

**Victoria and Esquimalt Harbours Bird Censuses
1997-1999**

Prepared by

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For

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1.0 INTRODUCTION

In 1997 the Victoria and Esquimalt Harbours Environmental Action Program commissioned a study to assess bird populations in the harbours area. A background paper was prepared (Shepard 1997) summarizing known data and predicting bird population patterns, and data for 1997-1998 were summarized in Shepard (1998). This report synthesizes the finding from all surveys conducted during the study.

2.0 STUDY AREA

This study encompasses the sheltered marine waters (9.6 km²) of the Greater Victoria region, including Victoria Harbour, the Gorge, Portage Inlet, Esquimalt Harbour and Esquimalt Lagoon. Figure 1 outlines the study area, showing the 12 census subareas and the 108 polygons used for analysis. The 12 subareas were made up of polygon groups that exhibited similar geography and bird species composition. They are described in the discussion section of this report.

3.0 METHODS

Volunteers were recruited to assist with the censuses. Approximately every two months, birds found in each polygon (on the water, the intertidal, or flying overhead) were counted. Results were compiled and entered into a database for analysis.

4.0 RESULTS

This section presents a summary of bird use in each subarea, followed by an annotated list of the most common and widespread species.

Tables 1 to 13 summarize data from the field surveys, showing species totals and densities for each census.

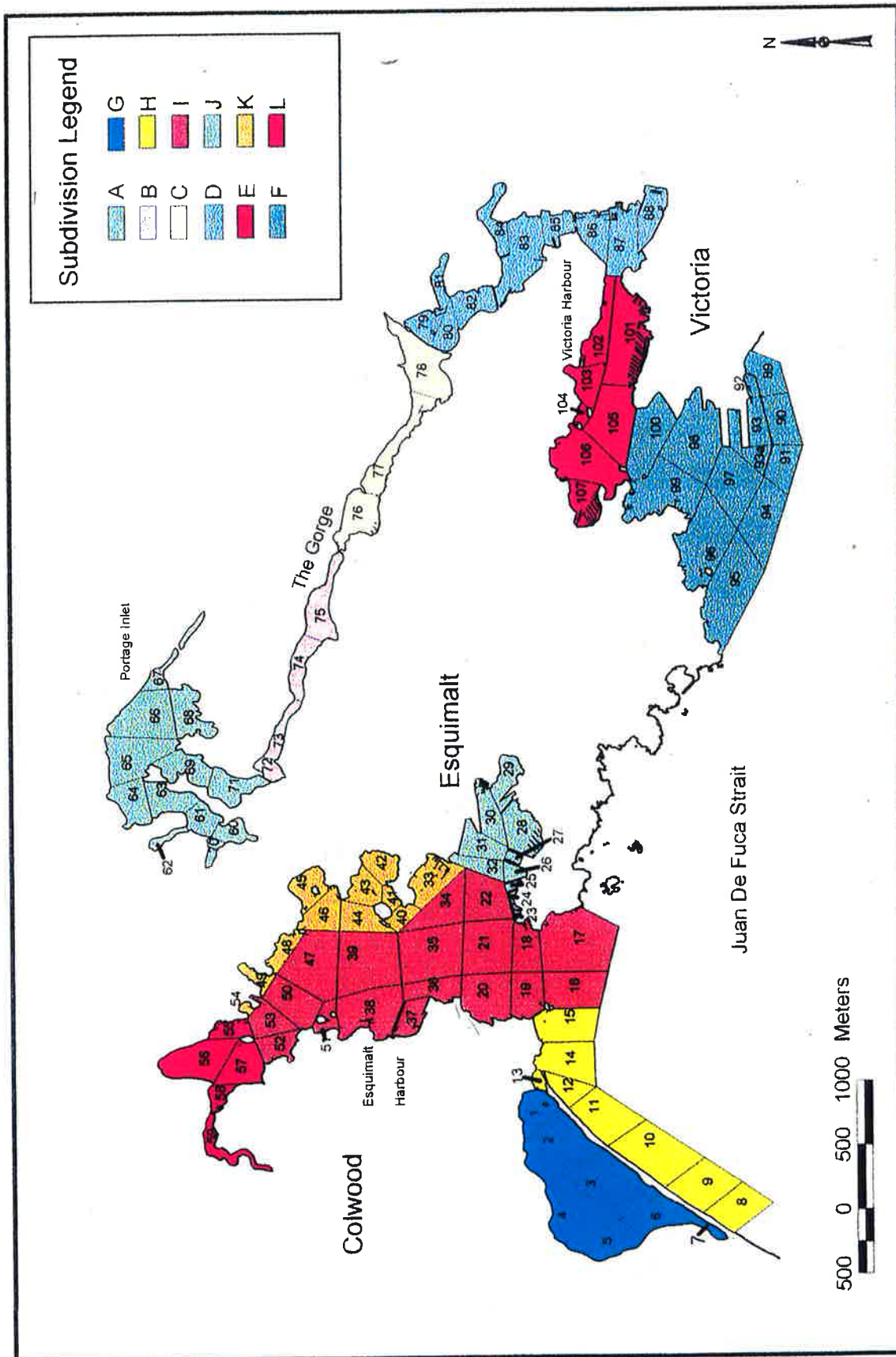


Figure 1. Map of the Victoria and Esquimalt Harbours area showing subdivisions and polygons censused.

Table 1. Numbers and densities of marine-associated birds for the entire study area during each census.

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²
Red-throated Loon	2	0.2							6	0.6	1	0.1	1	0.1	1	0.1	2	0.2	50	5.2		
Pacific Loon									8	0.8	1	0.1					13	1.4	6	0.6		
Common Loon	5	0.5	1	0.1			14	1.5	4	0.4	5	0.5	2	0.2	2	0.2	2	0.2	4	0.4		
Yellow-billed Loon									1	0.1												
Pied-billed Grebe									1	0.1							4	0.4				
Eared Grebe							1	0.1														
Red-necked Grebe	3	0.3			1	0.1	16	1.7	12	1.3	4	0.4			1	0.1	24	2.5	28	2.9	5	0.5
Horned Grebe	6	0.6					31	3.2	8	0.8	7	0.7					11	1.1	7	0.7		
Western Grebe	1	0.1					1	0.1							1	0.1	2	0.2	27	2.8		
Double-crested Cormorant	110	11.5	15	1.6	26	2.7	94	9.8	21	2.2	130	13.5	17	1.8	25	2.6	61	6.4	111	11.6	22	2.3
Brandt's Cormorant							3	0.3			1	0.1					3	0.3				
Pelagic Cormorant	4	0.4	2	0.2			3	0.3	5	0.5	5	0.5			1	0.1	7	0.7			2	0.2
Great Blue Heron	7	0.7	8	0.8	6	0.6	17	1.8	4	0.4	20	2.1	16	1.7	9	0.9	9	0.9	7	0.7	23	2.4
Mute Swan	1	0.1	4	0.4			14	1.5	5	0.5	5	0.5	6	0.6	11	1.1	5	0.5	8	0.8		
Trumpeter Swan									3	0.3	3	0.3										
Canada Goose	21	2.2	601	62.6	78	8.1	502	52.3	126	13.1	63	6.6	65	6.8	72	7.5	144	15.0	74	7.7	44	4.6
Brant	16	1.7																				
Wood Duck					6	0.6	2	0.2	1	0.1	19	2.0	2	0.2			14	1.5	20	2.1	4	0.4
Green-winged Teal	170	17.7					92	9.6														
Gadwall	33	3.4															1	0.1	5	0.5		
Mallard	58	6.0	54	5.6	237	24.7	430	44.8	220	22.9	321	33.4	144	15.0	418	43.5	258	26.9	401	41.8	84	8.8
Northern Pintail	11	1.1			1	0.1	37	3.9	8	0.8					1	0.1	2	0.2	31	3.2	4	0.4
Eurasian Wigeon									1	0.1	1	0.1					2	0.2	3	0.3		
American Wigeon	26	2.7	3	0.3			115	12.0	103	10.7	280	29.2			17	1.8	157	16.4	72	7.5	1	0.1
Canvasback	1	0.1					14	1.5	11	1.1	29	3.0					34	3.5	3	0.3		
Greater Scaup	127	13.2					1	0.1	123	12.8	12	1.3	11	1.1			225	23.4	121	12.6		
Lesser Scaup	2	0.2									119	12.4					42	4.4	85	8.9		
scaup sp.	33	3.4					125	13.0	105	10.9	88	9.2									19	2.0
Harlequin Duck	4	0.4	1	0.1	7	0.7	19	2.0	6	0.6	9	0.9					11	1.1	11	1.1	2	0.2
Oldsquaw	2	0.2					3	0.3	29	3.0	52	5.4					24	2.5	2	0.2		
Surf Scoter	81	8.4	7	0.7	1	0.1	81	8.4	57	5.9	48	5.0	5	0.5			34	3.5	21	2.2	22	2.3
White-winged Scoter	5	0.5					7	0.7	11	1.1	11	1.1	3	0.3					9	0.9	1	0.1
Common Goldeneye	3	0.3							91	9.5	111	11.6	7	0.7			122	12.7	34	3.5		
Bufflehead	164	17.1	1	0.1			106	11.0	285	29.7	384	40.0	2	0.2			203	21.1	336	35.0	29	3.0
Hooded Merganser	5	0.5	1	0.1			22	2.3	34	3.5	33	3.4			3	0.3	42	4.4	12	1.3	1	0.1

Table 1 (continued). Numbers and densities of marine-associated birds for the entire study area during each census.

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Common Merganser	44	4.6							1	0.1	53	5.5			9	0.9	6	0.6	27	2.8	22	2.3
Red-breasted Merganser	205	21.4					50	5.2	160	16.7	148	15.4					119	12.4	85	8.9	6	0.6
American Coot							45	4.7	26	2.7	27	2.8			2	0.2	22	2.3	13	1.4		
Semipalmated Plover																						
Killdeer	3	0.3	3	0.3	1	0.1	4	0.4	1	0.1					21	2.2					1	0.1
Black-bellied Plover					1	0.1					1	0.1			15	1.6	4	0.4			1	0.1
Black Oystercatcher	5	0.5	5	0.5	2	0.2	2	0.2	2	0.2	3	0.3	4	0.4	6	0.6	4	0.4	5	0.5	1	0.1
Greater Yellowlegs	2	0.2					1	0.1			1	0.1	1	0.1								
Ruddy Turnstone																						
Black Turnstone	18	1.9			8	0.8	31	3.2	13	1.4	6	0.6			51	5.3	59	6.1	22	2.3	5	0.5
Dunlin	1	0.1					32	3.3	7	0.7	28	2.9	4	0.4					11	1.1	7	0.7
Western Sandpiper	6	0.6			40	4.2							48	5.0								
Least Sandpiper			1	0.1																		
Sanderling					2	0.2	3	0.3	3	0.3												
Short-billed Dowitcher					1	0.1																
Common Snipe							1	0.1														
Red-necked Phalarope					6	0.6																
Bonaparte's Gull	1	0.1	1	0.1	18	1.9	188	19.6					112	11.7	3	0.3					4	0.4
Heermann's Gull					8	0.8	51	5.3							34	3.5						
Mew Gull	161	16.8	19	2.0	48	5.0	122	12.7	123	12.8	459	47.8	21	2.2	299	31.1	590	61.5	96	10.0	81	8.4
California Gull	2	0.2	1	0.1	263	27.4	26	2.7	2	0.2	1	0.1			82	8.5			8	0.8	2	0.2
Thayer's Gull							122	12.7	8	0.8							27	2.8				
Glaucous-winged Gull	241	25.1	107	11.1	408	42.5	337	35.1	261	27.2	383	39.9	288	30.0	403	42.0	192	20.0	220	22.9	185	19.3
Western Gull																	1	0.1				
gull sp.					60	6.3																
Caspian Tern																						
Common Murre					23	2.4	5	0.5							22	2.3	6	0.6	5	0.5	2	0.2
Pigeon Guillemot	6	0.6	2	0.2	1	0.1	3	0.3	2	0.2	3	0.3	2	0.2			12	1.3	13	1.4	1	0.1
Marbled Murrelet							6	0.6	4	0.4	2	0.2					1	0.1			10	1.0
Cassin's Auklet							1	0.1														
Rhinoceros Auklet	26	2.7	7	0.7	21	2.2	32	3.3	1	0.1	2	0.2	1	0.1	160	16.7	11	1.1	21	2.2	5	0.5
Total	721	75.1	154	16.0	913	95.1	1062	110.6	614	64.0	1117	116.4	481	50.1	1107	115.3	1053	109.7	527	54.9	337	35.1

Table 2. Numbers and densities of marine-associated birds for subarea A during each census (total area 0.82 km²)

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Pied-billed Grebe							1	1.2									2	2.4				
Horned Grebe							14	17.1	7	8.5	29	35.4	7	8.5	3	3.7	1	1.2	19	23.2	3	3.7
Western Grebe	47	57.3					5	6.1	1	1.2	3	3.7	5	6.1	1	1.2			6	7.3	17	20.7
Double-crested Cormorant	2	2.4	1	1.2			1	1.2	1	1.2												
Great Blue Heron							1	1.2	1	1.2												
Mute Swan							9	11.0	54	65.9	11	13.4	21	25.6	34	41.5	63	76.8	33	40.2	19	23.2
Canada Goose	5	6.1	354	431.7	1	1.2	2	2.4					2	2.4								
Wood Duck	162	197.6			3	3.7	75	91.5			10	12.2	2	2.4					7	8.5	4	4.9
Green-winged Teal	33	40.2																	5	6.1		
Gadwall	15	18.3	17	20.7	31	37.8	238	290.2	51	62.2	50	61.0	111	135.4	192	234.1	59	72.0	83	101.2	41	50.0
Mallard	11	13.4			1	1.2	11	13.4														
Northern Pintail																						
Eurasian Wigeon											1	1.2							3	3.7		
American Wigeon	15	18.3					56	68.3	11	13.4	75	91.5					2	2.4	17	20.7		
Canvasback							14	17.1			26	31.7					23	28.0				
Greater Scaup	127	154.9											11	13.4			123	150.0	110	134.1		
Lesser Scaup	2	2.4																				
scaup sp.	19	23.2					124	151.2	105	128.0	79	96.3									19	23.2
Surf Scoter							27	32.9														
Common Goldeneye									1	1.2			7	8.5					1	1.2		
Bufflehead	52	63.4					87	106.1	61	74.4	70	85.4	2	2.4			58	70.7	117	142.7	16	19.5
Hooded Merganser							2	2.4	2	2.4	2	2.4			2	2.4			5	6.1		
Common Merganser	19	23.2									39	47.6							13	15.9	22	26.8
American Coot							43	52.4	8	9.8	10	12.2					11	13.4	6	7.3		
Killdeer															11	13.4						
Western Sandpiper					1	1.2							7	8.5								
California Gull					1	1.2			2	2.4												
Glaucous-winged Gull	14	17.1	9	11.0	16	19.5	17	20.7	41	50.0	101	123.2	38	46.3	14	17.1	12	14.6	25	30.5	28	34.1
Belted Kingfisher															1	1.2						
Total	524	639.0	381	464.6	54	65.9	726	885.4	345	420.7	506	617.1	213	259.8	263	320.7	354	431.7	450	548.8	169	206.1

