Summary of Bird Mortalities in British Columbia and Yukon 1963-1994

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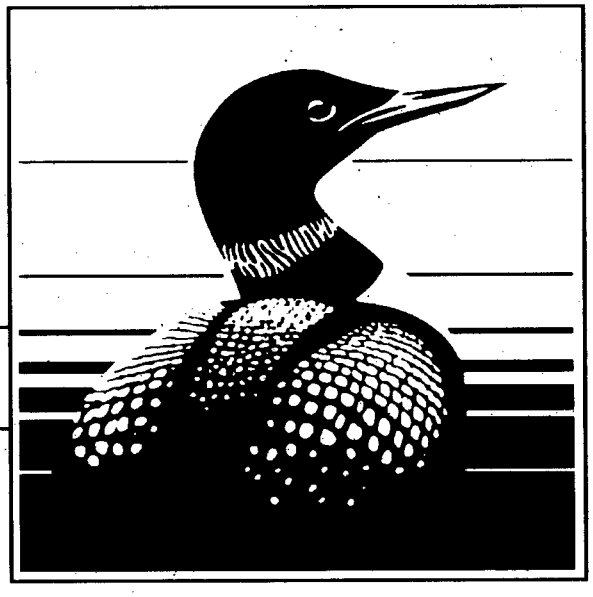
Pacific and Yukon Region 1995
Canadian Wildlife Service
Environmental Conservation Branch



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ABSTRACT

The Canadian Wildlife Service, British Columbia Ministry of the Environment, Lands and Parks and the British Columbia Ministry of Agriculture, Fisheries, and Food routinely receive calls about injured or dead birds from the public, veterinarians and wildlife rehabilitators. The details of 304 bird mortality events, involving over 52,000 individuals, reported in British Columbia and the Yukon between 1963 and 1994 have been presented and briefly summarized. Most of the birds were found in the Lower Mainland and on Vancouver Island. Numerically, the majority of the birds died in a single event, the Nestucca oil spill, which occurred off the west coast of Vancouver Island in December, 1988. Other common causes of deaths were pesticide poisoning, infectious diseases and trauma. Most of the pesticide-poisoned birds died from exposure to organophosphorus and carbamate insecticides, in particular carbofuran, fensulfothion and diazinon. This publication includes bird kills reported to several government bodies; it is not intended to be a complete account of all avian mortalities in the British Columbia and Yukon Region over the past 30 years. Regardless, it still highlights geographic areas with high avian mortalities, as well as identifies various causes of death. Recognizing these problems provides a starting point to initiate action to reduce potential hazards to wildlife and, ultimately, the number of mortalities. This summary also allows investigators to assess the importance of newly reported incidences in the context of previous patterns.

RESUME

Le Service canadien de la faune, le ministère de l'Environnement, des Terres et des Parcs de la Colombie-Britannique, et le ministère de l'Agriculture, des Pêches et de l'Alimentation de la Colombie-Britannique reçoivent régulièrement des appels concernant des oiseaux morts ou blessés, de la part du public, et de spécialistes en médecine vétérinaire et en réhabilitation de la faune. Cette étude fait état de 304 incidents de mortalité aviaire, totalisant plus de 52 000 spécimens, signalés en Colombie-Britannique et au Yukon au cours de la période comprise entre 1963 et 1994. La plupart de ces oiseaux ont été trouvés sur l'île de Vancouver et dans le Lower Mainland. Le plus grand nombre de ces décès aviaires est dû au déversement de pétrole du Nestucca, survenu au large de la côte ouest de l'île de Vancouver, en 1988. Parmi les autres causes de décès, on cite les empoisonnements aux pesticides, les maladies infectieuses et les traumatismes divers. La plupart des cas d'empoisonnement aux pesticides étaient dus à une contamination par des composés organophosphorés et par des insecticides du groupe des carbamates, notamment le carbofurane, le fensulfothion et le diazinon. Ce document fait état des cas de décès aviaires signalés aux diverses autorités gouvernementales; il ne s'agit pas d'un recensement exhaustif de tous les cas de mortalité aviaire survenus en Colombie-Britannique et au Yukon depuis trente ans. Néanmoins, il permet de déterminer les régions géographiques qui accusent un taux élevé de mortalité aviaire, et d'identifier les diverses causes de décès. Car c'est en reconnaissant ces phénomènes qu'on pourra entreprendre les mesures nécessaires pour réduire les dangers qui menacent la faune et, à terme, le nombre de décès aviaires. Ce document permettra également aux enquêteurs d'analyser les nouvelles tendances par rapport aux chiffres antérieurs.

TABLE OF CONTENTS

ABSTRACT i

TABLE OF CONTENTS ii

LIST OF TABLES iii

LIST OF FIGURES iv

LIST OF APPENDICES v

ACKNOWLEDGMENTS vi

1. INTRODUCTION 1

2. METHODS 1
- 2.1 Sources of case reports 1
- 2.2 Individual case reports 2
- 2.3 Presentation of data / Statistical analysis 5

3. RESULTS 5
- 3.1 Annual incidence of reports 6
- 3.2 Most probable cause of death 6
- 3.3 Location of die-offs 11

4. DISCUSSION 15
- 4.1 Annual incidence of reports 15
- 4.2 Most probable causes of death 16
  - Determining a probable cause of death 16
  - Common causes of death 16
- 4.3 Location of die-offs 17
- 4.4 Toxicologically relevant contaminant levels in wildlife 18
  - Neuro-toxic pesticides 18
  - Rodenticides 21
  - Chlorinated Chemicals 22
  - Lead 23
  - Mercury 24
  - Trace Elements 24
  - Miscellaneous compounds 24
- 4.5 Limitations of the data 27

5. CONCLUSIONS 27

6. REFERENCES 28

7. APPENDICES 32

LIST OF TABLES

Table 1. Number of waterbirds, passerines, and raptors reported to have died from various poisons in British Columbia and the Yukon, 1963-1994. 9

Table 2. Acute oral toxicity of organophosphate and carbamate insecticides whose residues were either detected in reported bird mortalities or were referenced in the individual case records (Appendix 9). 20

Table 3. Trace element levels in adult wild and domestic birds (ppm, wet weight). . . 25

LIST OF FIGURES

Figure 1. Annual incidence of bird mortality reports in British Columbia and the Yukon, 1963-1994 (N=1,215). 6

Figure 2. Probable cause of death of all reported bird kills in British Columbia and the Yukon, 1963-1994 (N=12,658). The graph does not include the 40,000 seabirds which died from an oil spill. 7

Figure 3. Probable cause of death of reported waterbirds, passerines and raptor mortalities in British Columbia and the Yukon, 1963-1994 (N=12,658). The graph does not include the 40,000 seabirds which died from an oil spill. 8

Figure 4. Location of bird mortalities reported in British Columbia and the Yukon between 1963 and 1994 by Provincial Region (N=12,658). The graph does not include the 40,000 seabirds which died from an oil spill. 11

Figure 5. Location of bird mortalities reported in the Lower Mainland, Prov. Region 2 (n=7,110). 12

Figure 6. Probable cause of death of bird mortalities reported in the Fraser Delta, upper Fraser Valley and north Fraser Vallegwof the Lower Mainland (n=7,110). The Fraser Delta includes the cities of Richmond, Surrey, Delta, Whiterock and Tsawwassen. The upper Fraser Valley includes the area east of Langley to Hope and north to Pitt Lake. The city of Vancouver and the area north to Lion's Bay and east to Port Coquitlam comprise the north Fraser Valley. 13

Figure 7. Location of bird mortalities reported on Vancouver Island, Prov. Region 1 (n=2,505). The graph does not include 40,000 seabirds which died from an oil spill along the west coast of Vancouver Island. 14

Figure 8. Probable cause of death of reported bird mortalities near Victoria and along the west coast of Vancouver Island (n=2,505). The graph does not include the 40,000 seabirds which died from an oil spill along the west coast of Vancouver Island. 15

Figure 9. Location of provincial regions as designated by the British Columbia Ministry of the Environment, Lands, and Parks. 38

LIST OF APPENDICES

Appendix 1. Taxonomic order, four letter codes, common names and scientific names used for birds listed in Appendices 6, 7 and 8 (Campbell, 1990). 33

Appendix 2. Provincial regions as designated by the Ministry of the Environment, Lands, and Parks. 38

Appendix 3. Abbreviations used in main body of text and individual case records (Appendix 9). 39

Appendix 4. Glossary of veterinary terms used in individual records (Appendix 9). . . 41

Appendix 5. Classification, common and trade names of toxic chemicals which appear in this report. 42

Appendix 6. Bird mortalities reported in British Columbia and the Yukon, 1963-1994, by species. 44

Appendix 7. Bird mortalities reported in British Columbia and the Yukon, 1963-1994, by location. 58

Appendix 8. Bird mortalities reported in British Columbia and the Yukon, 1963-1994, by cause of death. 69

Appendix 9. Individual records of bird mortalities reported in British Columbia and the Yukon, 1963-1994. 79

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1. INTRODUCTION

Field biologists, wildlife rehabilitators, and veterinarians routinely observe injured or dead wildlife. The extent of these mortalities can range from a single bird to many thousands of individuals. These events often raise questions regarding the overall health and stability of local wildlife populations and causes of death and sickness.

One method of detecting trends in a population is to record and summarize individual events. Review of these events can show the most common causes of reported mortality, the prevalence of various diseases, the occurrence of poisonings from toxic substances, as well as the susceptibility of different species to the various causes of death. Geographical areas where die-offs frequently occur can also be determined. This knowledge may be used to initiate actions which prevent or reduce future wildlife mortalities.

Since the mid-1960s, federal and provincial governments in British Columbia (Environment Canada - Canadian Wildlife Service (CWS), British Columbia Ministry of Environment, Lands, and Parks (BCEnv), and British Columbia Ministry of Agriculture, Fisheries, and Food (BCAg)) have received many calls about injured or dead birds from the public, veterinarians, and wildlife rehabilitators. The details of these reports ranged from brief hand-written notes, through to full scale investigations including laboratory analysis. Upon reviewing these reports, it was evident that in each case there was some level of concern; no reports were written about birds which were caught by cats, or of birds hitting windows. Therefore, the records of die-off reports are mainly of unusual events where the causes of death indicate some new and potentially controllable threat.

This report presents an account of 304 cases of bird die-offs which occurred in British Columbia and the Yukon between 1963 and 1994. The information is summarized in the main body of the report; details of individual cases are provided in Appendix 9. All Trumpeter Swan mortalities and cases involving raptors (eagles, hawks and falcons) which occurred after 1989 are summarized in the main text but detailed information has not been included in Appendix 9 since these records are available elsewhere (Elliott *et al.*, 1995; 1996a; 1996b; Wilson *et al.*, 1997). While most of the events were reported from the lower Fraser Valley and southern Vancouver Island, we have also included incidents from throughout British Columbia and the Yukon, as reported. The prevalence of different causes of death and geographic areas where multiple die-off events occurred are discussed. No mammalian, amphibian or reptilian mortalities are presented in this report.

2. METHODS

2.1 Sources of case reports

The majority of the cases presented in this report were originally documented by the Canadian Wildlife Service, Environment Canada. Most cases also included information from investigations by the Provincial Ministries of the Environment, Lands and Parks and/or Agriculture, Fisheries and Food. Additional toxicological information was obtained from

unpublished Provincial Government reports by Friis (1974) and von Schuckmann (1979). Those reports contained some die-off events which were not documented by the Canadian Wildlife Service, but are included in this report. Some of the records about carbofuran pesticide mortalities have been supplemented with information from Mineau (1993). The Island Veterinary Hospital (IVH) has worked closely with the Canadian Wildlife Service on several projects since 1989. Many of their post-mortem examinations have been included. Several reports of recent avian mortalities were solicited through phone conversations with regional biologists.

The CWS has intensively monitored the causes of death and injury of Trumpeter Swans and raptors (eagle, hawks and falcons) in the lower Fraser Valley and southern Vancouver Island since 1990. Those cases have been included in the summaries presented in the Results Section. Occasionally, some of these birds were treated at wildlife rehabilitation centers and eventually released back to the wild. We decided to include these individuals because it is unlikely they would have survived had they remained in the wild. Details of individual cases have not been included in Appendix 9 since these records are discussed in separate publications (Elliott *et al.*, 1995; 1996a; 1996b; Wilson *et al.*, 1997).

Each case discussed in detail in Appendix 9 has been assigned a 'Record' number. The source of all information included in each record has been indicated. When possible, we have included case numbers of reports from other agencies and laboratories. The original documentation summarized in each die-off report is available from the CWS Office at the Pacific Wildlife Research Centre, Delta, British Columbia.

2.2 Individual case reports

Each bird die-off report was examined and the information separated into seven categories. The following guidelines were established to create a database which was used to summarize the data in the Results Section and Appendices 6, 7 and 8.

Date The date refers to the earliest knowledge of when the event occurred. If, for example, a die-off was observed on March 5th but the investigation did not begin until March 8th and the lab work was not started until March 25th, the March 5th date was used in the report. In situations where an exact date was not provided, the first day of the month or, in some cases, the first day of the year was noted. Details regarding recorded dates and the length of each die-off are presented in the Comments section of individual records.

Species and numbers In many of the reports, species were listed in general terms, such as "ducks", "gulls", and "small birds"; they are also listed in generic terms in our records. However, if a full species name was recorded in the mortality report, it was included in our record. When possible, full species names were extrapolated from the provided information. For example, reports of dead crows from Vancouver Island were listed as Northwestern Crows as it is unlikely that American Crows would be involved since they are not found on the island. Similarly, wigeon have been entered as American Wigeon and starlings as European Starlings. A list of common names, Latin names and four letter

species codes (used in Appendices 6, 7 and 8) are presented in Appendix 1.

Determining actual numbers of dead birds was often difficult. The numbers as they were originally stated, be it "200-500", "several", or "about 40" were recorded in the individual case records (Appendix 9). We assumed that the numbers reported were low estimates of the actual numbers affected since sick or injured birds tend to seek cover and are therefore difficult to observe, carcasses are difficult to locate under many field conditions and scavengers are often quick to remove carcasses (Stinson and Bromley, 1991).

In order to create a database, a number was assigned using the following criteria:

a) If two numbers were given, we used the higher of the range;
b) If there was no indication of the number of birds involved, we erred on the side of caution and counted it as only one bird;
c) If 'several' birds were involved, we assigned it a value of six;
d) If the event involved a number of birds and a variety of species, the number of birds was divided by the number of species. For example, if the kill event involved 500 birds and five species were listed, we assigned 100 to each of the five species listed. In cases where ratios were indicated, such as "mostly mallards and a few scaup", we assigned 90% of the total number as mallards and 10% as scaup. We used specific numbers if they were clearly stated (i.e. "500 ducks and 1 hawk").

Location Die-off locations have been classified according to the Provincial Regions designated by the British Columbia Ministry of Environment, Lands, and Parks (Figure 9, Appendix 2), followed by the location of the nearest settlement or prominent physical feature.

Comments Most records contained background information. We have included these comments and described the type of original report (i.e. laboratory report, interdepartmental/ intergovernmental memorandum, memo from telephone conversation).

Many of the original case reports contained information which was vague, comments which were written in unstructured sentences, or handwritten on carbon copies which were illegible. To avoid misinterpreting the original context of the message, we have made minimal grammatical corrections. Additions to, or interpretations of missing or illegible information have been enclosed in square brackets followed by two question marks [??].

Lab report Laboratory reports were usually included in the file if post-mortem examinations had been conducted. This information, along with the laboratory case number, has been included in the individual case records (Appendix 9). If several birds were examined and determined to have the same cause of death, we only transcribed data from one examination and indicated the case numbers of the others. A number of different laboratories performed post-mortem examinations including Agriculture Canada (AgCan), the British Columbia Ministry of Agriculture, Fisheries, and Food (BCAg), the British Columbia Ministry of Environment, Lands, and Parks (BCEnv), and the Island Veterinary Hospital (IVH). Abbreviations and a glossary of veterinary terms used in the

Veterinary Hospital (IVH). Abbreviations and a glossary of veterinary terms used in the individual records, are described in Appendix 3 and 4, respectively.

Toxicology Agencies which conducted post-mortem examinations often sent the tissues to a different laboratory for toxicological analysis. Laboratories which conducted the chemical residue analysis of tissues included the Zenon Environmental Laboratory (Zenon), CanTest (CT), the British Columbia Ministry of Environment, Lands, and Parks Toxicology Laboratory (BCEnv) and the National Wildlife Research Centre, Canadian Wildlife Service Headquarters in Ottawa, Ontario (CWS). For some cases, information was obtained from unpublished Provincial Government reports by Friis (1974) or von Schuckmann (1979). All toxicological data as well as the laboratory which conducted the residue analysis (or the source of the information for data obtained from Friis (1974) and von Schuckmann (1979)) have been included in the individual case records.

For this report, all results are expressed on a wet weight basis as parts per million (ppm), unless otherwise stated. If the original data was expressed as dry weight, the values were converted to wet weight using the percent moisture listed in the results. In cases where toxicological data for liver or kidney tissues were presented on a dry weight basis and the percent moisture was not provided, conversions were made using a value of 70% moisture (the average percent moisture content of swan liver and kidney tissues analyzed at BCAg and CWS between 1963 and 1994).

Probable cause of death The veterinarian usually indicated a probable cause of death if a-post-mortem examination was conducted. In cases where a post-mortem examination was not conducted, the information included in the report was assessed and, if possible, a 'most probable cause of death' was determined. Mortalities attributed to toxicosis (lead, mercury, pesticides and other poisons) were determined using published data relating tissue residue levels to toxicity (see Section 4.4) and the circumstances of each case. The common and trade names of chemicals mentioned in the individual case records are listed by family classification in Appendix 5.

Determining the most probable cause of death was often a judgment call. The following guidelines were used to aid the decision-making process:

a) If the bird had multiple conditions which could have resulted in its death and it was possible to determine which condition occurred first, then it was listed as the most probable cause of death.
b) If the bird had multiple conditions which could have resulted in its death and it was not possible to determine which condition occurred first, then the most severe condition was listed as the probable cause of death.
c) If the bird was found to have some condition (such as an infectious disease) as well as acutely toxic levels of a toxin (lead, mercury, pesticide or other poison), the bird was categorized as poisoned.
d) If several contaminants (various pesticides, lead, mercury) were detected in one bird, and one chemical was present in much larger amounts than the other contaminants, then the chemical present in the greatest concentration was listed as the probable cause of death.

e) If several birds from a large die-off were examined and fall were found to have died from a similar condition, that condition was listed as the probable cause of death for all of the birds in that record.
f) If several birds from a large group of birds were examined and the probable cause of death was different for each bird, the cause of mortality of the rest of the group of birds was listed as "Undetermined".

In order to summarize the data, each record was grouped into one of the following eight general categories:
a) disease which included birds with conditions such as pneumonia, nephritis, pericarditis, air sacculitis, mycotic and bacterial infections, parasites, feathering problems, calcium deficiency, malnutrition and starvation.
b) infectious disease which included birds with contagious diseases like aspergillosis, avian pox, avian cholera and salmonella.
c) lead which included birds with acute lead toxicosis.
d) pesticides which included birds acutely poisoned by organochlorine, organophosphate or carbamate insecticides and rodenticides.
e) other poisons which included PCBs, asbestos, barbiturates, natural toxins like cyanogenic glucose and acute mercury toxicosis.
f) trauma which included birds that were shot, electrocuted, drowned, caught in a fishing net or had died from other traumatic injuries.
g) undetermined which included birds whose cause of death could not be ascertained.
h) other causes which included birds that fell from their nest, were orphaned or died from physical exhaustion.
A complete list of the causes of death is presented in Appendix 8.

2.3 Presentation of data / Statistical analysis

Individual cases are presented in Appendix 9. Summarizes of the records by species, location, and cause of death are in Appendices 6, 7 and 8, respectively. General trends are shown in the Results section. Since this report only summarizes bird mortalities reported to several bodies of government and as it is impossible to document all of the avian mortalities in British Columbia and the Yukon, we did not conduct statistical analysis of the data-set. We felt this would be misleading and give more validity to the data than is warranted.

3. RESULTS

The figures presented below show general trends in the data. In order to simplify the data, we categorized the birds into three groups: (1) waterbirds which included loons, grebes, fulmars, cormorants, herons, ospreys, swans, ducks, geese, shorebirds, coots, gulls, murres, auklets; (2) passerine species which included kingfishers, galliformes, nighthawks, doves and passerines; (3) raptors which included eagles, hawks and owls.

3.1 Annual incidence of reports

The incidence of bird mortality reports fluctuated annually, but in general, appears to have increased slightly from 1963 to 1989, and more dramatically from 1989 to 1994 (Figure 1).

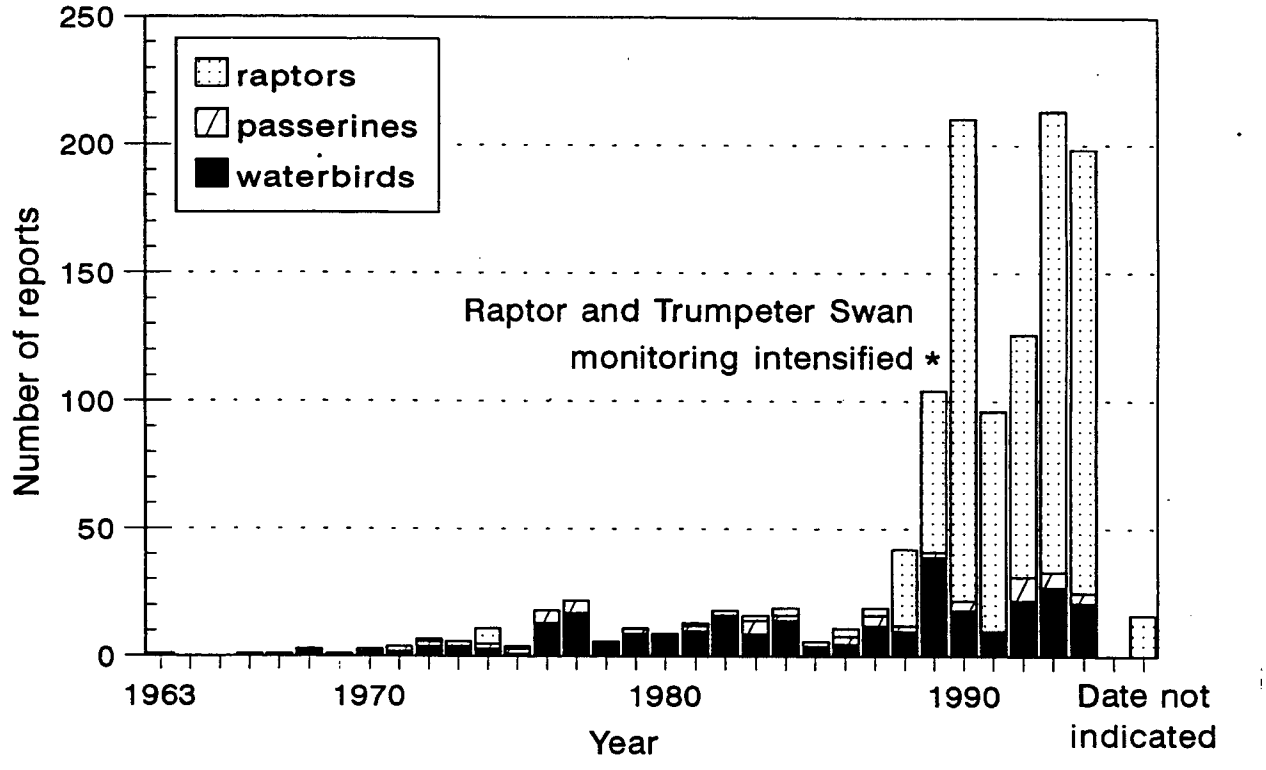

Figure 1. Annual incidence of bird mortality reports in British Columbia and the Yukon, 1963-1994 (N=1,215).

3.2 Most probable cause of death

The Nestucca oilspill off the west coast of Vancouver Island in December 1988 resulted in estimated mortality of 40,000 seabirds (Record No. 201). The figures presented below do not include this event, since it significantly influences the number of deaths and would mask other trends which might be visible.

The majority of bird mortalities reported in British Columbia and the Yukon between 1963 and 1994 were attributed to the Nestucca oilspill (not included in the figures because of the reasons previously stated), followed by pesticide poisoning (30%), undetermined causes (21%), infectious diseases (20%), trauma (20%), diseases (4%), poisons other than lead and pesticides (4%) and lead toxicosis (1%) (Figure 2). The specific causes of death included in each of these categories are described briefly in the Methods Section (see Probable Cause of Death) and are listed in detail in Appendix 8.

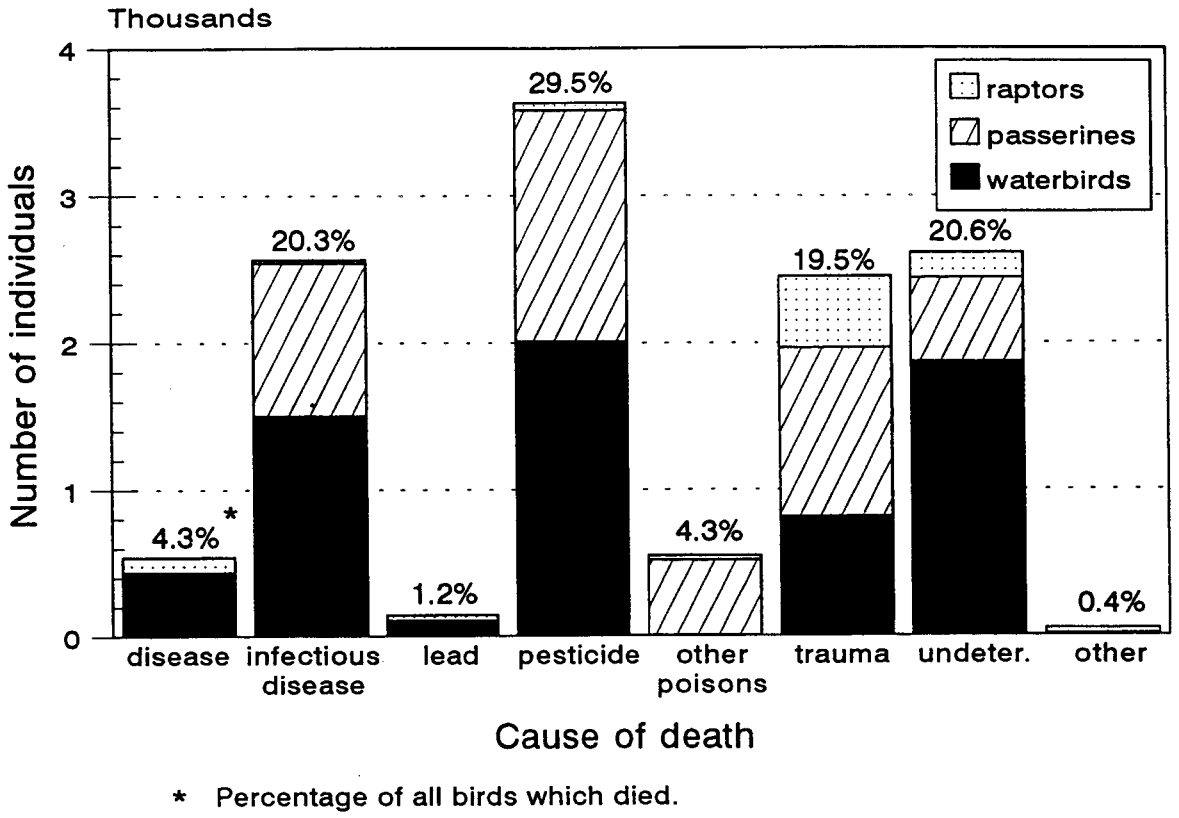

Figure 2. Probable cause of death of all reported bird kills in British Columbia and the Yukon, 1963-1994 (N=12,658). The graph does not include the 40,000 seabirds which died from an oilspill.

More specific causes of death for each of the three bird species groups (waterbirds, passerines, raptors) are shown in Figure 3. In Figure 2, starvation was included as a 'disease' but has been shown separately in Figure 3. Similarly, collision, electrocution, shot and drowning were categorized under 'trauma' in Figure 2 but are shown separately in Figure 3. The majority of waterbirds died in the oilspill (not included in figures), followed by pesticide poisoning (31%), undetermined causes (27%), infectious diseases (22%) and drowning (10%). Most passerine birds died from pesticide poisoning (32%), collisions (23%), infectious diseases (21%), undetermined causes (12%) and other poisons (11%). The majority of raptors died from trauma (23%), undetermined causes (18%), collisions (13%), electrocution (11%), starvation (9%) and pesticide poisoning (5%).

The majority of the pesticide poisoned birds died from exposure to organophosphate and carbamate insecticides, particularly carbofuran, fensulfothion and diazinon (Table 1).

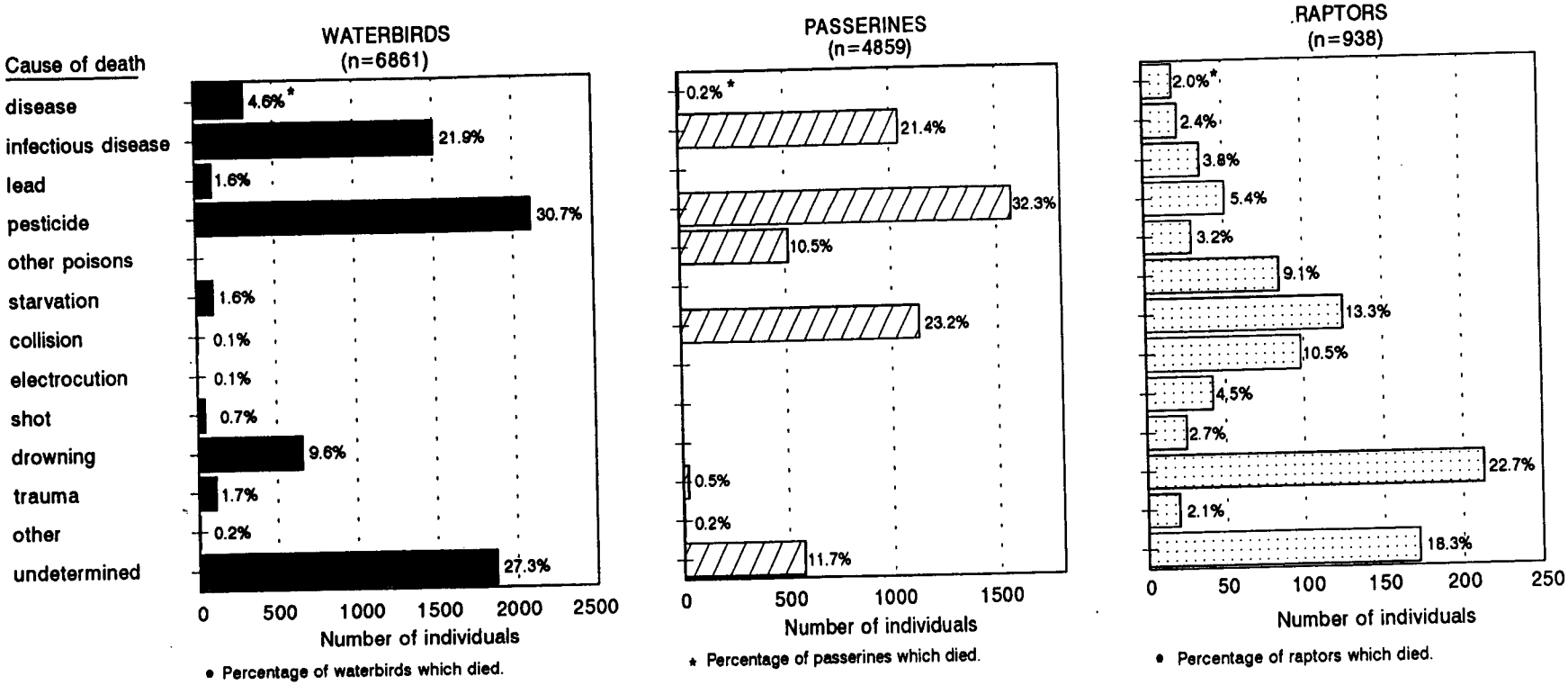

Figure 3. Probable cause of death of reported waterbirds, passerines and raptor mortalities in British Columbia and the Yukon, 1963-1994 (N=12,658). The graph does not include the 40,000 seabirds which died from an oilspill.

Table 1. Number of waterbirds, passerines, and raptors reported to have died from various poisons in British Columbia and the Yukon, 1963-1994.

Chemical	waterbirds		passerines		raptors	
	# birds	(# reports)	# birds	(# reports)	# birds	(# reports)
Organophosphates/Carbamates						
Azinophos-ethyl suspected[1,2]					5	(5)
Carbofuran	100	(1)	1	(1)	3	(3)
Carbofuran F	140	(2)				
Carbofuran G	1189	(5)	1178	(1)	2	(2)
Carbophenothion suspected[1]	1	(1)				
Diazinon	118	(7)	5	(2)		
Diazinon F	36	(4)	4	(1)		
Diazinon suspected[1]	10	(2)				
Fenitrothion			6	(1)		
Fensulfothion	12	(1)	36	(2)	1	(1)
Fensulfothion G	200	(1)	200	(1)		
Fensulfothion & Bromacil					1	(1)
Fensulfothion & Parathion	89	(1)				
Fenthion			2	(1)	2	(2)
Malathion suspected[1]			1	(1)		
Methamidophos	5	(1)				
Parathion	100	(1)			2	(2)
Parathion suspected[1]					2	(2)
Pirimicarb suspected[1,2]					1	(1)
Phorate					6	(6)
Phosphamidon suspected[1]			1	(1)		
Temephos	1	(1)				
Temephos G	18	(1)	10	(1)		
TEPP suspected[1]			33	(1)		
Terbufos					3	(3)
Terbufos suspected[1]					1	(1)
OP[3]					2	(2)
OP suspected[1]	45	(2)				
Carbamate[4]					1	(1)
OP/Carbamate[5]	21	(1)	21	(2)	11	(11)
OP/Carbamate suspected[1]			8	(1)		
Pesticide suspected[6]	2	(2)	55	(2)	6	(6)
	2087	(33)	1561	(19)	49	(49)
Rodenticides						
ANTU[7] suspected[1]	20	(1)				
Styrichnine			6	(1)		
Herbicides						
MCPA suspected	1	(1)				
Organochlorine Insecticides						
DDT			1	(1)		
Dieldrin					1	(1)
Dieldrin & DDT					1	(1)
Endosulfan	1	(1)	1	(1)		

Table 1 (continued). Number of waterbirds, passerines, and raptors reported to have died from various poisons in British Columbia and the Yukon, 1963-1994.

Chemical	waterbirds		passerines		raptors	
	# birds	(# reports)	# birds	(# reports)	# birds	(# reports)
Metals[8]						
Lead[8]	106	(52)			35	(35)
- sub-lethal exposure[9]	2	(2)			104	(104)
Lead & Mercury					1	(1)
Lead & Copper	3	(1)				
Mercury[8]	2	(2)			2	(2)
- sub-lethal exposure[9]			1	(1)	24	(23)
- suspected			2	(1)		
Mercury & DDT						
- sub-lethal exposure[9]					1	(1)
Miscellaneous						
Asbestos			6	(1)		
Cyanogenic glucoside			500	(1)		
PCBs	1	(1)				
Sodium pentabarbital					28	(1)
Poisoning suspected[10]			5	(1)		

[1] Birds were 'suspected' of pesticide poisoning if (a) contaminant residues were < 1 ppm, or (b) the file stated cause of death due to specific pesticide but no toxicological data was associated with record (see Section 4.4 for details).

[2] Some of these cases are currently under investigation by the CWS to confirm the presence of these pesticides; their status may change in the future.

[3] Birds were listed as poisoned by OPs if (a) OP residues > 1 ppm, or (b) ChE activity was inhibited by >50% of normal levels for the species and subsequently reactivated with 2-PAM (see Section 4.4 for details).

[4] Birds were listed as poisoned by Carbamate if (a) Carbamate residues > 1 ppm, or (b) ChE activity was inhibited by >50% of normal levels for the species and subsequently reactivated spontaneously (see Section 4.4 for details).

[5] Birds were listed as OP/Carbamate poisoned if the ChE activity was inhibited by >50% of normal for the species but did not reactivate either spontaneously or with 2-PAM (see Section 4.4 for details).

[6] Cause of death was suspected of being caused by pesticides but the specific family could not be ascertained.

[7] α-Naphthyl Thiourea

[8] Mortalities attributed to acute toxicosis (see Section 4.4 for criteria).

[9] Individuals exposed to sub-lethal levels (see Section 4.4 for criteria)

[10] Cause of death was suspected of being caused by a toxic chemical but the specific type could not be ascertained.

3.3 Location of die-offs

The majority (76%) of reported bird mortalities were from the Lower Mainland and Vancouver Island (Figure 4). Of the birds kills reported in the Lower Mainland, most were from the Fraser Delta (55%), followed by Manning Park (14%), the upper Fraser Valley (12%) and the north Fraser Valley (4%) (Figure 5). The Fraser Delta includes the cities of Richmond, Surrey, Delta, Whiterock and Tsawwassen. The upper Fraser Valley includes the area east of Langely to Hope and north to Pitt Lake. The city of Vancouver and the area north to Lion's Bay and east to Port Coquitlam comprise the north Fraser Valley.

