	0	0	0	0	0	1	0	3	0	0	4	3	1	2.0	1.4	16.7
CBCH	4	1	0	1	5	1	0	5	0	3	0	3	23	5	1	2.9	1.7	66.7
WREN	0	0	0	2	1	1	1	0	0	0	1	0	6	2	1	1.2	0.4	41.7
GCKI	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
VATH	0	0	0	10	4	0	0	0	0	0	0	0	14	10	4	7.0	4.2	16.7
RSTO	0	0	0	0	0	2	0	2	0	0	0	3	7	3	2	2.3	0.6	25.0
FOSP	0	0	0	3	0	0	2	0	0	0	5	0	10	5	2	3.3	1.5	25.0
DEJU	0	1	4	10	0	0	1	0	0	0	1	0	17	10	1	3.4	3.9	41.7
RECR	0	0	0	25	0	0	0	0	0	0	0	0	25	25	25	25.0	0.0	8.3
PISI	0	0	0	0	0	0	0	30	0	0	0	3	33	30	3	16.5	19.1	16.7
PASS	0	0	13	0	1	3	0	0	0	3	0	2	22	13	1	4.4	4.9	41.7
#TOT	5	3	23	52	13	21	9	44	0	10	17	11	208	52	3	18.9	15.7	91.7

Bird Surveys of Forest Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#GEE	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
CAGO	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
#RAP	0	3	3	0	1	4	0	6	0	0	2	0	19	6	1	3.2	1.7	50.0
BAEA	0	3	3	0	0	4	0	5	0	0	2	0	17	5	2	3.4	1.1	41.7
SSHA	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
RTHA	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
RUHU	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
BEKI	0	0	1	0	0	0	0	0	0	0	2	0	3	2	1	1.5	0.7	16.7
#WOO	1	0	1	0	0	1	0	6	1	0	1	0	11	6	1	1.8	2.0	50.0
NOFL	1	0	0	0	0	1	0	6	1	0	1	0	10	6	1	2.0	2.2	41.7
PIWO	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#PAS	4	14	24	0	20	6	0	3	0	0	11	20	102	24	3	12.8	8.0	66.7
STJA	0	0	1	0	2	0	0	0	0	0	2	1	6	2	1	1.5	0.6	33.3
NOCR	0	0	4	0	0	0	0	0	0	0	5	0	9	5	4	4.5	0.7	16.7
CBCH	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
BRCR	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
WREN	0	0	1	0	2	2	0	1	0	0	1	1	8	2	1	1.3	0.5	50.0
GCKI	0	8	0	0	0	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
AMRO	0	0	1	0	0	1	0	0	0	0	0	1	3	1	1	1.0	0.0	25.0
VATH	4	0	0	0	0	0	0	0	0	0	0	1	5	4	1	2.5	2.1	16.7
RSTO	0	0	0	0	1	1	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
FOSP	0	0	1	0	0	1	0	1	0	0	1	1	5	1	1	1.0	0.0	41.7
DEJU	0	0	15	0	15	1	0	0	0	0	1	0	32	15	1	8.0	8.1	33.3
LALO	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
PUFI	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
PISI	0	0	0	0	0	0	0	0	0	0	0	15	15	15	15	15.0	0.0	8.3
PASS	0	4	0	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
#TOT	5	17	29	0	21	11	0	17	1	0	16	22	139	29	1	15.4	8.7	75.0

Bird Surveys of Forest Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	0	0	1	0	0	0	2	0	3	2	1	1.5	0.7	18.2
GBHE	0	0	0	0	0	1	0	0	0	2	0	3	2	1	1.5	0.7	18.2
#RAP	1	2	0	0	1	3	1	1	0	1	0	10	3	1	1.4	0.8	63.6
BAEA	1	2	0	0	1	3	1	1	0	1	0	10	3	1	1.4	0.8	63.6
RUGR	0	0	0	0	0	0	4	1	0	0	0	5	4	1	2.5	2.1	18.2
HUMM	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
RUHU	1	0	1	0	0	0	0	0	0	0	0	2	1	1	1.0	0.0	18.2
BEKI	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#WOO	1	0	2	0	1	1	0	1	0	1	0	7	2	1	1.2	0.4	54.5
NOFL	1	0	2	0	1	1	0	1	0	1	0	7	2	1	1.2	0.4	54.5
#PAS	6	31	26	10	4	8	5	6	0	5	0	101	31	4	11.2	10.0	81.8
STJA	2	2	1	2	1	2	0	3	0	1	0	14	3	1	1.8	0.7	72.7
NOCR	0	0	0	0	0	0	4	0	0	2	0	6	4	2	3.0	1.4	18.2
CBCH	0	0	0	2	0	0	1	0	0	0	0	3	2	1	1.5	0.7	18.2
WREN	2	0	0	0	0	2	0	1	0	1	0	6	2	1	1.5	0.6	36.4
ROWR	0	0	3	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	9.1
MAWR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
HETH	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
AMRO	0	0	2	3	1	2	0	1	0	0	0	9	3	1	1.8	0.8	45.5
SPAR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
FOSP	1	3	0	0	0	1	0	0	0	0	0	5	3	1	1.7	1.2	27.3
DEJU	0	1	0	0	1	1	0	0	0	0	0	3	1	1	1.0	0.0	27.3
PISI	1	25	20	0	1	0	0	1	0	0	0	48	25	1	9.6	11.9	45.5
AMGO	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	9.1
#TOT	9	33	30	11	6	13	10	9	0	9	0	130	33	6	14.4	9.9	81.8

Bird Surveys of Forest Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#RAP	2	0	2	0	4	2	2	2.0	0.0	50.0
BAEA	0	0	2	0	2	2	2	2.0	0.0	25.0
NOHA	1	0	0	0	1	1	1	1.0	0.0	25.0
RTHA	1	0	0	0	1	1	1	1.0	0.0	25.0
BEKI	0	2	5	0	7	5	2	3.5	2.1	50.0
#WOO	0	0	1	0	1	1	1	1.0	0.0	25.0
NOFL	0	0	1	0	1	1	1	1.0	0.0	25.0
#PAS	3	8	13	2	26	13	2	6.5	5.1	100.0
STJA	1	0	2	0	3	2	1	1.5	0.7	50.0
CBCH	1	5	0	2	8	5	1	2.7	2.1	75.0
BRCR	0	0	1	0	1	1	1	1.0	0.0	25.0
WREN	1	3	0	0	4	3	1	2.0	1.4	50.0
GCKI	0	0	1	0	1	1	1	1.0	0.0	25.0
VATH	0	0	4	0	4	4	4	4.0	0.0	25.0
SOSP	0	0	5	0	5	5	5	5.0	0.0	25.0
#TOT	5	10	21	2	38	21	2	9.5	8.3	100.0