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²	total	birds/ha ²
Double-crested Cormorant	6	28.0	1	4.7	5	23.4	28	130.8	1	4.7	89	415.9	3	14.0	10	46.7	4	18.7	52	243.0	3	14.0
Great Blue Heron																						
Trumpeter Swan																						
Canada Goose	15	70.1	50	233.6	11	51.4	10	46.7	1	4.7	22	102.8	16	74.8	3	14.0	9	42.1	8	37.4		
Mallard			2	9.3	7	32.7	28	130.8	40	186.9	64	299.1			20	93.5	33	154.2	35	163.6		
Eurasian Wigeon																						
American Wigeon	2	9.3																				
Canvasback																						
Greater Scaup																						
scaup sp.	14	65.4																				
Bufflehead	28	130.8																				
Hooded Merganser																						
Common Merganser	13	60.7																				
Red-breasted Merganser																						
Western Sandpiper																						
Least Sandpiper																						
Mew Gull																						
California Gull																						
Glaucous-winged Gull	11	51.4																				
Belted Kingfisher																						
Total	89	415.9	53	247.7	31	144.9	84	392.5	233	1088.8	286	1336.4	31	144.9	44	205.6	131	612.1	141	658.9	10	46.7

Species	April 1997	June 1997	August 1997	October 1997	January 1998	March 1998	May 1998	September 1998	Jan / Feb 1999	Mar / Apr 1999	May 1999
	total	total	total	total	total	total	total	total	total	total	total
Double-crested Cormorant	31	92.0	1	3.0	1	3.0	1	3.0	1	3.0	1
Great Blue Heron			1	3.0			1	3.0			
Canada Goose		1	3.0			2	5.9		2	5.9	
Green-winged Teal						9	26.7		10	29.7	
Mallard		11	32.6	1	3.0	3	8.9	26	77.2	9	26.7
American Wigeon				2	5.9						
Greater Scaup					6	17.8			3	8.9	
Common Goldeneye					4	11.9			3	8.9	
Bufflehead				1	3.0	3	8.9		16	47.5	
Hooded Merganser	1	3.0			1	3.0					
Common Merganser	6	17.8				5	14.8	3			
Killdeer											
Greater Yellowlegs	1	3.0									
Western Sandpiper		8	23.7								
Least Sandpiper		1	3.0								
Mew Gull	8	23.7	4	11.9	7	20.8	2	5.9	1	3.0	
Glaucous-winged Gull											
Total	47	139.5	26	77.2	9	26.7	48	142.4	20	59.3	34
									100.9	35	103.9
											1
											3.0

Species	April 1997	June 1997	August 1997	October 1997	January 1998	March 1998	May 1998	September 1998	Jan / Feb 1999	Mar / Apr 1999	May 1999
	total	total	total	total	total	total	total	total	total	total	total
Pacific Loon									1	1.4	
Pied-billed Grebe					1	1.4					
Red-necked Grebe										2	2.9
Horned Grebe										1	1.4
Western Grebe	1	1.4								5	7.2
Double-crested Cormorant			1	1.4							
Great Blue Heron		1	1.4		2	2.9	4	5.7			
Canada Goose		74	105.9		11	15.7	2	2.9	1	1.4	
Mallard	4	5.7					1	1.4			
Greater Scaup									3	4.3	
Common Goldeneye					1	1.4			6	8.6	
Bufflehead					2	2.9			7	10.0	
Hooded Merganser				6	8.6	3	4.3		6	8.6	
Common Merganser	1	1.4									
Red-breasted Merganser	19	27.2							2	2.9	
American Coot					14	20.0			2	2.9	
Mew Gull	1	1.4								6	8.6
California Gull					2	2.9			1	1.4	
Glaucous-winged Gull											
Common Murre	30	42.9	13	18.6	21	30.0	24	34.3	39	55.8	
Rhinoceros Auklet											
Total	56	80.1	88	125.9	23	32.9	32	45.8	75	107.3	46
											65.8
											35
											50.1
											16
											22.9
											64
											91.6
											31
											44.3
											0
											0.0

Table 6. Numbers and densities of marine-associated birds for subarea E during each census (total area 0.76 km²)

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Pacific Loon							1	1.3	1	1.3							7	9.2	1	1.3		
Common Loon																	1	1.3				
Pied-billed Grebe																	13	17.0	3	3.9	2	2.6
Red-necked Grebe	1	1.3									2	2.6					5	6.5				
Horned Grebe																						
Double-crested Cormorant					1	1.3	5	6.5	5	6.5			1	1.3	1	1.3	38	49.7	1	1.3	1	1.3
Pelagic Cormorant			2	2.6			2	2.6	1	1.3	1	1.3					2	2.6			1	1.3
Great Blue Heron					1	1.3	1	1.3	1	1.3			2	2.6			5	6.5				
Canada Goose			2	2.6	2	2.6							2	2.6			3	3.9			4	5.2
Mallard	1	1.3					8	10.5	6	7.9	12	15.7					23	30.1				
Eurasian Wigeon																						
American Wigeon							41	53.7	34	44.5	68	89.0					136	178.0	1	1.3		
Greater Scaup											1	1.3					7	9.2	2	2.6		
Harlequin Duck	2	2.6					3	3.9	2	2.6							2	2.6				
Oldsquaw									2	2.6	2	2.6					2	2.6	1	1.3		
Surf Scoter	1	1.3					14	18.3	1	1.3	5	6.5	1	1.3			13	17.0			3	3.9
White-winged Scoter	2	2.6					1	1.3	6	7.9												
Common Goldeneye									32	41.9							26	34.0	2	2.6		
Bufflehead	13	17.0					14	18.3	32	41.9	11	14.4					52	68.1	13	17.0	1	1.3
Hooded Merganser							4	5.2	8	10.5	4	5.2					24	31.4				
Common Merganser																	6	7.9	4	5.2		
Red-breasted Merganser	24	31.4							33	43.2	39	51.0					54	70.7	37	48.4		
American Coot					1	1.3	1	1.3									2	2.6				
Killdeer					1	1.3																
Black-bellied Plover																						
Black Oystercatcher	2	2.6	2	2.6			2	2.6			1	1.3	3	3.9	1	1.3	2	2.6	1	1.3		
Greater Yellowlegs							1	1.3														
Black Turnstone							5	6.5							32	41.9	26	34.0				
Bonaparte's Gull							3	3.9							1	1.3						
Mew Gull					18	23.6	46	60.2	27	35.3	1	1.3			4	5.2	249	325.9				
California Gull															6	7.9						
Glaucous-winged Gull	6	7.9	9	11.8	43	56.3	32	41.9	29	38.0	11	14.4	29	38.0	36	47.1	27	35.3	7	9.2	16	20.9
Common Murra																	1	1.3	1	1.3		
Marbled Murrelet																	1	1.3				
Rhinoceros Auklet							1	1.3									7	9.2	6	7.9		
Belted Kingfisher																	1	1.3				
Total	52	68.1	15	19.6	67	87.7	187	244.8	220	288.0	158	206.8	38	49.7	81	106.0	737	964.7	80	104.7	28	36.6

Table 7. Numbers and densities of marine-associated birds for subarea F during each census (total area 1.63 km²)

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Pacific Loon																	2	1.2				
Common Loon	1	0.6					5	3.1			1	0.6					1	0.6				
Red-necked Grebe	1	0.6					9	5.5	6	3.7	2	1.2			1	0.6	6	3.7	10	6.1		
Horned Grebe	2	1.2					3	1.8									1	0.6				
Western Grebe																			2	1.2		
Double-crested Cormorant					7	4.3	4	2.5											2	1.2		
Brandt's Cormorant							1	0.6			1	0.6					3	1.8				
Pelagic Cormorant	3	1.8					1	0.6	1	0.6	3	1.8					5	3.1			1	0.6
Great Blue Heron			1	0.6			3	1.8									2	1.2				
Canada Goose													2	1.2			2	1.2			2	1.2
American Wigeon											7	4.3										
Greater Scaup							1	0.6														
Harlequin Duck	2	1.2					6	3.7									3	1.8	6	3.7		
Oldsquaw	1	0.6							5	3.1	5	3.1					2	1.2				
Surf Scoter							18	11.0	1	0.6	4	2.5										
White-winged Scoter							3	1.8														
Common Goldeneye																	11	6.7	3	1.8		
Bufflehead	1	0.6							1	0.6	4	2.5					2	1.2				
Hooded Merganser									4	2.5	16	9.8					8	4.9				
Common Merganser											3	1.8										
Red-breasted Merganser	1	0.6					32	19.6	1	0.6	9	5.5					22	13.5				
Black-bellied Plover																	1	0.6				
Black Oystercatcher			2	1.2			22	13.5	2	1.2	2	1.2					2	1.2				
Black Turnstone	18	11.0			5	3.1	26	15.9	4	2.5	6	3.7			13	8.0	28	17.2	1	0.6		
Dunlin																						
Sanderling							3	1.8														
Bonaparte's Gull					11	6.7	125	76.6							1	0.6						
Heermann's Gull					2	1.2	4	2.5														
Mew Gull					5	3.1	49	30.0	2	1.2	11	6.7			28	17.2	74	45.4			3	1.8
California Gull					7	4.3	9	5.5							11	6.7						
Glaucous-winged Gull	21	12.9	3	1.8	59	36.2	44	27.0	13	8.0	11	6.7	36	22.1	31	19.0	26	15.9	9	5.5	18	11.0
Common Murre							3	1.8							1	0.6	5	3.1	1	0.6	1	0.6
Pigeon Guillemot	1	0.6	1	0.6													12	7.4	9	5.5	8	4.9
Marbled Murrelet							2	1.2			2	1.2										
Cassin's Auklet							1	0.6														
Rhinoceros Auklet	4	2.5	7	4.3	14	8.6	11	6.7			2	1.2	1	0.6	94	57.6	3	1.8	9	5.5	2	1.2
Belted Kingfisher					1	0.6																
Total	56	34.3	14	8.6	111	68.1	385	236.1	40	24.5	98	60.1	39	23.9	180	110.4	219	134.3	54	33.1	36	22.1

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Red-throated Loon	1	1.2											1	1.2			1	1.2				
Common Loon	7	8.2	2	2.4	8	9.4	1	1.2	1	1.2	3	3.5	4	4.7	2	2.4	1	1.2			1	1.2
Double-crested Cormorant	1	1.2	2	2.4	2	2.4	3	3.5	1	1.2	1	1.2	4	4.7	7	8.2	2	2.4	1	1.2	3	3.5
Great Blue Heron	1	1.2	4	4.7									6	7.1	5	5.9			7	8.2		
Mute Swan	12	14.1	18	21.2	64	75.3	23	27.1	57	67.1	17	20.0	3	3.5	35	41.2	36	42.4	9	10.6	9	10.6
Canada Goose	2	2.4													2	2.4						
Green-winged Teal																						
Gadwall	14	16.5	22	25.9	101	118.8	49	57.6	29	34.1	98	115.3	23	27.1	169	198.8	86	101.2	98	115.3	35	41.2
Mallard									8	9.4					1	1.2	2	2.4	27	31.8	4	4.7
Northern Pintail	9	10.6	3	3.5			11	12.9	11	12.9	91	107.1			17	20.0	14	16.5	31	36.5	1	1.2
American Wigeon	1	1.2							61	71.8	10	11.8					1	1.2	3	3.5		
Canvasback																	44	51.8				
Greater Scaup									24	28.2	20	23.5					42	49.4	85	100.0		
Lesser Scaup																						
Surf Scoter																						
White-winged Scoter									16	18.8	84	98.8					47	55.3	19	22.4		
Common Goldeneye	37	43.5	1	1.2			1	1.2	78	91.8	244	287.1					97	114.1	157	184.7	9	10.6
Bufflehead			1	1.2			2	2.4	9	10.6	3	3.5					2	2.4	2	2.4	1	1.2
Hooded Merganser																	1	1.2				
Common Merganser																						
Red-breasted Merganser	4	4.7							1	1.2	4	4.7					5	5.9	4	4.7		
American Coot									18	21.2	17	20.0					9	10.6	6	7.1		
Semipalmated Plover	3	3.5	3	3.5	1	1.2	2	2.4	1	1.2	1	1.2									1	1.2
Killdeer																	3	3.5			1	1.2
Black-bellied Plover																						
Black Oystercatcher					1	1.2																
Greater Yellowlegs					3	3.5			8	9.4	1	1.2										
Black Turnstone	1	1.2					6	7.1	7	8.2			4	4.7			4	4.7	15	17.6		
Dunlin	5	5.9			33	38.8							41	48.2					11	12.9	7	8.2
Western Sandpiper																						
Sanderling					2	2.4			3	3.5												
Short-billed Dowitcher					1	1.2																
Ruddy Turnstone																					5	5.9
Bonaparte's Gull	1	1.2	1	1.2	6	7.1	6	7.1					61	71.8	1	1.2						
Heermann's Gull					1	1.2	1	1.2							2	2.4						
Mew Gull	70	82.4	13	15.3	8	9.4	1	1.2	7	8.2	166	195.3			222	261.2	23	27.1			9	10.6
California Gull			5	5.9	171	201.2									55	64.7						
Thayer's Gull									8	9.4							12	14.1				
Glaucoous-winged Gull	79	92.9	40	47.1	202	237.6	53	62.4	61	71.8	83	97.6	82	96.5	143	168.2	69	81.2	53	62.4	54	63.5
Caspian Tern													1	1.2			1	1.2			2	2.4
Belted Kingfisher					3	3.5	1	1.2														
Total	248	291.8	115	135.3	607	714.1	161	189.4	409	481.2	965	1135.3	232	272.9	694	816.5	500	588.2	533	627.1	143	168.2

Table 9. Numbers and densities of marine-associated birds for subarea H during each census (total area 0.87 km²)