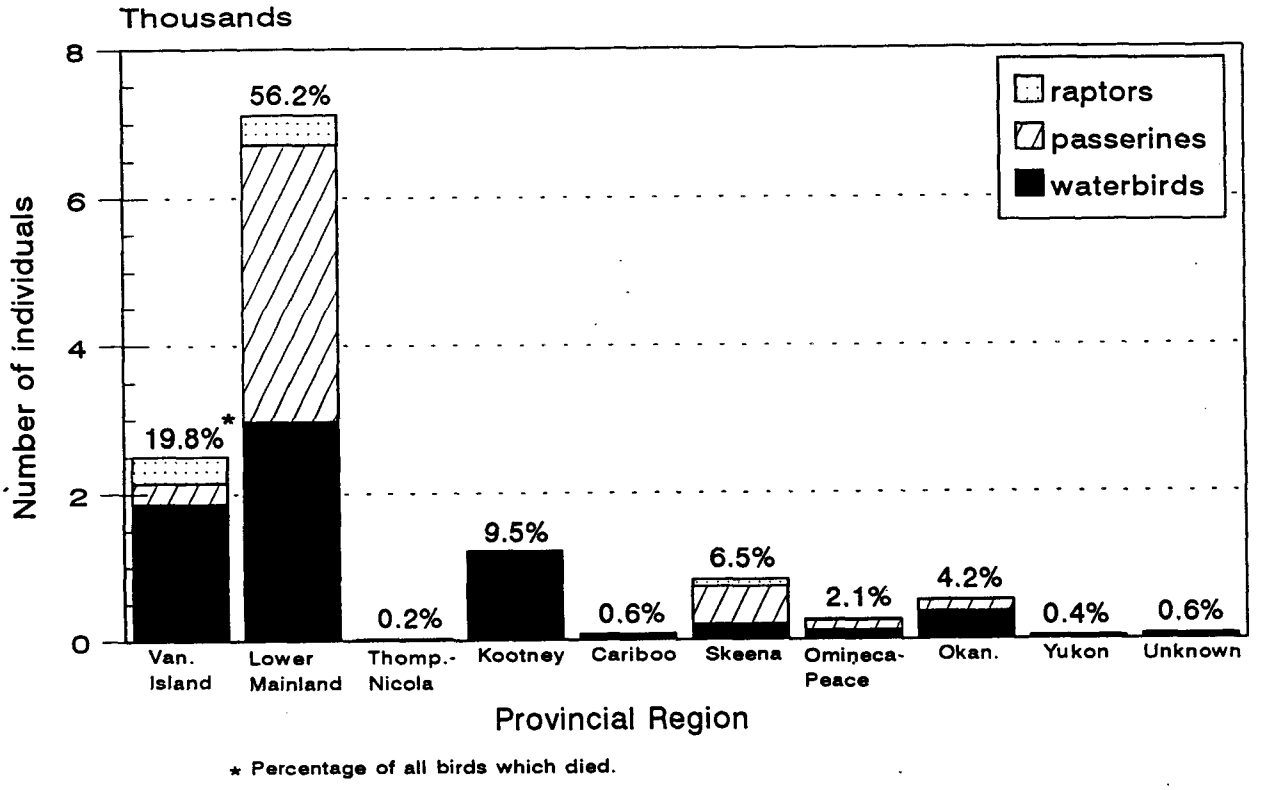

Figure 4. Location of bird mortalities reported in British Columbia and the Yukon between 1963 and 1994 by Provincial Region (N=12,658). The graph does not include the 40,000 seabirds which died from an oilspill.

The majority of the reported bird mortalities in the Fraser Delta were pesticide poisoned (76%) (Figure 6). The 1,000 passerines reported to have died in Manning Park were hit by cars. In the upper Fraser Valley, most reported deaths were from undetermined causes (39%) followed by pesticide poisoning (27%), diseases (12%) and lead toxicosis (8%). Most bird fatalities reported in the north Fraser Valley were from undetermined causes (32%), trauma (24%), pesticide poisoning (23%) and infectious diseases (10%).

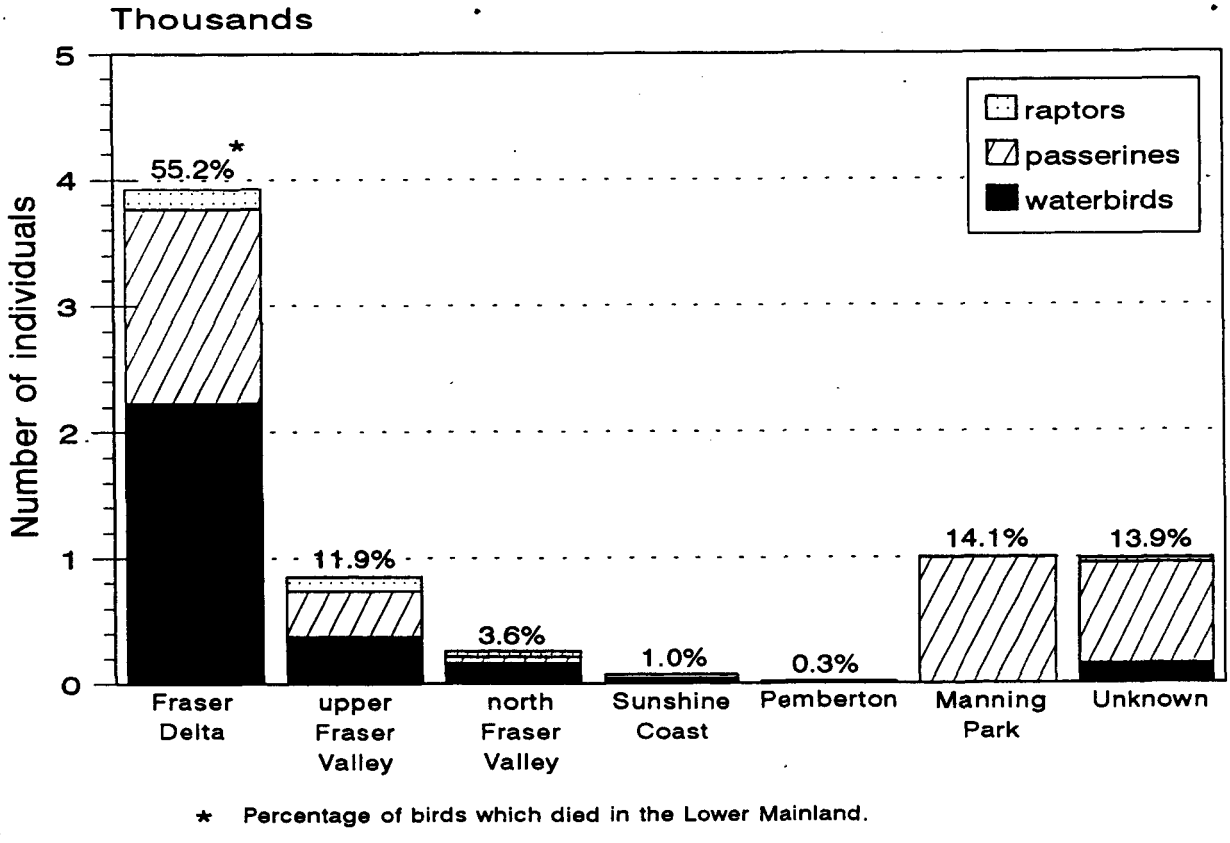

Figure 5. Location of bird mortalities reported in the Lower Mainland, Prov. Region 2 (n=7,110).

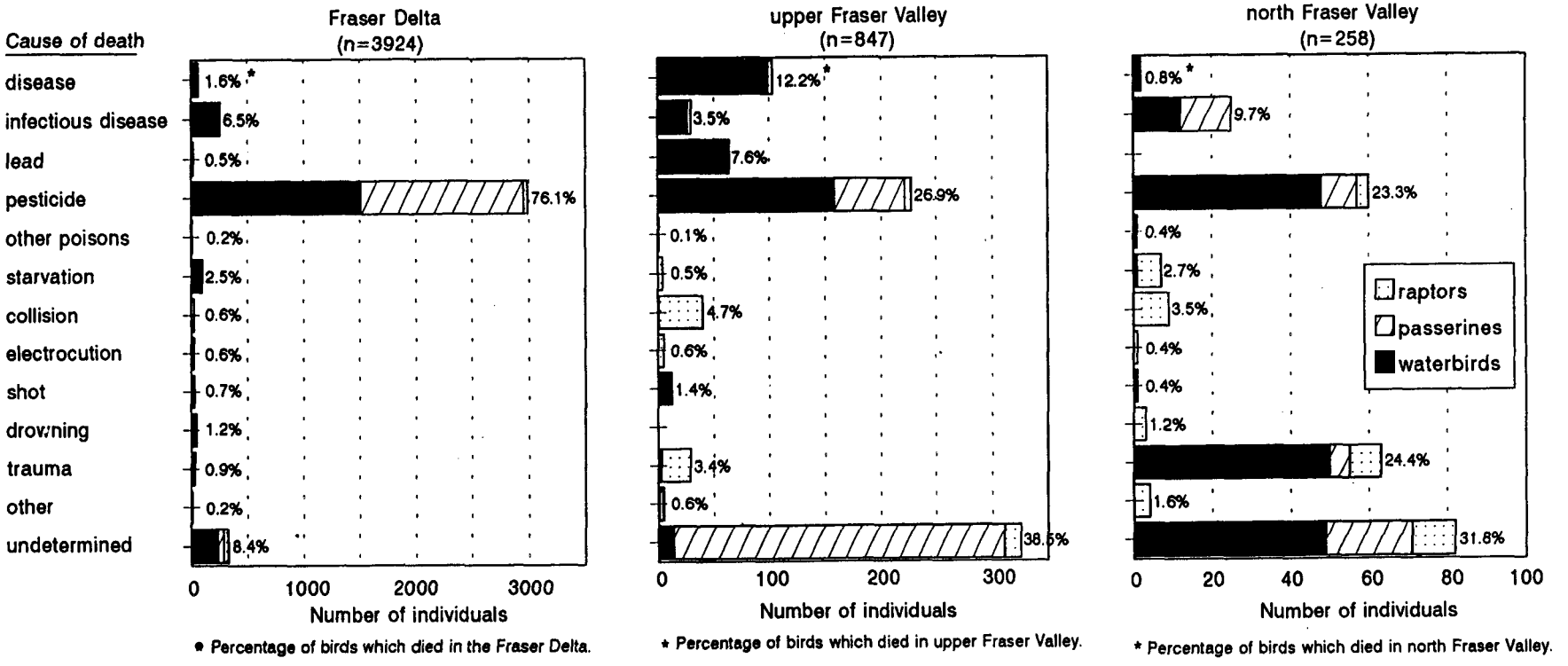

Figure 6. Probable cause of death of bird mortalities reported in the Fraser Delta, upper Fraser Valley and north Fraser Valley of the Lower Mainland (n=7,110). The Fraser Delta includes the cities of Richmond, Surrey, Delta, Whiterock and Tsawwassen. The upper Fraser Valley includes the area east of Langley to Hope and north to Pitt Lake. The city of Vancouver and the area north to Lion's Bay and east to Port Coquitlam comprise the north Fraser Valley.

On Vancouver Island, a substantial number of seabirds died from the Nestucca oilspill off the west coast of the island (estimated mortality of 40,000 individuals). Excluding that incident, most birds died near Victoria (42%), primarily from drowning (56%), infectious diseases (21%) and undetermined causes (14%) (Figures 7 and 8). A number of seabirds were also washed onshore along the west coast of the island (34%) whose cause of death could either not be determined or was attributed to drowning (Figure 8).

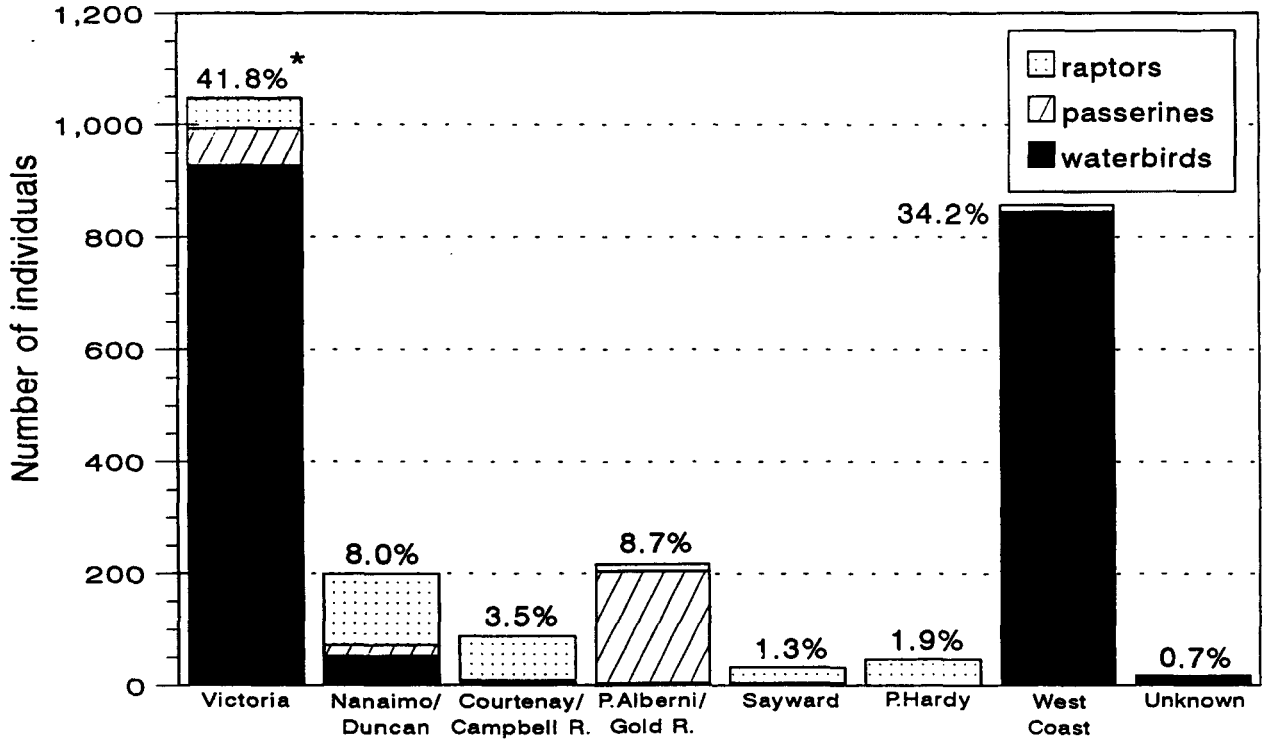

Figure 7. Location of bird mortalities reported on Vancouver Island, Prov. Region 1 (n=2,505). The graph does not include 40,000 seabirds which died from an oilspill along the west coast of Vancouver Island.

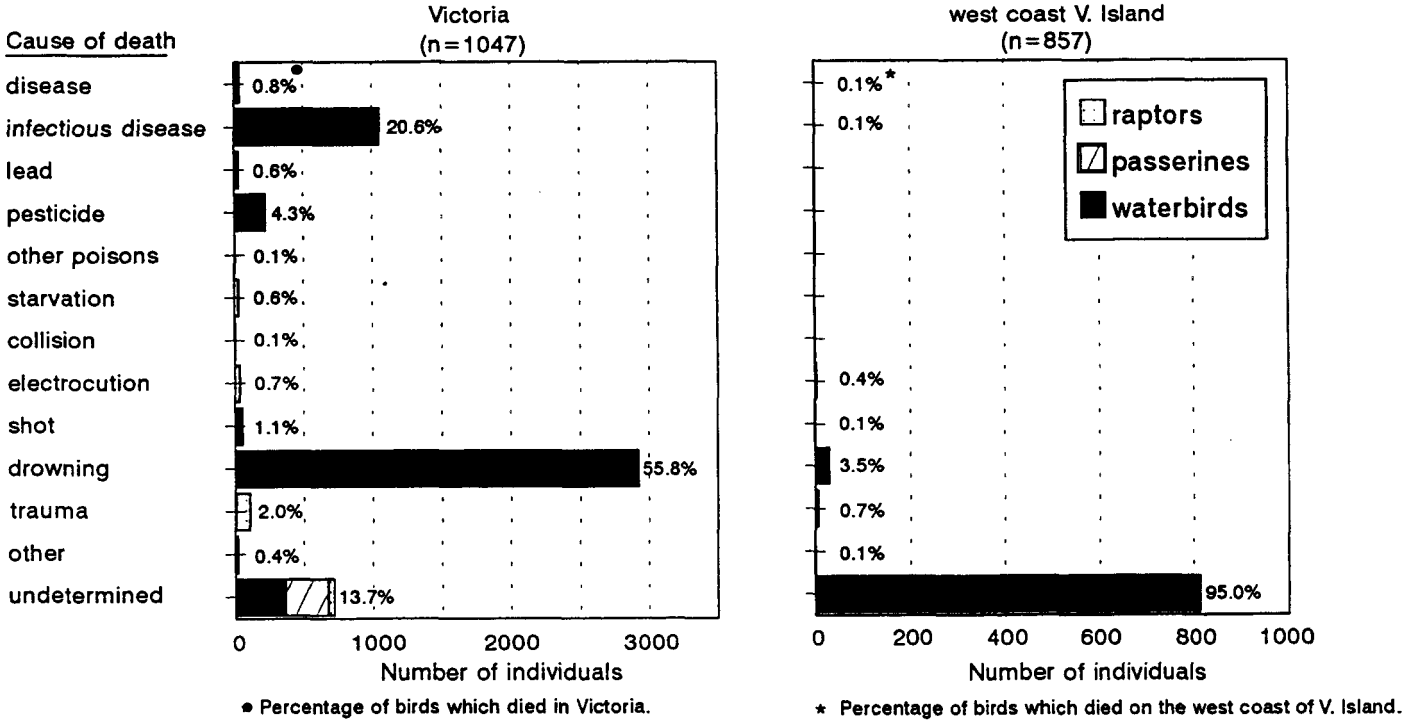

Figure 8. Probable cause of death of reported bird mortalities near Victoria and along the west coast of Vancouver Island (n=2,505). The graph does not include the 40,000 seabirds which died from an oil spill along the west coast of Vancouver Island.

4. DISCUSSION

4.1 Annual incidence of reports

The number of reports of bird mortalities may have increased slightly from 1963 to 1989 and more dramatically from 1989 to 1994 (Figure 1). Although it is probable that some records of die-off events which may have occurred in the 1960s were lost, the increase in reports since 1989 more likely reflects an increase in monitoring effort over that time period. A second wildlife toxicologist was transferred to the Canadian Wildlife Service, Pacific and Yukon Region in 1989. Also, that year CWS, in cooperation with the Island Veterinary Hospital, began an investigation of Bald Eagle and Trumpeter Swan mortality in British Columbia. An agreement to investigate avian mortalities was re-signed by various Provincial and Federal Government Agencies in 1990, thereby acknowledging their continued commitment to monitor the health of local wildlife populations. Since 1990, the Canadian Wildlife Service has been conducting a study looking at the causes of mortality of raptors (eagles, hawks and owls) and Trumpeter Swans in British Columbia. The decline in reported cases in 1991 and 1992 correlate with two years when funding for the CWS projects was reduced and monitoring effort declined.

4.2 Most probable causes of death

Determining a probable cause of death

Wild birds are exposed to a melange of disease, chemical contaminants and environmental stresses which influence their survival. Birds may live and reproduce successfully for many years and then suddenly die in response to a stimulus which alone would not be sufficient to cause mortality, but due to a number of contributing factors was sufficient to tip the scales of their well-being and result in death. Categorizing specific causes of mortality was often a judgment call. We believe the guidelines discussed in the Methods Section provide an adequate basis for making such decisions.

Common causes of death

Excluding the 40,000 seabirds killed by the Nestucca oil spill in December 1988, most birds died from pesticide poisoning, followed by undetermined causes, infectious diseases, trauma, poisons other than lead and pesticides, diseases and lead toxicosis (Figure 2). Since the majority of all reported moralities involved waterbirds, it is not surprising that similar trends were observed when waterbirds were considered as a separate group (Figure 3). Most passerines died from pesticide poisoning, but a significant number also died from collision (1,000 birds were hit by cars in Manning Park in June 1980; Record No. 102) and infectious diseases (1,000 birds died during a Salmonella outbreak in Nov. 1992; Record No. 269). Reported raptor mortalities were attributed to a wider variety of causes, with the majority being trauma related (including collision and electrocution) or from undetermined causes. A significant number also died from starvation (Record No. 278).

The organophosphate and carbamate insecticides which caused the greatest number of fatalities in our records were carbofuran, fensulfothion, and diazinon (Table 1). All of these chemicals have been used on agricultural fields. Granular carbofuran has been voluntarily withdrawn from the lower Fraser Valley for most of the past 20 years (Elliott *et al.*, 1996a) and has recently been banned (PMRA, 1995). Fensulfothion is no longer available commercially.

There are several reasons why a large number of reported bird kills may be attributed to pesticide poisoning. Waterbirds and passerines often travel in flocks; therefore, a single die-off event may involve a large number of birds (Record No. 37 and 171). In addition, some species of waterfowl and passerines may be more exposed to pesticides because they tend to forage in agricultural fields, common sites of pesticide application. These carcasses may have a better chance of being discovered and reported to government agencies, since agricultural fields are routinely visited by growers. The high incidence of pesticide poisoning in raptors may be a result of the birds preying on injured or dead waterfowl which were exposed to pesticides. Secondary poisoning of raptors has been documented elsewhere (Stone *et al.*, 1984; Balcomb, 1983; Hunt *et al.*, 1991; Franson, 1994). Organophosphorous and carbamate insecticides are, in general, extremely toxic, and exposure to very low levels can result in mortality (see Section 4.4).

There is a strong element of seasonality associated with the likelihood of detecting

pesticide-related bird kills. Most pesticide kills would be expected to occur in the summer when the chemicals are being used. However, those kills would involve broadly dispersed individuals on breeding territories and therefore have a low chance of being detected. There is a bias to detect the few pesticide kills that are out of season and which involve flocking birds. Comparatively, infectious disease outbreaks may be easier to spot because most die-off events would involve flocks. Several records reported large numbers of die-offs from infectious diseases (Record No. 241 and 269).

There is also bias in which bird species are reported; body size is important as is the status of the species. Undoubtedly, more Trumpeter Swan cases were reported because of the rare status of the species and reintroduction efforts. Raptorial birds may be reported more often due to the high interest in carcasses for taxidermy purposes. In addition, collision may be a common cause of death in birds of prey (particularly Bald Eagles) since they tend to scavenge along highways for road kill and passers-by may tend to see and report individuals which have been injured or killed.

The comparatively high incidence of raptors which died of starvation may be due to periods of poor weather which made hunting difficult. During the winter of 1992/93, 36 Barn Owls were reported to have starved to death; the majority died over a one week period in mid-January. Local rehabilitators reported that the temperature, which had been relatively mild, dropped dramatically in early January and a hard crust formed on the snow. It is suspected the owls starved to death because they could not break through the crust in order to catch mice (Record No. 278).

The 1,000 passerines which died from "collision" was a single event (Record No. 102). Large numbers of mostly Evening Grosbeaks and a few Pine Siskins were found dying along the roadside near Manning Park over a two month period around June 1980. The deaths appeared to be caused by impact with moving vehicles while the birds were consuming road side grit and salt. The abundance of Evening Grosbeaks may have been in response to spruce budworm infestations as spruce budworm larvae were identified in the gizzards of the dead birds. The record stated that similar incidents occurred in New Brunswick in 1964 and 1966 when the number of Grosbeaks exploded as a result of an increase in the spruce budworm population and thousands of birds were killed by traffic when they flocked around highway shoulders to ingest salt and grit. It is unknown why these birds were craving salt and grit. Some other agent may have been involved in the incident, but because it could not be identified and as the birds died as a result of colliding with vehicles, we listed the cause of death as 'Trauma - Vehicle collision'. This event is not typical of deaths reported in passerines.

4.3 Location of die-offs

The majority of bird mortality events reported in British Columbia and the Yukon between 1963 and 1994 occurred in the Lower Mainland and on Vancouver Island (Figure 4). This should be expected since these areas are the major wintering locations for a wide variety of bird species with, on average, an estimated 500,000 waterbirds using the Fraser River Delta annually (Butler and Campbell, 1987). Carcasses may also tend to be noticed by the public since the Lower Mainland and Vancouver Island are densely populated, supporting over 2 million

people, or 56% of the provincial population (British Columbia Statistics, 1995). A network also exists in these areas which records and responds to reported bird die-offs. Proximity to the Canadian Wildlife Service Office in Delta has an impact both in terms of a reporting location and personnel able and willing to investigate a report. Comparatively, few cases were reported from the Yukon Region likely due to the sparse, widely dispersed human population present to observe die-offs and the lack of personnel to record and investigate the events.

In the Lower Mainland, most reported bird kills occurred in the Fraser Delta, Manning Park and the upper and north Fraser Valley (Figure 5). The Fraser Delta and upper Fraser Valley are important agricultural areas which have some of the most intensive farming practices in British Columbia (British Columbia Statistics, 1995). However, those areas also provide essential habitat for large populations of local and migratory avian wildlife. A significant number of the birds which died in these areas were poisoned by pesticides (Figure 6). Because many of the pesticide residues identified as toxic agents in the poisoned birds are registered for agricultural use, the application of pesticides in these areas should be carefully monitored and efforts made to minimize harmful, non-target effects. The high incidence of trauma related mortalities in the north Fraser Valley may be related to its comparatively urban environment which may be potentially hazardous to wildlife. Infectious diseases may be more prevalent among birds reported from the north Fraser Valley because the urban environment may have a comparatively high density of bird feeders which could facilitate the spreading of these diseases. The large number of passerines which died in Manning Park has been discussed in Section 4.2, 'Common causes of death'.

On Vancouver Island, the majority of reported bird mortalities (excluding the estimated 40,000 seabirds associated with the Nestucca oil spill) were from the Victoria area (Figure 7). The primary causes of death were drowning and infectious disease (Figure 8). The significant number of drowned waterbirds may be a result of the westerly winds transporting birds from the Pacific Ocean. Infectious diseases, such as Salmonella, may be transmitted among birds by a variety of methods including ingestion of contaminated food and/or water, and direct contact (Friend *et al.*, 1987). Poor sanitation of bird-feeders could facilitate the spreading of diseases among urban bird populations. However, it is more likely that a comparatively large proportion of bird kills were reported in the Victoria area since it supports the largest and most dense human population on the island (British Columbia Statistics, 1995). A substantial number of avian mortalities were also reported from the west coast of the island (Figure 5). The cause of death of most of these birds could not be determined (Figure 6). The prevailing westerly winds carry injured or dead seabirds from the Pacific Ocean and wash them onshore in the Pacific Rim National Park, where visitors and park rangers patrolling the area are likely to find and report bird kills.

4.4 Toxicologically relevant contaminant levels in wildlife

Neuro-toxic pesticides

Of the over 12,000 bird mortalities reported in British Columbia and the Yukon over the last 30 years (excluding the deaths associated with the Nestucca oil spill), the deaths of 3,589 individuals have been attributed to organophosphate and carbamate insecticides and another 108

were suspected of exposure (Table 1). These chemicals are acutely toxic, quick acting compounds which effect the nervous system. Acute oral toxicity's (LD_{50}s) of pesticides detected in reported bird mortalities are listed in Table 2; alternative median LD_{50}s which consider inter-species variability, not listed in Table 2 are available in Baril *et al.* (1994). Exposure to sub-lethal concentrations of pesticides will not likely cause the death of the individual but it may impede neurological functions of the bird such as coordination, vision, hearing and behaviour which could increase the chance of death from other causes such as predation, electrocution and collision. The insecticides which have caused the greatest number of fatalities in our records, are carbofuran, fensulfothion, and diazinon. Carbofuran was voluntarily withdrawn in the lower Fraser Valley from 1976 to 1986; currently, its use is severely restricted throughout Canada and it is banned from use in the lower Fraser Valley (PMRA, 1995). Fensulfothion is no longer commercially available; however, diazinon, based on the large number of both domestic and commercial registrations, is still widely used. Granular formulation of phorate is also not available for use in British Columbia (labelled instruction).

Exposure to these compounds can be ascertained by the physical condition of the bird, inhibition of the cholinesterase (ChE) enzymes in blood and/or brain tissue, as well as detection of pesticide residues in the crop and/or stomach contents. Physical symptoms characteristic of exposure include tightly clenched talons, rapid respiration, salivation, muscle twitching, inability to stand or fly unrelated to any injury, a full crop and a detached attitude (Porter, 1993). Most affected birds are in good flesh. Although these conditions can be identified by an experienced care-giver, it is qualitative information and exposure must be confirmed using analytical techniques.

The cholinesterase activity of individuals suspected of pesticide poisoning was not determined for the majority of the cases presented in this report. (Only recently has the assay been included in our routine blood chemistry screening procedures). Many factors which are unrelated to pesticides, such as age and stress can effect cholinesterase levels (Rattner and Fairbrother, 1991) and make it difficult to determine a 'normal' range of activity. In addition, ChE activity varies significantly among different avian species. We have determined the 'normal' brain and plasma cholinesterase activity levels for various raptor species using data collected since 1990. Based on preliminary results, 'normal' brain cholinesterase activity levels for Bald Eagles and Red-tailed Hawks are 22.1 (SD=3.11, n=51) and 24.8 (SD=1.84, n=6) μmol/min/g, respectively; 'normal' plasma cholinesterase activity level for Bald Eagles and-Red-tailed Hawks are 814 (SD=184, n=43) and 1178 (SD=178, n=7) μmol/min/l, respectively. Although these values may be slightly modified, it is unlikely they will change significantly. Our values are comparable to 'normal' plasma/brain ChE levels listed in Westlake *et al.* (1983), Hill (1988) and Smith (1990). Depression of brain cholinesterase levels by more than 50% of normal is diagnostic of acute toxicity (Hill and Fleming, 1982). Reactivation of cholinesterase activity with 2-PAM (pyridine-2-aldoxime methochloride) is indicative of exposure to organophosphorus insecticides; spontaneous reactivation is indicative to exposure to carbamate insecticides. Although the inhibition of cholinesterase is evidence of exposure to organophosphates and/or carbamate pesticides, absence of inhibition does not negate exposure to these compounds since the enzyme may reactivate following exposure. Alternatively, death may occur too rapidly for brain cholinesterase depression to manifest (Grue *et al.*, 1991).

Table 2. Acute oral toxicity of organophosphate and carbamate insecticides whose residues were either detected in reported bird mortalities or were referenced in the individual case records (Appendix 9).

Chemical	Purity (%)	Test Animal	No.	Sex[1]	Age (month)	LD_{50}[2] (mg/kg)	Confidence Limit, 95%	Ref.[3]
Organophosphates								
Acephate	93.2	Mallard	12	M	4-6	234	(186-295)	1
Azinophos-methyl	90	Mallard	12	M	3-4	135	(97.8-188)	1
		Bobwhite[4]	4	M	24	60.0-120		1
Carbophenothion	94.65	Mallard	12	M	3-4	121	(95.9-152)	1
Chlorfenvinphos	99[5]	Mallard	12	F	3-4	85.5	(44.5-164)	1
		Bobwhite	3	M	12	80.0-160		1
Chlorpyrifos	99	Mallard	12	F	-	75.6	(35.4-161)	1
	94.5	CAQU[6]	12	F	5-7	68.3	(40.7-115)	1
Diazinon	89	Mallard	16	M	3-4	3.54	(2.37-5.27)	1
Disulfoton	97	Mallard	12	M	3	6.54	(3.76-11.4)	1
Ethion	95	Mallard	10	F	3	≥2,560		1
Fenitrothion	95	Mallard	15	F	3	1,662	(185-14,958)	1
		Bobwhite	9	F	5	23.6	(12.8-43.5)	1
Fensulfothion	90	Mallard	12	F	5-7	0.749	(0.595-0.944)	1
		CAQU	20	F	9	1.19	(0.935-1.51)	1
Fenthion	90	Mallard	12	F	4	5.94	(4.28-8.23)	1
	99	Bobwhite	4	M	-	≤4.00		1
Fonofos	94.3	Mallard	12	M	3-4	16.9	(13.4-21.3)	1
Malathion	95	Mallard	24	F	3	1,485	(1,020-2,150)	1
Methaminophos	74.8	Mallard	12	M	3	8.48	(6.73-10.7)	1
Mevinphos	100	Mallard	12	F	5-7	4.63	(3.57-6.00)	1
Parathion	99.5	Mallard	20	F	15	1.44	(1.16-1.80)	1
	99.5	CAQU	12	M	5-6	16.9	(12.2-23.5)	1
Phorate	98.8	Mallard	12	F	3-4	0.616	(0.367-1.03)	1
Phosphamidon	80	Mallard	12	F	3	3.81	(2.91-5.00)	1
Temephos	92	Mallard	16	M	4-7	79.4	(38.5-163)	1
		CAQU	12	F	6	18.9	(15.0-23.8)	1
TEPP	40[7]	Mallard	12	M	3-4	3.56	(2.70-4.68)	1
Terbufos	tech[8]	Bobwhite	-	M/F	Adult	15	(12-19)	2
	15G	Bobwhite	-	M/F	Adult	26	(20-34)	2
Tetrachlorvinphos	tech	Mallard	3	M/F	3-5	>>2,000		1
Sulfotep	-	EUST[9]	-	-	-	100		2
Carbamates								
Carbofuran	98.8	Mallard	20	F	12	0.510	(0.410-0.635)	1
		Bobwhite	12	F	3	5.04	(3.64-6.99)	1
Methomyl	90	Mallard	15	M	8-24	15.9	(11.4-22.0)	1
Pirimicarb	95	GRPA[10]	20-74	-	Adult	29.6	(26.5-33.0)	3
	95	REPA[11]	20-74	-	Adult	32.8	(28.9-37.2)	3

[1] M male; F female
[2] LD_{50} = dose of chemical estimated to kill 50% of exposed population.
[3] 1: Hudson *et al.* (1984); 2: Smith (1987); 3: Grolleau & Caritez (1986)
[4] Bobwhite - Northern Bobwhite Quail
[5] 91% β-isomers, 8% α-isomers
[6] CAQU - California Quail
[7] 40% TEPP, 60% other ethyl phosphates
[8] tech - technical grade
[9] EUST - European Starling
[10] GRPA - Gray Partridge
[11] REPA - Red Partridge

A 'lethal' dose of a poison may be influenced by many factors including the inherent toxicity of the compound, the route of exposure (ingestion, dermal, inhalation), the sensitivity of the species, the condition of the bird (general health, age, sex) and environmentalgwtresses (poor weather). Therefore, the ability of an individual to tolerate exposure to pesticides may vary considerably making it difficult to determine the minimum dose above which the cause of death can be attributed to poisoning. In addition, many organophosphates and carbamates are highly water-soluble and rapidly absorbed and metabolized in the body. This makes subsequent detection in body tissues very difficult. We have set a value of 1 ppm of organophosphate and carbamate insecticides in crop and/or stomach contents as sufficient to have caused mortality in affected individuals. It is easy to misdiagnose individuals which have been exposed to these types of pesticides. In several cases, the veterinarian listed the initial cause of death as infectious disease or parasites only to have toxicology results show exposure to organophosphorus or carbamate insecticides.

In this report, birds were categorized as pesticide poisoned if organophosphate or carbamate pesticide residues >1 ppm were detected in the crop and/or stomach contents or cholinesterase activity was inhibited $>50\%$ of normal. 'Normal' ChE activity levels for Bald Eagles and Red-tailed Hawks was determined from our data (see above); cholinesterase levels reported in Westlake *et al.* (1983), Hill (1988) and Smith (1990) were used as estimates of 'normal' ChE activity in other avian species. In some cases, the lab report indicated if the ChE level was significantly depressed and often included the 'normal' range for the individual species. Birds with severely depressed ChE activity that reactivated with 2-PAM were considered to have been poisoned by organophosphates; birds whose ChE activity spontaneously reactivated were categorized as poisoned by carbamates. Birds were also listed as pesticide poisoned if we judged there was significant evidence of exposure (i.e. the report said birds died immediately after near-by pesticide application and the birds exhibited physical symptoms of exposure). Birds were categorized as being 'suspected' of pesticide exposure if pesticide residues were <1 ppm. Birds with physical symptoms strongly suggestive of pesticide exposure but no supportive toxicological data were also listed as 'suspected' of pesticide exposure. Finally, birds were categorized as 'suspected' of being poisoned if the record stated pesticide poisoning as the cause of death but the conclusion was not substantiated with additional information (i.e. if the only record of the event was in a CWS summary sheets which listed it as poisoned). The cause of death was categorized as 'undetermined' if the report stated that the bird was 'suspected' of being poisoned but there was no information supporting their diagnosis. Birds described as "sick and recovered quickly", "in convulsions" or "having serious neurological problems" were also categorized as 'undetermined' because these are generic symptoms which could be associated with a variety of conditions.

Rodenticides

α-Naphthyl Thiourea (ANTU)

Twenty coots were suspected of poisoning by ANTU based on the physical condition of the birds during the post-mortem examination; the toxicology laboratory did not have the methodology to screen for ANTU (Record No. 48). Although the exact mechanism of action is not known, physical symptoms include frothing at the mouth, pulmonary edema, and respiratory difficulty (Amdur *et al.*, 1991). ANTU is a relatively selective rodenticide with an acute oral

LD_{50} of 3 mg/kg in rats (Amdur *et al.*, 1991). Mammals are quite resistant; monkeys are the least sensitive with an acute oral LD_{50} of 4 g/kg (Amdur *et al.*, 1991). Avian sensitivity to ANTU has not been determined and although no bird mortalities have been documented, death could likely result if sufficient quantities were ingested.