Bird Surveys of Intertidal (Subtidal) Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	2	4	9	0	7	1	5	28	9	1	4.7	3.0	60.0
COLO	0	0	0	2	4	9	0	7	1	5	28	9	1	4.7	3.0	60.0
#GRE	0	0	0	1	3	5	0	2	1	2	14	5	1	2.3	1.5	60.0
GREB	0	0	0	1	0	0	0	0	0	2	3	2	1	1.5	0.7	20.0
HOGR	0	0	0	0	0	3	0	0	0	0	3	3	3	3.0	0.0	10.0
WEGR	0	0	0	0	3	2	0	2	1	0	8	3	1	2.0	0.8	40.0
#COR	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
CORM	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
#SWA	0	0	0	0	0	0	0	1	0	21	22	21	1	11.0	14.1	20.0
TRUS	0	0	0	0	0	0	0	1	0	21	22	21	1	11.0	14.1	20.0
#GEE	0	0	0	0	0	17	0	8	0	0	25	17	8	12.5	6.4	20.0
GOOS	0	0	0	0	0	17	0	8	0	0	25	17	8	12.5	6.4	20.0
#DAB	0	0	0	0	0	0	20	1	0	0	21	20	1	10.5	13.4	20.0
MALL	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
NOPI	0	0	0	0	0	0	20	0	0	0	20	20	20	20.0	0.0	10.0
#DIV	13	0	33	147	7	87	27	162	47	158	681	162	7	75.7	64.3	90.0
DIVE	0	0	0	0	0	0	0	11	0	0	11	11	11	11.0	0.0	10.0
HADU	0	0	30	26	4	43	14	45	21	49	232	49	4	29.0	15.9	80.0
SCOT	0	0	0	0	0	0	3	0	0	0	3	3	3	3.0	0.0	10.0
SUSC	0	0	0	10	0	10	0	8	0	25	53	25	8	13.3	7.9	40.0
WWSC	13	0	3	41	1	5	0	0	4	0	67	41	1	11.2	15.2	60.0
COGO	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	10.0
BUFF	0	0	0	0	0	17	0	98	20	66	201	98	17	50.3	38.9	40.0
MERG	0	0	0	0	2	0	0	0	0	1	3	2	1	1.5	0.7	20.0
HOME	0	0	0	0	0	0	10	0	2	0	12	10	2	6.0	5.7	20.0
RBME	0	0	0	0	0	7	0	0	0	0	7	7	7	7.0	0.0	10.0
RUDU	0	0	0	0	0	0	0	0	0	9	9	9	9	9.0	0.0	10.0
DUCK	0	0	0	70	0	5	0	0	0	7	82	70	5	27.3	37.0	30.0
#RAP	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	10.0
BAEA	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	10.0
#SHO	0	0	0	0	0	0	50	0	0	0	50	50	50	50.0	0.0	10.0
BLTU	0	0	0	0	0	0	50	0	0	0	50	50	50	50.0	0.0	10.0
#GUL	50	0	0	5	0	0	0	0	0	50	105	50	5	35.0	26.0	30.0
GULL	0	0	0	5	0	0	0	0	0	50	55	50	5	27.5	31.8	20.0
HEGU	50	0	0	0	0	0	0	0	0	0	50	50	50	50.0	0.0	10.0
#PAS	0	0	0	1	0	0	10	0	0	0	11	10	1	5.5	6.4	20.0
NOCR	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
DEJU	0	0	0	0	0	0	10	0	0	0	10	10	10	10.0	0.0	10.0
#TOT	63	0	33	156	14	118	108	182	49	236	959	236	14	106.6	74.3	90.0

Bird Surveys of Intertidal (Subtidal) Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#LOO	0	1	4	1	0	12	3	11	1	9	1	6	49	12	1	4.9	4.4	83.3
LOON	0	0	0	0	0	0	0	2	0	0	0	1	3	2	1	1.5	0.7	16.7
COLO	0	1	4	1	0	12	3	9	1	9	1	5	46	12	1	4.6	4.1	83.3
#GRE	0	1	2	2	0	8	5	9	0	3	1	9	40	9	1	4.4	3.4	75.0
GREB	0	0	1	0	0	0	0	0	0	2	0	3	6	3	1	2.0	1.0	25.0
HOGR	0	0	1	0	0	8	0	9	0	1	0	5	24	9	1	4.8	3.8	41.7
RNGR	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
WEGR	0	1	0	2	0	0	5	0	0	0	1	0	9	5	1	2.3	1.9	33.3
#COR	0	0	1	0	0	5	0	1	0	0	1	4	12	5	1	2.4	1.9	41.7
CORM	0	0	1	0	0	5	0	1	0	0	0	4	11	5	1	2.8	2.1	33.3
PECO	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
#HER	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
GBHE	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#SWA	0	0	0	0	0	11	0	0	0	12	0	24	47	24	11	15.7	7.2	25.0
TRUS	0	0	0	0	0	11	0	0	0	12	0	24	47	24	11	15.7	7.2	25.0
#GEE	0	0	0	0	0	0	0	5	0	11	0	4	20	11	4	6.7	3.8	25.0
BRAN	0	0	0	0	0	0	0	5	0	11	0	4	20	11	4	6.7	3.8	25.0
#DAB	0	0	0	0	0	0	0	19	0	2	0	0	21	19	2	10.5	12.0	16.7
MALL	0	0	0	0	0	0	0	17	0	2	0	0	19	17	2	9.5	10.6	16.7
NOPI	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#DIV	28	28	108	57	74	376	35	336	33	267	48	329	1719	376	28	143.3	139.5	100.0
HADU	4	10	13	25	24	33	15	25	10	50	25	41	275	50	4	22.9	13.6	100.0
OLDS	0	0	0	0	0	0	0	1	0	3	0	9	13	9	1	4.3	4.2	25.0
BLSC	0	0	0	0	8	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
SUSC	0	2	8	10	20	47	4	77	3	29	22	31	253	77	2	23.0	22.8	91.7
WWSC	9	0	3	0	0	0	2	16	0	16	0	2	48	16	2	8.0	6.7	50.0
COGO	0	0	8	0	6	0	3	7	0	13	0	5	42	13	3	7.0	3.4	50.0
BAGO	0	0	0	2	0	0	0	0	0	4	0	0	6	4	2	3.0	1.4	16.7
BUFF	15	0	51	20	14	156	10	175	12	80	0	56	589	175	10	58.9	61.0	83.3
MERG	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
HOME	0	15	0	0	0	0	0	0	0	0	1	0	16	15	1	8.0	9.9	16.7
COME	0	1	0	0	0	1	1	3	0	1	0	0	7	3	1	1.4	0.9	41.7
RBME	0	0	1	0	0	0	0	2	0	2	0	1	6	2	1	1.5	0.6	33.3
RUDU	0	0	9	0	0	11	0	8	0	3	0	3	34	11	3	6.8	3.6	41.7
DUCK	0	0	15	0	0	128	0	22	8	66	0	181	420	181	8	70.0	70.5	50.0
#RAP	0	1	0	0	0	0	0	0	1	0	0	0	2	1	1	1.0	0.0	16.7
BAEA	0	1	0	0	0	0	0	0	1	0	0	0	2	1	1	1.0	0.0	16.7
#GUL	0	0	2	0	0	10	30	3	0	8	1	2	56	30	1	8.0	10.3	58.3
GULL	0	0	2	0	0	10	30	3	0	8	1	2	56	30	1	8.0	10.3	58.3
#ALC	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
ALCI	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
#PAS	0	0	0	0	0	0	0	17	0	2	0	0	19	17	2	9.5	10.6	16.7
NOCR	0	0	0	0	0	0	0	17	0	2	0	0	19	17	2	9.5	10.6	16.7
#TOT	28	32	117	60	74	422	73	401	35	314	52	380	1988	422	28	165.7	161.3	100.0

Bird Surveys of Intertidal (Subtidal) Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#LOO	1	14	2	10	3	2	0	8	0	0	1	3	44	14	1	4.9	4.6	75.0
LOON	0	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0.	8.3
COLO	1	11	2	10	3	2	0	8	0	0	1	3	41	11	1	4.6	4.0	75.0
#GRE	0	5	1	2	1	2	0	5	0	2	1	0	19	5	1	2.4	1.7	66.7
GREB	0	0	0	2	0	0	0	0	0	2	0	0	4	2	2	2.0	0.0	16.7
HOGR	0	5	0	0	0	0	0	5	0	0	1	0	11	5	1	3.7	2.3	25.0
EAGR	0	0	0	0	0	2	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
WEGR	0	0	1	0	1	0	0	0	0	0	0	0	2	1	1	1.0	0.0	16.7
#COR	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
CORM	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#GEE	0	0	0	0	0	0	0	0	116	172	100	300	688	300	100	172.0	90.7	33.3
BRAN	0	0	0	0	0	0	0	0	116	172	100	300	688	300	100	172.0	90.7	33.3
#DAB	0	1	0	0	0	0	0	2	0	0	0	0	3	2	1	1.5	0.7	16.7
GWTE	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
NOSL	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#DIV	14	213	16	54	79	73	18	57	17	12	21	33	607	213	12	50.6	56.5	100.0
SCAU	0	0	0	6	0	0	0	0	0	0	0	0	6	6	6	6.0	0.0	8.3
LESC	0	1	0	0	21	7	0	0	0	0	0	0	29	21	1	9.7	10.3	25.0
HADU	8	24	7	21	30	14	13	16	17	12	21	6	189	30	6	15.8	7.3	100.0
OLDS	0	5	0	0	0	0	0	0	0	0	0	0	5	5	5	5.0	0.0	8.3
SUSC	0	32	0	6	2	0	0	0	0	0	0	0	40	32	2	13.3	16.3	25.0
WWSC	0	6	0	0	10	0	0	3	0	0	0	2	21	10	2	5.3	3.6	33.3
COGO	0	6	0	7	1	4	0	3	0	0	0	0	21	7	1	4.2	2.4	41.7
BAGO	0	0	0	0	0	17	0	0	0	0	0	0	17	17	17	17.0	0.0	8.3
BUFF	0	93	5	14	15	31	5	35	0	0	0	25	223	93	5	27.9	28.6	66.7
HOME	0	0	4	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
RUDU	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
DUCK	6	44	0	0	0	0	0	0	0	0	0	0	50	44	6	25.0	26.9	16.7
#RAP	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
BAEA	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#GUL	0	0	1	15	0	0	4	0	0	0	2	0	22	15	1	5.5	6.5	33.3
GULL	0	0	1	15	0	0	4	0	0	0	2	0	22	15	1	5.5	6.5	33.3
#ALC	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
PIGU	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
BEKI	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
#TOT	15	234	20	82	83	77	22	74	133	186	125	337	1388	337	15	115.7	96.2	100.0