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Red-throated Loon									2	2.3			1	1.1			2	2.3	26	29.9		
Pacific Loon									6	6.9			1	1.1					5	5.7		
Common Loon			1	1.1			1	1.1					1	1.1	1	1.1			3	3.4		
Eared Grebe							1	1.1														
Red-necked Grebe					1	1.1	4	4.6	3	3.4							1	1.1	3	3.4	2	2.3
Horned Grebe	2	2.3					3	3.4			4	4.6					2	2.3	2	2.3		
Western Grebe													1	1.1			12	13.8				
Double-crested Cormorant			4	4.6	1	1.1									1	1.1					1	1.1
Great Blue Heron																						
Brant	16	18.4																				
Harlequin Duck																						
Surf Scoter	17	19.5	7	8.0	7	8.0	9	10.3	21	24.1	3	3.4	4	4.6			20	23.0	1	1.1	19	21.8
White-winged Scoter	3	3.4									3	3.4	3	3.4					7	8.0	7	8.0
Common Goldeneye									2	2.3							2	2.3	9	10.3	1	1.1
Bufflehead																	19	21.8	2	2.3		
Common Merganser	1	1.1									3	3.4			9	10.3						
Red-breasted Merganser	54	62.1					17	19.5	27	31.0	53	60.9					14	16.1	29	33.3	6	6.9
Killdeer																					2	2.3
Black Turnstone																			1	1.1		
Bonaparte's Gull					1	1.1							50	57.5							4	4.6
Heermann's Gull					2	2.3	1	1.1							24	27.6						
Mew Gull	2	2.3	6	6.9	5	5.7	1	1.1	9	10.3			5	5.7	1	1.1	7	8.0	1	1.1	69	79.3
California Gull	1	1.1	1	1.1	64	73.6											15	17.2			2	2.3
Thayer's Gull																						
Western Gull																			1	1.1		
Glaucous-winged Gull	15	17.2	29	33.3	38	43.7	13	14.9	29	33.3	29	33.3	50	57.5	18	20.7	30	34.5	35	40.2	43	49.4
Caspian Tern			1	1.1																	2	2.3
Pigeon Guillemot					1	1.1									1	1.1						
Rhinoceros Auklet													1	1.1								
Belted Kingfisher																						
Total	111	127.6	49	56.3	120	137.9	50	57.5	99	113.8	95	109.2	116	133.3	55	63.2	113	129.9	137	157.5	151	173.6

Table 12. Numbers and densities of marine-associated birds for subarea K during each census (total area 0.52 km²)																						
Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²	total	birds/km²
Common Loon							1	1.9				2	3.8									
Red-necked Grebe							1	1.9														
Horned Grebe																						
Double-crested Cormorant			7	13.4	2	3.8	19	36.3	1	1.9	2	3.8					1	1.9			1	1.9
Pelagic Cormorant							1	1.9														
Great Blue Heron	4	7.6			2	3.8	4	7.6	1	1.9	2	3.8					1	1.9	2	3.8	1	1.9
Canada Goose	2	3.8									2	3.8	3	5.7					2	3.8	4	7.6
Mallard							4	7.6											2	3.8		
Greater Scaup											1	1.9										
Harlequin Duck			1	1.9					4	7.6	3	5.7										
Oldsquaw							10	19.1														
Surf Scoter	63	120.2					11	21.0	6	11.5	1	1.9										
White-winged Scoter									2	3.8	2	3.8										
Common Goldeneye	3	5.7							24	45.8	20	38.2					2	3.8	4	7.6		
Bufflehead	8	15.3							16	30.5	9	17.2							1	1.9		
Hooded Merganser							7	13.4	5	9.5	7	13.4										
Common Merganser	47	89.7							1	1.9	1	1.9							3	5.7		
Red-breasted Merganser									17	32.4	17	32.4										
Black Oystercatcher	2	3.8																				
Black Turnstone							4	7.6	1	1.9						1	1.9					
Bonaparte's Gull							7	13.4														
Mew Gull	82	156.5					25	47.7	24	45.8	33	63.0	16	30.5			5	9.5				
California Gull							17	32.4			1	1.9										
Thayer's Gull							122	232.8														
Glaucous-winged Gull	3	5.7			2	3.8	13	24.8	14	26.7	22	42.0	3	5.7			3	5.7	15	28.6	8	15.3
gull sp.					60	114.5																
Belted Kingfisher	1	1.9	1	1.9			1	1.9	1	1.9												
Total	215	410.3	9	17.2	66	126.0	247	471.4	117	223.3	131	250.0	22	42.0	68	129.8	12	22.9	27	51.5	14	26.7

Table 13. Numbers and densities of marine-associated birds for subarea L during each census (total area 0.33 km²)

Species	April 1997		June 1997		August 1997		October 1997		January 1998		March 1998		May 1998		September 1998		Jan / Feb 1999		Mar / Apr 1999		May 1999	
	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²	total	birds/km ²
Red-throated Loon							1	3.0											2	6.0		
Red-necked Grebe	1	3.0					1	3.0	1	3.0												
Horned Grebe	3	9.0					1	3.0	1	3.0									3	9.0		
Double-crested Cormorant																						
Great Blue Heron			1	3.0							14	41.9	3	9.0			1	3.0				
Mute Swan							13	38.9	4	12.0	5	15.0					1	3.0				
Canada Goose	2	6.0	112	335.3					3	9.0	7	21.0	13	38.9			31	92.8	13	38.9	4	12.0
Green-winged Teal	6	18.0			3	9.0			1	3.0					24	71.9	4	12.0	2	6.0		
Mallard	7	21.0	2	6.0	57	170.7	61	182.6	99	296.4	92	275.4	1	3.0	1	3.0	57	170.7	174	521.0	8	24.0
American Wigeon																	1	3.0				
Common Goldeneye									3	9.0	4	12.0					5	15.0	3	9.0		
Bufflehead	25	74.9					3	9.0	23	68.9	13	38.9					30	89.8	22	65.9		
Hooded Merganser	1	3.0							2	6.0	3	9.0			1	3.0	3	9.0	3	9.0		
Common Merganser	2	6.0																	3	9.0		
Red-breasted Merganser	12	35.9							3	9.0	24	71.9					6	18.0				
Killdeer																						
Greater Yellowlegs	1	3.0													2	6.0					1	3.0
Mew Gull	5	15.0			11	32.9	1	3.0	3	9.0	227	679.6					141	422.2	95	284.4		
California Gull	1	3.0																	3	9.0		
Glaucous-winged Gull	3	9.0			1	3.0	1	3.0	1	3.0	50	149.7					6	18.0	39	116.8		
Belted Kingfisher					1	3.0	1	3.0	1	3.0												
Total	69	206.6	115	344.3	73	218.6	83	248.5	145	434.1	439	1314.4	17	50.9	33	98.8	286	856.3	362	1083.8	13	38.9

4.1 BIRD USE IN THE SUBAREAS

The following section describes bird use in each of the census subareas.

A) Portage Inlet, Downstream to the Craigflower Bridge.

Characterized by shallow waters and relatively low salinity, this subarea is one of the two most important (the other being Esquimalt Lagoon – subarea G) in the study area. Extensive mudflats are located at the head of the inlet. This is one of the few areas that has moderate to heavy bird use year round. The mudflats at the head of the inlet hosted a wide variety of dabbling duck species including Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), American Wigeon (*Anas americana*), Green-winged Teal (*Anas crecca*), and Gadwall (*Anas strepera*). During the winter mixed species flocks of diving ducks, primarily Greater Scaup (*Aythya marila*), Bufflehead (*Bucephala albeola*) and Common Goldeneye (*Bucephala clangula*) were present. Portage Inlet is probably one of the main rearing areas for Canada Geese (*Branta canadensis*) in the Capital Regional District. In early spring, pairs of geese set up territories along Portage Inlet. When at nest sites, they are difficult to detect and rarely sit on the water. From May through July, the young hatch and form mixed family aggregations. These birds can often be found swimming in open waters, or loafing on the shoreline or adjacent lawns. By August, most of the geese have vacated the inlet. During the winter, Canada Geese range widely throughout the Capital Regional District, frequently travelling in flocks of 100-300 birds. Although our censuses did not detect such numbers, local birders frequently report Canada Goose flocks at Portage Inlet. Another frequent user of Portage Inlet is the Double-crested Cormorant (*Phalacrocorax auritus*). Small numbers of this species forage in this subarea year round, however in February and March, individuals and small flocks actively feed on herring schools coming into the inlet to spawn.

B) Craigflower Bridge to the Tillicum Bridge

Subarea B has similar characteristics as subarea A, but with a narrower channel. It is used mainly in the winter by a wide array of waterfowl. Mallard are found throughout, usually seen swimming close to shore, and foraging or resting on shore. Mixed family aggregations of Canada Geese use the waterway and shoreline from May through July. Diving ducks, particularly Bufflehead, Greater Scaup, and Canvasback (*Aythya valisineria*) forage and rest in a few localities within this subarea. American Wigeon frequent the shores near the Craigflower Bridge.

C) Tillicum Bridge to the Selkirk Trestle

Subarea C features deeper waters than A&B, and there is a mudflat near the Selkirk Trestle. Virtually no bird activity was detected in this subarea, although the mudflats occasionally hosted small groups of Mallard, Green-winged Teal and shorebirds.

D) Selkirk Trestle to Laurel Point

This subarea is the main light industrial area of Victoria Harbour. Bird activity was limited primarily to a few Glaucous-winged Gull (*Larus glaucescens*) and Mew Gull (*Larus canus*) flying over the area or resting on pilings, barges or the shore. Mixed family aggregations of Canada Geese were seen resting on the beach near the Ocean Pointe Resort in June and July.

E) Laurel Point to West Bay

Subarea E features a wide variety of habitats, including rocky shores, sandy beaches, sea lettuce (*Ulva* sp.) beds, rocky islets, pilings, marinas and open water. Species diversity was relatively high. The birds were usually dispersed, however flocks of Mallard, Bufflehead and Mew Gull were occasionally encountered. The boom barrier near the West Bay Marina was used as a resting area by many species, including Black Turnstone (*Arenaria melanocephala*) and Mew Gull.

F) Outer Waters and Adjacent Shores of Victoria Harbour

The eastern shore of Subarea F consists mainly of docks and other anthropogenic marine structures or features. The western shore is a mix of docks, as well as some natural shoreline and rocky islets. Although many species of birds were found, large flocks were rarely encountered. Alcids, loons and grebes were a noticeable component of the avifauna. The coves and rocky islets between Macauley and McLoughlin Points were used at times by small flocks of Red-breasted Merganser (*Mergus serrator*) and Harlequin Duck (*Histrionicus histrionicus*). The only other area hosting a similar species composition was southern Esquimalt Harbour (subarea I).

↑ div
↓ Abund

G) Inside Waters of Esquimalt Lagoon

Esquimalt Lagoon features sheltered waters with a mud, sand and gravel bottom. Large numbers of many species were observed in the lagoon. This is the only subarea that had substantial numbers of birds present year round. Most of the lagoon is used by birds for either foraging or resting. The gravel bars at the east end host the greatest diversity of birds. Gulls, shorebirds and waterfowl were frequently encountered here. The north shore is used as a resting and feeding area by Canada Geese and Mallards. The open water in the centre-west appeared to be the area favored by diving ducks such as Lesser Scaup (*Aythya affinis*), Common Goldeneye and Bufflehead.

H) Exposed Waters Outside Esquimalt Lagoon

The shallow waters here are totally exposed to Juan de Fuca Strait. Although this area has traditionally been known as a good area for bird observation, only small numbers were recorded during this study. Red-breasted Merganser and Surf Scoter (*Melanitta perspicillata*) were the most common species observed. The gravel bars along the shoreline east of Esquimalt Lagoon occasionally hosted small flocks of loafing gulls.

I) Southern and Central Esquimalt Harbour

Subarea I features relatively deep waters with a few sheltered coves along its western shore. Generally, small numbers of birds were encountered. The species composition included birds normally associated with more exposed locations. Frequently encountered were Red-throated Loon (*Gavia stellata*), Pigeon Guillemot (*Cepphus columba*) and Rhinoceros Auklet (*Cerorhinca monocerata*). During the summer, this area was rarely used by birds.

J) Industrial and Naval Area in the Eastern End of Esquimalt Harbour

This subarea has sheltered waters but is subjected to high levels of noise and human disturbance. Very few birds were found here, although a few Red-breasted Merganser, Mew Gull and Glaucous-winged Gull were observed.

K) Shoreline and Coves Along North and East Shores of Esquimalt Harbour

Subarea K has a great diversity of habitats including mudflats, logbooms, rocky islets and sheltered coves. A high species diversity of bird species was found, including most of the diving ducks that occur in the Victoria area. However, except for Glaucous-winged and Mew Gulls resting on the log booms, the number of birds was low.

L) North End of Esquimalt Harbour

Much of this subarea that becomes an exposed mudflat at low tide. This area was important for many species of waterfowl, particularly Canada Goose, Mallard, Green-winged Teal and Bufflehead. At times, large flocks of Mew Gull foraged on the flats, and mixed family aggregations of Canada Geese used the western shores from May to July.

4.2 ANNOTATED LIST OF SELECTED BIRD SPECIES

— why did he choose the ones he did?

Double-crested Cormorant

Phalacrocorax auritus

Figure 2 shows the seasonal abundance of the Double-crested Cormorant whereas figures 3 & 4 display the distribution and density for the April and October 1997 surveys respectively. This species was most abundant in March, April and October. The cormorants were frequently observed flying in small groups or resting on pilings, buoys and trees. They were most common in Portage Inlet, the Gorge and the northeastern portion of Esquimalt Harbour. Aggregations of up to 44 birds were observed feeding in the shallow waters of Portage Inlet. Prior to the onset of the breeding season, the study area supported between 110 and 130 Double-crested Cormorant.

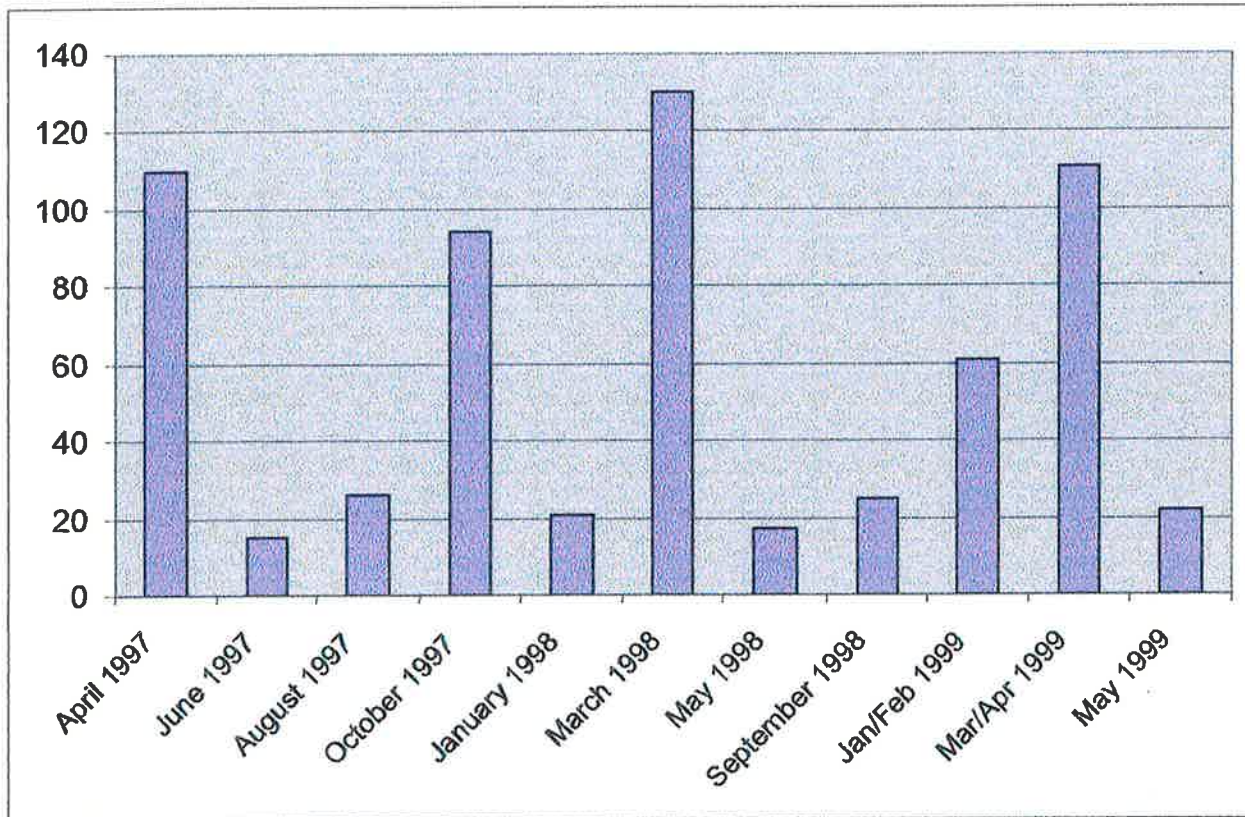


Figure 2. Seasonal abundance of Double-crested Cormorants in the Victoria and Esquimalt Harbours area.