Strychnine

Strychnine is a non-selective rodenticide which is extremely toxic to birds; acute oral LD_{50} in 6 month Mallards is 2.8 mg/kg (Hudson *et al.*, 1984). Physical signs of intoxication include wing droop, salivation, tremors, convulsions (see Hudson *et al.*, 1984 for more details). We were unable to find any published accounts of avian mortality from Strychnine poisoning. Strychnine was definitely the cause of death of six crows discussed in Record No. 137 since 93.7 ppm was detected in their gut contents.

Chlorinated Chemicals

Organochlorine pesticides

The acute toxicity of individual organochlorine pesticides varies significantly. Concentrations of DDE (the principle metabolite of DDT) associated with acute mortality are at least 100 ppm in the liver whereas liver concentrations of only 3 to 10 ppm of the cyclodiene group of organochlorine pesticides (which includes dieldrin and endosulfan) are associated with death (Cooke *et al.*, 1982). The acute oral LD_{50} of endosulfan varies considerably among avian species ranging from >320 mg/kg in adult female pheasants to 31.2 mg/kg in adult female mallards (Hudson *et al.*, 1984). Physical symptoms of exposure include ataxia, slowness, high carriage, jerkiness, tremors and shivers (Hudson *et al.*, 1984).

Although the use of high molecular-weight organochlorine pesticides (such as DDT, dieldrin, heptachlor, chlordane, benezene hexachloride and mirex) has been restricted in Canada since the early 1970s (Noble and Elliott, 1990), our records document acute poisoning from dieldrin (Record No. 9), endosulfan (Record No. 23 and 55) and DDT (Record No. 20) in the early 1970s. Acute poisoning from these compounds is not currently a major concern, but because of their extreme persistence in the environment and bioaccumulation in the food-chain, wildlife are still exposed to these contaminants (Nobel *et al.*, gw93). Organochlorine pesticides should be considered as possible contributing factors when examining more recent cases and determining the most probable cause of death.

PCBs, PCDDs, PCDFs ("dioxin-like" chemicals)

Polychlorinated biphenyls (PCBs) are not acutely toxic; residues associated with acute mortality are >100 ppm in liver (Cooke *et al.*, 1982). These compounds are, however, very persistent in the environment and bioaccumulate in the food-chain. Even though the production of PCBs was banned in North America in 1977 (Canadian Council of Resource and Environment Ministers, 1986), we have one case of a cormorant which died from acute PCB toxicosis in March 1986 (Record No. 168). Presently, local wildlife populations are still exposed to these compounds and they should be considered as possible contributing factors when examining individual cases and determining the most probable cause of death.

Polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) residues have not been presented in this report. Association of PCDD and PCDF exposure in conjunction with 2,3,7,8-TCDD like PCBs, expressed as toxic equivalents, in morality of Bald Eagles is discussed in Elliott *et al.* (1996c). PCDD and PCDF contaminants and their chronic sub-lethal effects for select avian species in British Columbia are discussed in Bellward *et al.* (1990); Hart *et al.* (1991); Elliott *et al.* (1989; 1996d; 1996e), Sanderson *et al.* (1994a; 1994b); Wilson *et al.* (1996).

Lead

Of the over 12,000 reported bird mortalities, 141 died from acute lead toxicosis and an additional 106 had elevated, sub-lethal levels (Table 1). Although sub-lethal lead concentrations will likely not kill the affected individual directly, it may cause neurotoxic effects such as poor coordination, impaired vision, hearing and behaviour which could increase the chance of death from other causes such as electrocution, vehicle collision and starvation (U.S. Fish & Wildlife Service, 1986). Symptoms typical of acute lead toxicity include bright green feces, dilated pupils, distended proventriculus and lethargy (Degernes and Redig, 1988).

Acute toxicosis implies recent exposure to lead which can be measured by the extent of inhibition of the enzyme δ-aminolevulinic acid dehydratase (ALA-d) in blood, or the detection of lead in blood, kidney or liver tissues. Inhibition of ALA-d is expressed as a ratio of 'normal' activity to 'inhibited' activity. An ALA-d ratio of ≥ 5, a blood lead level >0.8 ppm wet weight or lead levels in kidney or liver ≥ 10 ppm wet weight are diagnostic of lead poisoning. We also categorized birds as lead poisoned if they exhibited physical symptoms typical of acute lead toxicosis and also had at least one lead shot in their gizzard, proventriculus or crop. Sanderson and Bellrose (1986) suggested ingestion of one or two lead shot is sufficient to cause acute toxicity in waterfowl. In some of the earlier cases, the veterinarian who conducted the post-mortem examination recorded the cause of death as lead poisoning, but no toxicological data was included in the report. We categorized those cases as lead poisoned based on the assumption that the veterinarian had correctly diagnosed the cause of death.

An ALA-d ratio between 2 and 5, a blood lead level between 0.2 and 0.8 ppm wet weight or a kidney or liver lead level between 5 and 10 ppm wet weight indicate sub-lethal exposure (Elliott *et al.*, 1992a; Longcore *et al.*, 1974). Bone lead levels are a good indicator of life-long exposure, but do not accurately reflect recent exposure (Scheuhammer, 1987) and, therefore, cannot be used to define acute toxicosis. We set a value of >2 ppm wet wt. in bone as an indication of sub-lethal exposure.

Lead toxicosis was not found to be a common cause of mortality when all of the birds presented in our report were considered as a single group. However, Table 1 shows that the most lead poisoned birds were waterbirds and the majority of birds with elevated, but sub-lethal, lead levels were raptorial species. Waterfowl often acquire lead from ingesting spent lead shot as grit to aid in digestion (Sanderson and Bellrose, 1986); predatory birds consume the debilitated waterfowl thereby also becoming poisoned (Pain *et al.*, 1993). Although lead shot use for waterfowl hunting has been banned in the Lower Fraser Valley and on south-east Vancouver Island since 1990, residual shot still in the environment ensures that lead poisoning

will likely continue for a long time.

Mercury

Of the bird mortalities reported in our records, four were attributed to acute mercury toxicosis and 25 birds had elevated, but sub-lethal, levels (Table 1). The major toxic effect of methyl-mercury is the dysfunction of the central nervous system (Scheuhammer, 1987); clinical symptoms of exposure include loss of appetite leading to weight loss, progressive weakness and the inability to coordinate movement (Puls, 1994). Liver mercury levels of >20 ppm wet wt. are considered acutely toxic; levels of >5 ppm wet wt. reflect elevated sub-lethal exposure (Scheuhammer, pers. comm.). Exposure to sub-lethal levels can interfere with neurological activities which could increase the likelihood of injury or mortality from other causes.

Two Ruffed Grouse were suspected of mercury poisoning (Record No. 7). This record was originally found in a CWS summary sheet which listed the cause of death as mercury poisoning but no post-mortem examination or toxicological data was attached to the report. The incident was also reported in Friis (1974) but no mercury levels were listed. Because of the limited information available on this record, we categorized the cause of death was 'suspected' mercury toxicosis.

The majority of the birds with elevated, sub-lethal mercury levels were raptors. Although poisoning of raptors by mercury has not been previously documented in North America (Noble and Elliott, 1990), cases have been reported in Europe (Borg *et al.*, 1969; Delbeke *et al.*, 1984). Industrial usage and environmental releases of mercury have been regulated in Canada and the United States since the early 1970s (Noble and Elliott, 1990).

Trace Elements

Many of the reports in Appendix 9 list trace element levels in liver and kidney tissue. Abnormal levels imply a chemical imbalance which may indicate the presence of a disease or, in some cases, exposure to specific contaminants. For example, lead poisoned birds often have elevated levels of iron (Honda *et al.*, 1990a). Explanation of the biochemical processes regulating these elements and how they may interpreted is beyond the scope of this report (for further details see Amdur *et al.*, 1991). Typical trace element levels in wild and domestic birds are listed in Table 3.

Miscellaneous compounds

Among our records there were cases where the probable cause of death was attributed to asbestos (Record No. 29) and the natural plant toxin cyanogenic glucoside (Record No. 12). A number of Bald Eagles collected as part of the raptor study conducted by the Island Veterinary Hospital were found to have been poisoned by the barbiturate sodium barbital as a result of intentional baiting. As these compounds are not typically associated with wildlife poisoning, their toxicological properties have not been discussed in this report.

Table 3. Trace element levels in adult wild and domestic birds (ppm, wet weight).

Trace Element Species	Diagnostic Level[1]	Liver	Kidney	Reference
Arsenic, As				
Poultry	normal	0.01-0.25	0.01-0.20	Puls (1994)
	toxic	5-10	5-10	Puls (1994)
Calcium, Ca				
Seabirds, Pacific Ocean[2]	normal	48.3-81.7	-	Elliott & Scheuhammer (1997)
Herring Gull, Atlantic	normal	32	-	Elliott *et al.* (1992b)
Herring Gull, Great Lk.	normal	69	135	Struger *et al.* (1987)
Poultry	normal	75-80	170-600	Puls (1994)
Cadmium, Cd				
Poultry	normal	0.04-0.5	0.02-1.5	Puls (1994)
	high	5.0-20	5.0-60	Puls (1994)
	toxic	15-200	70-140	Puls (1994)
Waterfowl	normal	0.01-0.3	0.7-2.0	Puls (1994)
	high	4.0-45	15-50	Puls (1994)
	toxic	25-208	> 100	Puls (1994)
Copper, Cu				
Seabirds, Pacific Ocean[2]	normal	6.56-8.28	-	Elliott & Scheuhammer (1997)
Seabirds, N.Pacific[3]	normal	4.14-7.65	1.66-6.10	Honda *et al.* (1990b)
Seabirds, Gough Isl.[4]	normal	4.1-8.5	3.3-7.0	Muirhead & Furness (1988)
Seabirds, Atlantic[5]	normal	5.8	-	Elliott *et al.* (1992b)
Herring Gull, Great Lk.	normal	4.89	4.00	Struger *et al.* (1987)
Duck	adequate	10-50	4.0-17.0	Puls (1994)
	high	100-200	-	Puls (1994)
	toxic	> 200	-	Puls (1994)
Geese	adequate	6.0-26.0	3.0-9.0	Puls (1994)
	toxic	50-800	-	Puls (1994)
Iron, Fe				
Seabirds, Pacific Ocean[2]	normal	163-322	-	Elliott & Scheuhammer (1997)
Seabirds, N.Pacific[3]	normal	144-543	107-209	Honda *et al.* (1990b)
Herring Gull, Great Lk.	normal	271	165	Struger *et al.* (1987)
Poultry	deficient	30-35	30-40	Puls (1994)
	marginal	35-45	-	Puls (1994)
	adequate	60-300	45-100	Puls (1994)
	high	300-2,000	200-450	Puls (1994)
	toxic	8,000	-	Puls (1994)
Magnesium, Mg				
Seabirds, Pacific Ocean[2]	normal	209-225	-	Elliott & Scheuhammer (1997)
Herring Gull, Atlantic	normal	207	-	Elliott *et al.* (1992b)
Herring Gull, Great Lk.	normal	224	203	Struger *et al.* (1987)
Poultry	normal	150-500	200-500	Puls (1994)

Table 3 (continued). Trace element levels in adult wild and domestic birds (ppm, wet weight).

Trace Element Species	Diagnostic Level[1]	Liver	Kidney	Reference
Manganese, Mn				
Seabirds, Pacific Ocean[2]	normal	2.51-4.00	-	Elliott & Scheuhammer (1997)
Seabirds, N.Pacific[3]	normal	2.03-5.12	1.15-3.79	Honda *et al.* (1990b)
Herring Gull, Atlantic	normal	4.6	-	Elliott *et al.* (1992b)
Herring Gull, Great Lk.	normal	3.86	4.47	Stuger *et al.* (1987)
Poultry	deficient	1.5-4.0	-	Puls (1994)
	adequate	2.0-4.0	1.5-2.5	Puls (1994)
	high	4.0-6.0	2.5-6.0	Puls (1994)
	toxic	> 9.0	-	Puls (1994)
Selenium, Se				
Seabirds, Pacific Ocean[2]	normal	2.98-8.86	-	Elliott & Scheuhammer (1997)
Poultry	deficient	0.05-0.25	0.1-0.4	Puls (1994)
	marginal	0.25-0.35	0.4-0.5	Puls (1994)
	adequate	0.35-1.0	0.5-1.2	Puls (1994)
	high	2.0-6.0	1.5-5.2	Puls (1994)
	toxic	4.0-40	3.5-25	Puls (1994)
Zinc, Zn				
Seabirds, Pacific Ocean[2]	normal	30.1-39.2	-	Elliott & Scheuhammer (1997)
Seabirds, N.Pacific[3]	normal	22.8-55.8	12.2-49.0	Honda *et al.* (1990b)
Seabirds, Gough Isl.[4]	normal	22-67	28-63	Muirhead & Furness (1988)
Herring Gull, Great Lk.	normal	25.6	28.2	Struger *et al.* (1987)
Poultry	deficient	18-40	17-22	Puls (1994)
	marginal	20-40	-	Puls (1994)
	adequate	25-40	20-32	Puls (1994)
	high	90-300	60-120	Puls (1994)
	toxic	200-1,900	300-800	Puls (1994)

[1] Definition of terms:
normal - used where deficiencies are unknown, indicates normal background levels.
deficient - levels at which clinical or pathological signs of deficiency should be apparent.
marginal - levels at which sub-clinical effects may prevail, such as reduced immune response, or reduced growth rate.
adequate - levels sufficient for optimum functioning of all body mechanisms with a small margin of reserve to counteract commonly encountered antagonistic conditions.
high - levels at which sub-clinical, clinical or pathological signs of toxicity would be expected to occur.
toxic - levels at which sub-clinical, clinical or pathological signs of toxicity would be expected to occur.

[2] Range of means in Ancient Murrelets, Cassin's Auklet and Rhinoceros Auklet

[3] Range of means detected in 157 Pelagic Seabirds of 19 species collected in the North Pacific and surrounding waters.

[4] Range of means detected in 185 Seabirds of 15 species collected on Gough Island, South Atlantic Ocean.

[5] Average in Leach's Storm Petrels, Atlantic Puffin, Double-crested Cormorants, Herring Gulls.

4.5 Limitations of the data

A number of agencies which have records of die-off events were not contacted and therefore their records have not been not included in this report. Although many of our reports included post-mortem examinations conducted by the British Columbia Ministry of Agriculture, Fisheries, and Food Laboratory, we did not ask them to provide us with additional cases which they may have on file which were missing from our files. We also did not contact non-governmental organizations such as the Society for the Prevention of Cruelty to Animals (SPCA) or local rehabilitation centers (Orphgwed Wildlife Rehabilitation Society, Monika's Wildlife Shelter, Wildlife Rescue).

The majority of incidents were reported from the Lower Mainland and Vancouver Island; few die-off events were recorded in other regions, particularly the Yukon. This bias highlights a major inadequacy in the network currently established to record and investigate bird mortalities in the Pacific and Yukon Region.

It was not possible to determine the number of birds which died as a proportion of any natural population since we did not know the precise number which died nor accurate estimates of wild populations over the last 30 years. Population level impacts were, therefore, not considered .

5. CONCLUSIONS

Details of 304 individual bird mortality events reported in British Columbia and the Yukon between 1963 and 1994 are presented and briefly summarized. Most of the reports were from the Lower Mainland and Vancouver Island. Although those areas support large bird populations, they are also the most densely human populated areas. The comparatively high incidence of events in those locations likely reflects the higher probability of people finding and reporting injured or dead wildlife and the proximity of investigating offices.

The majority of the birds died in the Nestucca oil spill. Other common causes of deaths were pesticide poisoning, infectious diseases and trauma. Most of the pesticide poisoned birds died from exposure to organophosphorus and carbamate insecticides, in particular carbofuran, fensulfothion and diazinon.

Data presented in this report only include records kept by several government agencies. This limitation may bias the nature of the cause of death (i.e. the public may be more likely to report an incidence of pesticide poisoning or vehicle collision rather than starvation). Regardless, it is still useful to document these events since summaries highlight geographic areas with high avian mortalities, as well as identify various causes of death. Recognizing these problems provides a starting point to initiate action to reduce potential hazards to wildlife and, ultimately, the number of mortalities. This summary also allows investigators to assess the importance of newly reported incidences in the context of previous patterns.

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Appendix 1. Taxonomic order, four letter codes, common names and scientific names used for birds listed in Appendices 6, 7 and 8 (Campbell, 1990).

Order / Family / Code	Common Name	Scientific Name
Gaviiformes: Loons		
Gaviidae: Loons		
RTLO	Red-throated Loon	*Gavia stellata*
PALO	Pacific Loon	*Gavia pacifica*
COLO	Common Loon	*Gavia immer*
Loon	any species of Loon	
Podicipedeformes: Grebes		
Podicipedidae: Grebes		
HOGR	Horned Grebe	*Podiceps auritus*
RNGR	Red-necked Grebe	*Podiceps grisegena*
EAGR	Eared Grebe	*Podiceps nigricollis*
WEGR	Western Grebe	*Aechmophorus occidentalis*
Greb	any species of grebe	
Procellariformes: Tube-nosed Swimmers		
Procellariidae: Fulmars, Petrels, Shearwaters		
NOFU	Northern Fulmar	*Fulmarus glacialis*
SOSH	Sooty Shearwater	*Puffinus griseus*
Pelecaniformes: Totipalmate Swimmers		
Phalacrocoracidae: Cormorants		
BRCO	Brandt's Cormorant	*Phalacrocorax penicillatus*
Corm	any species of cormorant	
Ciconiiformes: Bitterns, Herons, Egrets, Ibises, Storks		
Ardeidae: Bitterns, Herons, Egrets		
GBHE	Great Blue Heron	*Ardea herodias*
GRHE	Green-backed Heron	*Butorides striatus*
Anseriformes: Swans, Geese, Ducks		
Anatidae: Swans, Geese, Ducks		
FWDU	Fulvous Whistling Duck	*Dendrocygna bicolor*
TUSW	Tundra Swan	*Cygnus columbianus*
TRUS	Trumpeter Swan	*Cygnus buccinator*
MUSW	Mute Swan	*Cygnus olor*
Swan	any species of swan	
SNGO	Snow Goose	*Chen caerulescens*
CAGO	Canada Goose	*Branta canadensis*

Order / Family / Code	Common Name	Scientific Name
Goos	any species of goose	
GWTE	Green-winged Teal	*Anas crecca*
MALL	Mallard	*Anas platyrhynchos*
NOPI	Northern Pintail	*Anas acuta*
CITE	Cinnamon Teal	*Anas cyanpptera*
Teal	any species of teal	
NOSL	Northern Shoveler	*Anas clypeata*
AMWI	American Wigeon	*Anas americana*
LESC	Lesser Scaup	*Aythya affinis*
Scau	either Lesser or Greater Scaup	
OLDS	Oldsquaw	*Clangula hyemalis*
SUSC	Surf Scoter	*Melanitta perspicillata*
WWSC	White-winged Scoter	*Melanitta fusca*
Scot	any species of scoter	
COGO	Common Goldeneye	*Bucephala clangula*
BAGO	Barrow's Goldeneye	*Bucephala islandica*
Gold	either Common or Barrow's Goldeneye	
BUFF	Bufflehead	*Bucephala albeola*
Merg	any species of merganser	
RUDU	Ruddy Duck	*Oxyura jamaicensis*
Duck	any species of duck	
Wfow	any species of waterfowl	
Falconiformes: Diurnal Birds of Prey		
Cathartidae: American Vultures		
TUVU	Turkey Vulture	*Cathartes aura*
Accipitridae: Osprey, Eagles, Hawks		
OSPR	Osprey	*Pandion haliaetus*
BAEA	Bald Eagle	*Haliaeetus leucocephalus*
SSHA	Sharp-shinned Hawk	*Accipiter striatus*
COHA	Cooper's Hawk	*Accipiter cooperii*
RTHA	Red-tailed Hawk	*Buteo jamaicensis*
GOEA	Golden Eagle	*Aquila chrysaetos*
Hawk	any species of hawk	
Galliformes: Gallinaceous Birds		
Phasianidae: Partridge, Grouse, Ptarmigan, Turkey, Quail		
CHUK	Chukar	*Alectoris chukar*
RNPH	Ring-necked Pheasant	*Phasianus colchicus*
Quail	any species of quail	
Phea	any species of pheasant	
RUGR	Ruffed Grouse	*Bonasa umbellus*

Order / Family / Code	Common Name	Scientific Name
Gruiformes: Cranes, Rails, Allies		
Rallidae: Rails, Callinules, Coots		
AMCO	American Coot	*Fulica americana*
Charadriiformes: Shorebirds, Gulls, Auks, Allies		
Scolopacidae: Sandpipers, Phalaropes, Allies		
SPSA	Spotted Sandpiper	*Actitus macularia*
DUNL	Dunlin	*Calidris alpina*
COSN	Common Snipe	*Gallinago gallinago*
Laridae: Jaegers, Skua, Gulls, Terns		
HEEG	Heermann's Gull	*Larus heermanni*
MEGU	Mew Gull	*Larus canus*
RBGU	Ring-billed Gull	*Larus delawarensis*
CAGU	California Gull	*Larus californicus*
HEGU	Herring Gull	*Larus agrentatus*
GWGU	Glaucous-winged Gull	*Larus glaucescens*
Gull	any species of gull	
Sea Duck	any species of Sea Duck	
Alcidea: Auks, Murres, Puffins		
COMU	Common Murre	*Uria aalge*
PIGU	Pigeon Guillemot	*Cepphus columba*
MAMU	Marbled Murrelet	*Brachyramphus marmoratus*
Murr	any species of murre	
CAAU	Cassin's Auklet	*Ptychoramphus aleuticus*
RHAU	Rhinoceros Auklet	*Cerorhinca monocerata*
TUPU	Tufted Puffin	*Fratercula cirrhata*
Alci	any species of alcid	
Columbidae: Pigeons, Doves		
Columbidae: Pigeons, Doves		
RODO	Rock Dove	*Columba livia*
Strigiformes: Owls		
Tytonidae: Barn Owls		
BNOW	Barn Owl	*Tyto alba*
Strigidae: Typical Owls		
GHOW	Great Horned Owl	*Bubo virginianus*
Caprimulgiformes: Goatsuckers, Allies		
Caprimulgidae: Goatsuckers		
CONI	Common Nighthawk	*Chordeiles minor*

Order / Family / Code	Common Name	Scientific Name
Coraciiformes: Kingfishers, Allies		
Alcedinidae: Kingfishers		
BEKI	Belted Kingfisher	*Ceryle alcyon*
Piciformes: Woodpeckers, Allies		
Picidae: Woodpeckers		
NOFL	Northern Flicker	*Colaptes auratus*
Passeriformes: Passerine Birds		
Hirundinidae: Swallows		
BNSW	Barn Swallow	*Hirundo rustica*
Swal	any species of swallow	
Corvidae: Jays, Magpies, Crows		
STJA	Steller's Jay	*Cyanocitta stelleri*
Jay	any species of Jay	
BBMA	Black-billed Magpie	*Pica pica*
NWCR	Northwestern Crow	*Corvus caurinus*
Crow	any species of crow	
Paridae: Titmice		
MOCH	Mountain Chickadee	*Parus gambeli*
Muscicapidae: Kinglets, Bluebirds, Thrushes, Allies		
GCTH	Gray-cheeked Thrush	*Catharus minimus*
HETH	Hermit Thrush	*Catharus guttatus*
AMRO	American Robin	*Turdus migratorius*
VATH	Varied Thrush	*Ixoreus naevius*
Bombycillidae: Waxwings		
CEWA	Cedar Waxwing	*Bombycilla cedrorum*
Sturnidae: Starlings		
EUST	European Starling	*Sturnus vulgaris*
Emberizidae: Wood-Warblers, Sparrows, Blackbirds, Allies		
OCWA	Orange-crowned Warbler	*Vermivora celata*
WIWA	Wilson's Warbler	*Wilsonia pusilla*
Warb	any species of warbler	
SAVA	Savannah Sparrow	*Passerculus sandwichensis*
FOSP	Fox Sparrow	*Passerella iliaca*
SOSP	Song Sparrow	*Melospiza melodia*
LISP	Lincoln's Sparrow	*Melospiza lincolnii*
WCSP	White-crowned Sparrow	*Zonotrichia leucophrys*
GCSP	Golden-crowned Sparrow	*Zonotrichia atricapilla*
Spar	any species of sparrow	
DEJU	Dark-eyed Junco	*Junco hyemalis*

Order **Family** Code	Common Name	Scientific Name
LALO	Lapland Longspur	*Calcarius lapponicus*
BRBL	Brewer's Blackbird	*Euphagus cyanocephalus*
Fringillidae: Finches		
HOFI	House Finch	*Carpodacus mexicanus*
Finc	any species of finch	
PISI	Pine Siskin	*Carduelis pinus*
AMGO	American Goldfinch	*Carduelis tristis*
EVGR	Evening Grosbeak	*Coccothraustes vespertinus*
Passeridae: Old World Sparrows		
HOSP	House Sparrow	*Passer domesticus*

Appendix 2. Provincial regions as designated by the Ministry of the Environment, Lands, and Parks.

Region: 1 - Vancouver Island
2 - Lower Mainland
3 - Thompson-Nicola
4 - Kootenay
5 - Cariboo
6 - Skeena
7 - Omineca-Peace
8 - Okanagan
9 - Yukon

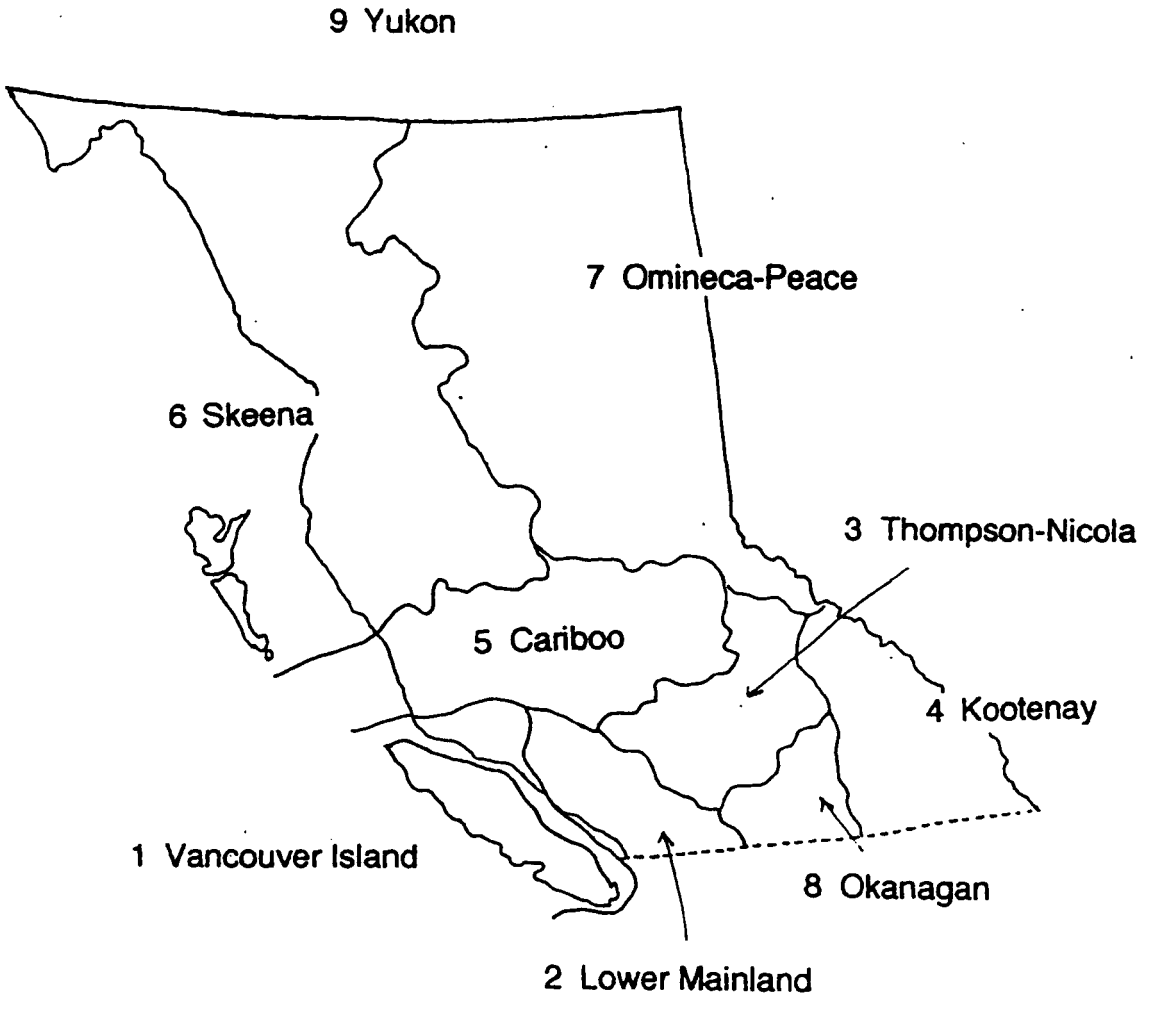

Figure 9. Location of provincial regions as designated by the British Columbia Ministry of the Environment, Lands, and Parks.

Appendix 3. Abbreviations used in main body of text and individual case records (Appendix 9).

Agencies, clinics and laboratories[1]

AgCan	Agriculture Canada - Health of Animals Branch
BCAg	British Columbia Ministry of Agriculture, Fisheries and Food
BCEnv	British Columbia Ministry of Environment, Lands, and Parks
CT	Can-Test Laboratories
CWS	Canadian Wildlife Service, Environment Canada
IVH	Island Veterinary Hospital
Monika's	Monika's Wildlife Shelter
OWL	Orphaned Wildlife Rehabilitation Centre
SPCA	Society for the Prevention of Cruelty to Animals
ZENON	ZENON Environmental Laboratories Limited

Chemicals

ANTU	α-naphthyl thiourea
BHC	benezene hexachloride
Chlorpyr.	chlorpyrifos
DDD	tetrachlorodiphenylethane, metabolite of DDT
DDE	dichlorodiphenyldichloroethylene, metabolite of DDT
DDT	dichlorodiphenyltrichloroethane
Endo.	endosulfan
HCB	hexachlorobenezene
HE	heptachlor epoxide
MCPA	(4-chloro-2-methylphenoxy)acetic acid
OC(s)	organochlorine insecticide(s)
OP(s)	organophosphate insecticide(s)
PCB(s)	polychlorinated biphenyl(s)
PCDD(s)	polychlorinated dibenzo-*p*-dioxin(s)
PCDF(s)	polychlorinated dibenzofurans
PCP	pentachlorophenol
TCP	tetrachlorophenol
TEPP	tetraethyl pyrophosphate
total DDT	sum of DDT, DDE, and DDD chemicals
total PCBs	sum of all PCBs

Trace elements

As	arsenic	Mg	magnesium
Ca	calcium	Mn	manganese
Cd	cadmium	Pb	lead
Cu	copper	Se	selenium
Fe	iron	Zn	zinc
Hg	mercury		

Miscellaneous

%	percent
*	indicates value confirmed manually by technician
a.i.	active ingredient
ALA-d	δ-aminolevulinic acid dehydratase
ChE	cholinesterase
cm	centimeter
Crk	creek
g	gram
Isl.	island
L	concentration of chemical below lower limit of detection
LD_{50}	lethal dose required to kill 50% of population
lb.	pounds
MDC	minimal detectable concentration
mg/kg	milligram per kilogram (same as ppm)
ND	not detected
No(s).	number(s)
ppm	parts per million (same as mg/kg)
Pt.	point
Q.C.I.	Queen Charlotte Islands
SD	standard deviation
μmol/min/g	micromole per minute per gram
μmol/min/l	micromole per minute per litre
wt.	weight
UBC	University of British Columbia

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(1) Federal and Provincial Government Ministries have changed names several times during the time span of this report. In an effort to limit confusion we have chosen to use the above abbreviations throughout the report.

Appendix 4. Glossary of veterinary terms used in individual records (Appendix 9).

Albumin	water-soluble blood protein
Aniso	anisocytosis, variation in red blood cell size
BID	abbreviation for latin 'bis in di'e' meaning twice daily
Calcium	basic element, important in many physiological functions
CaEDTA	calcium ethylene-diaminotetraacetate, a chemical used to chelate blood thus reducing its toxic effects
Clopidol therapy	antiprotozoan drug treatment
Glucose	a monosaccharide and principle source of energy for the body (formerly referred to as dextrose)
Hetero	a combination form meaning other or denoting relationship
HCT	hematocrit, the volume percentage of cells in blood (see PCV)
Iron dextran	injectable iron to treat anemia
IV Lactated Ringers	intravenous isotonic electrolyte/sugar solution given to support physiological functions of the body
Lymphs	lymphocytes, a white blood cell important in immunity
Monos	monocytes, a white blood cell with phagocytic activity
Nutravit	high energy vitamin paste
PAS	periodic acid-Schiff, a stain on tissue samples sectioned and microscopically examined
PCV	packed cell volume, the volume of cellular material found in blood, following centrifugation; same as hematocrit
Polys	polynucleated white blood cells often referred to as neutrophils
Protein	amino-acids in peptide linkages widely distributed in plants and animals
Reactive lymphs	stimulated lymophcytes
Retic	reticulocytes, a young red blood cell recently released from bone marrow
Rubricyte	red blood cell
SGOT	serum glutamic-oxaloacetic transaminase, an enzyme elevated in the blood with liver or muscle damage
SGPT	serum glutamic-pyruvic transaminase, an enzyme elevated in the blood
with	liver damage
Thrombo	thrombocytes, also known as platelets, essential for clotting
TID	abbreviation for latin 'ter in di'e' meaning three times a day
Toxic hets	toxic heterophils, damaged white blood cells
T.P.	total proteins, measure of total protein level in the serum
T.S.	total solids, measure of solid material in the serum
Uric acid	constituent of urine which become elevated in birds with dehydration or kidney disease
WBC	white blood cell

Appendix 5. Classification, common and trade names of toxic chemicals which appear in this report.

Family Common Name	Trade Names (used in Appendix 9)
Organophosphates	
Acephate	-
Azinophos-ethyl	-
Azinophos-methyl	Guthion
Carbophenothion	Trithion
Chlorfenvinphos	Birlane
Chlorpyrifos	Dursban
Diazinon	Diazinon, Basudin
Disulfoton	Disyston
Ethion	-
Fenitrothion	Sumithion
Fensulfothion	Dasanit
Fenthion	Spotton
Fonofos	Dyfonate
Malathion	Malathion
Methamidophos	Monitor
Mevinphos	-
Parathion	-
Phorate	Thimet
Phosphamidon	-
Temephos	Abate
TEPP (tetraethyl pyrophosphate)	-
Terbufos	Counter
Tetrachlorvinphos	-
Sulfotep	-
Carbamates	
Carbofuran	Furadan
Methomyl	Lannate
Pirimicarb	-
Organochlorine insecticides	
Aldrin	-
BHC (benezene hexachloride)	-
Chlordane	-
DDD (metabolite of DDT)	Rhothane
DDE (metabolite of DDT)	-
DDT	-
op-DDT	-
pp-DDT	-
total DDT	
Dieldrin	-

Family Common Name	Trade Names (used in Appendix 9)
Endosulfan	Thiodan
Endrin	-
Heptachlor	-
HCB (hexachlorobenzene)	-
HE (Heptachlor Epoxide)	-
Lindane	-
Methoxychlor	-
trans-Nonachlor	-
Oxychlordane	-
Rodenticides	
ANTU (α-Naphthyl Thiourea)	-
Diphacinone	Ramik Brown
Strychnine	-
Zinc Phosphide	ZP Rodent Bait, ZP Rodent Bait AG, Gopha-Rid
Botanical Insecticides	
Nicotine	-
Natural Plant Toxins	
Cyanogenic glucoside	-
Herbicides	
Atrazine	-
Diclobenil	-
Diuron	Lanox
MCPA	-
Wood preservatives	
PCP (pentachlorophenol)	-
TCP (tetrachlorophenol)	-
Industrial compounds	
PCB 1242	Aroclor 1242[1]
PCB 1254	Aroclor 1254
PCB 1260	Aroclor 1260
Asbestos	-
Barbiturates	
Sodium pentabarbitol	-

[1] Mixture of polychlorinated biphenyls (PCBs); last two digits indicate percentage of chlorine in solution.

Appendix 6. Bird mortalities reported in British Columbia and the Yukon, 1963 - 1994, listed by species.