Bird Surveys of Intertidal (Subtidal) Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	0	0	0	0	2	0	2	1	5	2	1	1.7	0.6	27.3
COLO	0	0	0	0	0	0	0	2	0	2	1	5	2	1	1.7	0.6	27.3
#GRE	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
WEGR	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#GEE	0	30	0	0	0	0	0	0	0	0	0	30	30	30	30.0	0.0	9.1
BRAN	0	30	0	0	0	0	0	0	0	0	0	30	30	30	30.0	0.0	9.1
#DIV	25	25	33	47	36	1	0	46	2	6	51	272	51	1	27.2	18.9	90.9
HADU	15	10	0	0	0	0	0	15	0	0	0	40	15	10	13.3	2.9	27.3
SUSC	6	15	25	47	35	1	0	31	0	3	0	163	47	1	20.4	16.8	72.7
WWSC	4	0	0	0	0	0	0	0	0	3	1	8	4	1	2.7	1.5	27.3
COME	0	0	8	0	0	0	0	0	0	0	0	8	8	8	8.0	0.0	9.1
RBME	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
DUCK	0	0	0	0	0	0	0	0	2	0	50	52	50	2	26.0	33.9	18.2
#SHO	0	0	0	0	0	20	0	0	0	0	0	20	20	20	20.0	0.0	9.1
WESA	0	0	0	0	0	20	0	0	0	0	0	20	20	20	20.0	0.0	9.1
#GUL	0	0	0	0	4	0	0	0	1	0	39	44	39	1	14.7	21.1	27.3
GULL	0	0	0	0	4	0	0	0	1	0	39	44	39	1	14.7	21.1	27.3
#ALC	0	2	0	0	0	1	0	1	0	2	2	8	2	1	1.6	0.5	45.5
PIGU	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	9.1
MAMU	0	0	0	0	0	0	0	1	0	0	2	3	2	1	1.5	0.7	18.2
CAAU	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	9.1
RHAU	0	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	9.1
#TOT	25	57	33	48	40	22	0	49	3	10	93	380	93	3	38.0	26.0	90.9

Bird Surveys of Intertidal (Subtidal) Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#LOO	1	6	5	5	17	6	1	4.3	2.2	100.0
COLO	1	6	5	5	17	6	1	4.3	2.2	100.0
#GRE	0	4	1	0	5	4	1	2.5	2.1	50.0
GREB	0	2	0	0	2	2	2	2.0	0.0	25.0
HOGR	0	0	1	0	1	1	1	1.0	0.0	25.0
RNGR	0	2	0	0	2	2	2	2.0	0.0	25.0
#DAB	60	33	0	0	93	60	33	46.5	19.1	50.0
GWTE	0	33	0	0	33	33	33	33.0	0.0	25.0
MALL	10	0	0	0	10	10	10	10.0	0.0	25.0
AMWI	50	0	0	0	50	50	50	50.0	0.0	25.0
#DIV	35	29	24	22	110	35	22	27.5	5.8	100.0
HADU	0	0	8	19	27	19	8	13.5	7.8	50.0
SUSC	35	29	16	3	83	35	3	20.8	14.2	100.0
#SHO	0	0	35	20	55	35	20	27.5	10.6	50.0
BLTU	0	0	20	0	20	20	20	20.0	0.0	25.0
WESA	0	0	15	20	35	20	15	17.5	3.5	50.0
#GUL	0	15	72	10	97	72	10	32.3	34.4	75.0
GULL	0	15	50	10	75	50	10	25.0	21.8	75.0
MEGU	0	0	6	0	6	6	6	6.0	0.0	25.0
CAGU	0	0	2	0	2	2	2	2.0	0.0	25.0
GWGU	0	0	14	0	14	14	14	14.0	0.0	25.0
#ALC	0	0	5	0	5	5	5	5.0	0.0	25.0
PIGU	0	0	5	0	5	5	5	5.0	0.0	25.0
#PAS	0	0	0	5	5	5	5	5.0	0.0	25.0
EUST	0	0	0	5	5	5	5	5.0	0.0	25.0
#TOT	96	87	142	62	387	142	62	96.8	33.4	100.0

Bird Surveys of Spit Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#GEE	0	0	0	0	0	0	0	0	0	13	13	13	13	13.0	0.0	10.0
CAGO	0	0	0	0	0	0	0	0	0	13	13	13	13	13.0	0.0	10.0
#DIV	0	0	0	0	6	0	0	0	0	3	9	6	3	4.5	2.1	20.0
WWSC	0	0	0	0	6	0	0	0	0	0	6	6	6	6.0	0.0	10.0
COME	0	0	0	0	0	0	0	0	0	3	3	3	3	3.0	0.0	10.0
#SHO	68	50	0	47	54	40	0	40	22	67	388	68	22	48.5	15.1	80.0
BLOY	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
BLTU	20	50	0	45	50	40	0	0	22	60	287	60	20	41.0	15.0	70.0
WESA	40	0	0	2	2	0	0	0	0	0	44	40	2	14.7	21.9	30.0
SHOR	8	0	0	0	2	0	0	40	0	1	51	40	1	12.8	18.4	40.0
#GUL	0	235	0	0	100	88	50	27	107	66	673	235	27	96.1	67.5	70.0
GULL	0	235	0	0	100	18	50	27	107	66	603	235	18	86.1	73.8	70.0
BOGU	0	0	0	0	0	26	0	0	0	0	26	26	26	26.0	0.0	10.0
HEGU	0	0	0	0	0	44	0	0	0	0	44	44	44	44.0	0.0	10.0
#PAS	0	0	0	1	0	24	12	0	0	6	43	24	1	10.8	9.9	40.0
NOCR	0	0	0	0	0	21	7	0	0	3	31	21	3	10.3	9.5	30.0
WREN	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
EUST	0	0	0	0	0	0	5	0	0	0	5	5	5	5.0	0.0	10.0
RSTO	0	0	0	0	0	3	0	0	0	3	6	3	3	3.0	0.0	20.0
#TOT	68	285	0	48	160	152	62	67	129	155	1126	285	48	125.1	75.0	90.0

Bird Surveys of Spit Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#COR	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
DCCO	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#HER	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
GBHE	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
#GEE	0	0	8	3	0	0	0	0	0	0	0	0	11	8	3	5.5	3.5	16.7
BRAN	0	0	8	3	0	0	0	0	0	0	0	0	11	8	3	5.5	3.5	16.7
#DIV	0	0	3	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
BUFF	0	0	3	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
#RAP	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
BAEA	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1.0	0.0	8.3
#SHO	54	32	102	0	128	34	0	12	120	71	25	62	640	128	12	64.0	40.8	83.3
KILL	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
BLOY	0	30	0	0	0	34	0	12	0	30	10	26	142	34	10	23.7	10.2	50.0
BLTU	53	0	102	0	120	0	0	0	120	41	15	34	485	120	15	69.3	43.7	58.3
WESA	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
SHOR	0	0	0	0	8	0	0	0	0	0	0	2	10	8	2	5.0	4.2	16.7
#GUL	100	0	38	50	72	39	40	6	93	0	50	11	499	100	6	49.9	31.0	83.3
GULL	100	0	38	50	72	39	40	6	93	0	50	11	499	100	6	49.9	31.0	83.3
BEKI	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
#WOO	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
NOFL	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
#PAS	54	0	25	0	0	22	10	25	42	21	0	37	236	54	10	29.5	13.9	66.7
NOCR	40	0	3	0	0	19	10	15	42	18	0	33	180	42	3	22.5	14.3	66.7
GCKI	0	0	0	0	0	0	0	6	0	0	0	0	6	6	6	6.0	0.0	8.3
VATH	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
EUST	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
RSTO	0	0	0	0	0	3	0	4	0	0	0	3	10	4	3	3.3	0.6	25.0
DEJU	10	0	22	0	0	0	0	0	0	0	0	0	32	22	10	16.0	8.5	16.7
WEME	0	0	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	8.3
PASS	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
#TOT	208	33	176	53	200	95	50	46	255	92	76	110	1394	255	33	116.2	74.6	100.0