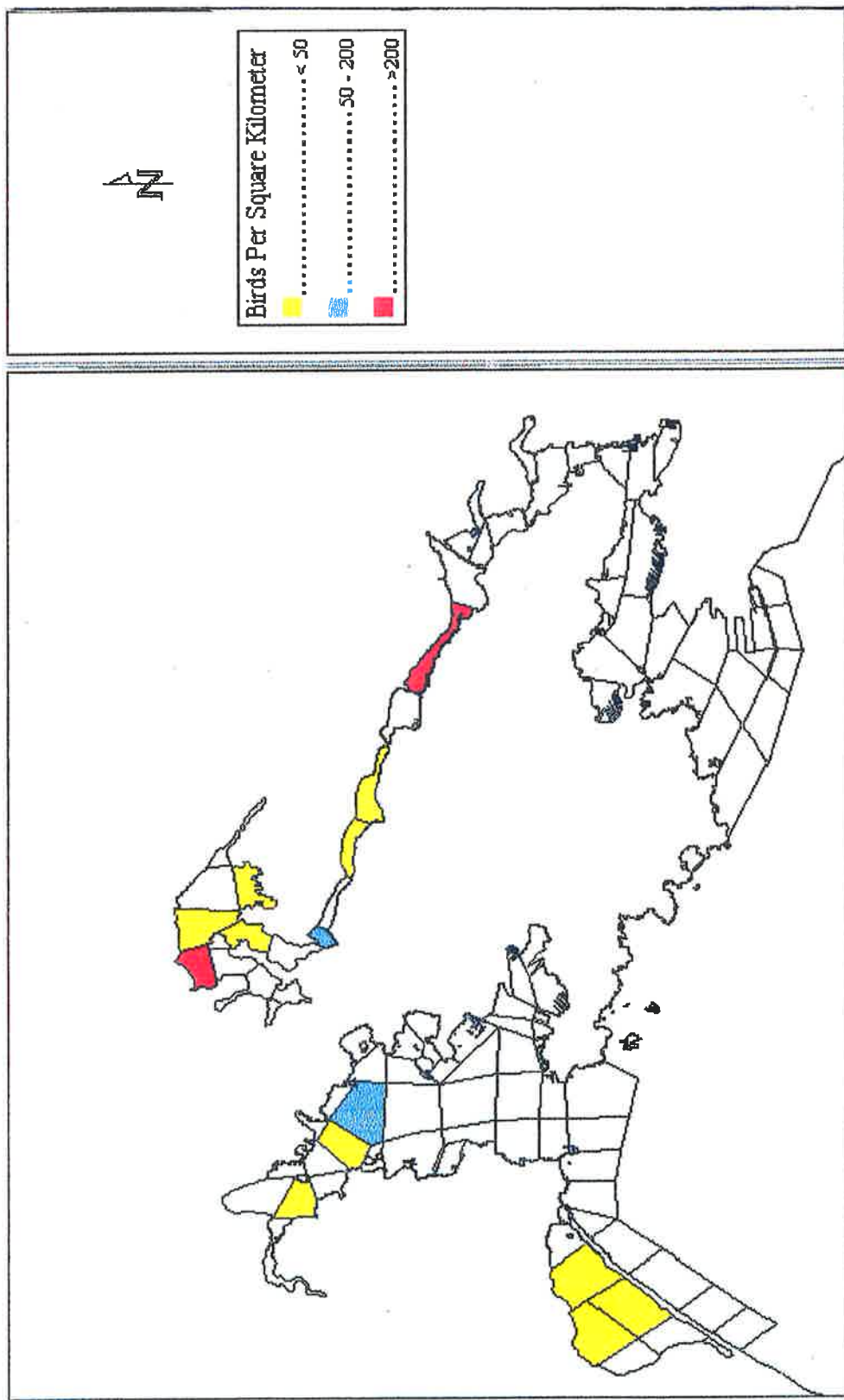


Figure 3. Distribution and density of Double-crested Cormorants in April 1997.

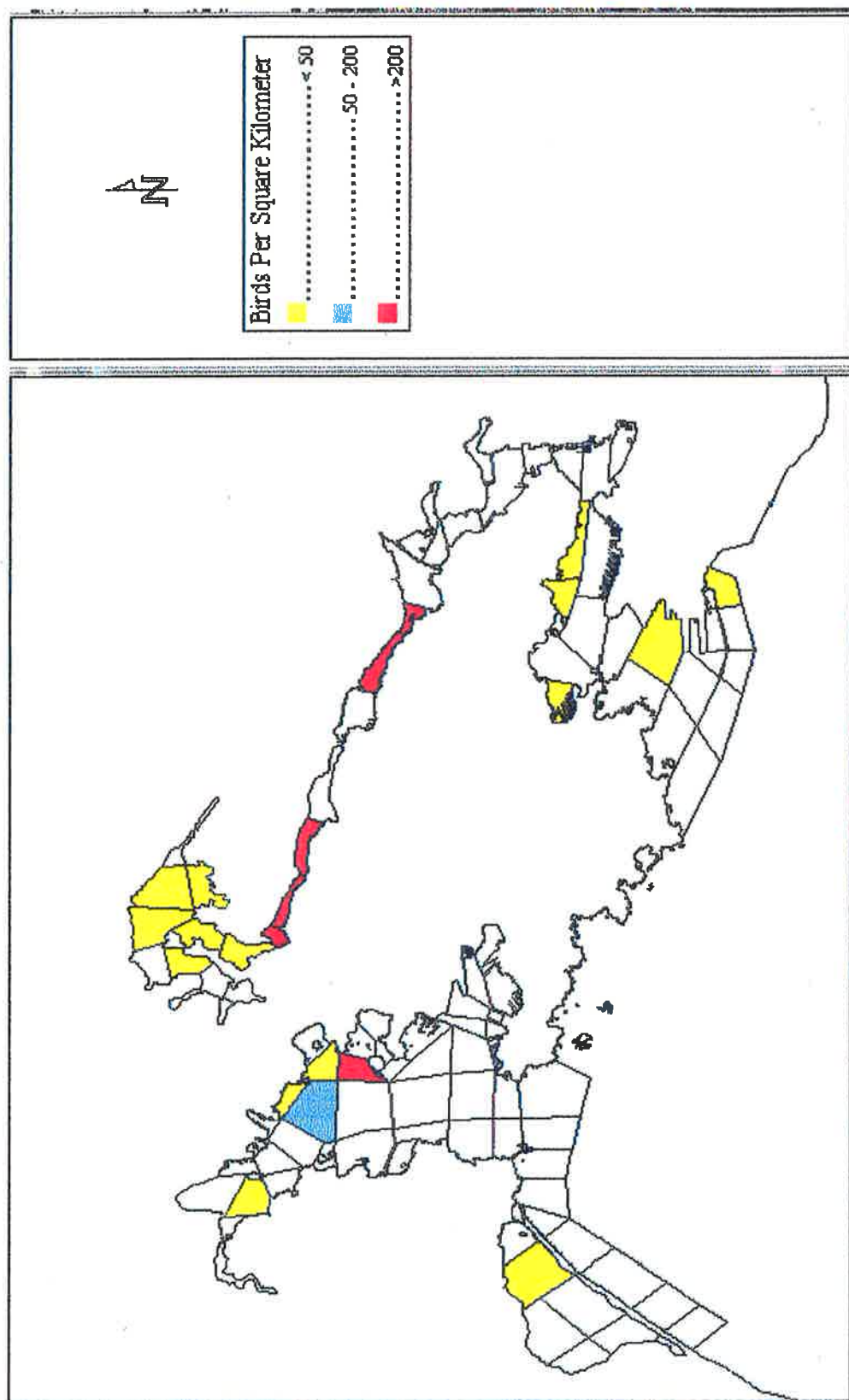


Figure 4. Distribution and density of Double-crested Cormorants in October 1997.

Great Blue Heron

Ardea herodias

Although not particularly common in the study area, the Great Blue Heron was a conspicuous component of the avifauna, particularly at the head Esquimalt Harbour. As many as 14 herons (in March, 1998) were observed foraging on the mudflats in Esquimalt Harbour.

Canada Goose

Branta canadensis

The Canada Goose was an abundant species. Figure 5 shows the seasonal abundance of this species, while figure 6 shows their distribution and density in June 1999. The geese tended to concentrate in Portage Inlet and Esquimalt Lagoon. In the late spring and early summer, they also occurred in moderate numbers at the head of Esquimalt Harbour. The species is increasing in the Victoria area (see Figure 7), with almost 750 birds counted in June 1999.

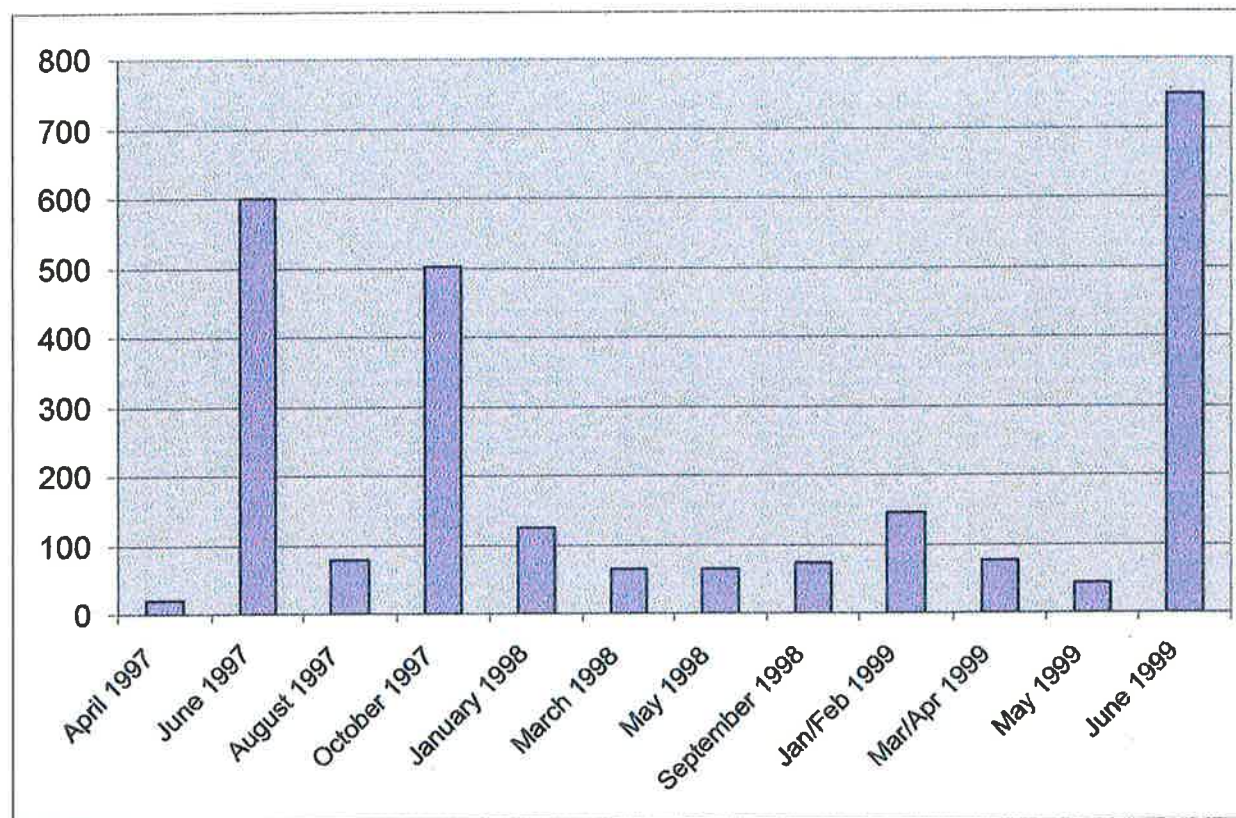


Figure 5. Seasonal abundance of Canada Geese in the Victoria and Esquimalt Harbours area.