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death Major	 Sub-category	Date of Die-off	Record Number
Gaviiformes: Loons							
RTLO	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
PALO	1	1	Nanaimo - Green L.	Trauma	Drowned (fishing net)	25-Oct-94	301
COLO	1	7	Chetwynd	Undetermined		01-Jun-88	197
COLO	1	3	Lillooet	Metal toxicosis	Lead	20-Nov-93	286
Loon	1	2	Whiterock	Trauma	Drowned (fishing net)	16-Aug-78	85
Loon	1	6	Q.C.I. - Tlell River	Undetermined		04-Mar-82	124
Loon	3	0	Not indicated	Undetermined		12-Aug-88	198
Loon	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
Podicipedeformes: Grebes							
HOGR	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
RNGR	40	6	Pacific Ocean (off Q.C.I.)	Undetermined		08-Nov-77	77
RNGR	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
EAGR	41	5	Williams Lake - Westwick L.	Trauma	Undetermined origin	16-Jun-86	169
WEGR	10	8	Kelowna	Trauma	Undetermined origin	10-May-76	52
WEGR	1	1	Port Alberni	Undetermined		20-Jan-78	82
WEGR	2	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
WEGR	7	2	Vancouver - False Crk.	Undetermined		13-Mar-81	112
WEGR	1	2	Delta - Boundary Bay	Undetermined		01-Nov-90	235
Greb	2	2	Surrey - Serpentine Fen	Undetermined		19-Apr-77	67
Greb	40	2	Point Roberts	Trauma	Drowned (fishing net)	04-Aug-83	141
Greb	5	1	Esquimalt	Undetermined		17-Aug-84	159
Greb	1	8	Vernon - Kal Lake	Disease	Pneumonia / Aspergillosis	05-Nov-84	162
Procellariformes: Tube-nosed Swimmers							
NOFU	5	1	Pacific Ocean (off Uclulet)	Undetermined		20-Feb-76	46
NOFU	40	6	Pacific Ocean (off Q.C.I.)	Undetermined		08-Nov-77	77
SOSH	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
Pelecaniformes: Totpalmate Swimmers							
BRCO	12	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
BRCO	30	1	Pacific Rim National Park	Trauma	Drowned (fishing net)	21-Mar-94	296
Corm	40	6	Pacific Ocean (off Q.C.I.)	Undetermined		08-Nov-77	77
Corm	1	2	Burrard Inlet	Poisoning	PCBs	22-Mar-86	168
Corm	1	1	Rocky Point	Undetermined		14-Sep-90	229
Ciconiiformes: Bitterns, Herons, Egrets, Ibises, Storks							

Taxonomic Order / Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
GBHE	1	2	Vancouver	Pesticide poisoning	Suspected	01-Jan-70	8
GBHE	1	1	Alberni Valley	Undetermined	(Mercury sub-lethal exposure)	01-Nov-70	10
GBHE	1	1	Victoria	Metal toxicosis	Mercury	01-Jan-72	15
GBHE	1	2	Powell River	Metal toxicosis	Mercury	01-Jan-76	44
GBHE	1	2	Delta - Westham Isl.	Disease	Bacterial infection	18-Mar-76	50
GBHE	2	2	Delta - Westham Isl.	Undetermined		31-Aug-76	57
GBHE	1	1	Campbell River	Undetermined		02-Oct-76	59
GBHE	4	2	Cultus Lake	Trauma	Gun shot	01-Feb-77	63
GBHE	1	2	Vancouver	Undetermined		17-Mar-77	64
GBHE	1	2	Fort Langley	Trauma	Fishing line entanglement	19-Apr-77	66
GBHE	1	2	Maple Ridge	Other	Fell from nest	08-Jun-77	71
GBHE	1	2	Sechelt	Other	Fell from nest	25-Jun-79	88
GBHE	2	2	Cultus Lake	Trauma	Gun shot	03-Dec-79	95
GBHE	2	2	Delta	Undetermined		03-Dec-79	96
GBHE	1	2	Richmond	Undetermined		11-Dec-79	98
GBHE	1	2	Delta	Undetermined		05-Feb-80	100
GBHE	2	2	Pender Harbour	Undetermined		17-Nov-82	133
GBHE	1	2	Richmond	Trauma	Gun shot	28-Oct-87	189
GBHE	2	2	Sunshine Coast	Undetermined		23-Jul-92	258
GBHE	1	2	Delta	Disease	Starvation	17-Jan-93	277
GBHE	3	2	Delta (airport)	Undetermined		20-Dec-93	289
GRHE	1	1	Saanich	Undetermined		20-Oct-89	214
Anseriformes: Swans, Geese, Ducks							
FWDU	1	2	Delta - Westham Isl.	Disease	Pneumonia	29-Oct-82	131
TUSW	1	2	Abbotsford - Judson L.	Infectious disease	Aspergillosis	29-Feb-92	254
TUSW	1	2	Ladner	Trauma	Gun shot	08-Jan-94	290
TUSW	1	3	Kamloops	Trauma	Foreign body ingestion	02-Mar-94	293
TUSW	1	2	Dewdney	Metal toxicosis	Lead	03-Mar-94	294
TUSW	1	2	Vancouver	Undetermined		15-Nov-94	303
TRUS	2	6	Q.C.I. - Tlell River	Metal toxicosis	Lead	04-Mar-82	124
TRUS	1	2	Maple Ridge	Disease	Hypovitaminosis A	01-Jan-87	177
TRUS	29	2	Abbotsford - Judson L.	Metal toxicosis	Lead	29-Feb-92	254
MUSW	1	1	Victoria	Pesticide poisoning	MCPA suspected	01-Aug-66	2
MUSW	1	1	Victoria	Disease	Clostridiosis	10-Apr-84	156
MUSW	2	2	Vancouver	Infectious disease	Avian Cholera	24-Apr-87	180
Swan	1	8	Penticton	Trauma	Gun shot	23-Mar-84	154

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Swan	1	8	Penticton	Disease	Parasitism (mixed sp.)	23-Mar-84	154
Swan	1	2	Vancouver	Infectious disease	Avian Cholera	24-Apr-87	180
Swan	1	2	Sumas	Metal toxicosis	Lead	08-Mar-88	194
Swan	1	2	Sumas	Infectious disease	Apergillosis	08-Mar-88	194
Swan	1	2	Harrison Hot Springs	Trauma	Esophageal impaction	11-Apr-91	247
Swan	1	2	Delta - Westham Isl.	Disease	Starvation	29-Nov-91	251
SNGO	1	2	Delta - Westham Isl.	Trauma	Gun shot	14-Mar-88	195
CAGO	100	8	Vaseux Lake (orchard)	Pesticide poisoning	Parathion	01-Jun-72	17
CAGO	1	8	Vaseux Lake	Pesticide poisoning	Endosulfan	01-May-73	23
CAGO	8	8	Winfield (orchard)	Pesticide poisoning	Diazinon F	02-May-74	30
CAGO	1	2	Burnaby Lake	Undetermined		08-Jul-76	54
CAGO	8	8	Penticton (orchard)	Pesticide poisoning	Diazinon F	12-May-80	101
CAGO	1	2	Vancouver - False Crk.	Undetermined		13-Mar-81	112
CAGO	6	8	Penticton	Pesticide poisoning	Diazinon	22-May-81	116
CAGO	6	8	Penticton - Okanagan L.	Undetermined		29-Jan-82	120
CAGO	5	8	Vernon - Okanagan L.	Pesticide poisoning	Diazinon suspected	03-Feb-82	121
CAGO	6	8	Osoyoos	Undetermined		04-Mar-82	123
CAGO	1	8	Westbank - Okanagan L.	Disease	Starvation	15-Apr-82	126
CAGO	12	2	Aldergrove	Pesticide poisoning	Fensulfothion	26-Jul-82	128
CAGO	1	7	Parsnip River	Disease	Neurofibroma	30-Oct-82	132
CAGO	11	2	Mission - Ruskin Lake	Pesticide poisoning	Diazinon	16-Jun-83	140
CAGO	5	2	Abbotsford - Judson L.	Metal toxicosis	Lead	09-Sep-85	164
CAGO	1	2	Maple Ridge	Undetermined	(Lead sub-lethal exposure)	27-Mar-87	179
CAGO	1	2	Surrey	Metal toxicosis	Lead	15-May-87	181
CAGO	2	2	Pitt Polder	Metal toxicosis	Lead	15-May-87	182
CAGO	1	2	Vancouver	Disease	Air sacculitis (non-viral)	22-May-87	184
CAGO	3	2	Indian Arm	Undetermined		25-May-87	185
CAGO	1	2	Pitt Polder	Metal toxicosis	Lead	06-Aug-87	188
CAGO	3	2	Surrey	Disease	Pneumonia/Necrosis/Enteritis	23-Dec-87	190
CAGO	1	2	Trepheway	Metal toxicosis	Lead	13-Jan-88	193
CAGO	2	0	Not indicated	Undetermined		23-Mar-89	205
CAGO	30	1	Victoria	Undetermined		01-May-89	206
CAGO	7	1	Victoria (golf course)	Undetermined		20-Jul-89	208
CAGO	40	2	Richmond	Pesticide poisoning	Carbofuran F	14-Aug-89	209
CAGO	1	1	Victoria (golf course)	Disease	Bone marrow aliment	14-Aug-90	227
CAGO	4	1	Victoria	Undetermined		14-Aug-90	227

Taxonomic Order							
Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death		Date of Die-off	Record Number
				Major	Sub-category		
CAGO	3	1	Victoria	Metal toxicosis	Lead	18-Nov-90	239
CAGO	20	1	Victoria (golf course)	Pesticide poisoning	OP suspected	04-Aug-91	248
CAGO	2	2	Vancouver - False Crk.	Undetermined		07-Feb-92	253
CAGO	1	2	Abbotsford - Judson L.	Metal toxicosis	Lead	27-Sep-92	266
CAGO	1	2	Langley	Undetermined		12-Dec-93	287
Goos	5	2	Delta	Pesticide poisoning	Methamidophos	13-Oct-79	90
GWTE	1	2	Richmond	Pesticide poisoning	Carbofuran G	15-Dec-73	26
GWTE	2	2	Ladner	Pesticide poisoning	Carbofuran G	25-Nov-74	37
GWTE	1000	2	Ladner	Pesticide poisoning	Carbofuran G	23-Oct-75	42
GWTE	33	2	Not indicated	Pesticide poisoning	Carbofuran F	01-Jan-77	61
GWTE	16	2	Delta	Undetermined		14-Nov-77	78
GWTE	1	2	Vancouver (golf course)	Undetermined		22-Jan-80	99
GWTE	1	1	Saanich	Infectious disease	Avian Cholera	20-Oct-89	214
GWTE	31	2	Whiterock - Crescent Beach	Disease	Starvation	12-Jan-93	274
MALL	29	2	Richmond	Pesticide poisoning	Carbofuran G	15-Dec-73	26
MALL	4	2	Ladner	Pesticide poisoning	Carbofuran G	25-Nov-74	37
MALL	2	0	Not indicated	Metal toxicosis	Lead	20-Feb-76	45
MALL	1	8	Osoyoos Lake (orchard)	Trauma	Gun shot	09-Mar-76	48
MALL	8	1	Victoria	Pesticide poisoning	Diazinon	15-Mar-76	49
MALL	1	0	Not indicated	Metal toxicosis	Lead	02-Apr-76	51
MALL	1	2	Burnaby Lake	Undetermined		08-Jul-76	54
MALL	8	0	Not indicated	Undetermined		18-Aug-76	56
MALL	25	2	Fraser Valley	Pesticide poisoning	Carbofuran G	01-Jan-77	60
MALL	33	2	Not indicated	Pesticide poisoning	Carbofuran F	01-Jan-77	61
MALL	3	2	Matsqui	Pesticide poisoning	Diazinon	15-Apr-77	65
MALL	20	1	Saanich	Infectious disease	Aspergillosis	28-Oct-77	76
MALL	16	2	Delta	Undetermined		14-Nov-77	78
MALL	200	4	Kimberly (mine)	Undetermined		18-Nov-77	79
MALL	3	0	Not indicated	Infectious disease	Aspergillosis	19-Dec-77	80
MALL	1	2	Richmond	Trauma	Gun shot	22-Dec-78	87
MALL	5	2	Richmond	Trauma	Gun shot	01-Dec-79	94
MALL	1	2	Delta	Undetermined		03-Dec-79	96
MALL	90	2	Richmond	Pesticide poisoning	Fensulfothion G	03-Dec-79	97
MALL	1	2	Vancouver	Trauma	Gun shot	05-Nov-80	105
MALL	7	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
MALL	4	2	Powell River	Pesticide poisoning	Diazinon	16-Jan-81	107

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
MALL	4	0	Not indicated	Undetermined		12-Feb-81	110
MALL	7	6	Q.C.I. - Tlell River	Undetermined		04-Mar-82	124
MALL	15	2	Sumas Prairie	Infectious disease	Aspergillosis	22-Sep-83	144
MALL	3	2	Delta (landfill)	Metal toxicosis	Lead	03-Oct-83	145
MALL	100	8	Vernon - Kal Lake	Disease	Pneumonia / Aspergillosis	05-Nov-84	162
MALL	18	2	Delta (golf course)	Pesticide poisoning	Diazinon F	19-Nov-85	165
MALL	7	2	Aldergrove	Infectious disease	Aspergillosis	05-Dec-85	166
MALL	10	2	Surrey	Trauma	Gun shot	18-Nov-86	172
MALL	1	0	Not indicated	Disease	Sacrosporidiosis	30-Dec-86	176
MALL	3	2	Surrey	Disease	Pneumonia/Necrosis/Enteritis	23-Dec-87	190
MALL	8	2	Langley	Disease	Pneumonia	13-Jan-88	192
MALL	50	2	Hatzic Lake	Disease	Enteritis / Pneumonia	30-Sep-89	212
MALL	166	1	Saanich	Infectious disease	Aspergillosis	20-Oct-89	214
MALL	1	2	Surrey	Undetermined		03-Jan-90	219
MALL	2	2	New Westminster	Undetermined		20-Oct-90	234
MALL	1000	4	Creston	Infectious disease	Aspergillosis	07-Dec-90	241
MALL	1	2	Langley	Undetermined		23-May-92	256
MALL	1	2	Ladner	Metal toxicosis	Lead	08-Sep-92	264
MALL	3	2	Sardis	Infectious disease	Aspergillosis	26-Oct-92	268
MALL	4	2	Whiterock - Crescent Beach	Disease	Starvation	12-Jan-93	274
MALL	1	2	Tsawwassen	Disease	Starvation	17-Jan-93	276
MALL	67	2	Ladner	Pesticide poisoning	Fensulfothion / Parathion	27-Jan-94	292
MALL	1	2	Delta - Westham Isl.	Undetermined		23-Aug-94	297
NOPI	1	1	Cowichan Bay	Undetermined		01-Jan-68	5
NOPI	30	2	Richmond	Undetermined		01-Nov-71	14
NOPI	29	2	Richmond	Pesticide poisoning	Carbofuran G	15-Dec-73	26
NOPI	26	2	Ladner	Pesticide poisoning	Carbofuran G	25-Nov-74	37
NOPI	25	2	Fraser Valley	Pesticide poisoning	Carbofuran G	01-Jan-77	60
NOPI	33	2	Not indicated	Pesticide poisoning	Carbofuran F	01-Jan-77	61
NOPI	18	9	Ross River / Dawson City	Pesticide poisoning	Temephos G	08-May-77	70
NOPI	16	2	Delta	Undetermined		14-Nov-77	78
NOPI	90	2	Richmond	Pesticide poisoning	Fensulfothion G	03-Dec-79	97
NOPI	2	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
NOPI	1	6	Q.C.I. - Tlell River	Undetermined		04-Mar-82	124
NOPI	1	2	Surrey	Trauma	Gun shot	18-Nov-86	172
NOPI	1	1	Saanich	Infectious disease	Aspergillosis	20-Oct-89	214

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
NOPI	200	2	Surrey	Infectious disease	Aspergillosis	28-Dec-89	217
NOPI	6	2	Surrey	Undetermined		03-Jan-90	219
NOPI	44	2	Whiterock - Crescent Beach	Disease	Starvation	12-Jan-93	274
NOPI	3	2	Tsawwassen	Disease	Starvation	17-Jan-93	276
NOPI	19	2	Ladner	Pesticide poisoning	Fensulfothion / Parathion	27-Jan-94	292
NOPI	6	2	Tsawwassen	Undetermined		12-Oct-94	300
CITE	5	2	Tsawwassen	Disease	Starvation	17-Jan-93	276
Teal	20	2	Richmond	Pesticide poisoning	Fensulfothion G	03-Dec-79	97
Teal	2	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
NOSL	1	2	New Westminster	Undetermined		20-Oct-90	234
AMWI	2	1	Saanich	Undetermined		01-Feb-68	6
AMWI	1	2	Richmond	Pesticide poisoning	Carbofuran G	15-Dec-73	26
AMWI	48	2	Ladner	Pesticide poisoning	Carbofuran G	25-Nov-74	37
AMWI	1	0	Not indicated	Disease	Nephritis / Pericarditis	20-Feb-76	45
AMWI	9	1	Victoria	Pesticide poisoning	Diazinon	15-Mar-76	49
AMWI	20	1	Saanich	Infectious disease	Aspergillosis	28-Oct-77	76
AMWI	4	1	Victoria	Trauma	Gun shot	04-Nov-79	92
AMWI	33	2	Powell River	Pesticide poisoning	Diazinon	16-Jan-81	107
AMWI	1	6	Q.C.I. - Tlell River	Undetermined		04-Mar-82	124
AMWI	1	1	Victoria	Pesticide poisoning	Diazinon	10-Apr-84	156
AMWI	1	1	Victoria	Trauma	Gun shot	10-Apr-84	156
AMWI	1	2	Surrey	Trauma	Gun shot	18-Nov-86	172
AMWI	2	2	Whiterock - Crescent Beach	Disease	Starvation	12-Jan-93	274
AMWI	1	2	Ladner	Pesticide poisoning	Suspected	18-Dec-93	288
AMWI	3	2	Ladner	Pesticide poisoning	Fensulfothion / Parathion	27-Jan-94	292
LESC	1	2	Burrard Inlet	Pesticide poisoning	OP or Carbamate	19-Dec-73	27
Scau	27	2	Matsqui	Pesticide poisoning	Diazinon	15-Apr-77	65
OLDS	1	6	Q.C.I. - Tlell	Undetermined		11-Mar-82	125
OLDS	1	2	Richmond	Undetermined		04-Nov-92	270
SUSC	1	2	Whiterock	Undetermined		11-Mar-92	255
SUSC	2	2	Whiterock - Crescent Beach	Disease	Starvation	12-Jan-93	274
WWSC	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
WWSC	2	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
Scot	40	6	Pacific Ocean (off Q.C.I.)	Undetermined		08-Nov-77	77
Scot	6	2	Whiterock - Crescent Beach	Undetermined		25-May-81	117
COGO	1	1	Cowichan Bay	Undetermined		01-Jan-68	5

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death Major	 Sub-category	Date of Die-off	Record Number
COGO	20	2	Burrard Inlet	Pesticide poisoning	OP or Carbamate	19-Dec-73	27
COGO	1	2	Abbotsford - Judson L.	Undetermined		29-Feb-92	254
BAGO	4	1	Victoria	Trauma	Gun shot	04-Nov-79	92
Gold	6	2	Vancouver - False Crk.	Undetermined		23-Feb-81	111
Gold	1	0	Not indicated	Undetermined		11-May-88	196
BUFF	2	1	Cowichan Bay	Undetermined		01-Jan-68	5
BUFF	1	2	Vancouver (golf course)	Undetermined		22-Jan-80	99
Merg	1	2	Vancouver - Trout Lake	Disease	Peritonitis	27-Apr-82	127
Merg	1	2	Vancouver - Trout Lake	Disease	Starvation	27-Apr-82	127
RUDU	1	0	Not indicated	Undetermined		05-Dec-84	163
Duck	1	2	Vancouver	Pesticide poisoning	Carbophenothion suspected	01-Jan-68	4
Duck	100	8	Kelowna - Duck Lake	Undetermined		01-Sep-71	11
Duck	5	2	Langley	Pesticide poisoning	Diazinon suspected	01-Jun-72	18
Duck	25	2	Vancouver	Pesticide poisoning	OP suspected	01-Dec-74	38
Duck	1	2	Richmond	Undetermined		10-Sep-76	58
Duck	12	1	Priest Lake	Undetermined		11-Oct-77	74
Duck	5	1	Parksville	Infectious disease	Aspergillosis	18-Oct-77	75
Duck	3	0	Not indicated	Trauma	Gun shot	19-Dec-77	81
Duck	6	9	Mayo	Undetermined		08-Aug-78	84
Duck	20	2	Harrison Hot Springs	Disease	Mycotic infection	12-Nov-79	93
Duck	2	2	Vancouver - False Crk.	Undetermined		13-Mar-81	112
Duck	5	2	Vancouver	Undetermined		29-Mar-84	155
Duck	6	2	Ladner	Undetermined		15-Jun-84	158
Duck	100	7	Fort Saint John	Undetermined		12-Sep-84	161
Duck	6	2	Delta - Boundary Bay	Undetermined		15-Oct-90	232
Duck	2	2	New Westminster	Undetermined		20-Oct-90	234
Duck	1	2	Fraser River	Undetermined		05-Mar-94	295
Wfow	20	1	Victoria	Undetermined		10-Apr-84	156
Wfow	1	1	Esquimalt	Undetermined		17-Aug-84	159
Falconiformes: Diurnal Birds of Prey							
TUVU	1	1	Cedar - Harmac	Trauma	Gun shot	19-Sep-93	284
OSPR	1	1	Victoria	Undetermined	(Mercury sub-lethal exposure)	01-Oct-73	25
BAEA	1	5	Williams Lake	Pesticide poisoning	Dieldrin / DDT	01-Oct-70	9
BAEA	1	1	Pender Island	Undetermined	(Mercury sub-lethal exposure)	01-Jun-72	19
BAEA	1	1	Campbell River	Undetermined	(Mercury / DDT sub-lethal exp.)	01-Jul-73	24
BAEA	1	1	Port Hardy	Undetermined		01-Aug-74	31

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
BAEA	1	1	Port Hardy	Undetermined		01-Sep-74	32
BAEA	1	1	Port Hardy	Undetermined		01-Nov-74	35
BAEA	1	1	Port Hardy	Undetermined		01-Jan-75	39
BAEA	1	6	Q.C.I. - Sandspit	Trauma	Electrocution	01-Mar-82	122
BAEA	2	0	Not indicated	Undetermined	(Mercury sub-lethal exposure)	25-Mar-83	136
BAEA	2	0	Not indicated	Undetermined		25-Mar-83	136
BAEA	1	2	Surrey	Metal toxicosis	Lead / Mercury	01-Mar-86	167
BAEA	1	1	Alert Bay	Trauma	Electrocution	16-Jun-86	170
BAEA	3	2	Delta (landfill)	Undetermined		17-Mar-89	204
SSHA	1	1	Sidney	Undetermined		23-Mar-84	153
COHA	1	1	Metchosin	Undetermined	(Mercury sub-lethal exposure)	01-Feb-74	28
COHA	1	1	Saltspring Isl.	Undetermined		01-Oct-74	33
COHA	1	2	Surrey	Undetermined		22-Dec-82	134
COHA	1	1	Nanaimo	Undetermined		19-Oct-89	213
RTHA	1	2	Abbotsford	Trauma	Collision - vehicle	26-Sep-90	230
GOEA	1	8	Princton	Trauma	Collision - vehicle	23-Jan-89	202
GOEA	1	1	Read Island	Undetermined		27-Feb-89	203
GOEA	1	7	Fort Nelson (landfill)	Disease	Starvation	18-Nov-89	215
GOEA	1	7	Prince George - Frost L.	Trauma	Leg-hold trap	20-Dec-89	216
GOEA	1	2	Port Coquitlam - Tree Isl.	Disease	Starvation	01-Feb-90	221
GOEA	1	6	Smithers	Trauma	Undetermined origin	25-Jun-90	222
GOEA	1	1	Wild Deer Lake	Trauma	Undetermined origin	26-Jun-90	223
GOEA	1	4	Windermere	Disease	Starvation	25-Jul-90	226
GOEA	1	2	Pemberton	Disease	Starvation	19-Jul-93	283
Hawk	1	2	Richmond	Pesticide poisoning	Carbofuran G	15-Dec-73	26
Hawk	1	2	Ladner	Pesticide poisoning	Carbofuran G	23-Oct-75	42
Hawk	1	0	Not indicated	Pesticide poisoning	Fensulfothion / Bromacil	02-Feb-81	108
Hawk	1	2	Vancouver	Undetermined		30-Dec-86	174
Hawk	10	3	Lillooet	Undetermined		26-Sep-88	199
Galliformes: Gallinaceous Birds							
CHUK	33	8	Summerland	Pesticide poisoning	TEPP suspected	01-Oct-74	34
RNPH	2	2	Vancouver	Pesticide poisoning	Diazinon	01-Oct-71	13
RNPH	11	2	Richmond	Trauma	Undetermined origin	01-Dec-79	94
Phea	1	2	Richmond	Trauma	Undetermined origin	25-May-87	186
RUGR	2	7	Fort Saint John	Metal toxicosis	Mercury suspected	12-Dec-69	7
Quail	25	1	Saltspring Isl.	Undetermined		01-Sep-89	211

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death Major	 Sub-category	Date of Die-off	Record Number
Gruiformes: Cranes, Rails, Allies							
AMCO	2	0	Not indicated	Trauma	Undetermined origin	20-Feb-76	45
AMCO	20	8	Osoyoos Lake (orchard)	Pesticide poisoning	ANTU suspected	09-Mar-76	48
AMCO	1	2	Not indicated	Undetermined		21-Oct-80	103
AMCO	1	1	Saanich	Trauma	Undetermined origin	20-Oct-89	214
Charadriiformes: Shorebirds, Gulls, Auks, Allies							
SPSA	3	9	Dawson City	Pesticide poisoning	Temephos G	22-May-76	53
DUNL	3	2	Delta	Undetermined		12-Jan-94	291
COSN	3	9	Dawson City	Pesticide poisoning	Temephos G	22-May-76	53
COSN	1	9	Whitehorse	Undetermined		12-May-83	139
COSN	1	9	Whitehorse	Pesticide poisoning	Temephos	09-May-84	157
HEEG	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
MEGU	20	2	Harrison Hot Springs	Disease	Mycotic infection	12-Nov-79	93
MEGU	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
MEGU	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
RBGU	16	2	Delta	Undetermined		14-Nov-77	78
CAGU	60	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
CAGU	10	2	Delta - Boundary Bay	Disease	Nephrosis	01-Nov-90	235
HEGU	16	2	Delta	Undetermined		14-Nov-77	78
HEGU	2	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
GWGU	1	2	Ladner	Pesticide poisoning	Carbofuran G	25-Nov-74	37
GWGU	2	1	Victoria	Pesticide poisoning	Diazinon F	09-Apr-75	40
GWGU	9	2	New Westminster	Infectious disease	Aspergillosis	03-Apr-81	113
GWGU	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
GWGU	2	2	Delta (landfill)	Undetermined		17-Mar-89	204
GWGU	8	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
GWGU	1	2	Richmond	Disease	Liver rupture	25-Jan-90	220
GWGU	10	2	Delta - Boundary Bay	Disease	Nephrosis	01-Nov-90	235
GWGU	18	2	Whiterock - Crescent Beach	Disease	Hydropericardium	06-Nov-90	236
GWGU	1	2	Delta - Boundary Bay	Metal toxicosis	Lead	23-Jan-91	244
GWGU	70	1	Pacific Rim National Park	Undetermined		05-Feb-91	245
GWGU	8	2	Delta - Boundary Bay	Disease	Myocarditis	11-Sep-91	249
GWGU	50	2	Coquitlam	Trauma	Undetermined origin	03-Feb-93	280
GWGU	100	2	Chilliwack (landfill)	Pesticide poisoning	Carbofuran	09-Nov-94	302
Gull	6	2	New Westminster	Undetermined		01-Apr-72	16
Gull	5	1	Pacific Ocean (off Uclulet)	Undetermined		20-Feb-76	46

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death Major	Most probable cause of death Sub-category	Date of Die-off	Record Number
Gull	40	6	Pacific Ocean (off Q.C.I.)	Undetermined		08-Nov-77	77
Gull	1	1	Sooke	Undetermined		15-Apr-78	83
Gull	1	2	Whiterock	Trauma	Drowned (fishing net)	16-Aug-78	85
Gull	6	1	Crofton	Disease	Parasitism (mixed sp.)	14-Sep-78	86
Gull	16	2	Surrey (landfill)	Pesticide poisoning	Diazinon	01-Nov-79	91
Gull	4	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
Gull	1	0	Not indicated	Undetermined		02-Feb-81	109
Gull	3	0	Not indicated	Infectious disease	Aspergillosis	15-Apr-81	114
Gull	1	2	Richmond	Disease	Liver hemorhage	13-Jan-82	119
Gull	1	2	Delta - Westham Isl.	Undetermined		12-Mar-84	149
Gull	24	2	Richmond	Infectious disease	Aspergillosis	13-Mar-84	151
Gull	1	1	Esquimalt	Undetermined		17-Aug-84	159
Gull	1	2	Delta - Boundary Bay	Undetermined		09-Nov-90	237
Gull	12	2	Delta - Boundary Bay	Undetermined		11-Nov-90	238
Gull	6	2	Delta - Deas Island	Other	Mischief (with Oil)	29-Nov-90	240
Gull	1	2	Delta	Trauma	Esophageal impaction	07-Dec-90	242
Gull	1	2	Delta	Trauma	Undetermined origin	10-Dec-90	243
Gull	2	2	Delta	Undetermined		10-Dec-90	243
Gull	16	2	Richmond	Undetermined		11-Sep-91	250
Gull	3	2	Sardis	Trauma	Gun shot	23-Nov-92	271
Gull	6	2	Burnaby	Undetermined		24-Dec-92	272
Gull	5	2	Langley	Undetermined		22-Feb-93	281
COMU	6	1	Juan de Fuca Strait	Disease	Malnutrition	28-Oct-80	104
COMU	70	1	Juan de Fuca Strait	Trauma	Drowned (fishing net)	11-Aug-82	129
COMU	2	0	Not indicated	Undetermined		21-Jan-83	135
COMU	12	1	Sooke	Trauma	Drowned (fishing net)	11-Sep-83	143
COMU	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
COMU	21	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
COMU	500	1	Sooke	Trauma	Drowned (fishing net)	08-Oct-90	231
COMU	2	2	Whiterock - Crescent Beach	Trauma	Drowned (fishing net)	15-Aug-92	259
COMU	1	2	Whiterock - Crescent Beach	Disease	Pneumonia	15-Aug-92	259
COMU	24	2	Whiterock - Crescent Beach	Undetermined		15-Aug-92	259
PIGU	5	1	Pacific Ocean (off Uclulet)	Undetermined		20-Feb-76	46
PIGU	1	2	Whiterock	Trauma	Drowned (fishing net)	16-Aug-78	85
PIGU	5000	1	Pacific Ocean (off Tofino)	Oil Spill		01-Dec-88	201
PIGU	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210

Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death		Date of Die-off	Record Number
				Major	Sub-category		
Taxonomic Order							
MAMU	2	1	*Pacific Rim National Park*	*Undetermined*		30-Aug-89	210
Murr	1	2	Whiterock	Trauma	Drowned (fishing net)	16-Aug-78	85
CAAU	600	1	Pacific Ocean	Undetermined		07-Sep-84	160
RHAU	10	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
RHAU	1	2	Whiterock - Crescent Beach	Disease	Pneumonia	15-Aug-92	259
RHAU	3	2	Whiterock - Crescent Beach	Undetermined		15-Aug-92	259
TUPU	1	1	Pacific Rim National Park	Undetermined		30-Aug-89	210
Alci	1	2	Whiterock	Trauma	Drowned (fishing net)	16-Aug-78	85
Sea Duck	5	1	Pacific Ocean (off Uclulet)	Undetermined		20-Feb-76	46
Sea Duck	2	2	Delta - Boundary Bay	Infectious disease	Aspergillosis	08-Nov-80	106
Columbidae: Pigeons, Doves							
RODO	200	2	Surrey	Pesticide poisoning	Fensulfothion G	17-Jun-87	187
RODO	5	2	Langley	Undetermined		22-Feb-93	281
RODO	20	2	Matsqui	Undetermined		07-Sep-94	298
RODO	1	2	Surrey	Disease	Pneumonia / Air sacculitis	15-Nov-94	304
Strigiformes: Owls							
BNOW	1	2	Burrard Inlet	Disease	Starvation	11-May-83	138
BNOW	2	2	Richmond (airport)	Undetermined		03-Jan-90	218
BNOW	36	2	Lower Fraser Valley	Disease	Starvation	21-Jan-93	278
GHOW	1	1	Victoria	Undetermined		01-Nov-74	36
Caprimulgiformes: Goatsuckers, Allies							
CONI	1	2	Burnaby Lake	Undetermined		08-Jul-76	54
Coraciiformes: Kingfishers, Allies							
BEKI	1	7	Pinchi Lake	Pesticide poisoning	DDT (Mercury sub-lethal exp.)	01-Aug-72	20
Piciformes: Woodpeckeres, Allies							
NOFL	1	1	Ladysmith to Qualicum	Infectious disease	Aspergillosis	01-Sep-92	263
Passeriformes: Passerine Birds							
BNSW	1	2	Burnaby	Pesticide poisoning	Malathion suspected	01-Aug-72	21
Swal	3	2	Maple Ridge	Other	Orphaned	26-Aug-77	72
Swal	3	2	*Cultus Lake*	*Undetermined*		05-Aug-83	142
Swal	3	2	Richmond	Undetermined		01-Jul-89	207
STJA	19	1	Ladysmith to Qualicum	Infectious disease	Aspergillosis	01-Sep-92	263
Jay	1	2	Surrey	Disease	Pneumonia / Air sacculitis	15-Nov-94	304
BBMA	2	7	Dawson Crk.	Pesticide poisoning	Fenthion	06-Jan-92	252
NWCR	6	2	Whiterock	Trauma	Undetermined origin	31-Jan-77	62
NWCR	3	2	Vancouver	Undetermined		04-Oct-77	73

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death Major	Most probable cause of death Sub-category	Date of Die-off	Record Number
NWCR	6	2	Burnaby	Pesticide poisoning	Strychnine	23-Mar-83	137
NWCR	6	1	Victoria	Undetermined		12-Mar-84	150
NWCR	6	2	Richmond	Undetermined		21-Nov-86	173
NWCR	5	2	Langley	Undetermined		22-Feb-93	281
Crow	2	2	Surrey (landfill)	Pesticide poisoning	Diazinon	01-Nov-79	91
Crow	1	2	Vancouver	Undetermined		17-Oct-90	233
Crow	1	1	Victoria	Trauma	Undetermined origin	04-Aug-91	248
Crow	1	1	Victoria	Undetermined		04-Aug-91	248
Crow	1	2	Sardis	Pesticide poisoning	OP or Carbamate	26-Oct-92	268
Crow	1	2	Chilliwack (landfill)	Pesticide poisoning	Carbofuran	09-Nov-94	302
Crow	1	2	Surrey	Disease	Pneumonia / Air sacculitis	15-Nov-94	304
MOCH	2	9	Whitehorse	Trauma	Collision - vehicle	03-May-77	69
GCTH	1	6	Cassiar	Poisoning	Asbestos	01-May-74	29
HETH	33	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
HETH	1	2	Vancouver	Undetermined		17-Oct-90	233
AMRO	21	2	Richmond	Pesticide poisoning	Fensulfothion	13-Aug-82	130
AMRO	8	2	Chilliwack	Undetermined		23-Mar-84	152
AMRO	1	2	Richmond	Undetermined		21-Nov-86	173
AMRO	1	0	Not indicated	Trauma	Undetermined origin	30-Dec-86	175
AMRO	100	2	Langley	Undetermined		05-Oct-88	200
AMRO	3	2	Richmond	Undetermined		01-Jul-89	207
AMRO	1	2	Tsawwassen (golf course)	Undetermined		05-Jul-90	224
AMRO	8	2	Surrey	Undetermined		05-Jul-90	225
AMRO	1	2	Vancouver	Undetermined		17-Oct-90	233
AMRO	4	2	East Vancouver	Trauma	Predation	13-Oct-92	267
AMRO	9	1	Victoria	Undetermined		15-Jan-93	275
AMRO	5	0	Not indicated	Disease	Necrosis (acute hepatic)	01-Feb-93	279
AMRO	7	1	Victoria	Undetermined		16-Mar-93	282
VATH	11	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
VATH	4	1	Quadra Isl.	Undetermined		02-Apr-91	246
CEWA	1	8	Summerland	Undetermined		01-Feb-67	3
CEWA	1	2	East Vancouver	Trauma	Predation	13-Oct-92	267
EUST	1	2	Burnaby Lake	Undetermined		08-Jul-76	54
EUST	1	2	Surrey (landfill)	Pesticide poisoning	Diazinon	01-Nov-79	91
EUST	2	2	Richmond	Pesticide poisoning	Fensulfothion	13-Aug-82	130
EUST	12	2	Delta - Westham Isl.	Pesticide poisoning	Fensulfothion	05-Oct-83	146

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
EUST	6	2	Vancouver	Undetermined		22-May-87	183
EUST	56	2	Langley	Undetermined		07-Jan-88	191
EUST	100	2	Langley	Undetermined		05-Oct-88	200
EUST	2	2	Vancouver	Undetermined		17-Oct-90	233
EUST	11	2	Delta (airport)	Undetermined		30-Jun-92	257
EUST	20	2	Ladner	Pesticide poisoning	OP or Carbamate	21-Aug-92	262
EUST	3	2	Ladner	Infectious disease	Avian Pox	27-Oct-93	285
OCWA	22	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
WIWA	56	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
Warb	2	9	Dawson City	Pesticide poisoning	Temephos G	22-May-76	53
SAVS	1060	2	Richmond	Pesticide poisoning	Carbofuran G	16-Sep-86	171
FOSP	256	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
SOSP	1	6	Cassiar	Poisoning	Asbestos	01-May-74	29
LISP	11	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
LISP	118	2	Richmond	Pesticide poisoning	Carbofuran G	16-Sep-86	171
WCSP	2	6	Cassiar	Poisoning	Asbestos	01-May-74	29
GCSP	111	6	Prince Rupert	Poisoning	Cyanogenic glucoside	23-Sep-71	12
Spar	1	2	Fraser Valley	Undetermined		01-Jul-75	41
Spar	2	9	Dawson City	Pesticide poisoning	Temephos G	22-May-76	53
Spar	12	2	Richmond	Undetermined		05-Jan-87	178
DEJU	2	6	Cassiar	Poisoning	Asbestos	01-May-74	29
LALO	1	9	Whitehorse	Undetermined		28-Apr-77	68
LALO	7	9	Whitehorse	Trauma	Collision - vehicle	03-May-77	69
BRBL	4	1	Victoria	Pesticide poisoning	Diazinon F	09-Apr-75	40
HOFI	1	2	Richmond	Pesticide poisoning	Fensulfothion	13-Aug-82	130
Finc	6	2	Tsawwassen	Infectious disease	Coccidiosis / Avian Pox	15-May-81	115
Finc	6	2	Vancouver	Infectious disease	Avian Pox	08-Nov-83	147
Finc	7	2	Surrey	Undetermined		05-Jul-90	225
Finc	7	2	Burnaby	Infectious disease	Avian Pox	17-Sep-94	299
PISI	100	2	Manning Park/Skagit Valley	Trauma	Collision - vehicle	07-Jun-80	102
PISI	120	8	Enderby	Trauma	Collision - vehicle	25-Dec-83	148
PISI	54	2	Sardis	Pesticide poisoning	Suspected	12-Sep-90	228
PISI	6	7	Dawson Crk.	Undetermined		15-Aug-92	261
PISI	180	1	central Vancouver Island	Infectious disease	Salmonella	01-Nov-92	269
PISI	720	2	Lower Fraser Valley	Infectious disease	Salmonella	01-Nov-92	269
PISI	12	1	Brentwood Bay	Undetermined		01-Jan-93	273

Taxonomic Order Species Code	No. of Deaths	Prov. Region	Local Area	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
AMGO	8	2	Pitt Meadows	Pesticide poisoning	OP or Carbamate suspected	10-Sep-92	265
EVGR	5	2	Richmond	Poisoning	Suspected	15-Sep-79	89
EVGR	900	2	Manning Park/Skagit Valley	Trauma	Collision - vehicle	07-Jun-80	102
EVGR	1	2	Tsawwassen	Undetermined		25-May-81	118
EVGR	30	7	Prince George	Undetermined		15-Aug-92	260
EVGR	94	7	Dawson Crk.	Undetermined		15-Aug-92	261
EVGR	10	1	central Vancouver Island	Infectious disease	Salmonella	01-Nov-92	269
EVGR	40	2	Lower Fraser Valley	Infectious disease	Salmonella	01-Nov-92	269
HOSP	10	1	central Vancouver Island	Infectious disease	Salmonella	01-Nov-92	269
HOSP	40	2	Lower Fraser Valley	Infectious disease	Salmonella	01-Nov-92	269
Pass	1	6	Q.C.I	Pesticide poisoning	Phosphamidon suspected	01-Jan-63	1
Pass	1	3	Interior BC	Pesticide poisoning	Suspected	01-Jan-73	22
Pass	6	2	New Westminster	Undetermined		15-Dec-75	43
Pass	6	2	Richmond	Pesticide poisoning	Fenitrothion	01-Mar-76	47
Pass	1	2	Delta	Pesticide poisoning	Endosulfan	14-Aug-76	55
Pass	1	1	Victoria	Undetermined		16-Mar-93	282

Appendix 7. Bird mortalities reported in British Columbia and the Yukon, 1963 - 1994, listed by location.