Bird Surveys of Spit Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
COLO	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#GEE	0	0	0	0	0	0	0	36	2	0	100	0	138	100	2	46.0	49.8	25.0
BRAN	0	0	0	0	0	0	0	36	2	0	100	0	138	100	2	46.0	49.8	25.0
#DAB	0	13	0	0	0	0	0	0	0	0	0	2	15	13	2	7.5	7.8	16.7
MALL	0	13	0	0	0	0	0	0	0	0	0	0	13	13	13	13.0	0.0	8.3
NOSL	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
#DIV	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
DUCK	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#RAP	0	0	1	0	0	1	1	0	0	0	0	1	4	1	1	1.0	0.0	33.3
BAEA	0	0	1	0	0	1	1	0	0	0	0	1	4	1	1	1.0	0.0	33.3
#SHO	122	8	52	13	87	50	0	51	17	40	0	0	440	122	8	48.9	36.9	75.0
BLOY	6	6	22	0	6	0	0	1	0	0	0	0	41	22	1	8.2	8.0	41.7
BLTU	100	0	30	13	50	50	0	50	15	0	0	0	308	100	13	44.0	29.6	58.3
SURF	0	0	0	0	4	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
LESA	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	8.3
ROSA	0	0	0	0	27	0	0	0	0	0	0	0	27	27	27	27.0	0.0	8.3
SHOR	16	2	0	0	0	0	0	0	0	40	0	0	58	40	2	19.3	19.2	25.0
#GUL	100	20	50	88	50	0	70	6	75	34	40	55	588	100	6	53.5	28.4	91.7
GULL	100	3	50	88	50	0	70	6	75	34	40	55	571	100	3	51.9	30.7	91.7
HEGU	0	17	0	0	0	0	0	0	0	0	0	0	17	17	17	17.0	0.0	8.3
BEKI	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#PAS	1	4	12	49	1	42	2	3	4	1	2	8	129	49	1	10.8	16.6	100.0
STJA	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
NOCR	0	4	8	49	0	17	2	0	4	1	0	2	87	49	1	10.9	16.3	66.7
CORA	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
WREN	0	0	0	0	0	2	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
AMRO	0	0	0	0	0	22	0	1	0	0	0	2	25	22	1	8.3	11.8	25.0
SPAR	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
FOSP	0	0	1	0	1	1	0	1	0	0	2	4	10	4	1	1.7	1.2	50.0
GCSP	0	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
#TOT	223	46	115	150	138	94	73	98	98	75	142	66	1318	223	46	109.8	48.0	100.0

Bird Surveys of Spit Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#GEE	20	5	14	12	10	0	0	0	0	0	0	61	20	5	12.2	5.5	45.5
BRAN	20	5	14	12	10	0	0	0	0	0	0	61	20	5	12.2	5.5	45.5
#DIV	0	0	4	0	8	2	0	0	0	0	0	14	8	2	4.7	3.1	27.3
WWSC	0	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	9.1
BUFF	0	0	0	0	8	0	0	0	0	0	0	8	8	8	8.0	0.0	9.1
COME	0	0	2	0	0	2	0	0	0	0	0	4	2	2	2.0	0.0	18.2
#RAP	0	0	1	0	1	0	0	0	0	0	0	2	1	1	1.0	0.0	18.2
BAEA	0	0	1	0	1	0	0	0	0	0	0	2	1	1	1.0	0.0	18.2
#SHO	0	0	0	0	30	0	1	1	0	0	0	32	30	1	10.7	16.7	27.3
BLTU	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	9.1
WESA	0	0	0	0	30	0	1	0	0	0	0	31	30	1	15.5	20.5	18.2
#GUL	0	50	50	11	6	50	159	0	87	50	0	463	159	6	57.9	48.1	72.7
GULL	0	50	50	11	6	50	159	0	87	50	0	463	159	6	57.9	48.1	72.7
RUHU	2	2	0	0	0	0	0	0	0	0	0	4	2	2	2.0	0.0	18.2
BEKI	0	0	0	0	1	0	1	1	0	0	0	3	1	1	1.0	0.0	27.3
#PAS	3	5	21	0	12	1	2	10	50	0	16	120	50	1	13.3	15.3	81.8
STJA	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
NOCR	0	3	20	0	10	0	0	10	10	0	16	69	20	3	11.5	5.9	54.5
CORA	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
WREN	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	9.1
AMRO	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
EUST	0	0	0	0	0	0	0	0	40	0	0	40	40	40	40.0	0.0	9.1
FOSP	2	1	0	0	2	1	0	0	0	0	0	6	2	1	1.5	0.6	36.4
#TOT	25	62	90	23	68	53	163	12	137	50	16	699	163	12	63.5	49.3	100.0

Bird Surveys of Spit Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#SHO	0	5	0	0	5	5	5	5.0	0.0	25.0
WESA	0	5	0	0	5	5	5	5.0	0.0	25.0
#GUL	5	100	150	90	345	150	5	86.3	60.2	100.0
GULL	5	100	150	90	345	150	5	86.3	60.2	100.0
#WOO	0	0	1	0	1	1	1	1.0	0.0	25.0
YBSA	0	0	1	0	1	1	1	1.0	0.0	25.0
#PAS	8	0	6	0	14	8	6	7.0	1.4	50.0
NOCR	8	0	0	0	8	8	8	8.0	0.0	25.0
CBCH	0	0	2	0	2	2	2	2.0	0.0	25.0
BRCR	0	0	1	0	1	1	1	1.0	0.0	25.0
GCKI	0	0	1	0	1	1	1	1.0	0.0	25.0
SOSP	0	0	2	0	2	2	2	2.0	0.0	25.0
#TOT	13	105	157	90	365	157	13	91.3	59.5	100.0

Bird Surveys of Estuarine Subtidal Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#LOO	0	2	1	0	0	0	1	0	0	0	4	2	1	1.3	0.6	30.0
LOON	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
COLO	0	2	0	0	0	0	1	0	0	0	3	2	1	1.5	0.7	20.0
#GRE	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
GREB	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
#HER	0	1	1	0	0	0	0	0	0	0	2	1	1	1.0	0.0	20.0
GBHE	0	1	1	0	0	0	0	0	0	0	2	1	1	1.0	0.0	20.0
#SWA	0	0	0	0	0	0	7	0	5	0	12	7	5	6.0	1.4	20.0
TRUS	0	0	0	0	0	0	7	0	5	0	12	7	5	6.0	1.4	20.0
#DAB	0	0	0	0	0	0	0	8	4	0	12	8	4	6.0	2.8	20.0
GWTE	0	0	0	0	0	0	0	0	4	0	4	4	4	4.0	0.0	10.0
GADW	0	0	0	0	0	0	0	8	0	0	8	8	8	8.0	0.0	10.0
#DIV	3	34	0	0	1	1	24	42	25	39	169	42	1	21.1	17.2	80.0
HADU	0	9	0	0	0	0	12	0	0	0	21	12	9	10.5	2.1	20.0
SUSC	3	9	0	0	0	0	0	0	0	0	12	9	3	6.0	4.2	20.0
WWSC	0	15	0	0	1	0	0	0	3	0	19	15	1	6.3	7.6	30.0
COGO	0	0	0	0	0	0	0	0	0	3	3	3	3	3.0	0.0	10.0
BUFF	0	0	0	0	0	0	0	42	22	35	99	42	22	33.0	10.1	30.0
MERG	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
HOME	0	0	0	0	0	0	12	0	0	1	13	12	1	6.5	7.8	20.0
COME	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
#RAP	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
FALC	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
#SHO	0	0	0	0	0	9	0	0	0	4	13	9	4	6.5	3.5	20.0
BLTU	0	0	0	0	0	6	0	0	0	4	10	6	4	5.0	1.4	20.0
DUNL	0	0	0	0	0	3	0	0	0	0	3	3	3	3.0	0.0	10.0
#GUL	80	120	50	0	0	730	6	265	28	21	1300	730	6	162.5	243.9	80.0
GULL	0	120	0	0	0	146	6	265	28	21	586	265	6	97.7	100.0	60.0
BOGU	0	0	0	0	0	219	0	0	0	0	219	219	219	219.0	0.0	10.0
HEGU	80	0	0	0	0	365	0	0	0	0	445	365	80	222.5	201.5	20.0
GWGU	0	0	50	0	0	0	0	0	0	0	50	50	50	50.0	0.0	10.0
BEKI	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
#PAS	0	24	0	0	0	50	0	0	0	0	74	50	24	37.0	18.4	20.0
NOCR	0	22	0	0	0	15	0	0	0	0	37	22	15	18.5	4.9	20.0
CORA	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
EUST	0	0	0	0	0	35	0	0	0	0	35	35	35	35.0	0.0	10.0
#TOT	83	183	52	0	1	791	38	315	62	64	1589	791	1	176.6	249.2	90.0