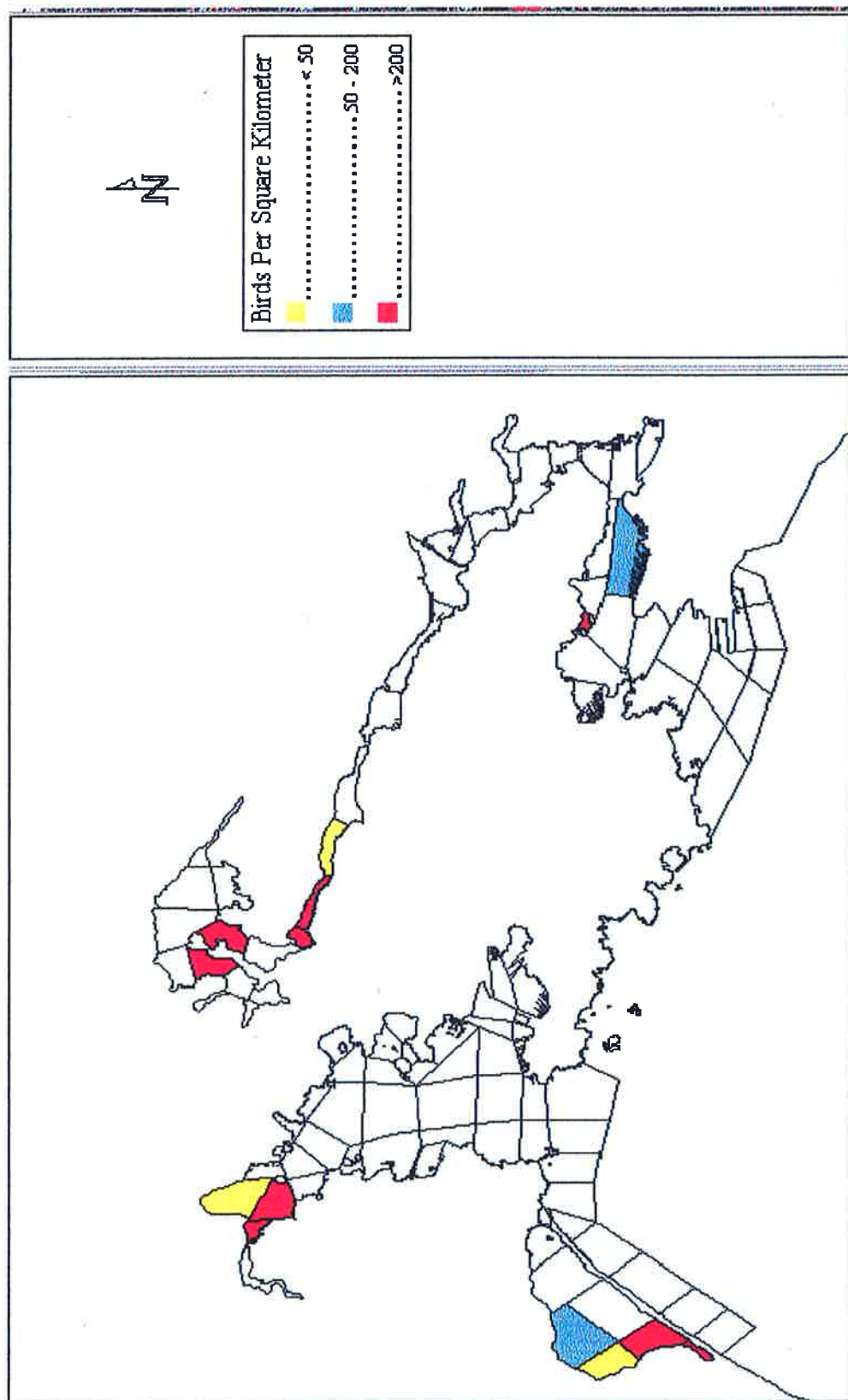


Figure 6. Distribution and density of the Canada Geese in June 1999.

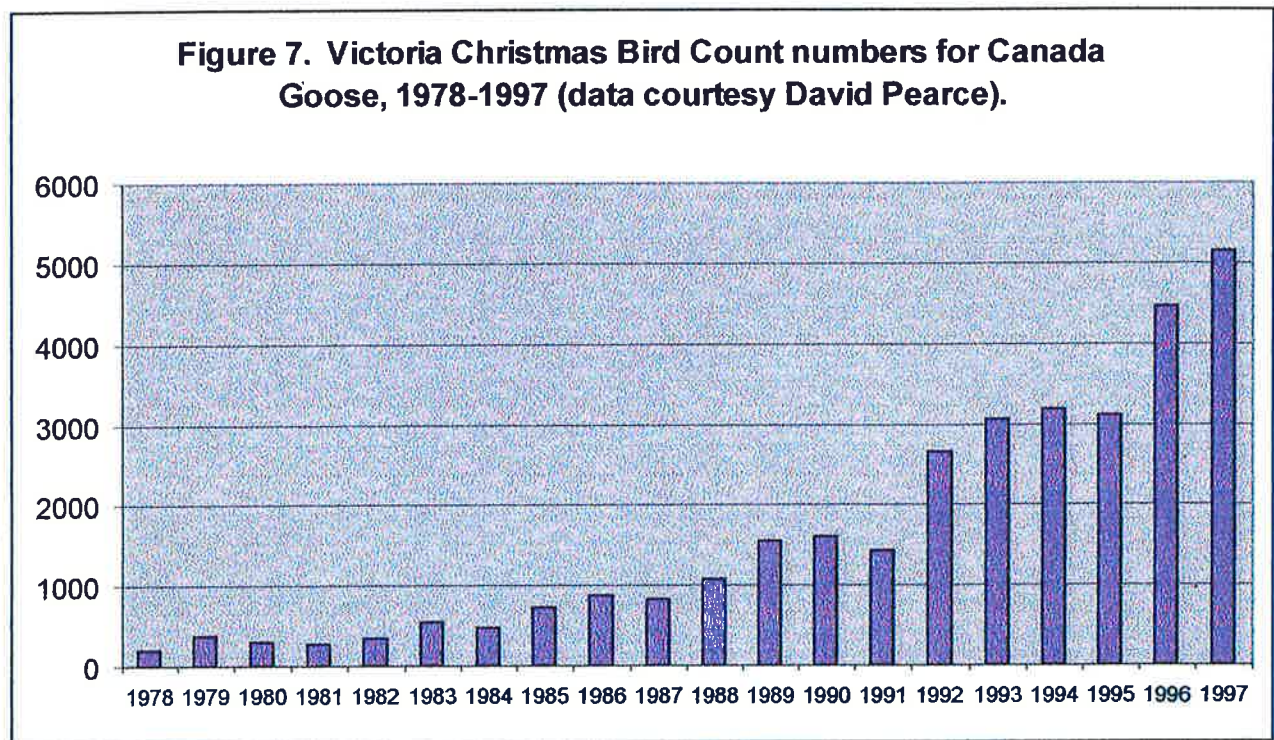


Figure 7. Total numbers of Canada Geese observed during Victoria Christmas Bird Counts, 1978-1997 (from Shepard 1998).

American Wigeon

Anas americana

The American Wigeon is primarily a winter resident of the Victoria and Esquimalt areas, being most numerous from October through March (Fig. 8). Figure 9 shows the distribution and density of American Wigeon in March 1998. This species tended to gather in dense feeding flocks, particularly in shallow waters and mudflats. Although normally fewer than 160 wigeon occurred in the study area, a peak of 280 was noted in March 1998.

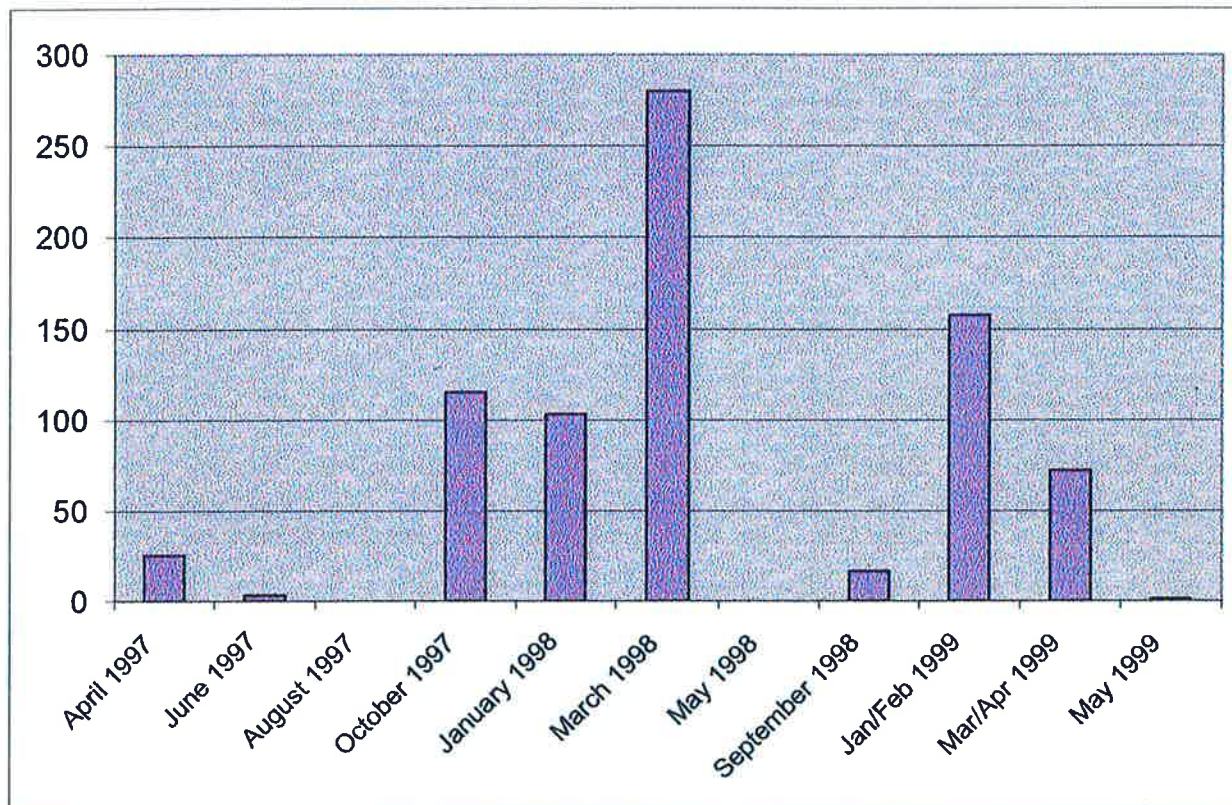


Figure 8. Seasonal abundance of American Wigeon in the Victoria and Esquimalt Harbours area.

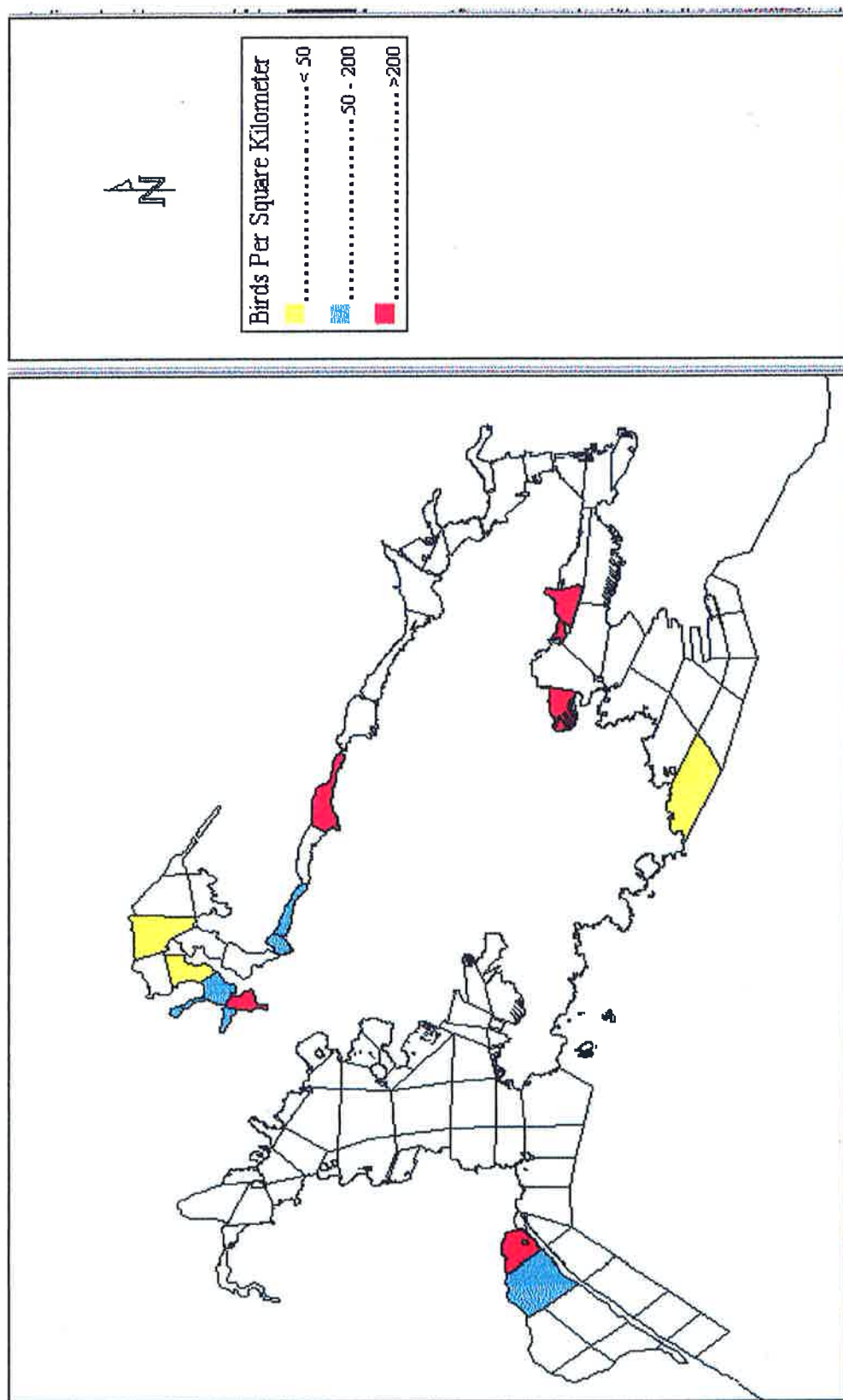


Figure 9. Distribution and density of American Wigeon in March 1998.

Mallard

Anas platyrhynchos

The Mallard was an abundant species, found primarily in sheltered shallow waters. Concentrations may have been affected by recreational duck feeding, as people were seen feeding ducks at all areas with high Mallard numbers. However, Mallard probably would occur here naturally, as the shallow waters with emergent vegetation appear to be readily available at those sites. Figure 10 shows the seasonal abundance of Mallards in the study area. The species was most common during the winter, dispersing to breed in April, and returning in August. Figure 11 shows distribution and density for the October 1997 survey. Throughout the year, the highest concentrations occurred in Portage Inlet, Esquimalt Lagoon, and particularly at the head of Esquimalt Harbour. During the winter as many as 430 Mallard occurred in the study area.