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Region 1 - Vancouver Island						
Alberni Valley	GBHE	1	Undetermined	(Mercury sub-lethal exposure)	01-Nov-70	10
Alert Bay	BAEA	1	Trauma	Electrocution	16-Jun-86	170
Brentwood Bay	PISI	12	Undetermined		01-Jan-93	273
Campbell River	BAEA	1	Undetermined	(Mercury/DDT sub-lethal exp.)	01-Jul-73	24
Campbell River	GBHE	1	Undetermined		02-Oct-76	59
Cedar - Harmac	TUVU	1	Trauma	Gun shot	19-Sep-93	284
central Vancouver Island	Pass (> PISI, EVGR, HOSP)	200	Infectious disease	Salmonella	01-Nov-92	269
Cowichan Bay	1 NOPI,1 COGO,2 BUFF	4	Undetermined		01-Jan-68	5
Crofton	Gull	6	Disease	Parasitism (mixed sp.)	14-Sep-78	86
Esquimalt	5 Greb, 1 Gull, 1Wfow	7	Undetermined		17-Aug-84	159
Juan de Fuca Strait	COMU	6	Disease	Malnutrition	28-Oct-80	104
Juan de Fuca Strait	COMU	70	Trauma	Drowned (fishing net)	11-Aug-82	129
Ladysmith to Qualicum	19 STJA, 1 NOFL	20	Infectious disease	Aspergillosis	01-Sep-92	263
Metchosin	COHA	1	Undetermined	(Mercury sub-lethal exposure)	01-Feb-74	28
Nanaimo	COHA	1	Undetermined		19-Oct-89	213
Nanaimo - Green L.	PALO	1	Trauma	Drowned (fishing net)	25-Oct-94	301
Pacific Ocean (off Uclulet)	Seabirds (NOFU, Gull, Sea Duck, PIGU)	20	Undetermined		20-Feb-76	46
Pacific Ocean	CAAU	600	Undetermined		07-Sep-84	160
Pacific Ocean (off Tofino)	Seabirds (Loon, COMU, RNGR, HOGR, WWSC, PIGU, MEGU, GWGU)	40000	Oil Spill		01-Dec-88	201
Pacific Rim National Park	Seabirds (60 CAGU, 8 GWGU, 2 HEGU, 1 MEGU, 1 HEEG, 21 COMU, 1 PIGU, 10 RHAU, 1 TUPU, 2 MAMU, 2 WWSC, 12 BRCO, 1 SOSH, 1 RTLO)	123	Undetermined		30-Aug-89	210
Pacific Rim National Park	GWGU	70	Undetermined		05-Feb-91	245
Pacific Rim National Park	BRCO	30	Trauma	Drowned (fishing net)	21-Mar-94	296
Parksville	Duck	5	Infectious disease	Aspergillosis	18-Oct-77	75
Pender Island	BAEA	1	Undetermined	(Mercury sub-lethal exposure)	01-Jun-72	19

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Port Alberni	WEGR	1	Undetermined		20-Jan-78	82
Port Hardy	BAEA	1	Undetermined		01-Aug-74	31
Port Hardy	BAEA	1	Undetermined		01-Sep-74	32
Port Hardy	BAEA	1	Undetermined		01-Nov-74	35
Port Hardy	BAEA	1	Undetermined		01-Jan-75	39
Priest Lake	Duck	12	Undetermined		11-Oct-77	74
Quadra Isl.	VATH	4	Undetermined		02-Apr-91	246
Read Island	GOEA	1	Undetermined		27-Feb-89	203
Rocky Point	Corm	1	Undetermined		14-Sep-90	229
Saanich	AMWI	2	Undetermined		01-Feb-68	6
Saanich	MALL, AMWI	40	Infectious disease	Aspergillosis	28-Oct-77	76
Saanich	166 MALL, 1 NOPI	167	Infectious disease	Aspergillosis	20-Oct-89	214
Saanich	AMCO	1	Trauma	Undetermined origin	20-Oct-89	214
Saanich	GRHE	1	Undetermined		20-Oct-89	214
Saanich	GWTE	1	Infectious disease	Avian Cholera	20-Oct-89	214
Saltspring Isl.	COHA	1	Undetermined		01-Oct-74	33
Saltspring Isl.	Quail	25	Undetermined		01-Sep-89	211
Sidney	SSHA	1	Undetermined		23-Mar-84	153
Sooke	Gull	1	Undetermined		15-Apr-78	83
Sooke	COMU	12	Trauma	Drowned (fishing net)	11-Sep-83	143
Sooke	COMU	500	Trauma	Drowned (fishing net)	08-Oct-90	231
Victoria	MUSW	1	Pesticide poisoning	MCPA suspected	01-Aug-66	2
Victoria	GBHE	1	Metal toxicosis	Mercury	01-Jan-72	15
Victoria	OSPR	1	Undetermined	(Mercury sub-lethal exposure)	01-Oct-73	25
Victoria	GHOW	1	Undetermined		01-Nov-74	36
Victoria	Bird (1 GWGU, 2 BRBL)	6	Pesticide poisoning	Diazinon F	09-Apr-75	40
Victoria	AMWI, MALL	17	Pesticide poisoning	Diazinon	15-Mar-76	49
Victoria	Duck (1 AMWI, 1 BAGO)	8	Trauma	Gun shot	04-Nov-79	92
Victoria	NWCR	6	Undetermined		12-Mar-84	150
Victoria	AMWI	1	Pesticide poisoning	Diazinon	10-Apr-84	156
Victoria	AMWI	1	Trauma	Gun shot	10-Apr-84	156
Victoria	MUSW	1	Disease	Clostridiosis	10-Apr-84	156
Victoria	Wfow	20	Undetermined		10-Apr-84	156
Victoria	CAGO	30	Undetermined		01-May-89	206
Victoria (golf course)	CAGO	7	Undetermined		20-Jul-89	208
Victoria (golf course)	CAGO	4	Undetermined		14-Aug-90	227

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Victoria (golf course)	CAGO	1	Disease	Bone marrow aliment	14-Aug-90	227
Victoria	CAGO	3	Metal toxicosis	Lead	18-Nov-90	239
Victoria (golf course)	CAGO	20	Pesticide poisoning	OP suspected	04-Aug-91	248
Victoria (golf course)	Crow	1	Trauma	Undetermined origin	04-Aug-91	248
Victoria (golf course)	Crow	1	Undetermined		04-Aug-91	248
Victoria	AMRO	9	Undetermined		15-Jan-93	275
Victoria	7 AMRO, 1 Pass	8	Undetermined		16-Mar-93	282
Wild Deer Lake	GOEA	1	Trauma	Undetermined origin	26-Jun-90	223
Region 2 - Lower Mainland						
Abbotsford	RTHA	1	Trauma	Collision - vehicle	26-Sep-90	230
Abbotsford - Judson L.	CAGO	5	Metal toxicosis	Lead	09-Sep-85	164
Abbotsford - Judson L.	COGO	1	Undetermined		29-Feb-92	254
Abbotsford - Judson L.	TRUS	29	Metal toxicosis	Lead	29-Feb-92	254
Abbotsford - Judson L.	TUSW	1	Infectious disease	Aspergillosis	29-Feb-92	254
Abbotsford - Judson L.	CAGO	1	Metal toxicosis	Lead	27-Sep-92	266
Aldergrove	CAGO	12	Pesticide poisoning	Fensulfothion	26-Jul-82	128
Aldergrove	MALL	7	Infectious disease	Aspergillosis	05-Dec-85	166
Burnaby	BNSW	1	Pesticide poisoning	Malathion suspected	01-Aug-72	21
Burnaby	NWCR	6	Pesticide poisoning	Strychnine	23-Mar-83	137
Burnaby	Gull	6	Undetermined		24-Dec-92	272
Burnaby	Finc	7	Infectious disease	Avian Pox	17-Sep-94	299
Burnaby Lake	CAGO, MALL, CONI, EUST	4	Undetermined		08-Jul-76	54
Burrard Inlet	20 COGO, 1 LESC	21	Pesticide poisoning	OP or Carbamate	19-Dec-73	27
Burrard Inlet	BNOW	1	Disease	Starvation	11-May-83	138
Burrard Inlet	Corm	1	Poisoning	PCBs	22-Mar-86	168
Chilliwack	AMRO	8	Undetermined		23-Mar-84	152
Chilliwack (landfill)	100 GWGU, 1 Crow	101	Pesticide poisoning	Carbofuran	09-Nov-94	302
Coquitlam	GWGU	50	Trauma	Undetermined origin	03-Feb-93	280
Cultus Lake	GBHE	4	Trauma	Gun shot	01-Feb-77	63
Cultus Lake	GBHE	2	Trauma	Gun shot	03-Dec-79	95
Cultus Lake	Swal	3	Undetermined		05-Aug-83	142
Delta	Pass	1	Pesticide poisoning	Endosulfan	14-Aug-76	55
Delta	Duck (NOPI, MALL, GWTE), Gull (HEGU, RBGU)	80	Undetermined		14-Nov-77	78

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Delta	Goos	5	Pesticide poisoning	Methamidophos	13-Oct-79	90
Delta	2 GBHE, 1 MALL	3	Undetermined		03-Dec-79	96
Delta	GBHE	1	Undetermined		05-Feb-80	100
Delta (landfill)	MALL	3	Metal toxicosis	Lead	03-Oct-83	145
Delta (golf course)	MALL	18	Pesticide poisoning	Diazinon F	19-Nov-85	165
Delta (landfill)	3 BAEA, 2 GWGU	5	Undetermined		17-Mar-89	204
Delta	Gull	1	Trauma	Esophageal impaction	07-Dec-90	242
Delta	Gull	1	Trauma	Undetermined origin	10-Dec-90	243
Delta	Gull	2	Undetermined		10-Dec-90	243
Delta (airport)	EUST	11	Undetermined		30-Jun-92	257
Delta	GBHE	1	Disease	Starvation	17-Jan-93	277
Delta (airport)	GBHE	3	Undetermined		20-Dec-93	289
Delta	DUNL	3	Undetermined		12-Jan-94	291
Delta - Boundary Bay	15 Duck (3 MALL, 1 NOPI, 1 WEGR, 1 Teal, 1 Sea Duck), 4 Gull	19	Infectious disease	Aspergillosis	08-Nov-80	106
Delta - Boundary Bay	Duck	6	Undetermined		15-Oct-90	232
Delta - Boundary Bay	Gull (CAGU, GWGU)	20	Disease	Nephrosis	01-Nov-90	235
Delta - Boundary Bay	WEGR	1	Undetermined		01-Nov-90	235
Delta - Boundary Bay	Gull	1	Undetermined		09-Nov-90	237
Delta - Boundary Bay	Gull	12	Undetermined		11-Nov-90	238
Delta - Boundary Bay	GWGU	1	Metal toxicosis	Lead	23-Jan-91	244
Delta - Boundary Bay	GWGU	8	Disease	Myocarditis	11-Sep-91	249
Delta - Deas Island	Gull	6	Other	Mischief (with oil)	29-Nov-90	240
Delta - Westham Isl.	GBHE	1	Disease	Bacterial infection	18-Mar-76	50
Delta - Westham Isl.	GBHE	2	Undetermined		31-Aug-76	57
Delta - Westham Isl.	FWDU	1	Disease	Pneumonia	29-Oct-82	131
Delta - Westham Isl.	EUST	12	Pesticide poisoning	Fensulfothion	05-Oct-83	146
Delta - Westham Isl.	Gull	1	Undetermined		12-Mar-84	149
Delta - Westham Isl.	SNGO	1	Trauma	Gun shot	14-Mar-88	195
Delta - Westham Isl.	Swan	1	Disease	Starvation	29-Nov-91	251
Delta - Westham Isl.	MALL	1	Undetermined		23-Aug-94	297
Dewdney	TUSW	1	Metal toxicosis	Lead	03-Mar-94	294
East Vancouver	4 AMRO, 1 CEWA	5	Trauma	Predation	13-Oct-92	267
Fort Langley	GBHE	1	Trauma	Fishing line entanglement	19-Apr-77	66
Fraser River	Duck	1	Undetermined		05-Mar-94	295

Provincial Region

Local Area	Species Code	No. of Deaths	Most probable cause of death		Date of Die-off	Record Number
			Major	Sub-category		
Fraser Valley	Spar	1	Undetermined		01-Jul-75	41
Fraser Valley	NOPI, MALL	50	Pesticide poisoning	Carbofuran G	01-Jan-77	60
Harrison Hot Springs	Duck, MEGU	40	Disease	Mycotic infection	12-Nov-79	93
Harrison Hot Springs	Swan	1	Trauma	Esophageal impaction	11-Apr-91	247
Hatzic Lake	Duck (> MALL)	50	Disease	Enteritis / Pneumonia	30-Sep-89	212
Indian Arm	CAGO	3	Undetermined		25-May-87	185
Ladner	Duck (34 AMWI, 19 NOPI, 2 MALL, 1 GWTE), 1 GWGU	80	Pesticide poisoning	Carbofuran G	25-Nov-74	37
Ladner	1000 GWTE, 1 Hawk	1001	Pesticide poisoning	Carbofuran G	23-Oct-75	42
Ladner	Duck	6	Undetermined		15-Jun-84	158
Ladner	EUST	20	Pesticide poisoning	OP or Carbamate	21-Aug-92	262
Ladner	MALL	1	Metal toxicosis	Lead	08-Sep-92	264
Ladner	EUST	3	Infectious disease	Avian Pox	27-Oct-93	285
Ladner	AMWI	1	Pesticide poisoning	Suspected	18-Dec-93	288
Ladner	TUSW	1	Trauma	Gun shot	08-Jan-94	290
Ladner	67 MALL, 19 NOPI, 3 AMWI	89	Pesticide poisoning	Fensulfothion / Parathion	27-Jan-94	292
Langley	Duck	5	Pesticide poisoning	Diazinon suspected	01-Jun-72	18
Langley	EUST	56	Undetermined		07-Jan-88	191
Langley	MALL	8	Disease	Pneumonia	13-Jan-88	192
Langley	EUST, AMRO	200	Undetermined		05-Oct-88	200
Langley	MALL	1	Undetermined		23-May-92	256
Langley	RODO, NWCR, Gull	15	Undetermined		22-Feb-93	281
Langley	CAGO	1	Undetermined		12-Dec-93	297
Lower Fraser Valley	Pass (> PISI, EVGR, HOSP)	800	Infectious disease	Salmonella	01-Nov-92	269
Lower Fraser Valley	BNOW	36	Disease	Starvation	21-Jan-93	278
Manning Park/Skagit Valley	Pass (>EVGR, PISI)	1000	Trauma	Collision - vehicle	07-Jun-80	102
Maple Ridge	GBHE	1	Other	Fell from nest	08-Jun-77	71
Maple Ridge	Swal	3	Other	Orphaned	26-Aug-77	72
Maple Ridge	TRUS	1	Disease	Hypovitaminosis A	01-Jan-87	177
Maple Ridge	CAGO	1	Undetermined	(Lead sub-lethal exposure)	27-Mar-87	179
Matsqui	Duck (> Scau, MALL)	30	Pesticide poisoning	Diazinon	15-Apr-77	65
Matsqui	RODO	20	Undetermined		07-Sep-94	298
Mission - Ruskin Lake	CAGO	11	Pesticide poisoning	Diazinon	16-Jun-83	140

Provincial Region

Local Area	Species Code	No. of Deaths	Most probable cause of death		Date of Die-off	Record Number
			Major	Sub-category		
New Westminster	Gull	6	Undetermined		01-Apr-72	16
New Westminster	Pass	6	Undetermined		15-Dec-75	43
New Westminster	GWGU	9	Infectious disease	Aspergillosis	03-Apr-81	113
New Westminster	2 Duck, 2 MALL, 1 NOSL	5	Undetermined		20-Oct-90	234
Not indicated	NOPI, MALL, GWTE	100	Pesticide poisoning	Carbofuran F	01-Jan-77	61
Not indicated	AMCO	1	Undetermined		21-Oct-80	103
Pemberton	GOEA	1	Disease	Starvation	19-Jul-93	283
Pender Harbour	GBHE	2	Undetermined		17-Nov-82	133
Pitt Meadows	AMGO	8	Pesticide poisoning	OP or Carbamate suspected	10-Sep-92	265
Pitt Polder	CAGO	2	Metal toxicosis	Lead	15-May-87	182
Pitt Polder	CAGO	1	Metal toxicosis	Lead	06-Aug-87	188
Point Roberts	Greb	40	Trauma	Drowned (fishing net)	04-Aug-83	141
Port Coquitlam - Tree Isl.	GOEA	1	Disease	Starvation	01-Feb-90	221
Powell River	GBHE	1	Metal toxicosis	Mercury	01-Jan-76	44
Powell River	Duck (> AMWI, MALL)	37	Pesticide poisoning	Diazinon	16-Jan-81	107
Richmond	Duck (1 NOPI)	30	Undetermined		01-Nov-71	14
Richmond	Duck (>NOPI, >MALL, 1 AMWI, 1 GWTE), 1 Hawk	60	Pesticide poisoning	Carbofuran G	15-Dec-73	26
Richmond	Pass	6	Pesticide poisoning	Fenitrothion	01-Mar-76	47
Richmond	Duck	1	Undetermined		10-Sep-76	58
Richmond	MALL	1	Trauma	Gun shot	22-Dec-78	87
Richmond	EVGR	5	Poisoning	Suspected	15-Sep-79	89
Richmond	MALL	5	Trauma	Gun shot	01-Dec-79	94
Richmond	RNPH	11	Trauma	Undetermined origin	01-Dec-79	94
Richmond	Duck (> MALL, > NOPI, Teal)	200	Pesticide poisoning	Fensulfothion G	03-Dec-79	97
Richmond	GBHE	1	Undetermined		11-Dec-79	98
Richmond	Gull	1	Disease	Liver hemorhage	13-Jan-82	119
Richmond	21 AMRO, 2 EUST, 1 HOFI	24	Pesticide poisoning	Fensulfothion	13-Aug-82	130
Richmond	Gull	24	Infectious disease	Aspergillosis	13-Mar-84	151
Richmond	Spar (> SAVS, LISP)	1178	Pesticide poisoning	Carbofuran G	16-Sep-86	171
Richmond	6 NWCR, 1 AMRO	7	Undetermined		21-Nov-86	173
Richmond	Spar	12	Undetermined		05-Jan-87	178
Richmond	Phea	1	Trauma	Undetermined origin	25-May-87	186
Richmond	GBHE	1	Trauma	Gun shot	28-Oct-87	189

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Richmond	Pass (AMRO, Swal)	6	Undetermined		01-Jul-89	207
Richmond	CAGO	40	Pesticide poisoning	Carbofuran F	14-Aug-89	209
Richmond (airport)	BNOW	2	Undetermined		03-Jan-90	218
Richmond	GWGU	1	Disease	Liver rupture	25-Jan-90	220
Richmond	Gull	16	Undetermined		11-Sep-91	250
Richmond	OLDS	1	Undetermined		04-Nov-92	270
Sardis	PISI	54	Pesticide poisoning	Suspected	12-Sep-90	228
Sardis	Crow	1	Pesticide poisoning	OP or Carbamate	26-Oct-92	268
Sardis	MALL	3	Infectious disease	Aspergillosis	26-Oct-92	268
Sardis	Gull	3	Trauma	Gun shot	23-Nov-92	271
Sechelt	GBHE	1	Other	Fell from nest	25-Jun-79	88
Sumas	Swan	1	Infectious disease	Aspergillosis	08-Mar-88	194
Sumas	Swan	1	Metal toxicosis	Lead	08-Mar-88	194
Sumas Prairie	MALL	15	Infectious disease	Aspergillosis	22-Sep-83	144
Sunshine Coast	GBHE	2	Undetermined		23-Jul-92	258
Surrey - Serpentine Fen	Greb	2	Undetermined		19-Apr-77	67
Surrey (landfill)	16 Gull, 2 Crow, 1 EUST	19	Pesticide poisoning	Diazinon	01-Nov-79	91
Surrey	COHA	1	Undetermined		22-Dec-82	134
Surrey	BAEA	1	Metal toxicosis	Lead / Mercury	01-Mar-86	167
Surrey	10 MALL, 1 AMWI, 1	12	Trauma	Gun shot	18-Nov-86	172
Surrey	CAGO	1	Metal toxicosis	Lead	15-May-87	181
Surrey	RODO	200	Pesticide poisoning	Fensulfothion G	17-Jun-87	187
Surrey	Wfow (MALL, CAGO)	6	Disease	Pneumonia/Necrosis/Enteritis	23-Dec-87	190
Surrey	NOPI	200	Infectious disease	Aspergillosis	28-Dec-89	217
Surrey	6 NOPI, 1 MALL	7	Undetermined		03-Jan-90	219
Surrey	AMRO, Finc	15	Undetermined		05-Jul-90	225
Surrey	Crow, RODO, Jay	3	Disease	Pneumonia / Air sacculitis	15-Nov-94	304
Trepheway	CAGO	1	Metal toxicosis	Lead	13-Jan-88	193
Tsawwassen	Finc	6	Infectious disease	Coccidiosis / Avian Pox	15-May-81	115
Tsawwassen	EVGR	1	Undetermined		25-May-81	118
Tsawwassen (golf course)	AMRO	1	Undetermined		05-Jul-90	224
Tsawwassen	Duck (4 CITE, 2 NOPI, 1 MALL)	9	Disease	Starvation	17-Jan-93	276
Tsawwassen	NOPI	6	Undetermined		12-Oct-94	300
Vancouver	Duck	1	Pesticide poisoning	Carbophenothion suspected	01-Jan-68	4
Vancouver	GBHE	1	Pesticide poisoning	Suspected	01-Jan-70	8

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Vancouver	RNPH	2	Pesticide poisoning	Diazinon	01-Oct-71	13
Vancouver	Duck	25	Pesticide poisoning	OP suspected	01-Dec-74	38
Vancouver	GBHE	1	Undetermined		17-Mar-77	64
Vancouver	NWCR	3	Undetermined		04-Oct-77	73
Vancouver (golf course)	GWTE, BUFF	2	Undetermined		22-Jan-80	99
Vancouver	MALL	1	Trauma	Gun shot	05-Nov-80	105
Vancouver	Finc	6	Infectious disease	Avian Pox	08-Nov-83	147
Vancouver	Duck	5	Undetermined		29-Mar-84	155
Vancouver	Hawk	1	Undetermined		30-Dec-86	174
Vancouver	2 MUSW, 1 Swan	3	Infectious disease	Avian Cholera	24-Apr-87	180
Vancouver	EUST	6	Undetermined		22-May-87	183
Vancouver	CAGO	1	Disease	Air sacculitis (non-viral)	22-May-87	184
Vancouver	2 EUST, 1 AMRO, 1 HETH, 1 Crow	5	Undetermined		17-Oct-90	233
Vancouver	TUSW	1	Undetermined		15-Nov-94	303
Vancouver - False Crk.	Gold	6	Undetermined		23-Feb-81	111
Vancouver - False Crk.	7 WEGR, 2 Duck, 1 CAGO	10	Undetermined		13-Mar-81	112
Vancouver - False Crk.	CAGO	2	Undetermined		07-Feb-92	253
Vancouver - Trout Lake	Merg	1	Disease	Peritonitis	27-Apr-82	127
Vancouver - Trout Lake	Merg	1	Disease	Starvation	27-Apr-82	127
Whiterock	NWCR	6	Trauma	Undetermined origin	31-Jan-77	62
Whiterock	Loon, Alci, Murr, Gull, PIGU)	5	Trauma	Drowned (fishing net)	16-Aug-78	85
Whiterock	SUSC	1	Undetermined		11-Mar-92	255
Whiterock - Crescent Beach	Scot	6	Undetermined		25-May-81	117
Whiterock - Crescent Beach	GWGU	18	Disease	Hydropericardium	06-Nov-90	236
Whiterock - Crescent Beach	1 COMU, 1 RHAU	2	Disease	Pneumonia	15-Aug-92	259
Whiterock - Crescent Beach	COMU	2	Trauma	Drowned (fishing net)	15-Aug-92	259
Whiterock - Crescent Beach	Duck (>COMU, RHAU)	27	Undetermined		15-Aug-92	259
Whiterock - Crescent Beach	Ducks (21 NOPI, 15 GWTE, 2 MALL, 1 AMWI, 1 SUSC)	83	Disease	Starvation	12-Jan-93	274
Region 3 - Thompson Nicola						
Interior BC	Pass	1	Pesticide poisoning	Suspected	01-Jan-73	22
Kamloops	TUSW	1	Trauma	Foreign body ingestion	02-Mar-94	293
Lillooet	Hawk	10	Undetermined		26-Sep-88	199

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Lillooet	COLO	1	Metal toxicosis	Lead	20-Nov-93	286
Region 4 - Kootney						
Creston	MALL	1000	Infectious disease	Aspergillosis	07-Dec-90	241
Kimberly (mine)	MALL	200	Undetermined		18-Nov-77	79
Windermere	GOEA	1	Disease	Starvation	25-Jul-90	226
Region 5 - Cariboo						
Williams Lake	BAEA	1	Pesticide poisoning	Dieldrin / DDT	01-Oct-70	9
Williams Lake - Westwick L.	EAGR	41	Trauma	Undetermined origin	16-Jun-86	169
Region 6 - Skeena						
Cassiar	Pass (2 WCSP, 2 DEJU, 1 GCTH, 1 SOSP)	6	Poisoning	Asbestos	01-May-74	29
Pacific Ocean (off Q.C.I.)	Seabird (RNGR, NOFU, Corm, Scot, Gull)	200	Undetermined		08-Nov-77	77
Prince Rupert	Pass (23 FOSP, 10 GCSP, 5 WIWA, 3 HETH, 2 OCWA , 1 LISP, 1 VATH)	500	Poisoning	Cyanogenic glucoside	23-Sep-71	12
Q.C.I	Pass	1	Pesticide poisoning	Phosphamidon suspected	01-Jan-63	1
Q.C.I. - Sandspit	BAEA	1	Trauma	Electrocution	01-Mar-82	122
Q.C.I. - Tlell	OLDS	1	Undetermined		11-Mar-82	125
Q.C.I. - Tlell River	TRUS	2	Metal toxicosis	Lead	04-Mar-82	124
Q.C.I. - Tlell River	7 MALL, 1 AMWI, 1 NOPI, 1 Loon	10	Undetermined		04-Mar-82	124
Smithers	GOEA	1	Trauma	Undetermined origin	25-Jun-90	222
Region 7 - Omineca Peace						
Chetwynd	COLO	1	Undetermined		01-Jun-88	197
Dawson Crk.	BBMA	2	Pesticide poisoning	Fenthion	06-Jan-92	252
Dawson Crk.	94 EVGR, 6 PISI	100	Undetermined		15-Aug-92	261
Fort Nelson (landfill)	GOEA	1	Disease	Starvation	18-Nov-89	215
Fort Saint John	RUGR	2	Metal toxicosis	Mercury suspected	12-Dec-69	7
Fort Saint John	Duck	100	Undetermined		12-Sep-84	161
Parsnip River	CAGO	1	Disease	Neurofibroma	30-Oct-82	132
Pinchi Lake	BEKI	1	Pesticide poisoning	DDT (Mercury sub-lethal exp.)	01-Aug-72	20
Prince George	EVGR	30	Undetermined		15-Aug-92	260
Prince George - Frost L.	GOEA	1	Trauma	Leg-hold trap	20-Dec-89	216
Region 8 - Okanagan						
Enderby	PISI	120	Trauma	Collision - vehicle	25-Dec-83	148

Provincial Region / Local Area	Species Code	No. of Deaths	Most probable cause of death: Major	Most probable cause of death: Sub-category	Date of Die-off	Record Number
Kelowna	WEGR	10	Trauma	Undetermined origin	10-May-76	52
Kelowna - Duck Lake	Duck	100	Undetermined		01-Sep-71	11
Osoyoos	CAGO	6	Undetermined		04-Mar-82	123
Osoyoos Lake (orchard)	AMCO	20	Pesticide poisoning	ANTU suspected	09-Mar-76	48
Osoyoos Lake (orchard)	MALL	1	Trauma	Gun shot	09-Mar-76	48
Penticton (orchard)	CAGO	8	Pesticide poisoning	Diazinon F	12-May-80	101
Penticton	CAGO	6	Pesticide poisoning	Diazinon	22-May-81	116
Penticton	Swan	1	Disease	Parasitism (mixed sp.)	23-Mar-84	154
Penticton	Swan	1	Trauma	Gun shot	23-Mar-84	154
Penticton - Okanagan L.	CAGO	6	Undetermined		29-Jan-82	120
Princton	GOEA	1	Trauma	Collision - vehicle	23-Jan-89	202
Summerland	CEWA	1	Undetermined		01-Feb-67	3
Summerland	CHUK	33	Pesticide poisoning	TEPP suspected	01-Oct-74	34
Vaseux Lake (orchard)	CAGO	100	Pesticide poisoning	Parathion	01-Jun-72	17
Vaseux Lake	CAGO	1	Pesticide poisoning	Endosulfan	01-May-73	23
Vernon - Kal Lake	Duck (>MALL), 1 Greb	101	Disease	Pneumonia / Aspergillosis	05-Nov-84	162
Vernon - Okanagan L.	CAGO	5	Pesticide poisoning	Diazinon suspected	03-Feb-82	121
Westbank - Okanagan L.	CAGO	1	Disease	Starvation	15-Apr-82	126
Winfield (orchard)	CAGO	8	Pesticide poisoning	Diazinon F	02-May-74	30
Region 9 - Yukon						
Dawson City	Bird (2 COSN, 2 SPSA, 1 Spar, 1 Warb)	10	Pesticide poisoning	Temephos G	22-May-76	53
Mayo	Duck	6	Undetermined		08-Aug-78	84
Ross River / Dawson City	Duck (NOPI)	18	Pesticide poisoning	Temephos G	08-May-77	70
Whitehorse	LALO	1	Undetermined		28-Apr-77	68
Whitehorse	7 LALO, 2 MOCH	9	Trauma	Collision - vehicle	03-May-77	69
Whitehorse	COSN	1	Undetermined		12-May-83	139
Whitehorse	COSN	1	Pesticide poisoning	Temephos	09-May-84	157
No Region Specified						
Not indicated	AMCO	2	Trauma	Undetermined origin	20-Feb-76	45
Not indicated	AMWI	1	Disease	Nephritis / Pericarditis	20-Feb-76	45
Not indicated	MALL	2	Metal toxicosis	Lead	20-Feb-76	45
Not indicated	MALL	1	Metal toxicosis	Lead	02-Apr-76	51
Not indicated	MALL	8	Undetermined		18-Aug-76	56
Not indicated	MALL	3	Infectious disease	Aspergillosis	19-Dec-77	80
Not indicated	Duck	3	Trauma	Gun shot	19-Dec-77	81

Provincial Region

Local Area	Species Code	No. of Deaths	Most probable cause of death		Date of Die-off	Record Number
			Major	Sub-category		
Not indicated	Hawk	1	Pesticide poisoning	Fensulfothion / Bromacil	02-Feb-81	108
Not indicated	Gull	1	Undetermined		02-Feb-81	109
Not indicated	MALL	4	Undetermined		12-Feb-81	110
Not indicated	Gull	3	Infectious disease	Aspergillosis	15-Apr-81	114
Not indicated	COMU	2	Undetermined		21-Jan-83	135
Not indicated	BAEA	2	Undetermined	(Mercury sub-lethal exposure)	25-Mar-83	136
Not indicated	BAEA	2	Undetermined		25-Mar-83	136
Not indicated	RUDU	1	Undetermined		05-Dec-84	163
Not indicated	AMRO	1	Trauma	Undetermined origin	30-Dec-86	175
Not indicated	MALL	1	Disease	Sacrosporidiosis	30-Dec-86	176
Not indicated	Gold	1	Undetermined		11-May-88	196
Not indicated	Loon	3	Undetermined		12-Aug-88	198
Not indicated	CAGO	2	Undetermined		23-Mar-89	205
Not indicated	AMRO	5	Disease	Necrosis (acute hepatic)	01-Feb-93	279

Appendix 8. Bird mortalities reported in British Columbia and the Yukon, 1963 - 1994, listed by most probable cause of death.