Bird Surveys of Estuarine Subtidal Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#LOO	0	1	0	2	0	0	0	0	0	0	0	0	3	2	1	1.5	0.7	16.7
COLO	0	1	0	2	0	0	0	0	0	0	0	0	3	2	1	1.5	0.7	16.7
#HER	0	1	0	0	0	0	1	0	0	0	0	0	2	1	1	1.0	0.0	16.7
GBHE	0	1	0	0	0	0	1	0	0	0	0	0	2	1	1	1.0	0.0	16.7
#SWA	28	15	0	15	23	0	25	0	10	0	0	1	117	28	1	16.7	9.4	58.3
TRUS	28	15	0	15	23	0	25	0	10	0	0	1	117	28	1	16.7	9.4	58.3
#DAB	0	30	0	12	0	0	13	0	0	0	5	0	60	30	5	15.0	10.6	33.3
MALL	0	30	0	12	0	0	13	0	0	0	5	0	60	30	5	15.0	10.6	33.3
#DIV	18	29	13	35	14	33	20	17	13	6	16	4	218	35	4	18.2	9.8	100.0
HADU	0	10	0	0	0	0	0	0	0	0	0	0	10	10	10	10.0	0.0	8.3
SUSC	0	4	0	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
COGO	0	0	2	0	8	0	0	3	0	0	1	0	14	8	1	3.5	3.1	33.3
BAGO	0	0	0	20	6	0	0	0	0	0	0	0	26	20	6	13.0	9.9	16.7
BUFF	18	15	11	15	0	30	20	13	13	6	15	0	156	30	6	15.6	6.3	83.3
COME	0	0	0	0	0	3	0	1	0	0	0	0	4	3	1	2.0	1.4	16.7
DUCK	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4.0	0.0	8.3
#RAP	0	0	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	8.3
BAEA	0	0	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	8.3
#SHO	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10.0	0.0	8.3
BLTU	10	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10.0	0.0	8.3
#GUL	0	40	19	0	0	72	0	6	2	1	0	0	140	72	1	23.3	28.0	50.0
GULL	0	40	19	0	0	72	0	6	2	1	0	0	140	72	1	23.3	28.0	50.0
BEKI	0	0	0	0	0	0	1	0	0	0	1	0	2	1	1	1.0	0.0	16.7
#PAS	0	0	0	1	0	0	0	9	0	0	0	0	10	9	1	5.0	5.7	16.7
NOCR	0	0	0	0	0	0	0	9	0	0	0	0	9	9	9	9.0	0.0	8.3
CORA	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#TOT	56	116	32	65	37	105	60	32	25	10	22	5	565	116	5	47.1	35.0	100.0

Bird Surveys of Estuarine Subtidal Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	0	0	2	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
GBHE	0	0	0	0	0	2	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
#SWA	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
TRUS	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#GEE	0	0	0	0	2	2	0	4	0	0	0	0	8	4	2	2.7	1.2	25.0
CAGO	0	0	0	0	2	2	0	4	0	0	0	0	8	4	2	2.7	1.2	25.0
#DAB	0	3	4	0	0	9	5	44	0	50	13	0	128	50	3	18.3	20.0	58.3
GWTE	0	0	0	0	0	0	0	0	0	12	0	0	12	12	12	12.0	0.0	8.3
MALL	0	3	4	0	0	9	5	44	0	38	13	0	116	44	3	16.6	17.1	58.3
#DIV	7	13	34	0	22	54	42	50	46	68	61	10	407	68	7	37.0	21.3	91.7
LESC	0	0	12	0	0	0	0	0	0	0	0	0	12	12	12	12.0	0.0	8.3
COGO	0	0	6	0	6	0	0	0	0	0	2	0	14	6	2	4.7	2.3	25.0
BAGO	0	5	0	0	0	0	10	0	6	8	0	0	29	10	5	7.3	2.2	33.3
BUFF	3	7	16	0	16	50	32	50	40	60	57	8	339	60	3	30.8	21.6	91.7
COME	4	1	0	0	0	4	0	0	0	0	2	2	13	4	1	2.6	1.3	41.7
#SHO	0	131	0	0	0	0	0	0	0	0	0	0	131	131	131	131.0	0.0	8.3
BLTU	0	131	0	0	0	0	0	0	0	0	0	0	131	131	131	131.0	0.0	8.3
BEKI	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	8.3
#PAS	0	25	0	0	0	0	0	2	0	8	4	0	39	25	2	9.8	10.5	33.3
NOCR	0	0	0	0	0	0	0	2	0	8	4	0	14	8	2	4.7	3.1	25.0
EUST	0	25	0	0	0	0	0	0	0	0	0	0	25	25	25	25.0	0.0	8.3
#TOT	7	173	38	0	24	67	47	100	46	127	78	10	717	173	7	65.2	51.4	91.7

Bird Surveys of Estuarine Subtidal Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#DAB	15	20	3	0	0	0	0	0	0	0	0	38	20	3	12.7	8.7	27.3
MALL	15	20	3	0	0	0	0	0	0	0	0	38	20	3	12.7	8.7	27.3
#DIV	6	4	3	0	4	19	0	0	0	2	0	38	19	2	6.3	6.3	54.5
HADU	0	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	9.1
SUSC	0	0	0	0	0	16	0	0	0	0	0	16	16	16	16.0	0.0	9.1
COME	6	4	3	0	0	3	0	0	0	0	0	16	6	3	4.0	1.4	36.4
RBME	0	0	0	0	4	0	0	0	0	0	0	4	4	4	4.0	0.0	9.1
#RAP	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	9.1
BAEA	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#SHO	0	0	0	0	0	30	0	32	0	0	3	65	32	3	21.7	16.2	27.3
WESA	0	0	0	0	0	30	0	20	0	0	3	53	30	3	17.7	13.7	27.3
DOWI	0	0	0	0	0	0	0	12	0	0	0	12	12	12	12.0	0.0	9.1
#GUL	0	6	0	0	0	0	0	50	0	6	0	62	50	6	20.7	25.4	27.3
GULL	0	6	0	0	0	0	0	50	0	6	0	62	50	6	20.7	25.4	27.3
BEKI	1	0	0	2	0	1	0	0	0	1	0	5	2	1	1.3	0.5	36.4
#PAS	4	0	0	40	0	0	0	30	0	0	0	74	40	4	24.7	18.6	27.3
NOCR	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	9.1
EUST	0	0	0	40	0	0	0	30	0	0	0	70	40	30	35.0	7.1	18.2
RWBL	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#TOT	26	30	6	42	4	51	0	112	0	9	3	283	112	3	31.4	34.9	81.8

Bird Surveys of Estuarine Subtidal Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#HER	1	1	0	0	2	1	1	1.0	0.0	50.0
GBHE	1	1	0	0	2	1	1	1.0	0.0	50.0
#DAB	0	0	12	0	12	12	12	12.0	0.0	25.0
MALL	0	0	12	0	12	12	12	12.0	0.0	25.0
#DIV	20	18	0	6	44	20	6	14.7	7.6	75.0
SUSC	20	0	0	0	20	20	20	20.0	0.0	25.0
BUFF	0	0	0	6	6	6	6	6.0	0.0	25.0
COME	0	18	0	0	18	18	18	18.0	0.0	25.0
#RAP	1	1	1	0	3	1	1	1.0	0.0	75.0
BAEA	1	1	1	0	3	1	1	1.0	0.0	75.0
#SHO	5	0	0	0	5	5	5	5.0	0.0	25.0
WESA	5	0	0	0	5	5	5	5.0	0.0	25.0
#GUL	20	0	105	45	170	105	20	56.7	43.7	75.0
GULL	20	0	100	45	165	100	20	55.0	40.9	75.0
MEGU	0	0	5	0	5	5	5	5.0	0.0	25.0
BEKI	1	0	2	0	3	2	1	1.5	0.7	50.0
#PAS	5	5	4	0	14	5	4	4.7	0.6	75.0
NOCR	5	0	0	0	5	5	5	5.0	0.0	25.0
WREN	0	5	0	0	5	5	5	5.0	0.0	25.0
SOSP	0	0	4	0	4	4	4	4.0	0.0	25.0
#TOT	53	25	124	51	253	124	25	63.3	42.5	100.0