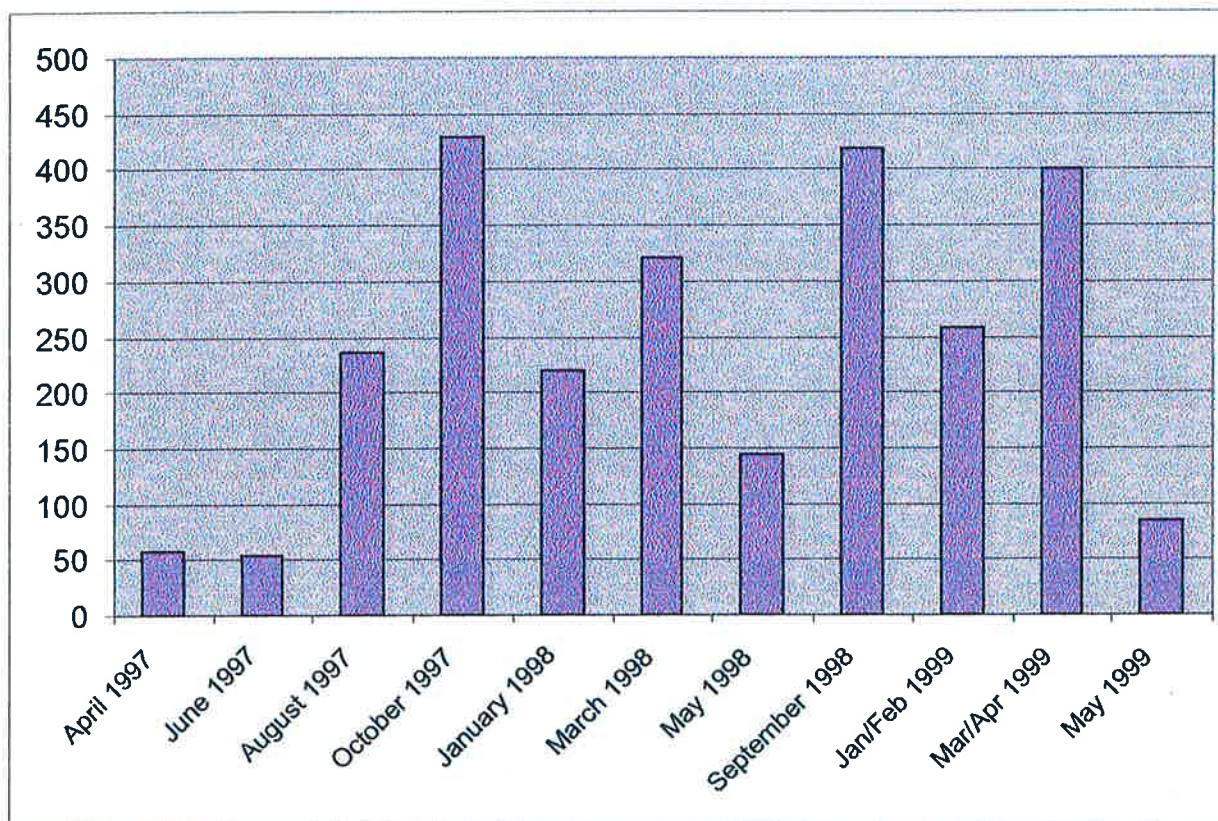


Figure 10. Seasonal abundance of Mallards in the Victoria and Esquimalt Harbours area.

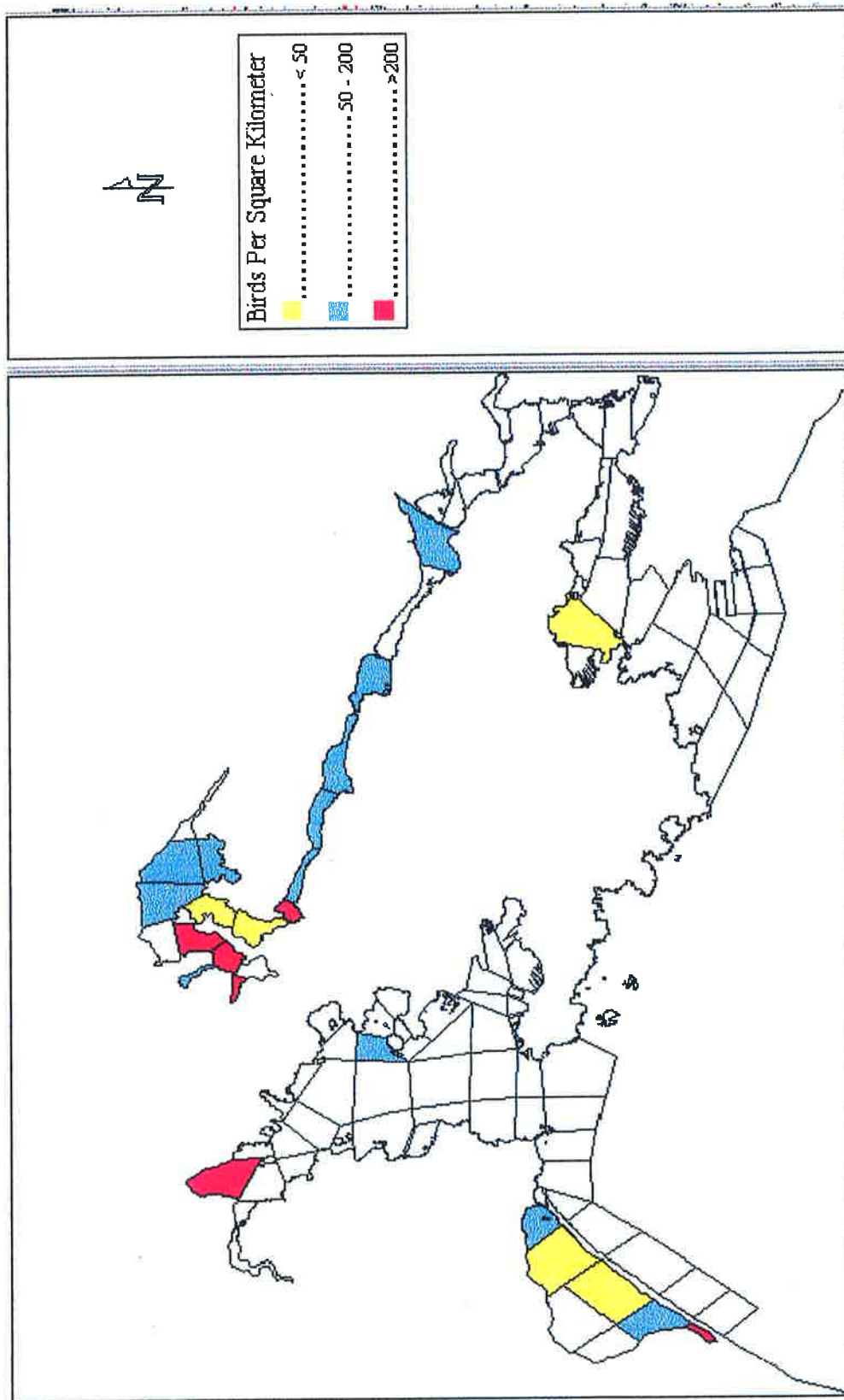


Figure 11. Distribution and density of Mallards in October 1997.

Greater Scaup *Aythya marila*, Lesser Scaup *Aythya affinis*

It was not always possible to identify all scaup to species; however it is likely that all or most of the unidentified scaup were Greater Scaup. Figure 12 shows the seasonal abundance of scaup in the study area. The Greater Scaup was primarily a wintering species, most common from October through April. Lesser Scaup appeared mainly as spring migrants in March. Figure 13 shows the distribution and density of the Greater Scaup in January/February 1999 when more than 260 birds were found in the study area. Portage Inlet and Esquimalt Lagoon were the centres of scaup abundance throughout the study.

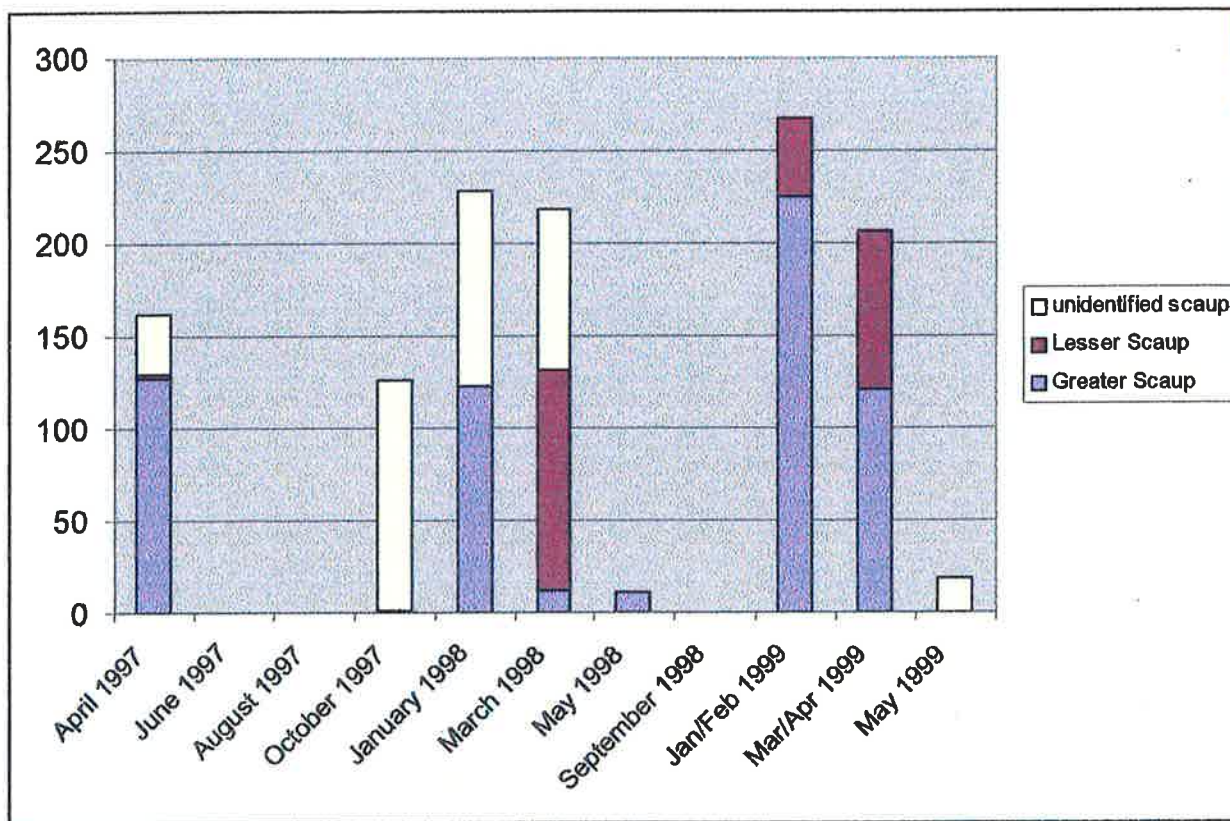


Figure 12. Seasonal abundance of scaup in the Victoria and Esquimalt Harbours area.

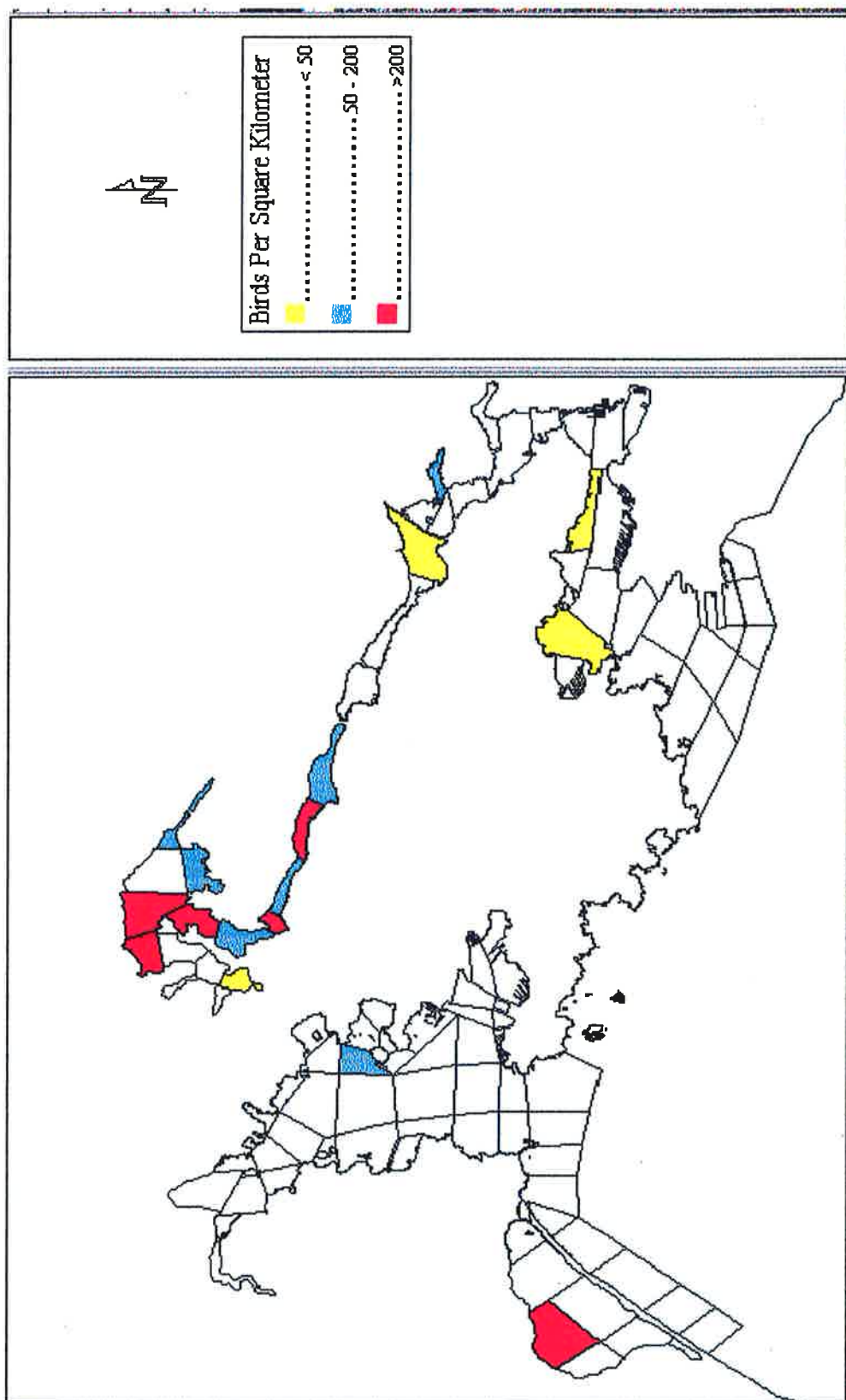


Figure 13. Distribution and density of Greater Scaup in January/February 1999.

Bufflehead

Bucephala albeola

Figure 14 shows the seasonal abundance of the Bufflehead in the study area. This species was primarily a winter resident (mid-October through April), associating in loose flocks throughout much of the survey area. As many as 380 Bufflehead occurred within the study area. Esquimalt Lagoon and the head of Esquimalt Harbour were the most favoured locations. Figure 15 shows the distribution and density of Bufflehead in March 1998.