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Disease						
Air sacculitis (non-viral)	CAGO	1	2	Vancouver	22-May-87	184
Bacterial infection	GBHE	1	2	Delta - Westham Isl.	18-Mar-76	50
Bone marrow ailment	CAGO	1	1	Victoria (golf course)	14-Aug-90	227
Clostridiosis	MUSW	1	1	Victoria	10-Apr-84	156
Enteritis / Pneumonia	Duck (> MALL)	50	2	Hatzic Lake	30-Sep-89	212
Hydropericardium	GWGU	18	2	Whiterock - Crescent Beach	06-Nov-90	236
Hypovitaminosis A	TRUS	1	2	Maple Ridge	01-Jan-87	177
Liver hemorhage	Gull	1	2	Richmond	13-Jan-82	119
Liver rupture	GWGU	1	2	Richmond	25-Jan-90	220
Malnutrition	COMU	6	1	Juan de Fuca Strait	28-Oct-80	104
Mycotic infection	Duck, MEGU	40	2	Harrison Hot Springs	12-Nov-79	93
Myocarditis	GWGU	8	2	Delta - Boundary Bay	11-Sep-91	249
Necrosis (acute hepatic)	AMRO	5	0	Not indicated	01-Feb-93	279
Nephritis / Pericarditis	AMWI	1	0	Not indicated	20-Feb-76	45
Nephrosis	Gull (CAGU, GWGU)	20	2	Delta - Boundary Bay	01-Nov-90	235
Neurofibroma	CAGO	1	7	Parsnip River	30-Oct-82	132
Parasitism (mixed sp.)	Gull	6	1	Crofton	14-Sep-78	86
Parasitism (mixed sp.)	Swan	1	8	Penticton	23-Mar-84	154
Peritonitis	Merg	1	2	Vancouver - Trout Lake	27-Apr-82	127
Pneumonia	FWDU	1	2	Delta - Westham Isl.	29-Oct-82	131
Pneumonia	MALL	8	2	Langley	13-Jan-88	192
Pneumonia	1 COMU, 1 RHAU	2	2	Whiterock - Crescent Beach	15-Aug-92	259
Pneumonia / Air sacculitis	Crow, RODO, Jay	3	2	Surrey	15-Nov-94	304
Pneumonia / Aspergillosis	Duck (>MALL), 1 Greb	101	8	Vernon - Kal Lake	05-Nov-84	162
Pneumonia/Necrosis/Enteritis	Wfow (MALL, CAGO)	6	2	Surrey	23-Dec-87	190
Sacrosporidiosis	MALL	1	0	Not indicated	30-Dec-86	176
Starvation	CAGO	1	8	Westbank - Okanagan L.	15-Apr-82	126
Starvation	Merg	1	2	Vancouver - Trout Lake	27-Apr-82	127
Starvation	BNOW	1	2	Burrard Inlet	11-May-83	138
Starvation	GOEA	1	7	Fort Nelson (landfill)	18-Nov-89	215
Starvation	GOEA	1	2	Port Coquitlam - Tree Isl.	01-Feb-90	221
Starvation	GOEA	1	4	Windermere	25-Jul-90	226
Starvation	Swan	1	2	Delta - Westham Isl.	29-Nov-91	251

Most probable cause of death Major category Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Starvation	Ducks (21 NOPI, 15 GWTE, 2 MALL, 1 AMWI, 1 SUSC)	83	2	Whiterock - Crescent Beach	12-Jan-93	274
Starvation	Duck (4 CITE, 2 NOPI, 1 MALL)	9	2	Tsawwassen	17-Jan-93	276
Starvation	GBHE	1	2	Delta	17-Jan-93	277
Starvation	BNOW	36	2	Lower Fraser Valley	21-Jan-93	278
Starvation	GOEA	1	2	Pemberton	19-Jul-93	283
Infectious Disease						
Aspergillosis	Duck	5	1	Parksville	18-Oct-77	75
Aspergillosis	MALL, AMWI	40	1	Saanich	28-Oct-77	76
Aspergillosis	MALL	3	0	Not indicated	19-Dec-77	80
Aspergillosis	15 Duck (3 MALL, 1 NOPI, 1 WEGR, 1 Teal, 1 Sea Duck), 4 Gull	19	2	Delta - Boundary Bay	08-Nov-80	106
Aspergillosis	GWGU	9	2	New Westminster	03-Apr-81	113
Aspergillosis	Gull	3	0	Not indicated	15-Apr-81	114
Aspergillosis	MALL	15	2	Sumas Prairie	22-Sep-83	144
Aspergillosis	Gull	24	2	Richmond	13-Mar-84	151
Aspergillosis	MALL	7	2	Aldergrove	05-Dec-85	166
Aspergillosis	Swan	1	2	Sumas	08-Mar-88	194
Aspergillosis	166 MALL, 1 NOPI	167	1	Saanich	20-Oct-89	214
Aspergillosis	NOPI	200	2	Surrey	28-Dec-89	217
Aspergillosis	MALL	1000	4	Creston	07-Dec-90	241
Aspergillosis	TUSW	1	2	Abbotsford - Judson L.	29-Feb-92	254
Aspergillosis	19 STJA, 1 NOFL	20	1	Ladysmith to Qualicum	01-Sep-92	263
Aspergillosis	MALL	3	2	Sardis	26-Oct-92	268
Avian Cholera	2 MUSW, 1 Swan	3	2	Vancouver	24-Apr-87	180
Avian Cholera	GWTE	1	1	Saanich	20-Oct-89	214
Avian Pox	Finc	6	2	Vancouver	08-Nov-83	147
Avian Pox	EUST	3	2	Ladner	27-Oct-93	285
Avian Pox	Finc	7	2	Burnaby	17-Sep-94	299
Coccidiosis / Avian Pox	Finc	6	2	Tsawwassen	15-May-81	115
Salmonella	Pass (> PISI, EVGR, HOSP)	200	1	central Vancouver Island	01-Nov-92	269
Salmonella	Pass (> PISI, EVGR, HOSP)	800	2	Lower Fraser Valley	01-Nov-92	269
Metal Poisoning						
Lead	MALL	2	0	Not indicated	20-Feb-76	45
Lead	MALL	1	0	Not indicated	02-Apr-76	51
Lead	TRUS	2	6	Q.C.I. - Tlell River	04-Mar-82	124

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Lead	MALL	3	2	Delta (landfill)	03-Oct-83	145
Lead	CAGO	5	2	Abbotsford - Judson L.	09-Sep-85	164
Lead	CAGO	1	2	Surrey	15-May-87	181
Lead	CAGO	2	2	Pitt Polder	15-May-87	182
Lead	CAGO	1	2	Pitt Polder	06-Aug-87	188
Lead	CAGO	1	2	Trepheway	13-Jan-88	193
Lead	Swan	1	2	Sumas	08-Mar-88	194
Lead	CAGO	3	1	Victoria	18-Nov-90	239
Lead	GWGU	1	2	Delta - Boundary Bay	23-Jan-91	244
Lead	TRUS	29	2	Abbotsford - Judson L.	29-Feb-92	254
Lead	MALL	1	2	Ladner	08-Sep-92	264
Lead	CAGO	1	2	Abbotsford - Judson L.	27-Sep-92	266
Lead	COLO	1	3	Lillooet	20-Nov-93	286
Lead	TUSW	1	2	Dewdney	03-Mar-94	294
Lead / Mercury	BAEA	1	2	Surrey	01-Mar-86	167
Mercury	GBHE	1	1	Victoria	01-Jan-72	15
Mercury	GBHE	1	2	Powell River	01-Jan-76	44
Mercury suspected	RUGR	2	7	Fort Saint John	12-Dec-69	7
Oil Spill						
	Seabirds (Loon, COMU, RNGR, HOGR, WWSC, PIGU, MEGU, GWGU)	40000	1	Pacific Ocean (off Tofino)	01-Dec-88	201
Other						
Fell from nest	GBHE	1	2	Maple Ridge	08-Jun-77	71
Fell from nest	GBHE	1	2	Sechelt	25-Jun-79	88
Mischief (with oil)	Gull	6	2	Delta - Deas Island	29-Nov-90	240
Orphaned	Swal	3	2	Maple Ridge	26-Aug-77	72
Pesticide Poisoning						
ANTU suspected	AMCO	20	8	Osoyoos Lake (orchard)	09-Mar-76	48
Carbofuran	100 GWGU, 1 Crow	101	2	Chilliwack (landfill)	09-Nov-94	302
Carbofuran F	NOPI, MALL, GWTE	100	2	Not indicated	01-Jan-77	61
Carbofuran F	CAGO	40	2	Richmond	14-Aug-89	209
Carbofuran G	Duck (> NOPI, > MALL, 1 AMWI, 1 GWTE), 1 Hawk	60	2	Richmond	15-Dec-73	26
Carbofuran G	Duck (34 AMWI, 19 NOPI, 2 MALL, 1 GWTE), 1 GWGU	80	2	Ladner	25-Nov-74	37

Most probable cause of death Major category Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Carbofuran G	1000 GWTE, 1 Hawk	1001	2	Ladner	23-Oct-75	42
Carbofuran G	NOPI, MALL	50	2	Fraser Valley	01-Jan-77	60
Carbofuran G	Spar (> SAVS, LISP)	1178	2	Richmond	16-Sep-86	171
Carbophenothion suspected	Duck	1	2	Vancouver	01-Jan-68	4
DDT (Mercury sub-lethal exp.)	BEKI	1	7	Pinchi Lake	01-Aug-72	20
Diazinon	RNPH	2	2	Vancouver	01-Oct-71	13
Diazinon	AMWI, MALL	17	1	Victoria	15-Mar-76	49
Diazinon	Duck (> Scau, MALL)	30	2	Matsqui	15-Apr-77	65
Diazinon	16 Gull, 2 Crow, 1 EUST	19	2	Surrey (landfill)	01-Nov-79	91
Diazinon	Duck (> AMWI, MALL)	37	2	Powell River	16-Jan-81	107
Diazinon	CAGO	6	8	Penticton	22-May-81	116
Diazinon	CAGO	11	2	Mission - Ruskin Lake	16-Jun-83	140
Diazinon	AMWI	1	1	Victoria	10-Apr-84	156
Diazinon F	CAGO	8	8	Winfield (orchard)	02-May-74	30
Diazinon F	Bird (1 GWGU, 2 BRBL)	6	1	Victoria	09-Apr-75	40
Diazinon F	CAGO	8	8	Penticton (orchard)	12-May-80	101
Diazinon F	MALL	18	2	Delta (golf course)	19-Nov-85	165
Diazinon suspected	Duck	5	2	Langley	01-Jun-72	18
Diazinon suspected	CAGO	5	8	Vernon - Okanagan L.	03-Feb-82	121
Dieldrin / DDT	BAEA	1	5	Williams Lake	01-Oct-70	9
Endosulfan	CAGO	1	8	Vaseux Lake	01-May-73	23
Endosulfan	Pass	1	2	Delta	14-Aug-76	55
Fenitrothion	Pass	6	2	Richmond	01-Mar-76	47
Fensulfothion	CAGO	12	2	Aldergrove	26-Jul-82	128
Fensulfothion	21 AMRO, 2 EUST, 1 HOFI	24	2	Richmond	13-Aug-82	130
Fensulfothion	EUST	12	2	Delta - Westham Isl.	05-Oct-83	146
Fensulfothion / Bromacil	Hawk	1	0	Not indicated	02-Feb-81	108
Fensulfothion / Parathion	67 MALL, 19 NOPI, 3 AMWI	89	2	Ladner	27-Jan-94	292
Fensulfothion G	Duck (> MALL, > NOPI, Teal)	200	2	Richmond	03-Dec-79	97
Fensulfothion G	RODO	200	2	Surrey	17-Jun-87	187
Fenthion	BBMA	2	7	Dawson Crk.	06-Jan-92	252
Malathion suspected	BNSW	1	2	Burnaby	01-Aug-72	21
MCPA suspected	MUSW	1	1	Victoria	01-Aug-66	2
Methamidophos	Goos	5	2	Delta	13-Oct-79	90
OP or Carbamate	20 COGO, 1 LESC	21	2	Burrard Inlet	19-Dec-73	27
OP or Carbamate	EUST	20	2	Ladner	21-Aug-92	262

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
OP or Carbamate	Crow	1	2	Sardis	26-Oct-92	268
OP or Carbamate suspected	AMGO	8	2	Pitt Meadows	10-Sep-92	265
OP suspected	Duck	25	2	Vancouver	01-Dec-74	38
OP suspected	CAGO	20	1	Victoria (golf course)	04-Aug-91	248
Parathion	CAGO	100	8	Vaseux Lake (orchard)	01-Jun-72	17
Phosphamidon suspected	Pass	1	6	Q.C.I	01-Jan-63	1
Strychnine	NWCR	6	2	Burnaby	23-Mar-83	137
Suspected	GBHE	1	2	Vancouver	01-Jan-70	8
Suspected	Pass	1	3	Interior BC	01-Jan-73	22
Suspected	PISI	54	2	Sardis	12-Sep-90	228
Suspected	AMWI	1	2	Ladner	18-Dec-93	288
Temephos	COSN	1	9	Whitehorse	09-May-84	157
Temephos G	Bird (2 COSN, 2 SPSA, 1 Spar, 1 Warb)	10	9	Dawson City	22-May-76	53
Temephos G	Duck (NOPI)	18	9	Ross River / Dawson City	08-May-77	70
TEPP suspected	CHUK	33	8	Summerland	01-Oct-74	34
Poisoning						
Asbestos	Pass (2 WCSP, 2 DEJU. 1 GCTH, 1 SOSP)	6	6	Cassiar	01-May-74	29
Cyanogenic glucoside	Pass (23 FOSP, 10 GCSP, 5 WIWA, 3 HETH, 2 OCWA, 1 LISP, 1 VATH)	500	6	Prince Rupert	23-Sep-71	12
PCBs	Corm	1	2	Burrard Inlet	22-Mar-86	168
Suspected	EVGR	5	2	Richmond	15-Sep-79	89
Trauma						
Collision - vehicle	7 LALO, 2 MOCH	9	9	Whitehorse	03-May-77	69
Collision - vehicle	Pass (>EVGR, PISI)	1000	2	Manning Park/Skagit Valley	07-Jun-80	102
Collision - vehicle	PISI	120	8	Enderby	25-Dec-83	148
Collision - vehicle	GOEA	1	8	Princton	23-Jan-89	202
Collision - vehicle	RTHA	1	2	Abbotsford	26-Sep-90	230
Drowned (fishing net)	Loon, Alci, Murr, Gull, PIGU	5	2	Whiterock	16-Aug-78	85
Drowned (fishing net)	COMU	70	1	Juan de Fuca Strait	11-Aug-82	129
Drowned (fishing net)	Greb	40	2	Point Roberts	04-Aug-83	141
Drowned (fishing net)	COMU	12	1	Sooke	11-Sep-83	143
Drowned (fishing net)	COMU	500	1	Sooke	08-Oct-90	231
Drowned (fishing net)	COMU	2	2	Whiterock - Crescent Beach	15-Aug-92	259

Most probable cause of death Major category Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Drowned (fishing net)	BRCO	30	1	Pacific Rim National Park	21-Mar-94	296
Drowned (fishing net)	PALO	1	1	Nanaimo - Green L.	25-Oct-94	301
Electrocution	BAEA	1	6	Q.C.I. - Sandspit	01-Mar-82	122
Electrocution (Mercury sub-lethal exposure)	BAEA	1	1	Alert Bay	16-Jun-86	170
Esophageal impaction	Gull	1	2	Delta	07-Dec-90	242
Esophageal impaction	Swan	1	2	Harrison Hot Springs	11-Apr-91	247
Fishing line entanglement	GBHE	1	2	Fort Langley	19-Apr-77	66
Foreign body ingestion	TUSW	1	3	Kamloops	02-Mar-94	293
Gun shot	MALL	1	8	Osoyoos Lake (orchard)	09-Mar-76	48
Gun shot	GBHE	4	2	Cultus Lake	01-Feb-77	63
Gun shot	Duck	3	0	Not indicated	19-Dec-77	81
Gun shot	MALL	1	2	Richmond	22-Dec-78	87
Gun shot	Duck (1 AMWI, 1 BAGO)	8	1	Victoria	04-Nov-79	92
Gun shot	MALL	5	2	Richmond	01-Dec-79	94
Gun shot	GBHE	2	2	Cultus Lake	03-Dec-79	95
Gun shot	MALL	1	2	Vancouver	05-Nov-80	105
Gun shot	Swan	1	8	Penticton	23-Mar-84	154
Gun shot	AMWI	1	1	Victoria	10-Apr-84	156
Gun shot	10 MALL, 1 AMWI, 1 NOPI	12	2	Surrey	18-Nov-86	172
Gun shot	GBHE	1	2	Richmond	28-Oct-87	189
Gun shot	SNGO	1	2	Delta - Westham Isl.	14-Mar-88	195
Gun shot	Gull	3	2	Sardis	23-Nov-92	271
Gun shot	TUVU	1	1	Cedar - Harmac	19-Sep-93	284
Gun shot	TUSW	1	2	Ladner	08-Jan-94	290
Leg-hold trap	GOEA	1	7	Prince George - Frost L.	20-Dec-89	216
Predation	4 AMRO, 1 CEWA	5	2	East Vancouver	13-Oct-92	267
Undetermined origin	AMCO	2	0	Not indicated	20-Feb-76	45
Undetermined origin	WEGR	10	8	Kelowna	10-May-76	52
Undetermined origin	NWCR	6	2	Whiterock	31-Jan-77	62
Undetermined origin	RNPH	11	2	Richmond	01-Dec-79	94
Undetermined origin	EAGR	41	5	Williams Lake - Westwick L.	16-Jun-86	169
Undetermined origin	AMRO	1	0	Not indicated	30-Dec-86	175
Undetermined origin	Phea	1	2	Richmond	25-May-87	186
Undetermined origin	AMCO	1	1	Saanich	20-Oct-89	214
Undetermined origin	GOEA	1	6	Smithers	25-Jun-90	222

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
Undetermined origin	GOEA	1	1	Wild Deer Lake	26-Jun-90	223
Undetermined origin	Gull	1	2	Delta	10-Dec-90	243
Undetermined origin	Crow	1	1	Victoria (golf course)	04-Aug-91	248
Undetermined origin	GWGU	50	2	Coquitlam	03-Feb-93	280
Undetermined						
(Lead sub-lethal exposure)	CAGO	1	2	Maple Ridge	27-Mar-87	179
(Mercury/DDT sub-lethal exp)	BAEA	1	1	Campbell River	01-Jul-73	24
(Mercury sub-lethal exposure)	GBHE	1	1	Alberni Valley	01-Nov-70	10
(Mercury sub-lethal exposure)	BAEA	1	1	Pender Island	01-Jun-72	19
(Mercury sub-lethal exposure)	OSPR	1	1	Victoria	01-Oct-73	25
(Mercury sub-lethal exposure)	COHA	1	1	Metchosin	01-Feb-74	28
(Mercury sub-lethal exposure)	BAEA	2	0	Not indicated	25-Mar-83	136
	CEWA	1	8	Summerland	01-Feb-67	3
	1 NOPI,1 COGO,2 BUFF	4	1	Cowichan Bay	01-Jan-68	5
	AMWI	2	1	Saanich	01-Feb-68	6
	Duck	100	8	Kelowna - Duck Lake	01-Sep-71	11
	Duck (1 NOPI)	30	2	Richmond	01-Nov-71	14
	Gull	6	2	New Westminster	01-Apr-72	16
	BAEA	1	1	Port Hardy	01-Aug-74	31
	BAEA	1	1	Port Hardy	01-Sep-74	32
	COHA	1	1	Saltspring Isl.	01-Oct-74	33
	BAEA	1	1	Port Hardy	01-Nov-74	35
	GHOW	1	1	Victoria	01-Nov-74	36
	BAEA	1	1	Port Hardy	01-Jan-75	39
	Spar	1	2	Fraser Valley	01-Jul-75	41
	Pass	6	2	New Westminster	15-Dec-75	43
	Seabirds (NOFU, Gull, Sea Duck, PIGU)	20	1	Pacific Ocean (off Uclulet)	20-Feb-76	46
	CAGO, MALL, CONI, EUST	4	2	Burnaby Lake	08-Jul-76	54
	MALL	8	0	Not indicated	18-Aug-76	56
	GBHE	2	2	Delta - Westham Isl.	31-Aug-76	57
	Duck	1	2	Richmond	10-Sep-76	58
	GBHE	1	1	Campbell River	02-Oct-76	59
	GBHE	1	2	Vancouver	17-Mar-77	64
	Greb	2	2	Surrey - Serpentine Fen	19-Apr-77	67
	LALO	1	9	Whitehorse	28-Apr-77	68

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
	NWCR	3	2	Vancouver	04-Oct-77	73
	Duck	12	1	Priest Lake	11-Oct-77	74
	Seabird (RNGR, NOFU, Corm, Scot, Gull)	200	6	Pacific Ocean (off Q.C.I.)	08-Nov-77	77
	Duck (NOPI, MALL, GWTE) Gull (HEGU, RBGU)	80	2	Delta	14-Nov-77	78
	MALL	200	4	Kimberly (mine)	18-Nov-77	79
	WEGR	1	1	Port Alberni	20-Jan-78	82
	Gull	1	1	Sooke	15-Apr-78	83
	Duck	6	9	Mayo	08-Aug-78	84
	2 GBHE, 1 MALL	3	2	Delta	03-Dec-79	96
	GBHE	1	2	Richmond	11-Dec-79	98
	GWTE, BUFF	2	2	Vancouver (golf course)	22-Jan-80	99
	GBHE	1	2	Delta	05-Feb-80	100
	AMCO	1	2	Not indicated	21-Oct-80	103
	Gull	1	0	Not indicated	02-Feb-81	109
	MALL	4	0	Not indicated	12-Feb-81	110
	Gold	6	2	Vancouver - False Crk.	23-Feb-81	111
	7 WEGR, 2 Duck, 1 CAGO	10	2	Vancouver - False Crk.	13-Mar-81	112
	Scot	6	2	Whiterock - Crescent Beach	25-May-81	117
	EVGR	1	2	Tsawwassen	25-May-81	118
	CAGO	6	8	Penticton - Okanagan L.	29-Jan-82	120
	CAGO	6	8	Osoyoos	04-Mar-82	123
	7 MALL, 1 AMWI, 1 NOPI, 1 Loon	10	6	Q.C.I. - Tlell River	04-Mar-82	124
	OLDS	1	6	Q.C.I. - Tlell	11-Mar-82	125
	GBHE	2	2	Pender Harbour	17-Nov-82	133
	COHA	1	2	Surrey	22-Dec-82	134
	COMU	2	0	Not indicated	21-Jan-83	135
	BAEA	2	0	Not indicated	25-Mar-83	136
	COSN	1	9	Whitehorse	12-May-83	139
	Swal	3	2	Cultus Lake	05-Aug-83	142
	Gull	1	2	Delta - Westham Isl.	12-Mar-84	149
	NWCR	6	1	Victoria	12-Mar-84	150
	AMRO	8	2	Chilliwack	23-Mar-84	152
	SSHA	1	1	Sidney	23-Mar-84	153
	Duck	5	2	Vancouver	29-Mar-84	155

Most probable cause of death Major category Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
	Wfow	20	1	Victoria	10-Apr-84	156
	Duck	6	2	Ladner	15-Jun-84	158
	5 Greb, 1 Gull, 1Wfow	7	1	Esquimalt	17-Aug-84	159
	CAAU	600	1	Pacific Ocean	07-Sep-84	160
	Duck	100	7	Fort Saint John	12-Sep-84	161
	RUDU	1	0	Not indicated	05-Dec-84	163
	6 NWCR, 1 AMRO	7	2	Richmond	21-Nov-86	173
	Hawk	1	2	Vancouver	30-Dec-86	174
	Spar	12	2	Richmond	05-Jan-87	178
	EUST	6	2	Vancouver	22-May-87	183
	CAGO	3	2	Indian Arm	25-May-87	185
	EUST	56	2	Langley	07-Jan-88	191
	Gold	1	0	Not indicated	11-May-88	196
	COLO	1	7	Chetwynd	01-Jun-88	197
	Loon	3	0	Not indicated	12-Aug-88	198
	Hawk	10	3	Lillooet	26-Sep-88	199
	EUST, AMRO	200	2	Langley	05-Oct-88	200
	GOEA	1	1	Read Island	27-Feb-89	203
	3 BAEA, 2 GWGU	5	2	Delta (landfill)	17-Mar-89	204
	CAGO	2	0	Not indicated	23-Mar-89	205
	CAGO	30	1	Victoria	01-May-89	206
	Pass (AMRO, Swal)	6	2	Richmond	01-Jul-89	207
	CAGO	7	1	Victoria (golf course)	20-Jul-89	208
	Seabirds (60 CAGU, 8 GWGU, 2 HEGU, 1 MEGU, 1 HEEG, 21 COMU, 1 PIGU, 10 RHAU, 1 TUPU, 2 MAMU, 2 WWSC, 12 BRCO, 1 SOSH, 1 RTLO)	123	1	Pacific Rim National Park	30-Aug-89	210
	Quail	25	1	Saltspring Isl.	01-Sep-89	211
	COHA	1	1	Nanaimo	19-Oct-89	213
	GRHE	1	1	Saanich	20-Oct-89	214
	BNOW	2	2	Richmond (airport)	03-Jan-90	218
	6 NOPI, 1 MALL	7	2	Surrey	03-Jan-90	219
	AMRO	1	2	Tsawwassen (golf course)	05-Jul-90	224
	AMRO, Finc	15	2	Surrey	05-Jul-90	225
	CAGO	4	1	Victoria (golf course)	14-Aug-90	227

Most probable cause of death **Major category** Sub-category	Species code	No. of Deaths	Prov. Region	Local Area	Date of Die-off	Record Number
	Corm	1	1	Rocky Point	14-Sep-90	229
	Duck	6	2	Delta - Boundary Bay	15-Oct-90	232
	2 EUST, 1 AMRO, 1 HETH, 1 Crow	5	2	Vancouver	17-Oct-90	233
	2 Duck, 2 MALL, 1 NOSL	5	2	New Westminster	20-Oct-90	234
	WEGR	1	2	Delta - Boundary Bay	01-Nov-90	235
	Gull	1	2	Delta - Boundary Bay	09-Nov-90	237
	Gull	12	2	Delta - Boundary Bay	11-Nov-90	238
	Gull	2	2	Delta	10-Dec-90	243
	GWGU	70	1	Pacific Rim National Park	05-Feb-91	245
	VATH	4	1	Quadra Isl.	02-Apr-91	246
	Crow	1	1	Victoria (golf course)	04-Aug-91	248
	Gull	16	2	Richmond	11-Sep-91	250
	CAGO	2	2	Vancouver - False Crk.	07-Feb-92	253
	COGO	1	2	Abbotsford - Judson L.	29-Feb-92	254
	SUSC	1	2	Whiterock	11-Mar-92	255
	MALL	1	2	Langley	23-May-92	256
	EUST	11	2	Delta (airport)	30-Jun-92	257
	GBHE	2	2	Sunshine Coast	23-Jul-92	258
	Duck (>COMU, RHAU)	27	2	Whiterock - Crescent Beach	15-Aug-92	259
	EVGR	30	7	Prince George	15-Aug-92	260
	94 EVGR, 6 PISI	100	7	Dawson Crk.	15-Aug-92	261
	OLDS	1	2	Richmond	04-Nov-92	270
	Gull	6	2	Burnaby	24-Dec-92	272
	AMRO	9	1	Victoria	15-Jan-93	275
	RODO, NWCR, Gull	15	2	Langley	22-Feb-93	281
	7 AMRO, 1 Pass	8	1	Victoria	16-Mar-93	282
	PISI	12	1	Brentwood Bay	01-Jan-93	273
	CAGO	1	2	Langley	12-Dec-93	287
	GBHE	3	2	Delta (airport)	20-Dec-93	289
	DUNL	3	2	Delta	12-Jan-94	291
	Duck	1	2	Fraser River	05-Mar-94	295
	MALL	1	2	Delta - Westham Isl.	23-Aug-94	297
	RODO	20	2	Matsqui	07-Sep-94	298
	NOPI	6	2	Tsawwassen	12-Oct-94	300
	TUSW	1	2	Vancouver	15-Nov-94	303

APPENDIX 9. Individual records of bird mortalities reported in British Columbia and the Yukon, 1963-1994.

Record number: 1 1-Jan-63

Species and numbers: >1 Passerine

Location: Region 6. Queen Charlotte Islands

Comments: This record was found on a hand written note by CWS listing bird kills caused by pesticides. It indicates that birds had died from Phosphamidon poisoning in 1963 and 1964. No lab reports or additional details were attached.

Probable cause of death: Pesticide poisoning - Phosphamidon suspected

Record number: 2 1-Aug-66

Species and numbers: >1 Mute Swan

Location: Region 1. Victoria - Beacon Hill Park

Comments: Friis (1974): This cygnet was suspected herbicide poisoning (MCPA). No other information was included. [Authors note: It is unlikely that the swan was poisoned by MCPA since it is not acutely toxic; the oral LD_{50} for female chickens is 816 mg/kg (National Research Council. 1977-1987. Drinking Water and Health. Vol 1-7. National Academy Press. Washington, DC). However, since insufficient information was included in the report to rule out toxicosis, we left the probable cause of death as being suspected of poisoning by MCPA.]

Toxicology: Friis (1974) liver & fat: opDDT, ppDDT, DDE, DDD, total DDT - ND

Probable cause of death: Pesticide poisoning - MCPA suspected

Record number: 3 1-Feb-67

Species and numbers: >1 Cedar Waxwing

Location: Region 8. Summerland

Comments: This record was found in a CWS note listing bird kills caused by pesticides and also in Friis (1974). The date of these two sources differ by one month, but given they are the same species and both concern DDT, we assumed they represented the same event. The CWS note simply stated "DDT on apples". [Authors note: It is unlikely that the songbird died from DDT when the gizzard contents contained 2.8 ppm - see Section 4.4, organochlorine pesticides].

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT
fat	ND	0.805	0.597	0.104	1.506
gizzard contents	ND	0.214	2.570	ND	2.784

Probable cause of death: Undetermined

Record number: 4 1-Jan-68

Species and numbers: >1 Duck

Location: Region 2. Vancouver - Stanley Park

Comments: This record was found in a CWS note listing bird kills caused by pesticides. It indicated that the birds had died from Trithion (Carbophenothion). No lab reports or additional details were attached.

Probable cause of death: Pesticide poisoning - Carbophenothion suspected

Record number: 5 1-Jan-68

Species and numbers: 1 Northern Pintail, 1 Common Goldeneye, 2 Bufflehead

Location: Region 1. Cowichan Bay

Comments: Friis (1974): Ducks were found dead at Cowichan Bay after use of Benzene Hexachloride to control ambrosia beetle. The spraying was mainly at Cowichan Lake but also at Comox Lake and coastal locations.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT
Pintail - brain	ND	ND	0.014	ND	0.014
- liver	ND	ND	0.013	0.068	0.081
Goldeneye - brain	ND	ND	0.012	ND	0.012
- liver	ND	ND	0.006	ND	0.006
Goldeneye - muscle	ND	ND	0.008	ND	0.008
Bufflehead - liver	ND	ND	0.017	ND	0.017
- muscle	ND	ND	0.002	ND	0.002

Probable cause of death: Undetermined

Record number: 6 1-Feb-68

Species and numbers: >2 American Wigeon

Location: Region 1. Saanich - Canoe Cove

Comments: Friis (1974): Waterfowl mortality. No additional information was included.

Toxicology: Friis (1974) pool of two samples

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin
fat	ND	0.332	0.170	0.530	1.032	0.058
liver	ND	0.133	0.077	0.167	0.377	0.129

Probable cause of death: Undetermined

Record number: 7 12-Dec-69

Species and numbers: 2 Ruffed Grouse

Location: Region 7. Fort St. John

Comments: This listing was found in a CWS summary sheet of bird kills and also in Friis (1974). The CWS summary sheet reported that the birds had died from mercury poisoning. No lab reports or additional details were attached.

Toxicology: Friis (1974) liver: ppDDT, DDE, DDD, total DDT - ND

Probable cause of death: Metal toxicosis - Mercury suspected

Record number: 8 1-Jan-70

Species and numbers: > 1 Great Blue Heron

Location: Region 2. Vancouver - South Vancouver Colony [UBC??]

Comments: This listing was found in a CWS note listing bird kills caused by pesticides. It indicates that herons were poisoned between 1970 and 1972 but no specific pesticide was listed. No lab reports or additional details were attached.

Probable cause of death: Pesticide poisoning - Suspected

Record number: 9 1-Oct-70

Species and numbers: 1 Bald Eagle

Location: Region 5. Williams Lake

Comments: Friis (1974): Bird was found dead and submitted to BCEnv for analysis. No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Hg
liver	ND	3.72	179.40	8.19	191.31	23.70	0.01
muscle	0.76	1.22	92.80	2.29	97.07	ND	-

Probable cause of death: Pesticide poisoning - Dieldrin and DDT

Record number: 10 1-Nov-70

Species and numbers: 1 Great Blue Heron

Location: Region 1. Alberni Valley

Comments: Friis (1974): No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Hg
liver	0.73	2.87	1.52	1.52	6.64	ND	7.80
muscle	0.05	0.19	0.13	0.13	0.50	ND	-

Probable cause of death: Undetermined [Mercury - sub-lethal exposure]

Record number: 11 1-Sep-71

Species and numbers: 100 Ducks

Location: Region 8. Kelowna - Duck Lake

Comments: This record was found in a CWS summary sheet of bird kills. No lab reports or additional details were attached.

Probable cause of death: Undetermined

Record number: 12 23-Sep-71

Species and numbers: 200-500 Passerines - a sub-sample of 45 birds included 23 Fox Sparrows, 10 Golden-crowned Sparrows, 5 Wilson Warblers, 3 Hermit Thrushes, 2 Orange-crowned Warblers, 1 Lincoln's Sparrow and 1 Varied Thrush.

Location: Region 6. Prince Rupert - Roosevelt Park & 4th Ave West

Comments: CWS Report, Friis (1974): Local residents reported unusual bird behaviour; birds were crashing into windows and buildings and making strange noises during the night. There were reports of strong odors from the pulp mill located west of Prince Rupert. At the time of the die-off, there was an intense temperature inversion (43°F at water surface, 63°F at 3,000 feet) causing extensive fog with little air movement. An unconfirmed Federal Fisheries Water Analysis Report indicated higher than normal H_2S levels. One report indicated that leaves on trees were spotted with dead patches. The notes suggested some form of environmental toxin, either pesticide or industrial emission, were responsible for the bird deaths.

Lab Report: Field post-mortem: A Conservation Officer examined 5 Fox Sparrows and Hermit Thrushes on-site. All birds had internal hemorrhaging, especially in the lungs and liver. Fat deposition appeared normal. Three of the five birds had liver damage. Animal Pathology Report (agency was not stated): Eight birds were received; six birds had been examined previously. All birds were in good physical condition with adequate fat deposits. The Varied Thrush had mountain ash berries in its gizzard. There were seeds in the gizzards of the two Sparrows. Gizzards containing unknown seeds were submitted to Agriculture Canada, but they were too digested for identification. Most gizzards were stained deep purple. A number of birds had catarrhal inflammation in their intestinal tract. All birds had hemorrhages along the suture lines of the cranium and in the trachea. One bird had internal hemorrhages. Impact trauma was the probable cause of the hemorrhages. The musculature of all of the birds was extremely cyanotic. The cyanotic appearance of the birds suggest that cyanide, or a related poison, was the cause of the die-off. Since most of the birds had empty gizzards, it suggests the birds were not dying at the source of the poison. If an active cyanide compound was involved, the rapidity of its action would cause death within a very short time after ingestion. Note: In its normal state, cyanogenic glucoside is a non-toxic form of cyanide. However, enzymes in the crop and gizzard convert cyanogenic glucoside to the active acid. This transformation would likely be stimulated by the increased metabolic activity during flying from the feeding area to roosting area. The level of cyanogenic glucosides may be elevated in: wilted or frost-bitten plants; young plants when Fall rains have caused rapid growth after summer drought; plants exposed to herbicides. Animals indigenous to an area where cyanogenic glucosides are common frequently develop considerable tolerance for the glucoside, whereas animals newly introduced maybe more susceptible.

Toxicology: BCEnv gizzard contents (composite sample):15-200 ppm cyanide. A note indicated that tissues were sent to the CWS Pesticide Section in Ottawa for OP/Carbamate analysis but no results were in the file. Friis (1974): Various tissues (fat, muscle, liver, brain, hexane rinse of gizzard) of 9 Passerines were analyzed for ppDDT, DDE, DDD, total DDT, HE, Dieldrin, OPs; all were ND. Lead was detected in the liver of 2 Passerines (1.70 ppm and 1.56 ppm). A trace amount of arsenic was found in the liver of another Passerine.

Probable cause of death: Poisoning - Cyanogenic glucoside (natural plant toxin)

Record number: 13 1-Oct-71

Species and numbers: 2 Ring-necked Pheasants

Location: Region 2. Vancouver - University of British Columbia (UBC)

Comments: This record was found in Friis (1974) as well as a CWS summary sheet of bird kills. Friis (1974) recorded the incident to have occurred in October 1971 whereas the CWS summary sheet recorded it in November 1971. We considered them to be the same event since the species, number of individuals and location are the identical in both reports and Diazinon was listed as cause of death in the CWS report and was identified in the analytical results in Friis (1974).

Toxicology: Friis (1974) tissues listed in table: opDDT, ppDDT, DDD, Dieldrin - ND

	DDE	total DDT	Diazinon	Pb	Hg
hexane rinse	ND	ND	2.10	-	-
mouth contents	ND	ND	ND	-	-
crop contents	ND	ND	5.78	-	-
gizzard contents	0.04	0.04	7.74	-	-
gizzard contents	ND	ND	6.90	-	-
muscle	ND	ND	ND	-	-
fat	0.02	0.02	ND	-	-
liver	0.08	0.08	ND	-	-
liver	0.09	0.09	ND	ND	0.03

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 14 1-Nov-71

Species and numbers: 20-30 Ducks [Northern Pintail ??]

Location: Region 2. Richmond

Comments: This record was found in a CWS summary sheet of bird kills and in Friis (1974).