Bird Surveys of Brackish Marsh Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	0	0	1	0	1	2	0	4	2	1	1.3	0.6	30.0
GBHE	0	0	0	0	0	1	0	1	2	0	4	2	1	1.3	0.6	30.0
#SWA	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	10.0
TRUS	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	10.0
#DAB	0	0	0	117	0	17	0	5	0	7	146	117	5	36.5	53.9	40.0
DABL	0	0	0	10	0	17	0	0	0	7	34	17	7	11.3	5.1	30.0
GWTE	0	0	0	17	0	0	0	3	0	0	20	17	3	10.0	9.9	20.0
MALL	0	0	0	14	0	0	0	2	0	0	16	14	2	8.0	8.5	20.0
NOPI	0	0	0	16	0	0	0	0	0	0	16	16	16	16.0	0.0	10.0
EUWI	0	0	0	30	0	0	0	0	0	0	30	30	30	30.0	0.0	10.0
AMWI	0	0	0	30	0	0	0	0	0	0	30	30	30	30.0	0.0	10.0
#DIV	0	0	0	10	0	2	0	9	0	0	21	10	2	7.0	4.4	30.0
BUFF	0	0	0	0	0	0	0	9	0	0	9	9	9	9.0	0.0	10.0
DUCK	0	0	0	10	0	2	0	0	0	0	12	10	2	6.0	5.7	20.0
#RAP	0	0	0	5	0	0	0	0	4	1	10	5	1	3.3	2.1	30.0
BAEA	0	0	0	5	0	0	0	0	4	1	10	5	1	3.3	2.1	30.0
#GUL	0	0	0	192	0	120	0	10	0	0	322	192	10	107.3	91.7	30.0
GULL	0	0	0	192	0	24	0	10	0	0	226	192	10	75.3	101.3	30.0
BOGU	0	0	0	0	0	36	0	0	0	0	36	36	36	36.0	0.0	10.0
HEGU	0	0	0	0	0	60	0	0	0	0	60	60	60	60.0	0.0	10.0
#PAS	0	0	0	22	0	8	0	0	112	17	159	112	8	39.8	48.5	40.0
NOCR	0	0	0	22	0	8	0	0	100	17	147	100	8	36.8	42.6	40.0
EUST	0	0	0	0	0	0	0	0	12	0	12	12	12	12.0	0.0	10.0
#TOT	0	0	0	346	0	148	0	25	120	25	664	346	25	132.8	131.4	50.0

Bird Surveys of Brackish Marsh Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	1	1	0	2	0	0	2	0	0	1	7	2	1	1.4	0.5	41.7
GBHE	0	0	1	1	0	2	0	0	2	0	0	1	7	2	1	1.4	0.5	41.7
#SWA	20	0	25	0	0	4	0	8	9	0	30	0	96	30	4	16.0	10.5	50.0
TRUS	20	0	25	0	0	4	0	8	9	0	30	0	96	30	4	16.0	10.5	50.0
#DAB	0	0	6	0	39	37	0	0	0	0	0	0	82	39	6	27.3	18.5	25.0
GWTE	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
MALL	0	0	6	0	39	20	0	0	0	0	0	0	65	39	6	21.7	16.6	25.0
NOPI	0	0	0	0	0	16	0	0	0	0	0	0	16	16	16	16.0	0.0	8.3
#DIV	0	0	18	2	6	0	0	0	9	0	0	0	35	18	2	8.8	6.8	33.3
HADU	0	0	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
COGO	0	0	0	0	2	0	0	0	6	0	0	0	8	6	2	4.0	2.8	16.7
BUFF	0	0	0	0	4	0	0	0	1	0	0	0	5	4	1	2.5	2.1	16.7
COME	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	8.3
DUCK	0	0	18	0	0	0	0	0	0	0	0	0	18	18	18	18.0	0.0	8.3
#GUL	0	0	14	0	0	2	0	0	0	0	0	0	16	14	2	8.0	8.5	16.7
GULL	0	0	14	0	0	2	0	0	0	0	0	0	16	14	2	8.0	8.5	16.7
BEKI	0	0	0	0	0	1	0	0	0	0	0	1	2	1	1	1.0	0.0	16.7
#WOO	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
NOFL	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#PAS	0	0	0	3	28	9	0	0	4	0	0	2	46	28	2	9.2	10.8	41.7
NOCR	0	0	0	0	28	9	0	0	4	0	0	0	41	28	4	13.7	12.7	25.0
VATH	0	0	0	3	0	0	0	0	0	0	0	0	3	3	3	3.0	0.0	8.3
RSTO	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
#TOT	20	0	65	6	73	55	0	8	24	0	30	4	285	73	4	31.7	26.3	75.0

Bird Surveys of Brackish Marsh Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#SWA	19	0	0	0	0	0	0	0	0	0	0	0	19	19	19	19.0	0.0	8.3
TRUS	19	0	0	0	0	0	0	0	0	0	0	0	19	19	19	19.0	0.0	8.3
#GEE	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	8.3
CAGO	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	8.3
#DAB	0	0	0	0	0	0	0	0	75	0	0	0	75	75	75	75.0	0.0	8.3
MALL	0	0	0	0	0	0	0	0	63	0	0	0	63	63	63	63.0	0.0	8.3
NOSL	0	0	0	0	0	0	0	0	12	0	0	0	12	12	12	12.0	0.0	8.3
#DIV	12	0	0	6	0	0	17	0	7	4	0	0	46	17	4	9.2	5.3	41.7
BUFF	12	0	0	6	0	0	17	0	4	2	0	0	41	17	2	8.2	6.2	41.7
COME	0	0	0	0	0	0	0	0	3	2	0	0	5	3	2	2.5	0.7	16.7
#PAS	0	2	0	0	0	0	0	0	4	12	0	0	18	12	2	6.0	5.3	25.0
NOCR	0	0	0	0	0	0	0	0	0	4	0	0	4	4	4	4.0	0.0	8.3
EUST	0	0	0	0	0	0	0	0	0	8	0	0	8	8	8	8.0	0.0	8.3
RSTO	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
SPAR	0	0	0	0	0	0	0	0	4	0	0	0	4	4	4	4.0	0.0	8.3
PASS	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#TOT	31	2	0	6	0	0	17	0	88	16	0	0	160	88	2	26.7	31.7	50.0

Bird Surveys of Brackish Marsh Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#HER	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	9.1
GBHE	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	9.1
#RAP	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	9.1
BAEA	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	9.1
#SHO	0	0	0	0	0	0	10	0	0	0	0	10	10	10	10.0	0.0	9.1
SHOR	0	0	0	0	0	0	10	0	0	0	0	10	10	10	10.0	0.0	9.1
#GUL	0	0	0	0	0	0	0	0	0	0	52	52	52	52	52.0	0.0	9.1
GULL	0	0	0	0	0	0	0	0	0	0	52	52	52	52	52.0	0.0	9.1
#PAS	0	0	0	9	0	0	0	0	10	0	0	19	10	9	9.5	0.7	18.2
NOCR	0	0	0	8	0	0	0	0	10	0	0	18	10	8	9.0	1.4	18.2
AMRO	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#TOT	0	0	0	9	0	0	10	0	11	0	53	83	53	9	20.8	21.5	36.4

Bird Surveys of Brackish Marsh Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#HER	0	1	0	1	2	1	1	1.0	0.0	50.0
GBHE	0	1	0	1	2	1	1	1.0	0.0	50.0
#RAP	0	2	0	1	3	2	1	1.5	0.7	50.0
BAEA	0	2	0	1	3	2	1	1.5	0.7	50.0
#GUL	0	0	0	3	3	3	3	3.0	0.0	25.0
GULL	0	0	0	3	3	3	3	3.0	0.0	25.0
BEKI	0	2	0	1	3	2	1	1.5	0.7	50.0
#PAS	0	25	0	24	49	25	24	24.5	0.7	50.0
NOCR	0	25	0	24	49	25	24	24.5	0.7	50.0
#TOT	0	30	0	30	60	30	30	30.0	0.0	50.0