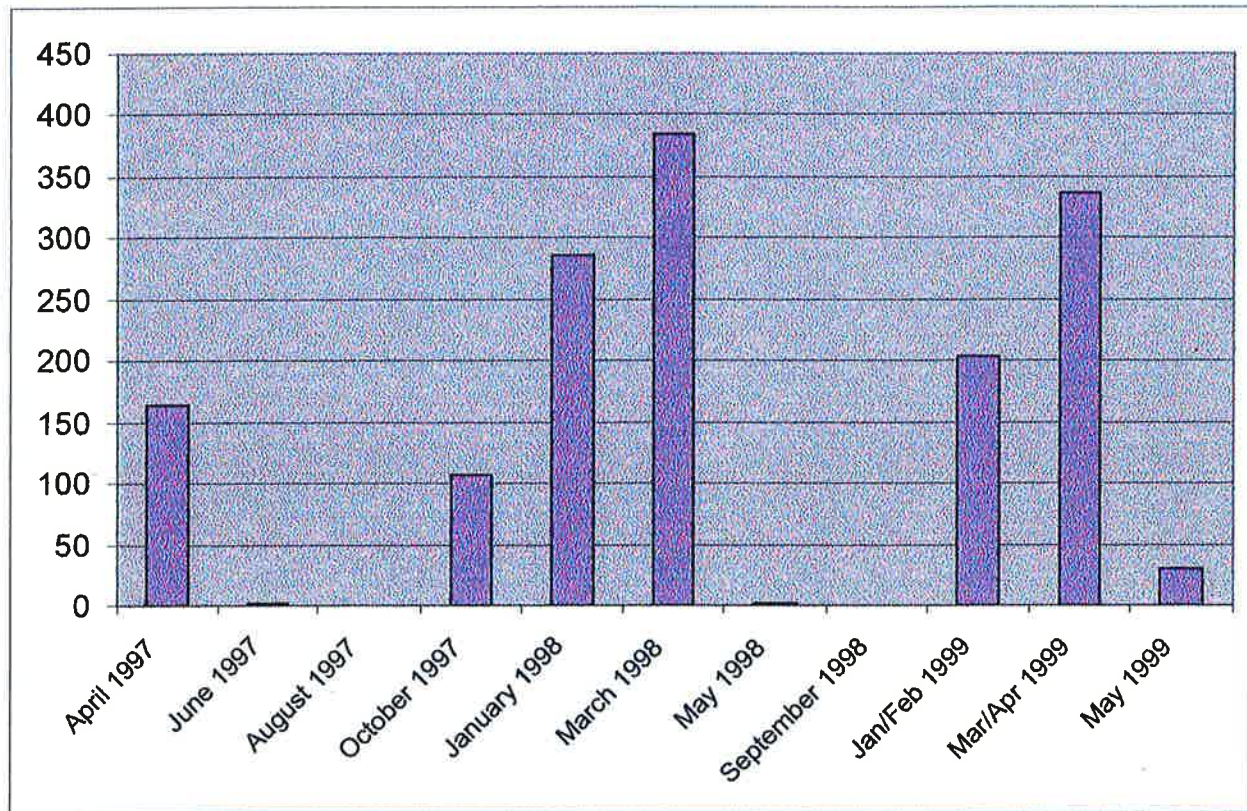


Figure 14. Seasonal abundance of Bufflehead in the Victoria and Esquimalt Harbours area.

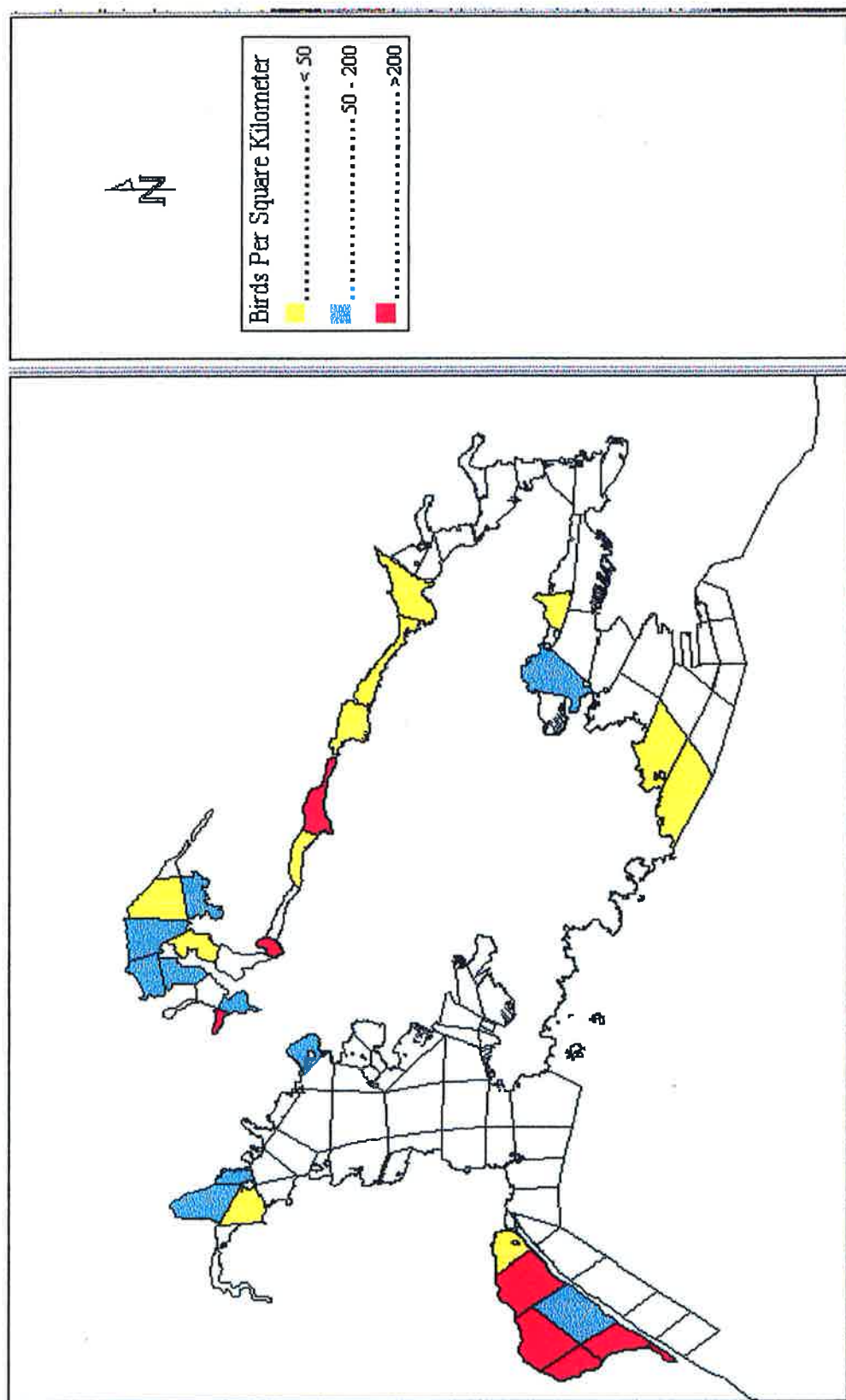


Figure 15. Distribution and density of Bufflehead in March 1998.

Red-breasted Merganser

Mergus serrator

Figure 16 shows the seasonal abundance of the Red-breasted Merganser in the study area. The species was locally abundant as a wintering resident (October through April). Figure 16 shows the distribution and density of this species in April 1997. Parts of Victoria and Esquimalt Harbours, as well as Royal Roads waters off Esquimalt Lagoon were frequently used. Although few birds were observed in Portage Inlet, local birders have noted high numbers of Red-breasted Mergansers there on occasion.

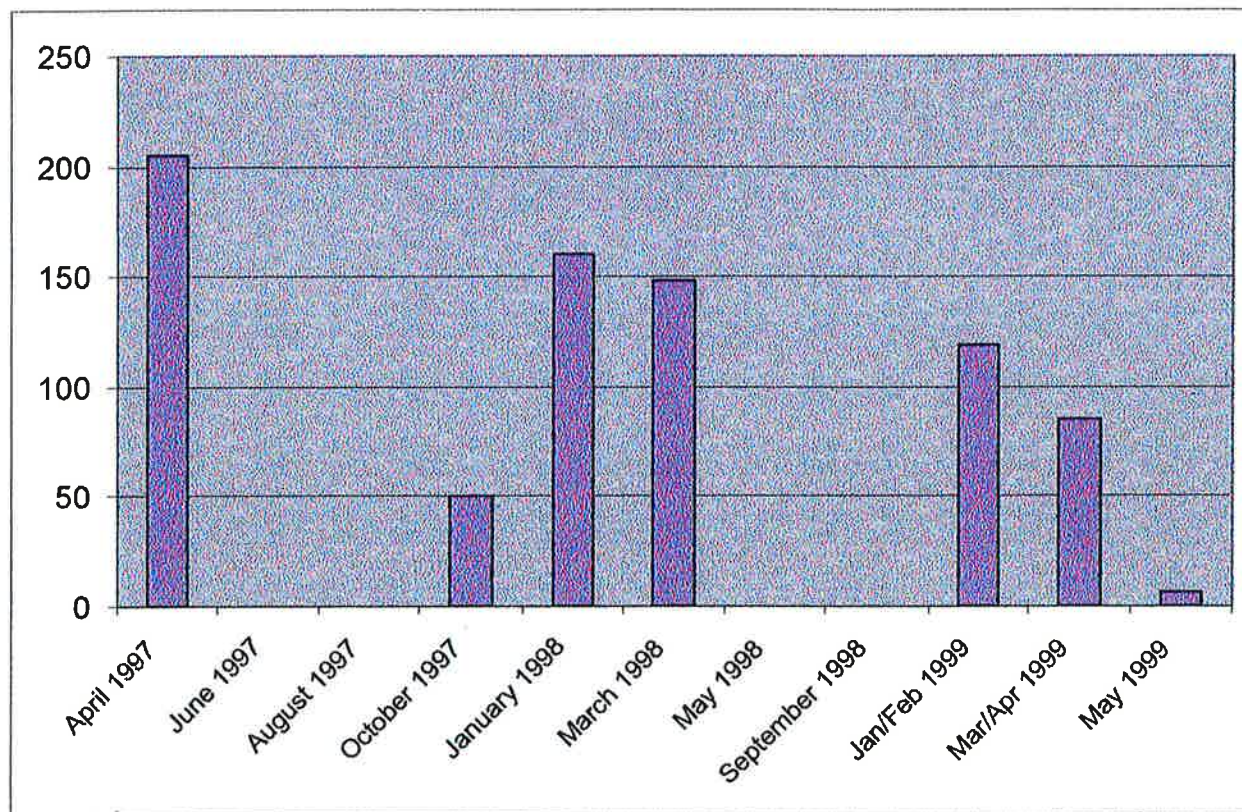


Figure 16. Seasonal abundance of Red-breasted Mergansers in the Victoria and Esquimalt Harbours area.

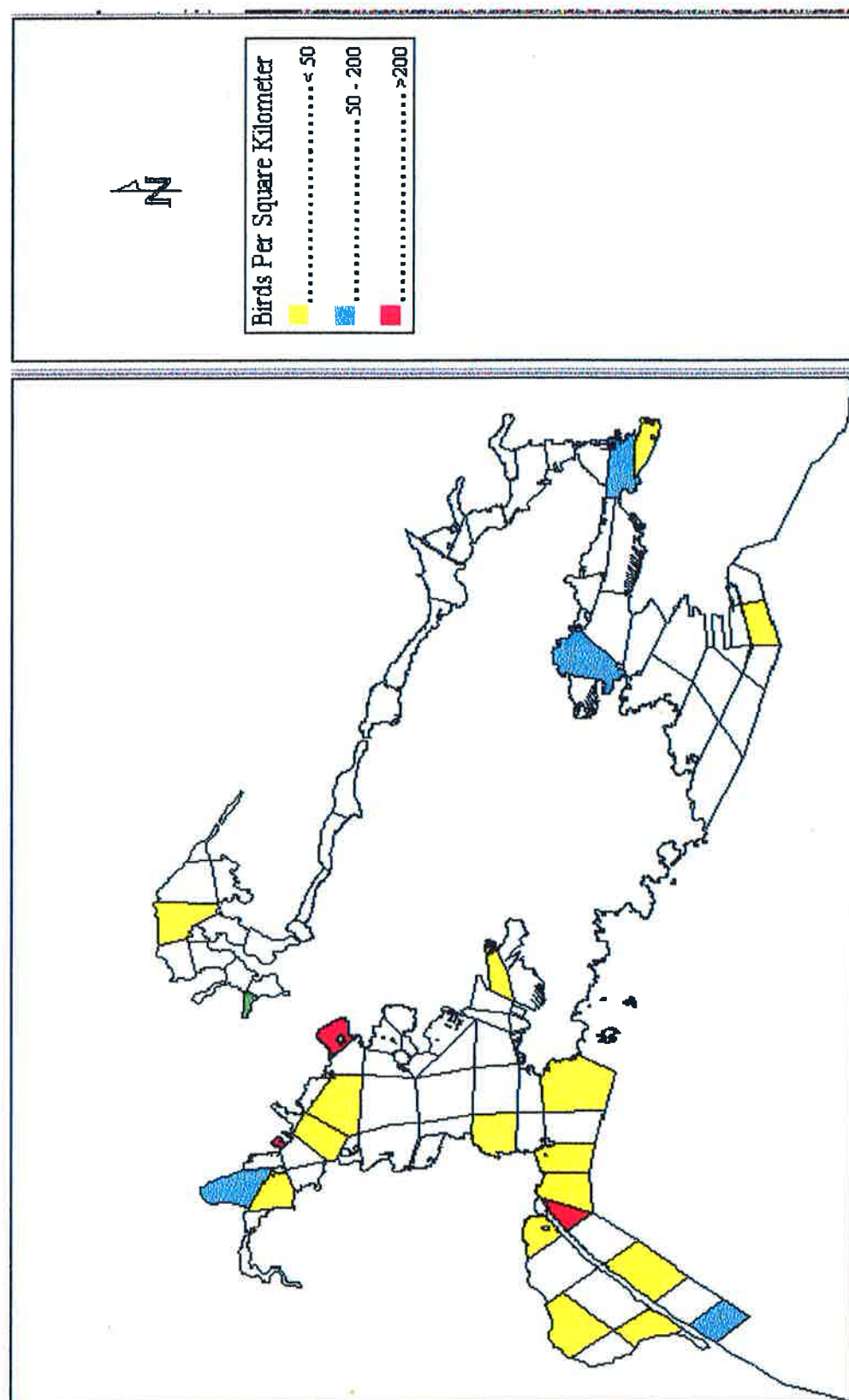


Figure 17. Distribution and density of Red-breasted Mergansers in April 1997.

Mew Gull

Larus canus

Figure 17 shows the seasonal abundance of the Mew Gull in the study area. This gull was present much of the year, but most abundant as a wintering bird. This highly mobile species was difficult to census as flocks tended to move rapidly in and out of the study area. Figure 18 shows the distribution and density of Mew Gull in January/February 1999. Throughout the year, log booms and mudflats in Victoria and Esquimalt Harbours were the most favoured areas of use. Next to Canada Geese, the Mew Gull was the most abundant bird species throughout the entire study, with almost 600 individuals observed in January/February 1999.