Toxicology: Friis (1974) One male Northern Pintail.

	opDDT	ppDDT	DDE	DDD	total DDT	Chlordane	Pb	Hg
liver	ND	ND	ND	ND	-	ND	ND	0.10
fat	ND	0.46	0.60	0.16	1.22	ND	-	-
crop contents	ND	ND	ND	ND	ND	ND	-	-
hexane rinse	ND	ND	ND	ND	ND	ND	-	-

Probable cause of death: Undetermined

Record number: 15 1-Jan-72

Species and numbers: 1 Great Blue Heron

Location: Region 1. Victoria

Comments: Friis (1974): No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	PCB 1260	Hg
liver	1.62	2.70	1.31	1.51	7.14	13.28	30.0
muscle	0.32	0.66	0.54	0.53	2.05	2.22	-

Probable cause of death: Metal toxicosis - Mercury

Record number: 16 1-Apr-72

Species and numbers: 6 Gulls

Location: Region 2. New Westminster - BC Pen. [Penitentiary??]

Comments: This record was found in a CWS summary sheet of bird kills. No lab reports or additional details were attached.

Probable cause of death: Undetermined

Record number: 17 1-Jun-72

Species and numbers: 100 Canada Geese

Location: Region 8. Vaseux Lake (orchard)

Comments: This record was found in a CWS summary sheet and in Friis (1974). The CWS Report indicated that the birds were found dead in an apple orchard and that they had been poisoned by Parathion. Friis (1974) stated that the geese died after Parathion and Guthion (Azinophos-methyl) was sprayed in an orchard for coddling moth. The young died first, followed by the adults.

Toxicology: Friis (1974) seven immatures:

	Guthion	Parathion
hexane rinse	ND	0.03
crop - clover	ND	29.27
crop - grass	ND	17.50
gizzard	ND	0.02-0.23
liver	ND	0.02-0.23
brain	ND	ND

Probable cause of death: Pesticide poisoning - Parathion

Record number: 18 1-Jun-72

Species and numbers: 4-5 Ducks

Location: Region 2. Langley

Comments: This record was found in a CWS summary sheet of bird kills. It indicated that the birds possibly died from pesticide poisoning (Diazinon). No lab reports or additional details were attached.

Probable cause of death: Pesticide poisoning - Diazinon suspected

Record number: 19 1-Jun-72

Species and numbers: 1 Bald Eagle

Location: Region 1. Pender Island

Comments: Friis (1974): Bird was found dead and submitted to BCEnv for analysis. No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Hg
liver	0.52	0.53	2.18	0.37	3.60	ND	5.80
muscle	0.37	0.51	0.48	0.25	1.61	ND	-
fat	29.65	72.05	54.35	15.50	171.55	ND	-

Probable cause of death: Undetermined [Mercury - sub-lethal exposure]

Record number: 20 1-Aug-72

Species and numbers: 1 Belted Kingfisher

Location: Region 7. Kimberly - Pinchi Lake

Comments: Friis (1974): Bird was collected at Pinchi Lake, site of the Cominco Mine, as part of a study monitoring mercury levels in the local environment. No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Chlordane	Hg
liver	ND	8.75	98	6.7	113.45	ND	ND	6.2
muscle	ND	0.43	40	7.2	47.63	ND	ND	-

Probable cause of death: Poisoning - DDT [Mercury - sub-lethal exposure]

Record number: 21 1-Aug-72

Species and numbers: 1 Barn Swallow

Location: Region 2. Burnaby

Comments: Friis (1974): Bird was found dead following Malathion spray.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Malathion
hexane rinse	ND	ND	ND	ND	ND	ND	ND
muscle	ND	ND	ND	ND	ND	ND	ND
viscera	ND	ND	3.2	ND	3.2	ND	ND

Probable cause of death: Pesticide poisoning - Malathion suspected

Record number: 22 1-Jan-73

Species and numbers: >1 Passerine

Location: Region 3. Interior British Columbia

Comments: This record was found in a CWS note listing bird kills caused by pesticides, but no specific pesticide was listed. No lab reports or additional details were included in the report.

Probable cause of death: Pesticide poisoning - Suspected

Record number: 23 1-May-73

Species and numbers: >1 Canada Goose

Location: Region 8. Vaseux Lake

Comments: Friis (1974): Goslings were found dead following foliage spraying with Thiodan (Endosulfan).

Toxicology: Friis (1974) Thiodan: crop (pool) 5.44 ppm; liver (pool) 1.02 ppm; fat (pool) 1.00 ppm; forage 7.19 ppm.

Probable cause of death: Pesticide poisoning - Endosulfan

Record number: 24 1-Jul-73

Species and numbers: 1 Bald Eagle

Location: Region 1. Campbell River

Comments: Friis (1974): Bird was found dead and submitted to BCEnv for analysis. No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	Dieldrin	Hg
liver	ND	13.62	43.76	34.52	91.90	ND	19.30
muscle	ND	0.49	9.77	1.10	11.36	ND	-

Probable cause of death: Undetermined [Mercury and DDT - sub-lethal exposure]

Record number: 25 1-Oct-73

Species and numbers: 1 Osprey

Location: Region 1. Victoria

Comments: Friis (1974): Bird was found dead and submitted to BCEnv for analysis. No additional information was included in file.

Toxicology: Friis (1974)

	opDDT	ppDDT	DDE	DDD	total DDT	PCB 1254	PCB 1260	Hg
liver	ND	ND	0.04	ND	0.04	ND	ND	6.34
muscle	ND	ND	0.41	ND	0.41	ND	ND	-
visc. fat	ND	ND	10.00	ND	10.00	ND	ND	-

Probable cause of death: Undetermined [Mercury - sub-lethal exposure]

Record number: 26 15-Dec-73

Species and numbers: 50-60 Ducks - mostly Northern Pintails and Mallards and at least 1 American Wigeon and Green-winged Teal and a Hawk.

Location: Region 2. Richmond

Comments: This record found in several CWS Reports, von Schuckmann (1979) and Mineau (1993). A total of 56 dead ducks including 13 male and 9 female Pintails, 3 male and 6 female Mallards, 1 Green-winged Teal, 1 Wigeon as well as 1 Hawk were found on 15 Dec. One Mallard was observed to be sick and uncoordinated. Most of the ducks were found floating in the water in the southeast corner of the flooded turnip field. (The low

lying area of the heavy clay turnip field flooded on 15 Dec, after 2 inches of rain fell.) A few ducks were picked up in an adjacent cauliflower patch. The total area of both fields was about 4 acres. The ducks appear to have rested in the flooded portion of the field. According to local hunters, the ducks are hunted in two fields northeast of the turnip field. It was suspected that a toxic substance killed the birds. During the previous growing season there had been four pesticide applications: Carbofuran (Furadan) had been used at seeding, Diazinon (Basudin 50 EC) had been applied in late August and Methomyl (Lannate) has been applied twice over the season.

Lab Report: No formal report was attached. The CWS report noted that the ducks were in excellent fat condition and had been feeding mainly on the seeds of weeds.

Toxicology: No formal report was attached. The preliminary CWS Report indicated that a water samples as well as liver, kidney, fat, muscle and crop contents were sent to the Provincial Pesticide Lab. The water sample contained 0.01 ppm Diazinon, 0.014 ppm DDT, 0.002 ppm DDE, and 0.005 ppm Methoxychlor. No Diazinon was found in the crop contents but there was an unidentified peak ahead of the where the Diazinon peak should be on the chromatograph (2 chromatographs were included in the CWS Report). The chemist suspected it could be a breakdown metabolite of Diazinon but had no way of identifying it. He did note that a degradation product of Diazinon, tetraethylmonothiopyrophosphate, is 30 times more toxic than the formulated emulsion concentrate of Diazinon (Melbo *et al.*, 1972; Biologico 38(5):136-139). No arsenic was detected in the samples. No results were listed for the liver, kidney, fat, muscle tissues. The report stated that samples were not analyzed for Carbofuran or Fensulfothion residues. However, a CWS Report prepared in 1975 which summarized Carbofuran related die-offs stated at a water sample from a puddle contained 1.70 ppm and a soil sample 1.96 ppm Carbofuran (see Record number 30). These values are also reported in Mineau (1993). Another letter written by CWS in 1975 stated that careless application of Carbofuran (Furadan 10G) resulted in the concentration of granules on the surface of the semi-flooded field which were ingested by the foraging ducks (filed in Record number 37). von Schuckmann (1979) reported Carbofuran granules were found in the crop contents of a Mallard and a Pintail.

Probable cause of death: Pesticide poisoning - Carbofuran G

Record number: 27 19-Dec-73

Species and numbers: 20 Common Goldeneye and 1 Lesser Scaup

Location: Region 2. Burrard Inlet - New Brighton Park

Comments: CWS Report, von Schuckmann (1979): The birds died at a sewage out-fall near New Brighton Park. They were reported to be writhing and unable to swim; all died within 20 minutes. A pesticide was suspected of having been dumped down a storm drain.

Toxicology: von Schuckmann (1979) fat, muscle, liver & crop contents of a Goldeneye were screened for OCs, OPs, PCP, Cyanide, Strychnine and Botulism - ND. Brain cholinesterase inhibition was strongly positive (indicative of exposure to OPs or Carbamate pesticides).

Probable cause of death: Pesticide poisoning - Organophosphate or Carbamate

Record number: 28 1-Feb-74

Species and numbers: 1 Cooper's Hawk

Location: Region 1. Metchosin

Comments: von Schuckmann (1979): No details provided.

Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB 1254	PCB 1260
muscle	ND	0.34	1.33	0.32	-	ND	ND
liver	ND	0.32	3.24	0.62	6.02	ND	ND

Probable cause of death: Undetermined [Mercury sub-lethal exposure]

Record number: 29 1-May-74

Species and numbers: 6 Passerines including 2 Dark-eyed Juncos, 2 White-crowned Sparrows, 1 Gray-cheeked Thrush, 1 Song Sparrow

Location: Region 6. Cassiar

Comments: von Schuckmann (1979): Cause of death was not determined due to advanced decomposition. Histological examination of submitted species failed to reveal the presence of foreign materials in the lungs. However, the Cassiar Mill closed for 2 days in 1974 to implement pollution control measures to protect bird life in the area.

Toxicology: von Schuckmann (1979) Asbestos dust in plumage of 6 birds examined.

Probable cause of death: Poisoning - Asbestos

Record number: 30 2-May-74

Species and numbers: 8 Canada Geese

Location: Region 8. Winfield (orchard)

Comments: CWS Report, von Schuckmann (1979): Birds were killed in an apple orchard which had been sprayed on 1 May with Diazinon. By late the following day, the first goose had died. Twelve to 36 hours passed between the death of first and eighth bird. bird. Crop contents were mostly clover.

Toxicology: von Schuckmann (1979) crop contents of 2 Geese: 56 ppm and 65 ppm Diazinon. The CWS files stated the chemical analysis was conducted at an unspecified pesticide lab in Vancouver.

Probable cause of death: Pesticide poisoning - Diazinon F

Record number: 31 1-Aug-74

Species and numbers: 1 Bald Eagle

Location: Region 1. Port Hardy

Comments: von Schuckmann (1979): No details provided.

Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB1254	PCB1260
fat	ND	ND	3.93	ND	-	12.41	ND

fat	ND	ND	1.26	ND	-	4.80	ND
muscle	ND	ND	0.04	ND	-	0.49	ND
liver	ND	ND	ND	ND	2.04	ND	ND

Probable cause of death: Undetermined

Record number: 32 1-Sep-74

Species and numbers: 1 Bald Eagle

Location: Region 1. Port Hardy

Comments: von Schuckmann (1979): No details included.

Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	PCB1254	PCB1260
fat	ND	ND	7.60	ND	7.19	ND

Probable cause of death: Undetermined

Record number: 33 1-Oct-74

Species and numbers: 1 Cooper's Hawk

Location: Region 1. Saltspring Island

Comments: von Schuckmann (1979): No details included.

Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB1254	PCB1260
muscle	ND	0.016	0.23	0.03	-	ND	ND
liver	0.001	0.02	0.02	0.004	2.60	ND	ND

Probable cause of death: Undetermined

Record number: 34 1-Oct-74

Species and numbers: 33 Chukars

Location: Region 8. Summerland

Comments: CWS Report, von Schuckmann (1979): Both sources stated the birds were found on the shore of Okanagan Lake, five miles north of Summerland (suggesting they might have died elsewhere and were dumped into the lake). The CWS Report stated that the cause of death was due to TEPP (tetraethylpyrophosphate).

Lab Report: The CWS Report stated that 6 carcasses were sent to BCAg and no pathology was found. No lab report was included in the file.

Toxicology: von Schuckmann (1979) muscle?: OPs detected but not identified or quantified. CWS Report: Carcasses were sent to BCAg who subsequently sent them to an unspecified pesticide lab in Vancouver. The samples were reported to have had trace levels of TEPP but no official report was attached.

Probable cause of death: Pesticide poisoning - TEPP suspected

Record number: 35 1-Nov-74

Species and numbers: 1 Bald Eagle

Location: Region 1. Port Hardy
Comments: von Schuckmann (1979): No details included.
Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB1254	PCB1260
fat	ND	ND	8.44	ND	-	9.31	ND
muscle	ND	ND	0.19	ND	-	0.90	ND
liver	ND	ND	0.11	ND	1.74	0.39	ND

Probable cause of death: Undetermined

Record number: 36 1-Nov-74

Species and numbers: 1 Great Horned Owl
Location: Region 1. Victoria
Comments: von Schuckmann (1979): No details included.
Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB1254	PCB1260
fat	ND	0.04	1.74	0.05	-	ND	1.41
muscle	ND	0.006	0.13	0.005	-	ND	ND
liver	ND	0.007	0.17	0.003	2.78	ND	ND

Probable cause of death: Undetermined

Record number: 37 25-Nov-74

Species and numbers: about 80 Ducks including 34 American Wigeon, 19 Northern Pintail, 2 Mallards and 1 Green-winged Teal and 1 Glaucous-winged Gull
Location: Region 2. Ladner
Comments: CWS Report, von Schuckmann (1979) and Mineau (1993): Heavy rains flooded about 10-20% of an agricultural field. Approximately 50 dead ducks were found in and around the flooded area of the field on 25 Nov. Thirty-five carcasses (18 Pintail, 14 Wigeon, 2 Mallards, 1 Green-winged Teal) were collected for post-mortem examination and pesticide residue analysis; the remaining carcasses had been partly or almost completely scavenged. Soil and water samples were also collected.
Another 15-20 dead Wigeon were found at the same site on 1 Jan 1975. Two or three hawks and about 30 gulls were observed scavenging the carcasses. One Glaucous-winged Gull was unable to fly. It was almost able to lift off but its legs were apparently too weak to support its body. The bird was collected but died later that day. On 3 Jan, a Pintail drake was captured on the field. It recovered within a few hours and was released. In total, about 80 birds were found at the site between November 1974 and January 1975. Although the site was a harvested potato field, there was a row of immature cabbage on one side of the field. According to the grower, the field had been planted to turnips the previous April or May, and Carbofuran had been used at that time (the material had been applied in band with a Gandy™ seeder). Unseasonal spring rains had caused crop failure, and the entire field had been plowed and put in potatoes. The potatoes had been harvested in September and the row of cabbage planted at that time. Mineau (1993) reported that there was some confusion as to the acreage actually planted to turnips, and some questions

remained regarding the rate of application of the pesticide. Also, some jugs of Furadan flowable were found on site that may have been used on the potato crop. However, the presence of Carbofuran granules in the ducks and the residue levels left in the granules at the time of the kill make the early summer application of the granular formulation a more likely culprit. Note: Mineau (1993) reported that a sample of granules taken from the field contained 4.3% Carbofuran, or slightly less than half of the nominal 10% concentration, and this following approximately 7-8 months of weathering and that according to the company, the release rate was well within the range expected for the Furadan 10G granules. However, that information could not be located in the CWS files. A letter written by CWS in 1975 stated that careless application of granular Carbofuran resulted in concentrations of granules on the surface which were ingested by foraging ducks and that even after 8 months on the fields, the granules still retained almost 50% of their Carbofuran.

Lab report: BCAg #V74-473: ***1st Group (Ducks) - 26 Nov 74***: Four ducks were submitted. The general condition of the birds was good. Virological and bacteriological examination did not reveal the presence of any infectious or contagious disease agent. All birds were positive for *Coccidia sp.* in the intestinal tract, and gizzard worm and intestinal nematode ova were detected in the Wigeon. The parasite load was not considered sufficient to be the cause of death. ***2nd Group (Gull) - 1 Jan 75***: No official report was included in file but the CWS Report stated that upon initial external examination, the carcass was in good shape, clean, with no external damage or parasites. There was watery red discharge from the cloaca. The autopsy of the bird revealed much fat, no gross pathology, and an empty gut except for about 10 ml watery red fluid.

Toxicology:

Date	Sample	Carbofuran (ppm)	Source of Data
25-Nov-74	Mallard? liver	60.9	von Schuckmann (1979)
	Mallard? muscle	2.48	von Schuckmann (1979)
	Mallard? crop contents	granules identified	von Schuckmann (1979)
	soil	0.27	AgCan Research Station
	water	0.063	BCAg Pesticide Lab
1-Jan-75	Gull organs [1]	12.5	Health Protection Branch

[1] Gull organs included liver, heart, empty stomach and intestine.

Note: Mineau (1993) reported that combined organs (heart, liver, gizzard and intestines) from one bird were analyzed. One laboratory reported a value of 60.9 ppm Carbofuran, whereas another reported 8.2 ppm for the same sample. (It is possible that some degradation could have taken place in transit from one laboratory to the other.) However, when the information was compiled for this report, von Schuckmann (1979) stated the 60.9 ppm Carbofuran was detected in the liver (not combined tissues) and a second lab report specifying 8.2 ppm Carbofuran in duck 'organs' could not be located.

Probable cause of death: Pesticide poisoning - Carbofuran G

Record number: 38 1-Dec-74

Species and numbers: 25 Ducks

Location: Region 2. Vancouver

Comments: This record was found in a CWS summary sheet of bird kills. The cause of death was listed as OP poisoning. No lab reports or additional details were attached.
Probable cause of death: Pesticide poisoning - Organophosphate suspected

Record number: 39 1-Jan-75

Species and numbers: 1 Bald Eagle
Location: Region 1. Port Hardy
Comments: von Schuckmann (1979): No details included.
Toxicology: von Schuckmann (1979)

	opDDT	ppDDT	DDE	DDD	Hg	PCB1254	PCB1260
muscle	ND	ND	0.11	ND	1.74	0.65	0.07

Probable cause of death: Undetermined

Record number: 40 9-Apr-75

Species and numbers: several birds including 1 Glaucous-winged Gull and 2 Brewers Blackbirds
Location: Region 1. Victoria - Hampton Park
Comments: CWS Report: During a strike of city workers, garbage which was temporally stored in a tennis court was sprayed with Diazinon to control flies. The following day, children at a nearby school picked up a number of dead birds and dying birds which were uncoordinated and behaving erratically. Ten additional garbage storage sites were also treated with Diazinon but no dead or sick birds were observed. The Fisheries and Wildlife Department of BCEnv requested BC Parks staff, responsible for the Diazinon application switch to Malathion. No follow-up was reported.
Probable cause of death: Pesticide poisoning - Diazinon F

Record number: 41 1-Jul-75

Species and numbers: 1 Sparrow
Location: Region 2. Fraser Valley
Comments: von Schuckmann (1979): No details included.
Toxicology: von Schuckmann (1979) tissue type not specified: DDE 0.10 ppm; DDD 0.03 ppm; total DDT 0.20 ppm.
Probable cause of death: Undetermined

Record number: 42 23-Oct-75

Species and numbers: > 1000 Green-winged Teal and 1 Hawk
Location: Region 2. Ladner
Comments: CWS Report, von Schuckmann (1979) and Mineau (1993): This event occurred in a turnip and cabbage field adjacent to (and owned by the same grower as) the field in which the 1974 Carbofuran kill occurred (see Record number 37). However, the application responsible for the previous kill had been made by an applicator and not the

owner.) This incident also occurred after heavy rainfall that caused flooding in much of the area. On 23 Oct, approximately 60 dead Teal were found in a partly flooded turnip field bordering the south end of the 1974 kill site. Examination of the digestive tracts of 3 birds revealed Furadan 10G granules. The farmer said he had hand-applied Furadan 10G on the soil surface around each plant in late May or early June 1975. The field had been harvested, except for culls, about the end of July. Propane exploders (air guns) were set in place as scare tactics to deter birds from using the field. Extensively scavenged carcasses of about 40 Green-winged Teal and one Hawk were found in a partly flooded, unharvested, cabbage field bordering on the east side of the 1974 kill site on 4 Nov. Furadan 10G was not registered for cabbage. The granules had been banded as in a turnip crop. About 7 Nov, one air gun was shut down due to complaints of local residents. CWS staff checked the turnip field 14 Nov. Weather conditions between 14-20 Nov had caused the remaining gun to only fire occasionally. On 20 Nov, about 1,000 Green-winged Teal carcasses were found on the field. Most of the ducks were collected and buried; the 5 Teal examined contained between 2 and 125 Carbofuran granules in their guts. Three empty, weathered 30 lb. Furadan 10G bags were found during a field site inspection on 21 Nov. On 23 Nov, the soil around the turnips in the field was examined - Furadan 10G granules were visible to the unaided eye. Soil samples from around two plants were collected and the Furadan granules separated from the soil by hand. These samples were found to contain 1.27 grams and 2.42 grams of Furadan 10G granules, respectively. Extrapolation of these levels gives Furadan 10G application rates of 48 lb./acre and 92 lb./acre. The registered application rate of Furadan 10G on turnips was 23 lb./acre. Soil and turnip samples were collected on 24 Nov. for pesticide residue analysis. The flooded section of the field was ditched. On 3 Dec, the field was ploughed. The farmer was prosecuted under the Pest Control Products Act because of the high rate of application and the application to an unregistered crop. Following this incident, FMC withdrew the registrations of 10G granule for shallow uses (i.e. carrots and turnips/rutabagas) from the lower mainland of British Columbia. At the request of the BC's Dept. of Agriculture, the sale of Furadan 10G resumed in the lower mainland in 1986.

Toxicology: No official reports were included in the file but the CWS Report stated that Health Protection Branch had detected 3.23 ppm Carbofuran in the plant samples collected 4 Nov and that the Carbofuran levels were above the minimum acceptable level (0.5 ppm) in the turnips collected 24 Nov. von Schuckmann (1979) reported Carbofuran granules in the crop contents of a Green-winged Teal.

Probable cause of death: Pesticide poisoning - Carbofuran G

Record number: 43 15-Dec-75

Species and numbers: several Passerines

Location: Region 2. New Westminster - Dublin St.

Comments: CWS Report: Birds were found in a residential yard. The first death was noticed in mid-December, which was about the same time that the home-owner purchased some sunflower seed bird feed. The majority of the deaths occurred in February 1976. The birds showed signs of weakness, sat huddled together with their feathers fluffed up. The home-owner noticed that birds had dirty cloacas and that their excrement contained blood.

No carcasses were collected for post-mortem examination. Seed samples were collected for chemical analysis.

Toxicology: No reports were attached. The CWS report stated that the seed was negative for aflotoxin and that BCAg found the seed to contain 0.15 ppm mercury.

Probable cause of death: Undetermined

Record number: 44 1-Jan-76

Species and numbers: 1 Great Blue Heron

Location: Region 2. Powell River

Comments: von Schuckmann (1979): No details included.

Toxicology: von Schuckmann (1979) mercury: liver 63.45 ppm; kidney 12.02 ppm.

Probable cause of death: Metal toxicosis - Mercury

Record number: 45 20-Feb-76

Species and numbers: 2 Mallards, 2 American Coots, 1 American Wigeon

Location: Not indicated

Comments: CWS file consisted of 5 AgCan Specimen Records. There were no case histories or indication of collection date of the specimen or location where birds were found in the file. The birds were grouped together since they were submitted by BCEnv to AgCan on the same day.

Lab report: AgCan #V76-0082, 87, 83, 85, 86: ***Mallard #82*** Post-mortem examination: Male. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of non-parasitic erosion of the gizzard; 10 lead pellets removed from gizzard contents. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. ***Mallard #87*** Post-mortem examination: Male. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of non-parasitic gizzard erosion; greenish hue to liver surface; bird was thin and wasted; 3 lead pellets removed from gizzard contents. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. ***Coot #83*** Post-mortem examination: Female. No evidence of any infectious or contagious disease. Necropsy: Evidence of advanced post-mortem change. Trauma was observed, probably due to impact with wire fence? Virology: Negative for chick embryo lethal agents. Parasitology: Negative. Conclusion: Death due to trauma. ***Coot #85*** Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of trauma to head region. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. Conclusion: Death due to trauma. ***Wigeon #86***: Post-mortem examination: Female. Necropsy: No evidence of trauma. Evidence of nephritis and pericarditis and severe non-parasitic gizzard erosion. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. Conclusion: Death due to nephritis and pericarditis.

Toxicology: AgCan liver: lead detected in #82, 87 (specific levels not reported), negative (only trace levels) in #85 and 86, negative in #83

Probable cause of death: ***Mallards***: Metal toxicosis - Lead; ***Am. Coots***: Trauma - Undetermined origin; ***Wigeon***: Disease - Nephritis and Pericarditis

Record number: 46 20-Feb-76

Species and numbers: 15-20 Seabirds including Northern Fulmar, Gulls, Sea Ducks, and Pigeon Guillemots

Location: Region 1. Pacific Ocean - 3 t 5 miles offshore of Uclulet

Comments: CWS Report: Four to five dead birds were sighted daily for 10 days. No oil slicks were noticed.

Lab report: AgCan #V76-105: One Fulmar was examined. Post-mortem examination: No evidence of trauma. Necropsy: Evidence of air sacculitis. Virology: Negative for chick embryo lethal agents. Bacteriology: Air sacs negative for pathogenic bacteria. Parasitology: Positive for *Stegophorous stella-polaris*; larval forms of ascarids noticed. Conclusion: Undetermined.

Toxicology: AgCan. liver: lead ND. A note indicated that tissue samples were saved for pesticide scan; no report was attached.

Probable cause of death: Undetermined

Record number: 47 1-Mar-76

Species and numbers: several Passerines

Location: Region 2. Richmond - Gilbert Rd.

Comments: CWS Report: Birds died near a backyard bird feeder apparently after eating wild bird seed from a bird feeder. No carcasses were collected for post-mortem examination. A sample of the bird seed was collected.

Toxicology: BCAg #8686. Seed: 0.13 ppm Fenitrothion (Sumithion). The CWS Report stated the result was not confirmed since low levels of pesticides are very difficult to identify and while there was little doubt the seed was contaminated by an OP pesticide, the particular pesticide Fenitrothion could not be confirmed.

Probable cause of death: Pesticide poisoning - Fenitrothion

Record number: 48 9-Mar-76

Species and numbers: 20 American Coot and at least 1 Mallard

Location: Region 8. Osoyoos Lake (orchard)

Comments: CWS Report: A flock of 175-200 Coots remained at the lake the entire winter. Some birds became sick, uncoordinated, and died. The birds were observed leaving the lake for a few hours each day to feed in nearby residential yards and orchards. The birds were in good body condition except for pulmonary congestion and hemorrhaging. A note attached to the CWS Report suggested these conditions could be caused by ingestion of ∝-Naphthyl Thiourea (ANTU), a naphyl urea rodenticide. The note surmised the Coots flew into local orchards to feed and that is where they likely were exposed to the rodenticide. The local residents reported no use of rodenticides.

Lab report: AgCan #V76-0123: Four Coots and one Mallard were autopsied. ***Coots***: Necropsy: No evidence of trauma. Severe hemorrhagic congestion of the lungs the etiology of which could not be determined; all Coots were affected. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: No evidence of

abnormal parasitism. ***Mallard***: Necropsy: Severe trauma with hemorrhage to the lower abdomen, probably the result of a gunshot wound as a lead pellet was removed from the locale of the tissue insult. Virology: Negative for chick embryo lethal agents. Bacteriology: Positive for *Corynebacterium sp.* isolated from the bone marrow. Conclusion: Death due to gun shot and a secondary bacteremia.

Toxicology: AgCan. liver (Coots and Mallard): lead - negative. A note attached to the CWS file surmised the hemorrhagic congestion of the Coots was suggestive of the rodenticide ANTU (∝-Naphthyl Thiourea) but the laboratory was unable to analyze for it. There was also a note that two birds were sent for PCB and DDE residue analysis but no results were attached.

Probable cause of death: ***Am. Coots***: Pesticide poisoning - ANTU suspected; ***Mallard***: Trauma - Gun shot

Record number: 49 15-Mar-76

Species and numbers: 17 American Wigeon and Mallard

Location: Region 1. Victoria

Comments: CWS Report: Birds were found dead in a private pond. The owner had sprayed Diazinon on the lawn surrounding the pond the previous day.

Lab report: AgCan #V76-0132: Two Wigeon (one female, one male) were examined. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: No lesions of pathological significance; the general condition of the birds was good. Virology: Negative for chick embryo lethal agents. Bacteriology: Positive for *Corynebacterum sp.* which were isolated from hearts. Parasitology: Negative. Conclusion: Death due to Bacteremia.

Toxicology: AgCan liver: lead ND. BCAg #8766/von Schuckmann (1979) intestine and gut contents: Diazinon 1.91 ppm. There was considerable evidence suggesting Diazinon Oxon was also present but it could not be quantified because a chemical standard was not available.

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 50 18-Mar-76

Species and numbers: 1 Great Blue Heron

Location: Region 2. Delta - Westham Island

Comments: CWS Report: Bird was lethargic and uncoordinated. It was euthanized.

Lab report: AgCan #V76-0129: Post-mortem examination: Female. No evidence of trauma. Necropsy: Evidence of atrophy of pectoral muscles and air sacculitis; stomach contained rodent fur and appeared to be impacted. Virology: Negative for chick embryo lethal agents. Bacteriology: Positive for *E. coli* which was isolated from bone marrow. Parasitology: Positive for unidentified nematode ova in feces. Histology: Selected tissues - inconclusive. Conclusion: Death due to Bacteremia.

Toxicology: AgCan liver: lead ND.

Probable cause of death: Disease - Bacterial infection.

Record number: 51 2-Apr-76

Species and numbers: 1 Mallard

Location: Not indicated

Comments: CWS file consisted of only the AgCan Specimen Record. No other information was available.

Lab report: AgCan #V76-0081: Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: Male. No evidence of trauma; esophageal impaction (full of corn); gizzard showed non-parasitic erosion; seven lead pellets removed from gizzard contents. Virology: Negative for chick embryo lethal agents. Parasitology: Negative.

Toxicology: AgCan liver: lead detected (specific levels not reported).

Probable cause of death: Metal toxicosis - Lead

Record number: 52 10-May-76

Species and numbers: >10 Western Grebes

Location: Region 8. Kelowna

Comments: CWS Report: Dead birds were found near a road bridging a creek at the south end of Kelowna

Lab report: AgCan #V76-246: Two specimen were submitted. Post-mortem examination: No evidence of any infectious or contagious disease was found. Necropsy: Evidence of hemorrhage and trauma to midneck region and fracture of both legs of one bird. Hemorrhage and trauma to base of the neck, puncture wounds and hemorrhage to breast muscle. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative for any organisms of pathological significance. Parasitology: Positive for tapeworms. Conclusion: Death in both instances due to trauma of unknown origin.

Toxicology: AgCan liver: lead ND

Probable cause of death: Trauma - Undetermined origin

Record number: 53 22-May-76

Species and numbers: >10 Birds including 2 Common Snipe, 2 Spotted Sandpipers, 1 Sparrow and 1 Warbler

Location: Region 9. Yukon - Dawson City

Comments: CWS Report: Some birds were found dead; others were suffering from respiratory distress and loss of equilibrium. Deaths followed an application of granular Abate (Temephos) which was used for mosquito control. Ten carcasses were collected - 4 carcasses were sent to Ottawa for analysis, 6 were sent to the CWS Office in Vancouver.

Lab report: AgCan #V76-0295, 96: One male Spotted Sandpiper and one female Common Snipe were examined. Post-mortem examination: No evidence of infectious or contagious disease. Virology: Negative for any chick embryo lethal agents. Parasitology: Negative. Conclusions: Sandpiper - cause of death was undetermined; Snipe - death due to trauma at base of neck which resulted in hemorrhage in the area.

Toxicology: A summary included in the CWS Report showed that of the 6 carcasses sent to the CWS Office in Vancouver, 4 were analyzed for Abate residues and 2 birds had detectable levels of Abate in their gizzards (lab not specified) - see table below. Brain ChE activity levels were also reported. A government memorandum from Ottawa reported that the 4 birds they received had not been killed by Abate since Abate was not detected in either the gut or gizzards (lab not specified) and the brain ChE activity levels (determined by the Freshwater Institute in Winnipeg) did not suggest exposure to Abate. No official reports were attached.

	Brain ChE activity (µmol/mg/min)	Abate in gizzard (mg/kg wet wt.)	Remarks
Sandpiper	0.0109	ND	22-May-76 respiratory distress, loss of equilibrium; gut empty
Snipe	0.0086	0.12	22-May-76 found dead; gut full
Sparrow	0.0264	0.23	22-May-76 found dead; gut full 0.1150 grams
Warbler	0.0241	ND	30-May-76 respiratory distress, loss of equilibrium; gut full
Snipe	-	-	post-mortem examination conducted
Sandpiper	-	-	post-mortem examination conducted

Probable cause of death: Pesticide poisoning - Temephos G (Abate)

Record number: 54 8-Jul-76

Species and numbers: >1 Canada Geese, Mallard, Common Night Hawk and European Starling

Location: Region 2. Burnaby Lake

Comments: CWS Report: Birds appeared to have sudden convulsions, spastic movements and died within 10 minutes to 1 hour. One Night Hawk was submitted to BCAg but no report was found in record. The incident was documented on 29 July 1976 and indicated that the last death occurred three weeks earlier. The file also stated that one deformed female Mallard specimen was collected on 18 Aug 1976. No additional information was included.

Probable cause of death: Undetermined

Record number: 55 14-Aug-76

Species and numbers: 1 Passerine and 1 Dog

Location: Region 2. Delta

Comments: A dog was reported to have died following an application of Thiodan (Endosulfan) on an adjacent residential property. Samples were collected by EPS but no reports or results were included in the file.

Probable cause of death: Pesticide poisoning - Endosulfan

Record number: 56 18-Aug-76

Species and numbers: 8 Mallards

Location: Not indicated.

Comments: CWS Report: Five female and 2 male Mallards were collected on 18 Aug. No details were included in file.

Probable cause of death: Undetermined

Record number: 57 31-Aug-76

Species and numbers: 2 Great Blue Herons

Location: Region 2. Delta - Westham Island

Comments: CWS Report: Two carcasses (one headless) were submitted for post-mortem examination. No report or results were found in the file.

Probable cause of death: Undetermined

Record number: 58 10-Sep-76

Species and numbers: 1 Duck

Location: Region 2. Richmond - River Rd.

Comments: CWS Report: The carcass was found in a roadside ditch. The report stated that the duck had been cross-bred.

Probable cause of death: Undetermined

Record number: 59 2-Oct-76

Species and numbers: 1 Great Blue Heron

Location: Region 1. Campbell River

Comments: CWS Report: The carcass was found on the side of the road to the sea plane base. It may have been struck by a moving vehicle or it might have flown into electrical wires.

Probable cause of death: Undetermined

Record number: 60 1-Jan-77

Species and numbers: about 50 Ducks - Northern Pintails and Mallards

Location: Region 2. Fraser Valley

Comments: Mineau (1993), NRCC (1979): This incident was not found in the CWS file but Mineau referenced the NRCC (1979) Report. The NRCC Report stated that 50 Pintails and Mallards had died in a partly flooded turnip field from ingestion of Furadan 10G granules and referenced a letter written by CWS Staff on 14 Nov 1977. Mineau (1993) stated that few details were available, except that it followed the usual pattern for Carbofuran poisoning and referenced personal communication with CWS Staff. He thought that in view of the voluntary withdrawal in effect on Carbofuran, the kill was thought to have resulted from the use of old stock.

Probable cause of death: Pesticide poisoning - Carbofuran G

Record number: 61 1-Jan-77

Species and numbers: about 100 Ducks - Northern Pintails, Mallards, Green-winged Teals

Location: Region 2. Not indicated

Comments: NRCC (1979): This incident was not found in the CWS file but referenced in a summary table of bird kills attributed to Carbofuran in NRCC (1979). The NRCC Report stated that 100 Pintails, Mallards and Green-winged Teals died in a partly flooded potato field from exposure to Furadan 4.8 flowable and referenced a letter written by CWS Staff on 14 Nov 1977. No other details were available.

Probable cause of death: Pesticide poisoning - Carbofuran F

Record number: 62 31-Jan-77

Species and numbers: >6 Northwestern Crows

Location: Region 2. Whiterock

Comments: CWS Report: Birds were found dead in a municipal park.

Lab report: AgCan #V77-0042, 47: Two crows were examined. ***Crow #42***: Post-mortem examination: Mature male. No evidence of any infectious or contagious disease. Necropsy: Evidence of pulmonary hemorrhage which appeared traumatic in origin Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for capillaria-like ova. Conclusion: Death due to trauma of unknown origin. ***Crow #47***: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of trauma to the right side of the skull resulting in severe hemorrhage to the part. Hemorrhage in the thoracic cavity. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive for *Corynebacterium Murium*. Parasitology: Positive for capillaria and other nematode ova. Tapeworm also present. Conclusion: Death due to trauma of unknown origin.

Toxicology: Samples were saved for pesticide analysis but no results were found.