Bird Surveys of Saltmarsh Habitat for Autumn 90

Date	23Sep	30Sep	08Oct	14Oct	21Oct	28Oct	04Nov	11Nov	18Nov	25Nov	Total	Max	Min	Mean	SD	%Freq
#HER	2	3	0	1	0	0	0	0	0	0	6	3	1	2.0	1.0	30.0
GBHE	2	3	0	1	0	0	0	0	0	0	6	3	1	2.0	1.0	30.0
#GEE	0	0	0	22	0	5	0	0	0	2	29	22	2	9.7	10.8	30.0
CAGO	0	0	0	22	0	5	0	0	0	2	29	22	2	9.7	10.8	30.0
#DAB	8	26	3	24	10	37	0	45	4	12	169	45	3	18.8	15.0	90.0
DABL	0	0	0	0	3	10	0	5	0	0	18	10	3	6.0	3.6	30.0
GWTE	1	13	0	0	0	0	0	0	4	1	19	13	1	4.8	5.7	40.0
MALL	5	6	0	20	5	5	0	25	0	11	77	25	5	11.0	8.3	70.0
NOPI	2	4	3	0	0	0	0	0	0	0	9	4	2	3.0	1.0	30.0
GADW	0	0	0	0	0	0	0	1	0	0	1	1	1	1.0	0.0	10.0
AMWI	0	3	0	4	2	22	0	14	0	0	45	22	2	9.0	8.7	50.0
#DIV	0	0	0	0	0	7	0	12	9	5	33	12	5	8.3	3.0	40.0
WWSC	0	0	0	0	0	0	0	0	7	0	7	7	7	7.0	0.0	10.0
BUFF	0	0	0	0	0	0	0	3	0	0	3	3	3	3.0	0.0	10.0
MERG	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
HOME	0	0	0	0	0	0	0	0	2	1	3	2	1	1.5	0.7	20.0
DUCK	0	0	0	0	0	6	0	9	0	4	19	9	4	6.3	2.5	30.0
#RAP	0	0	0	1	0	0	0	1	1	0	3	1	1	1.0	0.0	30.0
BAEA	0	0	0	1	0	0	0	1	1	0	3	1	1	1.0	0.0	30.0
#SHO	10	2	0	0	0	0	0	0	0	0	12	10	2	6.0	5.7	20.0
GRYE	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
WESA	10	0	0	0	0	0	0	0	0	0	10	10	10	10.0	0.0	10.0
#GUL	0	12	7	9	0	0	0	2	2	2	34	12	2	5.7	4.3	60.0
GULL	0	0	0	9	0	0	0	2	2	2	15	9	2	3.8	3.5	40.0
HEGU	0	12	7	0	0	0	0	0	0	0	19	12	7	9.5	3.5	20.0
BEKI	1	0	2	0	1	2	1	1	1	2	11	2	1	1.4	0.5	80.0
#WOO	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	10.0
NOFL	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	10.0
#PAS	4	0	2	1	35	2	2	11	0	9	66	35	1	8.3	11.4	80.0
NOCR	1	0	0	0	0	1	1	0	0	0	3	1	1	1.0	0.0	30.0
CORA	2	0	0	0	0	0	1	0	0	2	5	2	1	1.7	0.6	30.0
WREN	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	10.0
AMRO	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	10.0
EUST	0	0	0	0	35	0	0	0	0	0	35	35	35	35.0	0.0	10.0
RSTO	0	0	0	0	0	0	0	3	0	1	4	3	1	2.0	1.4	20.0
SPAR	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
FOSP	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	10.0
DEJU	0	0	0	0	0	0	0	8	0	0	8	8	8	8.0	0.0	10.0
RWBL	0	0	0	0	0	0	0	0	0	6	6	6	6	6.0	0.0	10.0
#TOT	25	43	14	58	46	53	3	72	17	33	364	72	3	36.4	21.8	100.0

Bird Surveys of Saltmarsh Habitat for Winter 90

Date	02Dec	09Dec	16Dec	23Dec	06Jan	13Jan	20Jan	27Jan	03Feb	10Feb	17Feb	24Feb	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
COLO	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#HER	0	0	0	0	1	0	0	1	0	1	0	1	4	1	1	1.0	0.0	33.3
GBHE	0	0	0	0	1	0	0	1	0	1	0	1	4	1	1	1.0	0.0	33.3
#SWA	0	0	1	0	0	0	0	0	0	0	0	2	3	2	1	1.5	0.7	16.7
TRUS	0	0	1	0	0	0	0	0	0	0	0	2	3	2	1	1.5	0.7	16.7
#GEE	0	30	0	0	0	0	0	24	0	78	0	53	185	78	24	46.3	24.6	33.3
CAGO	0	30	0	0	0	0	0	24	0	78	0	53	185	78	24	46.3	24.6	33.3
#DAB	1	24	31	20	4	17	24	84	122	214	80	21	642	214	1	53.5	62.6	100.0
DABL	1	0	19	0	0	1	0	18	0	0	0	5	44	19	1	8.8	9.0	41.7
GWTE	0	4	8	0	0	16	0	27	0	24	0	0	79	27	4	15.8	9.9	41.7
MALL	0	20	0	20	4	0	24	25	116	138	80	15	442	138	4	49.1	49.3	75.0
NOPI	0	0	0	0	0	0	0	14	6	52	0	1	73	52	1	18.3	23.1	33.3
BWTE	0	0	4	0	0	0	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
#DIV	7	1	27	0	3	27	1	36	2	20	30	0	154	36	1	15.4	13.9	83.3
COGO	0	0	0	0	0	0	0	0	0	1	2	0	3	2	1	1.5	0.7	16.7
BUFF	7	1	22	0	0	25	1	36	2	19	25	0	138	36	1	15.3	12.9	75.0
HOME	0	0	0	0	0	0	0	0	0	0	3	0	3	3	3	3.0	0.0	8.3
COME	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
DUCK	0	0	4	0	3	2	0	0	0	0	0	0	9	4	2	3.0	1.0	25.0
#RAP	0	0	4	0	3	0	0	0	0	0	0	1	8	4	1	2.7	1.5	25.0
HAWK	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
BAEA	0	0	3	0	1	0	0	0	0	0	0	1	5	3	1	1.7	1.2	25.0
SSHA	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
RTHA	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#SHO	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
KILL	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
#GUL	0	0	2	0	6	5	0	11	4	23	0	0	51	23	2	8.5	7.7	50.0
GULL	0	0	2	0	6	5	0	2	4	23	0	0	42	23	2	7.0	8.0	50.0
MEGU	0	0	0	0	0	0	0	9	0	0	0	0	9	9	9	9.0	0.0	8.3
BEKI	1	1	1	0	2	2	1	4	1	3	1	0	17	4	1	1.7	1.1	83.3
#PAS	0	0	25	0	6	72	0	54	0	6	0	2	165	72	2	27.5	29.2	50.0
NOCR	0	0	25	0	0	34	0	47	0	6	0	0	112	47	6	28.0	17.2	33.3
CORA	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
WREN	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
VATH	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
EUST	0	0	0	0	0	33	0	0	0	0	0	0	33	33	33	33.0	0.0	8.3
RSTO	0	0	0	0	1	1	0	5	0	0	0	2	9	5	1	2.3	1.9	33.3
SPAR	0	0	0	0	2	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
RWBL	0	0	0	0	0	4	0	0	0	0	0	0	4	4	4	4.0	0.0	8.3
#TOT	9	56	91	20	27	124	26	214	129	345	111	80	1232	345	9	102.7	96.5	100.0