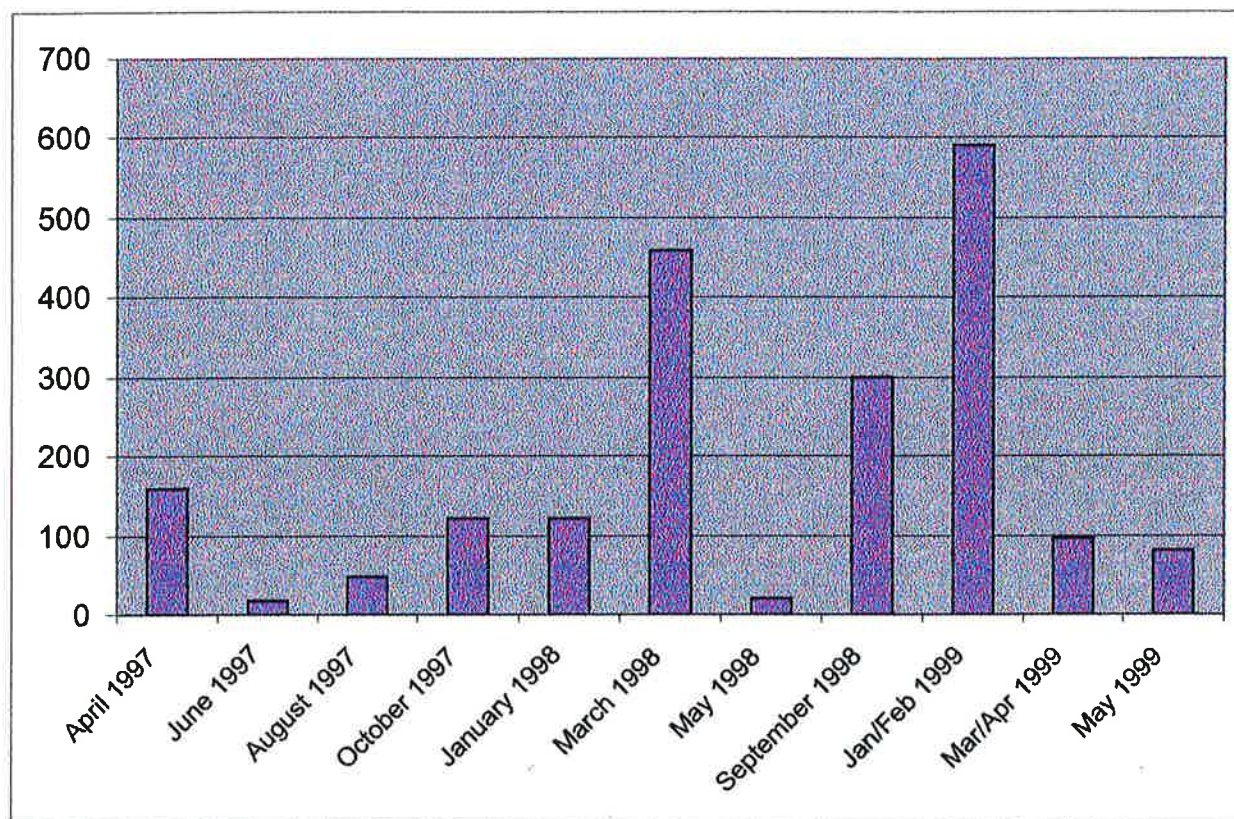


Figure 17. Seasonal abundance of Mew Gulls in the Victoria and Esquimalt Harbours area.

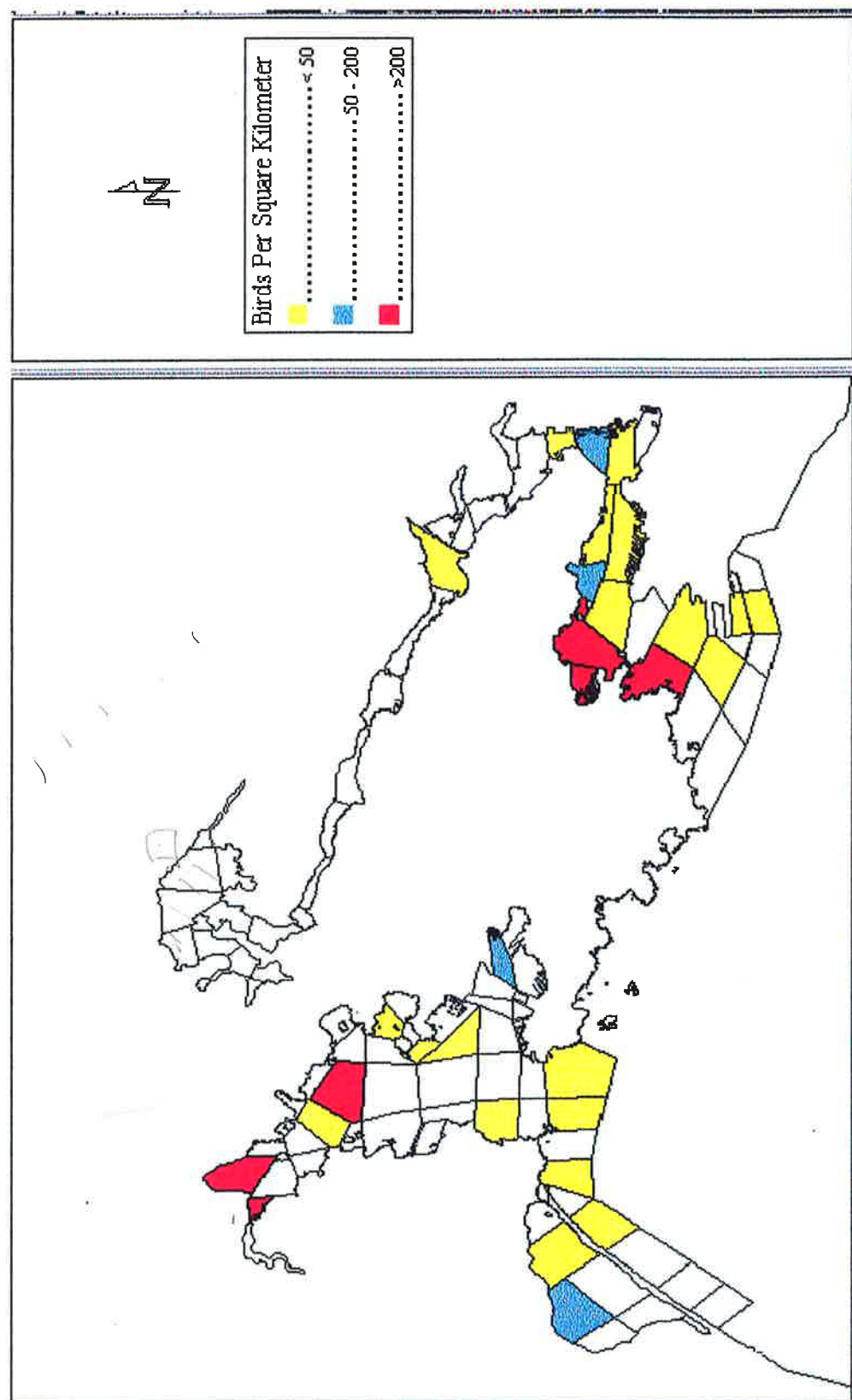


Figure 18. Distribution and density of Mew Gulls in January/February 1999.

Glaucous-winged Gull

Larus glaucescens

Figure 19 shows the seasonal abundance of the Glaucous-winged Gull in the study area. The species was resident and present all year long. Figure 20 shows the distribution and density of this gull species in August 1997. Glaucous-winged Gulls were widespread, however during the breeding season (mid-May through late July) they appeared mainly along the outer shores, only infrequently visiting Portage Inlet and the interior of Esquimalt Harbour. The study area supported just over 400 Glaucous-winged Gulls in late summer.

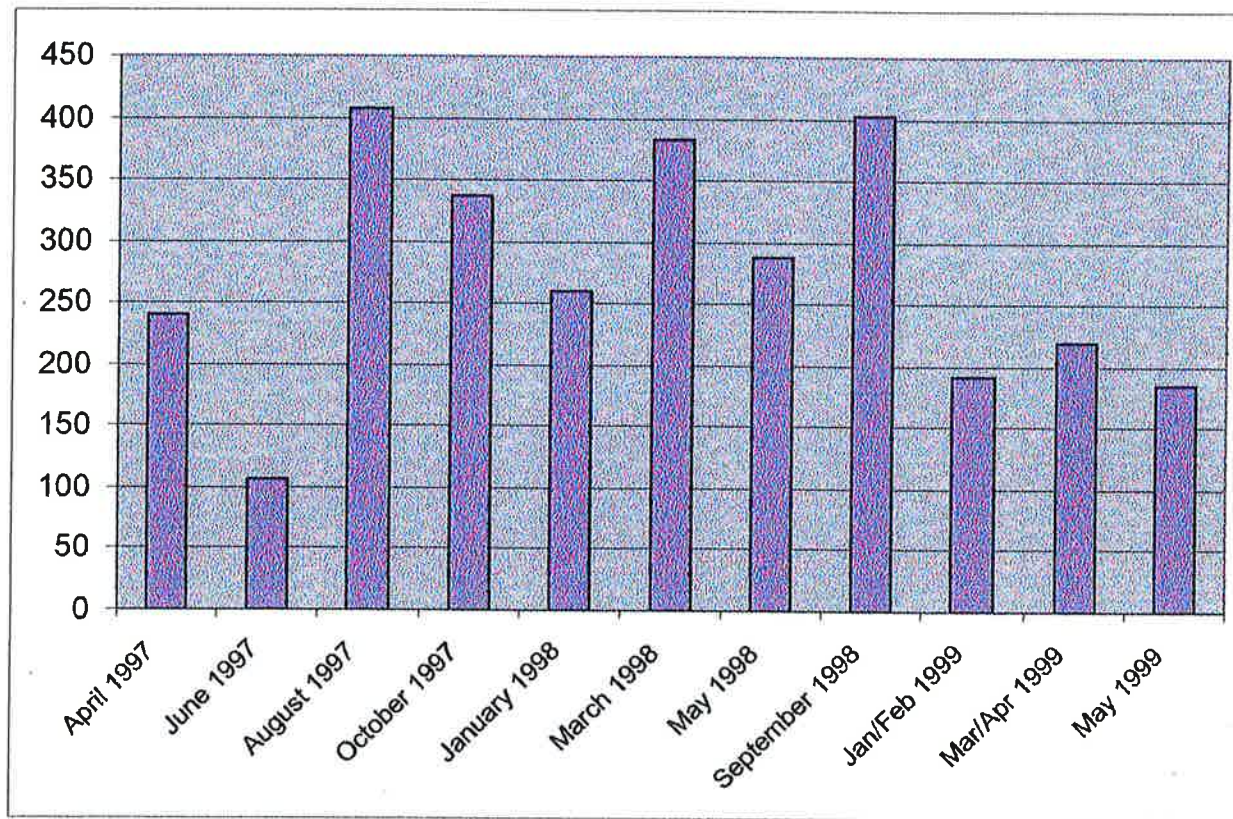


Figure 19. Seasonal abundance of Glaucous-winged Gulls in the Victoria and Esquimalt Harbours area.

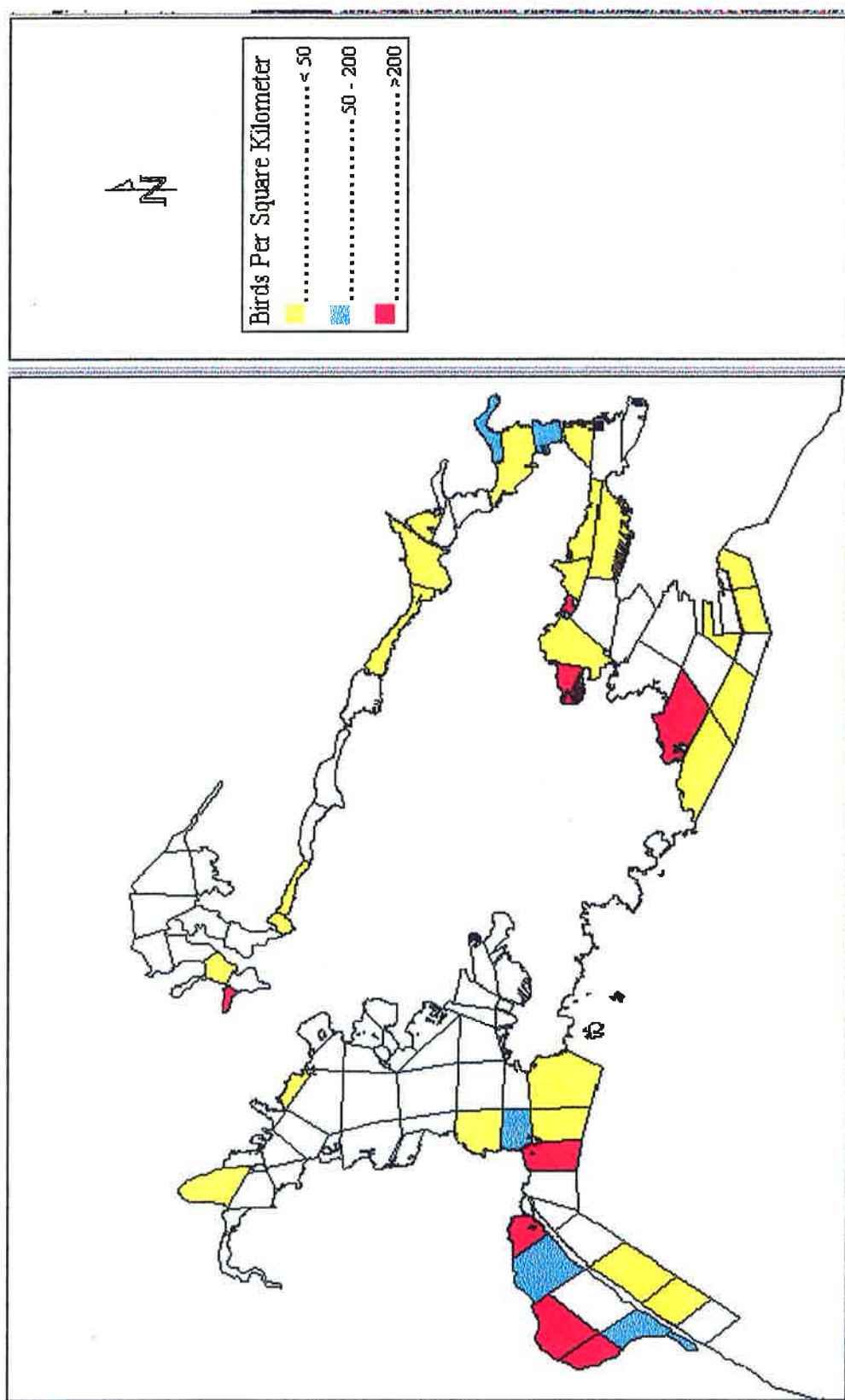


Figure 20. Distribution and density of Glaucous-winged Gulls in August 1997.

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6.0 LITERATURE CITED

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