Bird Surveys of Saltmarsh Habitat for Spring 91

Date	03Mar	10Mar	17Mar	24Mar	31Mar	07Apr	14Apr	20Apr	28Apr	05May	12May	19May	Total	Max	Min	Mean	SD	%Freq
#GRE	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
WEGR	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	8.3
#HER	0	1	0	0	0	0	1	2	1	0	0	1	6	2	1	1.2	0.4	41.7
GBHE	0	1	0	0	0	0	1	0	1	0	0	1	4	1	1	1.0	0.0	33.3
GRHE	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	2.0	0.0	8.3
#GEE	18	96	0	67	24	50	41	29	37	2	11	4	379	96	2	34.5	28.4	91.7
CAGO	18	96	0	67	24	50	41	29	37	2	11	4	379	96	2	34.5	28.4	91.7
#DAB	213	99	20	16	97	31	111	27	137	8	6	14	779	213	6	64.9	65.9	100.0
DABL	0	26	0	0	0	0	0	0	0	0	0	0	26	26	26	26.0	0.0	8.3
GWTE	0	0	0	0	6	11	6	0	2	0	0	0	25	11	2	6.3	3.7	33.3
MALL	205	73	20	16	91	20	105	27	135	8	6	13	719	205	6	59.9	63.1	100.0
NOPI	8	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8.0	0.0	8.3
AMWI	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1.0	0.0	8.3
#DIV	26	9	2	8	9	5	0	6	10	0	0	0	75	26	2	9.4	7.2	66.7
COGO	0	0	0	2	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
BUFF	24	7	2	6	9	5	0	2	10	0	0	0	65	24	2	8.1	7.0	66.7
HOME	0	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	8.3
COME	2	0	0	0	0	0	0	4	0	0	0	0	6	4	2	3.0	1.4	16.7
#RAP	0	0	0	2	1	0	0	1	0	0	3	1	8	3	1	1.6	0.9	41.7
BAEA	0	0	0	2	1	0	0	1	0	0	3	1	8	3	1	1.6	0.9	41.7
#SHO	0	0	0	0	0	0	5	5	0	0	60	3	73	60	3	18.3	27.8	33.3
GRYE	0	0	0	0	0	0	5	5	0	0	0	1	11	5	1	3.7	2.3	25.0
SAND	0	0	0	0	0	0	0	0	0	0	40	0	40	40	40	40.0	0.0	8.3
DUNL	0	0	0	0	0	0	0	0	0	0	20	0	20	20	20	20.0	0.0	8.3
SBDO	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2.0	0.0	8.3
BEKI	3	1	0	1	1	1	1	3	1	1	0	1	14	3	1	1.4	0.8	83.3
#PAS	4	20	2	15	39	4	1	65	18	31	10	16	225	65	1	18.8	18.7	100.0
STJA	0	0	2	0	3	1	0	0	0	0	0	0	6	3	1	2.0	1.0	25.0
NOCR	0	0	0	0	1	0	0	1	2	0	0	1	5	2	1	1.3	0.5	33.3
CORA	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1.0	0.0	8.3
AMRO	4	0	0	5	20	3	0	22	8	16	10	15	103	22	3	11.4	7.1	75.0
VATH	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1.0	0.0	8.3
EUST	0	20	0	10	15	0	0	40	0	0	0	0	85	40	10	21.3	13.1	33.3
SPAR	0	0	0	0	0	0	0	0	8	0	0	0	8	8	8	8.0	0.0	8.3
FOSP	0	0	0	0	0	0	0	1	0	15	0	0	16	15	1	8.0	9.9	16.7
#TOT	264	226	25	109	171	91	160	138	204	42	90	40	1560	264	25	130.0	77.3	100.0

Bird Surveys of Saltmarsh Habitat for Summer 91

Date	02Jun	16Jun	30Jun	07Jul	14Jul	21Jul	29Jul	04Aug	11Aug	18Aug	25Aug	Total	Max	Min	Mean	SD	%Freq
#HER	1	1	0	0	0	1	1	3	0	4	3	14	4	1	2.0	1.3	63.6
GBHE	1	1	0	0	0	1	1	3	0	4	3	14	4	1	2.0	1.3	63.6
#DAB	20	25	0	0	2	0	0	0	0	4	0	51	25	2	12.8	11.5	36.4
MALL	20	25	0	0	2	0	0	0	0	4	0	51	25	2	12.8	11.5	36.4
#DIV	3	15	0	0	0	0	0	0	0	0	18	36	18	3	12.0	7.9	27.3
BUFF	0	15	0	0	0	0	0	0	0	0	0	15	15	15	15.0	0.0	9.1
COME	3	0	0	0	0	0	0	0	0	0	18	21	18	3	10.5	10.6	18.2
#RAP	0	0	1	1	0	0	0	0	1	0	0	3	1	1	1.0	0.0	27.3
BAEA	0	0	1	1	0	0	0	0	1	0	0	3	1	1	1.0	0.0	27.3
#SHO	2	3	0	2	0	1	0	6	0	3	4	21	6	1	3.0	1.6	63.6
SEPL	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2.0	0.0	9.1
KILL	0	0	0	0	0	0	0	0	0	2	0	2	2	2	2.0	0.0	9.1
GRYE	2	1	0	2	0	1	0	0	0	1	4	11	4	1	1.8	1.2	54.5
SAND	0	2	0	0	0	0	0	0	0	0	0	2	2	2	2.0	0.0	9.1
WESA	0	0	0	0	0	0	0	4	0	0	0	4	4	4	4.0	0.0	9.1
#GUL	0	0	0	0	0	0	0	50	0	70	0	120	70	50	60.0	14.1	18.2
GULL	0	0	0	0	0	0	0	50	0	70	0	120	70	50	60.0	14.1	18.2
BEKI	1	2	1	3	2	4	3	1	1	3	2	23	4	1	2.1	1.0	100.0
#PAS	52	6	1	0	3	4	61	4	0	5	2	138	61	1	15.3	23.5	81.8
STJA	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1.0	0.0	9.1
NOCR	0	3	0	0	2	1	0	2	0	0	0	8	3	1	2.0	0.8	36.4
CORA	0	0	0	0	0	0	0	0	0	5	0	5	5	5	5.0	0.0	9.1
AMRO	12	2	0	0	1	3	1	1	0	0	0	20	12	1	3.3	4.3	54.5
EUST	40	0	0	0	0	0	60	0	0	0	2	102	60	2	34.0	29.5	27.3
FOSP	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
RWBL	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1.0	0.0	9.1
#TOT	79	52	3	6	7	10	65	64	2	89	29	406	89	2	36.9	33.5	100.0

Bird Surveys of Saltmarsh Habitat for Autumn 91

Date	01Sep	08Sep	15Sep	22Sep	Total	Max	Min	Mean	SD	%Freq
#LOO	0	0	0	1	1	1	1	1.0	0.0	25.0
COLO	0	0	0	1	1	1	1	1.0	0.0	25.0
#HER	3	3	1	0	7	3	1	2.3	1.2	75.0
GBHE	3	3	1	0	7	3	1	2.3	1.2	75.0
#GEE	30	0	0	12	42	30	12	21.0	12.7	50.0
CAGO	30	0	0	12	42	30	12	21.0	12.7	50.0
#DAB	30	15	39	15	99	39	15	24.8	11.8	100.0
GWTE	30	15	13	7	65	30	7	16.3	9.8	100.0
MALL	0	0	26	8	34	26	8	17.0	12.7	50.0
#RAP	0	2	1	1	4	2	1	1.3	0.6	75.0
BAEA	0	2	1	1	4	2	1	1.3	0.6	75.0
#SHO	2	4	0	0	6	4	2	3.0	1.4	50.0
GRYE	1	0	0	0	1	1	1	1.0	0.0	25.0
WESA	0	4	0	0	4	4	4	4.0	0.0	25.0
LBDO	1	0	0	0	1	1	1	1.0	0.0	25.0
#GUL	20	0	2	1	23	20	1	7.7	10.7	75.0
GULL	20	0	0	1	21	20	1	10.5	13.4	50.0
GWGU	0	0	2	0	2	2	2	2.0	0.0	25.0
BEKI	3	0	2	4	9	4	2	3.0	1.0	75.0
#PAS	0	9	5	2	16	9	2	5.3	3.5	75.0
STJA	0	1	1	0	2	1	1	1.0	0.0	50.0
NOCR	0	6	0	2	8	6	2	4.0	2.8	50.0
CORA	0	0	1	0	1	1	1	1.0	0.0	25.0
WREN	0	1	0	0	1	1	1	1.0	0.0	25.0
WIWR	0	0	1	0	1	1	1	1.0	0.0	25.0
AMRO	0	1	0	0	1	1	1	1.0	0.0	25.0
SOSP	0	0	2	0	2	2	2	2.0	0.0	25.0
#TOT	88	33	50	36	207	88	33	51.8	25.3	100.0