Probable cause of death: Trauma - Undetermined origin

Record number: 63 1-Feb-77

Species and numbers: 4 Great Blue Herons

Location: Region 2. Cultus Lake

Comments: CWS Report: The birds were found at the west end of the lake. They were reported to have been killed by a fish farm owner.

Probable cause of death: Trauma - Gun shot

Record number: 64 17-Mar-77

Species and numbers: 1 Great Blue Heron

Location: Region 2. Vancouver - 49th Ave. & Dunbar St.

Comments: CWS Report: The heron was found dead in vacant lot.

Probable cause of death: Undetermined

Record number: 65 15-Apr-77

Species and numbers: 25-30 Ducks, mostly Scaup and some Mallards

Location: Region 2. Matsqui Sewage Pond

Comments: CWS Report: Birds were found upside down with their heads were flopping from side to side with no control in the Matsqui sewage pond.

Toxicology: The CWS Report indicated that 2 carcasses were sent to BCAg but no report was included in the file. The BCEnv sent brain, liver and gut tissues to their lab for pesticide analysis but no results were included in file. von Schuckmann (1979): pooled samples from 2 Scaup and 1 Mallard:

	Diazinon	Cu	Zn	Pb	Cd
brain	0.39	-	-	-	-
liver	0.20	19.5	32.6	0.6	0.25
kidney	-	3.7	18.0	0.5	0.67

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 66 19-Apr-77

Species and numbers: 1 Great Blue Heron

Location: Region 2. Fort Langley

Comments: CWS Report: The heron was found alive with its legs tangled with fish line. It subsequently died.

Probable cause of death: Trauma - Fishing line entanglement

Record number: 67 19-Apr-77

Species and numbers: 2 Grebes

Location: Region 2. Surrey - Serpentine Fen

Comments: CWS Report: Grebes were found dead. Other [dead grebes??] had been located in the same area recently. There was no indication of further investigation.

Probable cause of death: Undetermined

Record number: 68 28-Apr-77

Species and numbers: 1 Lapland Longspur

Location: Region 9. Yukon - Whitehorse

Comments: CWS Report: This case was found in a summary sheet listing the dates and locations of the birds suspected of poisoning by Abate G in Ross River / Dawson City between 8 and 16 May 1977 (cross reference Record Number 70). Since this bird was found several weeks earlier than the other birds (on 28 April) in a different city, we have listed it as a separate incident.

Probable cause of death: Undetermined

Record number: 69 3-May-77

Species and numbers: 7 Lapland Longspur and >2 Mountain Chickadees
Location: Region 9. Yukon - Whitehorse
Comments: CWS Report: Impact with motor vehicle(s).
Probable cause of death: Trauma - Vehicle collision

Record number: 70 8-May-77

Species and numbers: >18 Ducks, mostly Northern Pintail
Location: Region 9. Yukon - Ross River / Dawson City
Comments: CWS Report: Deaths followed aerial application of granular Abate (Temephos). A summary sheet included in the file reported that the deaths occurred between the 8th and 16th May.
Lab report: AgCan #V77-0305: Two Northern Pintails were examined. Post-mortem examination: There was no evidence of trauma, infectious or contagious disease. Necropsy: Evidence of post-mortem change; no feed in the crops but they did contain some gravel. Virology: Negative for chick embryo lethal agents. Bacteriology: One bird was positive for *Streptococcus durans*, the significance of this organism could not be determined. The other bird was negative. Parasitology: Positive for intestinal flukes, tapeworms, and capillaria like nematode ova.
Toxicology: AgCan liver: lead ND. Tissues were held for pesticide analysis but no results were on file.
Probable cause of death: Pesticide poisoning - Temephos G

Record number: 71 8-Jun-77

Species and number: 1 Great Blue Heron
Location: Region 2. Maple Ridge - UBC Research Forest
Comments: CWS Report: Young fell from nest. There was no indication that a post-mortem examination was conducted.
Probable cause of death: Other - Fell from nest

Record number: 72 26-Aug-77

Species and numbers: 3 Swallows
Location: Region 2. Maple Ridge
Comments: CWS Report: Normal nesting and feeding activity was observed and then the nestlings suddenly died.
Lab report: AgCan #V77-0501: Three nestlings were examined. Post-mortem examination: There was no evidence of trauma, infectious or contagious disease. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. Conclusion: Nestlings were probably orphaned resulting in starvation.
Probable cause of death: Other - Orphaned

Record number: 73 4-Oct-77

Species and number: 3 Northwestern Crows

Location: Region 2. Vancouver

Comments: CWS Report, AgCan Report: Birds were found near grain elevators on the waterfront. One minute they were alive and perching in trees, the next minute they fluttered about and were dead on the ground.

Lab report: AgCan #V77-0615: Two carcasses were examined. Post-mortem examination: There was no evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of cerebral hemorrhage and enteritis. Mountain ash berries and mash were found in the gizzards. Virology: Negative for chick embryo lethal agents. Parasitology: Negative. Conclusion: Cause of death could not be ascertained.

Toxicology: Samples were misplaced by laboratory staff.

Probable cause of death: Undetermined

Record number: 74 11-Oct-77

Species and numbers: 10-12 wild and domestic Ducks

Location: Region 1. Priest Lake, south of Nanaimo

Comments: CWS Report: This incident was reported by the Conservation Officer in Nanaimo to BCEnv who relayed it to CWS. Ten to twelve (domestic and wild) birds were found dead on Priest Lake. Some decomposition had set in when the birds were examined and they were subsequently buried without autopsy.

Probable cause of death: Undetermined

Record number: 75 18-Oct-77

Species and numbers: >5 wild and domestic Ducks

Location: Region 1. Parksville

Comments: BCAg: Ducks died on the night of 18-19 Oct, on a dairy farm. Ducks were living on two dugouts in the farmyard; ducks from nearby dugout were not affected. The owner of the farm stated he had not changed his agricultural methods since 1983; this was the first duck kill. A kill, again involving domestic and wild ducks in the same manner, was reported one week ago on a swamp south of Nanaimo (cross reference Record Number 74). One duck was observed in the pond - it appeared to be gasping for air and then it climbed up on the bank and died. The ducks may have been eating corn and silage.

Lab report: BCAg #77-3157: Five ducks were submitted. Post-mortem examination: All were in good state of flesh. All had corm kernels in their crops and gizzards. The outstanding gross pathology common to each was a severe pneumonia. The lungs were congested, hemorrhagic and two lungs had whitish foci on their surface. The air sacs of one bird were grayish coloured and thickened. No other gross pathologies were observed. Bacteriology: Kidney, liver, spleen - scant non-hemolytic *E. coli*; lung - scant hemolytic and non-hemolytic *E. coli*; kidney and lung - scant/light *Aspergillus* on wet mount. Histology: The major histological change occurred in the lungs and consisted of blood vessel congestion, inflammatory cell invasion and mycotic elements. Under special stain

(Grocotts) there were masses of hyphae extending through the lung tissue. Diagnosis: Aspergillosis pneumonia. Comment: This particular group of birds had gained access to feed containing the *Aspergillus* fungi which has the ability to propagate and kill birds very quickly.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 76 28-Oct-77

Species and numbers: >40 Mallard and American Wigeon

Location: Region 1. Central Saanich - Martindale Rd.

Comments: CWS Report including a BCEnv Fish and Wildlife Branch Memorandum: Birds were found dead over a period of about 10 days. One live duck was observed to be unable to fly. The majority of the duck carcasses were found in a potato field and by an irrigation pond; one dead duck was found in an adjacent corn field. Ducks had been observed feeding on potatoes in the field where the majority of the mortalities occurred. The owner stated he had used Maneb (5%) and Thiodan (2%) in the field where the mortalities occurred and experimental use of Temik (3 lb. a.i./acre) in an adjacent potato field. A large quantity of yellow material was found in a drainage ditch beside the Temik treated field. It was tentatively identified as Diuron (Lanox) from an old package lying in the ditch.

Lab Report: AgCan #V77-0692: Four Mallards were examined. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive for *Aspergillus sp.* Parasitology: Positive for intestinal flukes. Conclusion: Death due to Aspergillosis.

Toxicology: AgCan liver: lead negative. BCEnv analyzed a variety of samples for Thiodan, Maneb, Temik and DDT. Results were also reported in von Schuckmann (1979). Temik and Maneb residues were not reported in file.

Lab No.	Description	Thiodan	Thiodan sulphate	opDDT	ppDDT	DDE
2965	gizzard contents	0.03	-	-	ND	-
2965-T	gizzard tissue	0.07	-	-	0.08	-
2966	gizzard contents	0.10	-	-	ND	-
2966-T	gizzard tissue	0.58	-	-	0.68	-
2970	soil from kill site	4.91	-	-	7.14	-
2972	potatoes from kill site	0.005	-	-	0.004	-
2969	water from kill site	0.0005	-	-	ND	-
2979	2nd soil from kill site	1.07	1.48	0.21	1.58	0.14
2980	2nd water from kill site	ND	ND	ND	ND	ND
2981	soil from adjacent potato field	1.85	3.10	0.05	1.00	0.44
2982	water from adjacent potato field	0.00024	0.00073	ND	0.00008	ND
2971	soil from corn field	ND	-	-	ND	-

Two soil samples were also sent to the Institute of Ocean Sciences for OC analysis:

	DDT	DDE	DDD
soil from kill site	1.3	0.6	0.6
soil from adjacent potato field	1.2	0.5	0.5

Probable cause of death: Infectious disease - Aspergillosis

Record number: 77 8-Nov-77

Species and numbers: >200 Seabirds including Redneck Grebes, Northern Fulmars, Cormorants, Scoters and Gulls.

Location: Region 6. Pacific Ocean - offshore of the Queen Charlotte Islands

Comments: CWS Report: No details included.

Lab report: AgCan #V77-0724: 1 Northern Fulmar and 4 Redneck Grebes were examined. Post-mortem examination: No evidence of trauma, feather soiling from oil or any infectious or contagious disease. Necropsy: Evidence of pulmonary congestion in the grebes. Fulmar had black tarry intestinal contents. The remainder of body organs were normal in appearance. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative for pathogenic organisms. Parasitology: Positive for tapeworm in grebes; negative for tapeworm in the Fulmar.

Toxicology: AgCan liver: lead ND, BCAg:

Specimen	PCBs	DDE
Bird #1 liver	ND	0.50
Bird #1 kidney	ND	0.27
Bird #1 muscle	ND	0.09
Bird #2 liver	10.30	0.36
Bird #2 kidney	7.22	0.25
Bird #2 muscle	ND	0.38
Bird #3 liver	ND	0.85
Bird #3 kidney	ND	ND
Bird #3 muscle	ND	0.21
Bird #4 liver	ND	0.36
Bird #4 kidney	ND	0.10
Bird #4 muscle	ND	0.04
Bird #5 liver	ND	0.04
Bird #5 kidney	ND	0.08
Bird #5 muscle	ND	0.03

Probable cause of death: Undetermined

Record number: 78 14-Nov-77

Species and numbers: >80 Ducks and Gulls including Northern Pintail, Mallards and Green-winged Teal, Herring Gulls and Ring-billed Gulls

Location: Region 2. Delta - 88th St. & 33rd/34th Aves.

Comments: CWS Reports: This incident was reported as three separate events in the CWS file, however, since they all occurred at approximately the same time and place we have grouped them together. On 14 Nov more than 40 ducks were reported dead at 34th and 33rd Avenues in Delta. Another 45 dead ducks (pintails and mallards) were found on 15-16 Nov at the south end of 88th St. in Delta, approximately 200 years from the dike. On 18 Nov, a ring-billed gull and herring gull were found dead on the west side of 88th St. No other information was included in any of the reports.

Lab report: AgCan #V77-0738, 58: Two Green-winged Teal and two Northern Pintail were examined. ***Teal #38*** Post-mortem examination: Birds were in good flesh condition. No abnormalities were noted. There was no evidence of trauma or any infectious or contagious disease. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative for organisms of pathologic significance. Parasitology: Negative. ***Pintail #58***. Post-mortem examination: Birds were in good flesh condition. No abnormalities were noted. There was no evidence of trauma or any infectious or contagious disease. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for tapeworms.

Toxicology: AgCan liver (2 teal, 2 pintails): lead ND; BCAg: 7 gizzards and 3 crop contents from various individuals from the 1st and 3rd CWS Reports were screened for OCs & OPs - ND. The 2nd CWS Report did not have any official toxicology reports. The report did state that 3 gizzards and 2 crops were screened for OCs and OPs and none were detected. However, it also stated that 0.05 mg Carbofuran were found in some crop contents.

Probable cause of death: Undetermined

Record number: 79 18-Nov-77

Species and numbers: 200 Mallards

Location: Region 4. Kimberly - Cominco Mine

Comments: CWS Report: Letter from a BCEnv Conservation Officer: Approximately 200 dead ducks were found in a settling pond at the Cominco Mine. Seven ducks were found still alive. They were captured and efforts made to keep them warm. They all died shortly after being caught. The pond was quite warm with concentrations of florigen, phosphoric acid, and detergents which are used for the mill's recycling program. There had been a sudden cold snap on the night of 17 November which froze many of the small ponds. This was the first known large die-off at the mine, although the occasional dead duck had been found during the previous spring and fall.

Lab report: AgCan #V77-0838: Four carcasses were examined. Post-mortem examination: Mature males. No evidence of trauma or any infectious or contagious disease. Necropsy: Some signs of gizzard erosion and inflammation. The intestinal tracts showed areas of severe inflammation the origin of which could not be determined. Virology: Negative for chick embryo lethal agents. Parasitology: Intestinal tract - positive for thorny headed worms; no gizzard worms were found; a tapeworm was observed. Conclusion: Gastro-intestinal inflammation due to unknown agent.

Probable cause of death: Undetermined

Record number: 80 19-Dec-77

Species and numbers: 3 Mallards

Location: Not indicated

Comments: File only consisted of AgCan Specimen Record.

Lab report: AgCan #V77-0839: Two male and one female adult Mallards. All three birds showed typical lesions of Aspergillosis.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 81 19-Dec-77

Species and numbers: 3 Ducks

Location: Not indicated

Comments: File only consisted of AgCan Specimen Record. Note written on CWS copy of specimen record said ducks had been shot.

Lab report: AgCan #V77-0840: Post-mortem examination: Males. No evidence of any infectious or contagious disease. Necropsy: No evidence of Aspergillus infection in lung tissue Virology: Negative for any chick embryo lethal agents.

Probable cause of death: Trauma - Gun shot

Record number: 82 20-Jan-78

Species and numbers: 1 Western Grebe

Location: Region 1. Port Alberni

Comments: CWS Report: No details included.

Lab report: AgCan #V78-0023: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Severe bruising on the right side of the neck posterior to angle of the mandible. Portions of fish were found in the esophagus. Gizzard erosion was evident. Bird was thin. Virology: Negative for any chick embryo lethal agents. Parasitology: Positive for gizzard worms. Parasites were not observed in the intestinal tract.

Toxicology: AgCan liver: lead ND; CT liver: PCP 0.064 ppm, TCP 0.016 ppm.

Probable cause of death: Undetermined

Record number: 83 15-Apr-78

Species and numbers: >1 Gull

Location: Region 1. Sooke

Comments: CWS Report: Birds were found dead. No additional information was included in the file.

Probable cause of death: Undetermined

Record number: 84 8-Aug-78

Species and numbers: 5-6 Ducks

Location: Region 9. Yukon - north-east of Mayo

Comments: CWS Report: Birds were found near a lake north-east of Mayo (central area of the Yukon). Most birds were dead; only one recovered. Note: The report suggests the ducks may have been scoters, but species as not confirmed.

Lab report: No report was attached to file. However, the CWS report stated that birds were x-rayed for lead pellets and the results were negative.

Probable cause of death: Undetermined

Record number: 85 16-Aug-78

Species and numbers: < 1 Loon, Alcid, Murre, Gull and Pigeon Guillemot

Location: Region 2. Whiterock

Comments: CWS Report: An unspecified number of loons, alcids, murres and gulls were found in the water off of the Whiterock, Point Robert and Roberts Bank area. One very weak Pigeon Guillemot was picked up and held for 2 to 3 days before it died. The report did not include any lab reports but it listed fishing net entanglement as the most likely cause of death.

Probable cause of death: Trauma - Drowned (Fishing net entanglement)

Record number: 86 14-Sep-78

Species and numbers: several Gulls

Location: Region 1. Crofton - Osborn Bay

Comments: CWS Report: One gull was found dead and several others appeared distressed after feeding on dead fish near discharge pipes from a pulp mill.

Lab report: AgCan #V78-0590: One gull was examined. Post-mortem examination: No evidence of trauma, infectious or contagious disease. Necropsy: Evidence of debilitation. A severe external louse infestation was present and proventricular, intestinal flukes and tapeworms were present. Virology: Negative for any chick embryo lethal agents. Conclusion: Multiple parasitism.

Probable cause of death: Disease - Parasitism (mixed species)

Record number: 87 22-Dec-78

Species and numbers: 1 Mallard

Location: Region 2. Richmond

Comments: CWS Report: The bird was very emaciated when shot.

Lab report: AgCan #V79-088: Post-mortem examination: No evidence of infectious or contagious disease. Virology: Negative for any chick embryo lethal agents. Parasitology: Positive for a heavy thorny-head worm infestation. Trauma was observed, probably due to gun shot.

Toxicology: AgCan liver: lead ND

Probable cause of death: Trauma - Gun shot

Record number: 88 25-Jun-79

Species and numbers: 1 Great Blue Heron

Location: Region 2. Sechelt

Comments: CWS Report: Juvenile heron fell from a nest. There was no follow-up investigation.

Probable cause of death: Other - Fell from nest

Record number: 89 15-Sep-79

Species and numbers: 5 Evening Grosbeak

Location: Region 2. Richmond

Comments: CWS Report: Dead birds were found on a residential property.

Lab report: AgCan #V79-695: Five carcasses were examined. Post-mortem examination: No evidence of infectious or contagious disease. Necropsy: Evidence of massive hemorrhage in thoracic cavity; lung congestion and inflammation of proventriculus. Virology: Negative for any chick embryo lethal agents. Conclusion: Lesions suggestive of ingestion or inhalation of toxic material.

Toxicology: Tissues were held for chemical analysis; no results were attached.

Probable cause of death: Poisoning - Suspected

Record number: 90 13-Oct-79

Species and numbers: 5 Geese

Location: Region 2. Delta

Comment: CWS Report: Geese were fed cauliflower leaves collected from a vegetable stand.

Toxicology: The leaves and the edible parts of the Cauliflower were submitted for analysis. No official lab reports were attached but a note in the CWS reported that the leaves and edible portions of the cauliflower had 2.47 ppm and 0.5 ppm Methamidophos (Monitor), respectively. The crop was last treated with Methamidophos 2 and a half months earlier, after which there was a long period of dry weather.

Probable cause of death: Pesticide poisoning - Methamidophos

Record number: 91 1-Nov-79

Species and numbers: 16 Gulls, 2 Crows and 1 Starling [European Starling ??]

Location: Region 2. Surrey - Municipal Landfill near Port Mann Bridge

Comments: CWS Report: The CAT operator at the landfill felt sick (nauseous and vomiting). He observed a number of dead birds as well as sick birds which were in convulsions, exhibited loss of co-ordination, and then died. The material [which the birds were eating??] was dumped in one corner by 5 or 6 community garbage trucks. The material has been covered and lime applied.

Lab report: BCAg #79-6037: Two crows, 3 gulls and 1 starling were examined. Post-mortem examination: Seeds found in the gizzard of the starling; very little ingesta in other birds. Breast muscle had very little blood. Internal organs were congested. Histology: Gizzard - extensive acute inflammatory reaction in the submucosa,

characterized by a fluid and fibrin exudation; heterophil infiltration. Proventriculus - one bird had masses of nematodes. Diagnosis: Toxicosis - Organophosphate.

Toxicology: BCAg ingesta (pooled 2 gulls and 1 crow): Strychnine, Nicotine - ND; individual blood samples from crow and gull: Cyanide ND; Diazinon: gull muscle 0.20 ppm, gull kidney 0.13 ppm, gull liver 0.02 ppm

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 92 4-Nov-79

Species and numbers: 8 Ducks including 1 American Wigeon and 1 Barrow's Goldeneye

Location: Region 1. Victoria - Craigflower Creek

Comments: Letter from BCEnv: Approximately 8 Ducks were discovered floating in the creek. The Wigeon and Goldeneye had been shot.

Toxicology: No results were attached although liver and muscle tissues collected for DDT and mercury analysis.

Probable cause of death: Trauma - Gun shot

Record number: 93 12-Nov-79

Species and numbers: 30-40 Ducks and Mew Gulls

Location: Region 2. Harrison Hot Springs

Comments: CWS file consisted of memos from the BCEnv. Thirty to forty dead ducks and Mew Gulls were found on the beach. Two African Swan (domestic species) were found dead on the bank of the Miami Slough on 26 October. Post-mortem examination determined the cause of death due to chronic glomerulonephritis (BCAg #79-5873). There was no indication that toxicological tests were conducted. The swan mortalities are not discussed in detail since mortalities of domestic species are not included in this report. BCEnv collected water and sediment samples from the Miami Slough area of Harrison Hot Springs on 20 March 1980 for coliform, water chemistry, and water and sediment pesticide residue analysis. Results indicate the water quality of the system was good. Coliform samples indicated no major dry weather sewage was entering the slough. Nutrient levels in the water were slightly elevated but were within the normal range for an agricultural area. The iron-bacteria growths on the stream bottom were as result of the iron spring entering upstream. Pesticide analysis of water samples were negative but sediment samples showed a low concentration of Diazinon (0.016 ppm) and possibly some Thiodan (Endosulfan). The Diazinon probably originated from household use. The levels indicated would probably have no acute effects on waterfowl or aquatic life.

Lab report: BCAg #79-6614: One Duck and one Mew Gull were submitted for post-mortem examination. ***Gull***: Post-mortem examination: Diffuse fungal infection involving air sacs, kidneys and lung. Appeared to be an Aspergillus infection. Carcass was emaciated. No body fat. ***Duck:*** Post-mortem examination: Mycotic lesions on the anterior of the sternum and its anterior extremity. Emaciated. No other specific gross lesions. Comment: Both birds had fungal infections which no doubt caused their death and the emaciation observed on the post-mortem examination. Diagnosis: Generalized mycotic infection.

Toxicology: BCEnv liver and kidney (gull and duck pooled): Aldrin, Chlordane, Dieldrin, Heptachlor, Malathion, Mevinphos, Benzene Hexclor, Diazinon, Dyfonate, Lindane, Methoxychlor and Parathion - ND.

Probable cause of death: Disease - Mycotic infection

Record number: 94 1-Dec-79

Species and numbers: 11 Ring-necked Pheasants and 5 Mallards

Location: Region 2. Richmond - Finn Rd. & Garden City Rd.

Comments: CWS Report: Dogs retrieved dead pheasants occasionally over a two month period. During a site inspection on 18 Jan 1980, four dead pheasants were found (three in the ditch along Finn Rd., one in an unharvested corn field north of Finn Rd. which had been scavenged). Five Mallard carcasses were also found; one was likely shot, the rest were completely scavenged.

Lab report: AgCan #V80-062: Four Pheasants and one Mallard were submitted. Post-mortem examination: All young birds; 1 Mallard drake, 3 hen and 1 cock Pheasant. No evidence of any infectious or contagious disease. Trauma observed, probably due to gun shot in the Mallard and trauma of unknown origin in the male pheasant and one female pheasant. Virology: Negative for any chick embryo lethal agents. Conclusions: Cause of death in the two remaining hen pheasants was not possible as much of the carcasses had been eaten by predator scavengers.

Toxicology: AgCan Mallard liver: lead ND.

Probable cause of death: ***Mallards:*** Trauma - Gun shot; ***Pheasants***: Trauma - Undetermined origin

Record number: 95 3-Dec-79

Species and numbers: 2 Great Blue Herons

Location: Region: 2. Cultus Lake

Comments: CWS Report: Shot at a trout farm.

Probable cause of death: Trauma - Gun shot

Record number: 96 3-Dec-79

Species and numbers: 2 Great Blue Heron, 1 Mallard and hundreds of Carp

Location: Region 2. Delta - Big (Oliver) Slough, near 112 St. & Mud Bay shore

Comments: BCEnv memorandum: Residents in the area reported "hundreds" of carp dying over a three day period. Gulls and other birds were observed foraging on dead fish. Investigation of the site on 7 Dec 1979 revealed about 2 dozen carp dead in the Slough and 2 Great Blue Heron and 1 Mallard drake were also found dead beside the Slough. Land adjacent to the slough was used for various agricultural purposes (dairy farming at the lower end of the slough, strawberries in the upper end of the slough). According to local residents, a ditch in the strawberry fields had been cleaned out just before the fish started dying. Two containers of a solution used to apply pesticides to foliated plants were found floating in the slough beside the strawberry field. An old can of Thiodan was also

found (just a piece of the can which was being used to block a hole in the fence). A note suggests that cleaning the ditch may have released hydrogen sulphide into the slough and caused the kill.

Toxicology: BCEnv Mallard (liver & brain), Carp (liver, spleen, kidney) and 1 water sample: Pesticides - all ND

Probable cause of death: Undetermined

Record number: 97 3-Dec-79

Species and numbers: approximately 200 Ducks - mostly Mallards, Northern Pintails, and some Teal.

Location: Region 2. Richmond

Comments: CWS Report: On 3 Dec 1979, 60 to 70 distressed or dead Mallards and Pintails were found in an agricultural area. The majority of the individuals were scattered over a harvested potato field; several were found in an adjoining field of unharvested cabbage and cauliflower. Subsequent investigation determined all ducks had been poisoned in the cabbage/cauliflower field by the organophosphate insecticide, Fensulfothion. The pesticide was reported to have been applied in late May or early June, at the normal rate. As much as 84% of the recommended initial concentration remained in the soil of one part of the field 7 months after application. The field was comparatively well-drained; even after a heavy rainfall there was little standing water. Two empty Dasanit 15G bags were found in one corner of the field. Scare tactics were employed to keep ducks out of the field; however, they were not effective and many more ducks were poisoned. Although the field was ditched on 15 Feb 1980, duck mortalities continued until it was ploughed on 26 March 1980. No further mortality was observed after plowing. Altogether approximately 200 Ducks died on the site. This is a well documented die-off with copies of lab reports, a press release, and minutes from a meeting are included in the record.

Lab report: AgCan #V79-943: Two Mallards and 1 Pintail were examined. Post-mortem examination: All birds were in good condition. No evidence of trauma or any infectious or contagious disease. Necropsy: Ducks appeared to be well fleshed. All birds showed heart congestion, but other organs were normal in appearance. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative for pathogenic organisms. Parasitology: Two ducks were positive for proventricular worms; the other duck had thorny-headed worms and a tapeworm. Other: All birds had many flat round black seeds in crops and gizzards which were tentatively identified as "smart weed" seeds. Crop and gizzard contents were examined for pesticide granules; none were found. Conclusion: Cause of death could not be determined.

Toxicology: BCEnv screened water, soil, vegetation, and gastro-intestinal contents for OCs and pesticides in early Dec. 1979. On 16 Jan 1980, BCAg collected a series of soil samples. The field was split into 4 quarters and composite samples were pooled from each section. A sub-sample of each pool was analyzed by the AgCan Research Lab and the BCEnv.

BCEnv:

	Collection Date	Fensulfothion	Remarks
proventriculus contents	Dec. 4	10.26	DDE 0.01 DDT 0.07

gizzard contents	Dec. 4	<0.1 L	DDE 0.10 DDT 0.11
potato	Dec. 4	< 0.1 L	DDE <0.1L DDT <0.1L
soil, potato field	Dec. 4	<0.1 L	DDE <0.1L DDT <0.1L
water, potato field	Dec. 4	<0.1 L	DDE <0.1L DDT <0.1L
soil, cabbage root ball	Dec. 6	0.18	other OPs <0.2
Soil, cabbage root ball	Dec. 6	0.32	other OPs <0.2
soil, cabbage root ball	Dec. 6	0.35	other OPs <0.2
soil, cabbage root ball	Dec. 6	18.02	other OPs <0.2
soil, 3cm x 15cm row	Dec. 10	42.36	-
soil, 3cm x 15cm row	Dec. 10	54.18	-
soil, 3cm x 15cm row	Dec. 10	21.15	-
soil, 3cm x 15 cm row	Dec. 10	<0.4	-
cabbage leaves	Dec. 10	<0.8	-
dock seeds	Dec. 10	<0.8	-

AgCan Research Lab / BCEnv (soil samples collected 16 Jan. 1980):

Quarter of field	AgCan Research Lab		BCEnv	
	Fensulfothion	F. Sulfone	Fensulfothion	F. Sulfone
north-east	12.35	4.8	11.9	5.3
south-east	2.5	1.35	1.9	1.1
north-west	11.2	4.0	9.1	3.5
south-west	17.9	8.3	17.9	9.1

Probable cause of death: Pesticide poisoning - Fensulfothion G

Record number: 98 11-Dec-79

Species and numbers: 1 Great Blue Heron

Location: Region: 2. Richmond - No. 5 Rd.

Comments: CWS Report: This juvenile heron was found dead in a ditch near a cranberry field. There was no indication of a follow-up investigation.

Probable cause of death: Undetermined

Record number: 99 22-Jan-80

Species and numbers: 1 Green-winged Teal and 1 Bufflehead

Location: Region 2. Vancouver (golf course)

Comments: CWS Report: Birds which were distressed and unable to fly were found in a ditch near a golf course. They were picked up, fed grain, went into convulsions and died.

Lab report: AgCan #V80-065, 66: ***Bufflehead #65*** Necropsy: Evidence of lung congestion and pericarditis. Bird was thin and wasted in appearance. There was no evidence of trauma. Virology: Negative for chick embryo lethal agents. Parasitology: Positive for thorny-headed worms and intestinal flukes. ***Teal #66*** Necropsy: Evidence of air sacculitis or any infectious or contagious disease. Bird was thin and wasted in appearance. The

lower bill was missing. Virology: Negative for chick embryo lethal agents. Parasitology: Positive for thorny-headed worms and spiny-headed intestinal flukes.

Toxicology: Tissues were held for pesticide analysis; no report was attached.

Probable cause of death: Undetermined

Record number: 100 5-Feb-80

Species and numbers: 1 Great Blue Heron

Location: Region 2. Delta

Comments: CWS Report: The juvenile bird was found in a ditch. There was no indication of any follow up investigation.

Probable cause of death: Undetermined

Report number : 101 12-May-80

Species and numbers: 8 Canada Geese

Location: Region 8. Penticton - Trout Creek area (orchard)

Comments: CWS Report: Trout Creek is an orchard area about 6 miles north of Penticton. Some carcasses were found in the lake; others were in an orchard. An orchardist indicated that sprays, including Diazinon, had been applied just previous to the die-off.

Lab report: Three of the geese were examined, one by AgCan and two by BCAg. AgCan #V80-399: ***Goose #1*** Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of much internal hemorrhage. Blood was observed in the anus and the bowels were highly inflamed. The gizzard lining was eroded but no parasites were found. Gizzard and proventriculus were full of grass. The head was missing and the flesh bared around left leg and right breast. Liver, kidneys, spleen and heart appeared normal. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. BCAg #80-3427: ***Geese #2 & 3*** Post-mortem examination: There was very little ingesta in the gizzard of either bird. The intestinal mucosa appeared hemorrhagic. Bacteriology: Heavy mixed coliformes (hem. and non-hem. *E. coli*, *Klebsiella*, heavy alpha *Strep*. Gut - non-hem *E. coli*. Comment: There was a mixture of bacteria recovered, none of which would be considered primarily the cause of death.

Toxicology: AgCan #V80-399 ***Goose #1*** liver-lead ND; BCEnv #80-3427 ***Geese #2 & #3***:

	Pb	Cd	Mn	Cu	Zn	Fe	As	Hg
liver	O.5	1.02	2.98	6.1	29.4	140	<0.5	<0.3
kidney	0.9	6.75	2.82	5.0	28.7	138	<0.5	<0.3

	Diazinon	Ethion	Malathion	Plictran
liver	<0.1	<1	<1	-
kidney	<0.1	<1	<1	-
intestine A	0.13	<1	<1	-
gizzard B	0.31	<1	<1	-

Probable cause of death: Pesticide poisoning - Diazinon F

Record number: 102 7-Jun-80

Species and numbers: 1,000 Passerines, mostly Evening Grosbeak and a few Pine Siskins

Location: Region 2. Manning Park and Skagit Valley

Comments: CWS Report: Birds were found dying along the roadside over a two month period. Highways staff reported that the problem had been ongoing for four to six years but never to the current extent. The deaths appeared to be caused by impact with moving vehicles while the birds were consuming road side grit and salt. The abundance of Evening Grosbeaks may have possibly been in response to the spruce budworm infestations. Similar incidents occurred in New Brunswick in 1964 and 1966 when the number of Evening Grosbeaks exploded as a result of an increase in the spruce budworm population and thousands of birds were killed by traffic when they flocked around highway shoulders to ingest salt and grit.

Lab report: BCAg #80-4799: Thirty grosbeaks were examined. Post-mortem examination: The glands of the birds did not appear to be mature. Some of the apparent females appeared to be immature males. Histology: Ovaries were forming follicles, however there were no mature follicles present. Some testicles had very little or no spermatozoa production. Comment: Spruce budworm larvae were identified in the gizzard of the grosbeaks.

Probable cause of death: Trauma - Vehicle collision

Record number: 103 21-Oct-80

Species and numbers: 1 American Coot

Location: Region 2. Not indicated.

Comments: CWS file contained only AgCan Specimen Record. No additional information was included.

Lab report: AgCan #V80-716: Post-mortem examination: Adult female. No evidence of trauma or infectious or contagious disease. Necropsy: The bird was well fleshed with no fat layer. All body organs appeared normal. Normal amount of food was observed in the gizzard, the nature of which was not determined. Virology: Negative for any chick embryo lethal agents. Parasitology: Negative. Conclusions: Cause of death could not be determined.

Toxicology: BCEnv

	% moisture	As	Cu	Zn	Pb	Cd
liver	68.9	L1.6	33.3	70.6	L3.11	0.6

Probable cause of death: Undetermined

Record number: 104 28-Oct-80

Species and numbers: 6 Common Murres

Location: Region 1. Juan de Fuca Strait - off Sherringham Point

Comments: CWS file contained only the BCAg Specimen Report. History from the report stated the dead birds were found floating in the water.

Lab report: BCAg #80-7431: Six murres were examined. These were labelled #1 to 6. #1, 3, 4 and 6 were females; #2 and 5 were male. Post-mortem examination: Bird #1 showed extensive edema within the body cavity and this was evident in most of the other birds but to a less degree. All lungs were congested. Bird #2, 4 and 5 showed some fish. The rest had empty gizzards. Contents of #1 to 5 were fairly loose but #6 was more solid feces. No other specific lesions noted. Livers, lungs and guts from Bird #1 and 2 were pooled, #3 and 4 pooled, and #5 and 6 pooled for Bacteriology, and tissues were taken for Histology. Histopathology: Lungs - intense congestion and a few focal peribronchiolar lymphocytic cuffs. Liver - scattered focal collections of mainly mononuclear inflammatory cells. Kidney - a few scattered and focal collection of inflammatory cells, mainly mononuclear, but some heterophils in the pelvis area. Hearts - NSL. Bacteriology: #1, 2, 3, 4: lung, liver - no bacterial growth; gut - scant coliform. #5, 6: lungs - scant *Staph. albus*; gut - coliforms. Comment: All these birds were young and appeared to be poor fishermen as they contained no fat depots and appeared in very emaciated condition. There was some inflammatory reaction in the kidneys and livers of these birds, but we were not able to isolate anything of significance, nor was the reaction suggestive of one that was severe enough to have caused death. I feel that these birds most likely succumbed to malnutrition, but as to whether this could be related to a pesticide problem or not, I leave up to you. Diagnosis: Malnutrition.

Toxicology: Liver, fat and muscle tissue were collected from each bird for residue analysis. No indication that analysis was conducted.

Probable cause of death: Disease - Malnutrition

Record number: 105 5-Nov-80

Species and numbers: 1 Mallard

Location: Region 2. Vancouver - Musqueam Native Reserve

Comments: CWS Report: The bird was shot by a hunter. When the carcass was opened, it appeared to have a greenish hue to the skin and a bad odour.

Lab report: AgCan #V80-757: Post-mortem examination: Male. No evidence of infectious or contagious disease. Necropsy: Evidence of extensive post-mortem change. Bird had been shot with resultant hemorrhage in thoracic cavity. One lead shot was recovered from the gizzard. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative.

Toxicology: AgCan liver: lead ND.

Probable cause of death: Trauma - Gun shot

Record number: 106 8-Nov-80

Species and numbers: 4 Gulls and 15 Ducks including 3 Mallards, 1 Northern Pintail, 1 Teal, 1 Western Grebe and 1 Sea Duck

Location: Region 2. Delta - Boundary Bay, between 96th & 104th St.

Comments: CWS Report: Bird carcasses were found scattered along mud flats. Five ducks (3 Mallards, 1 Northern Pintail, and 1 Teal) were found on 8 Nov; an additional 10 ducks (including 1 Western Grebe and 1 Sea Duck) and 4 Gulls were discovered on 10 Nov.

Lab report: AgCan #V80-754: Two Mallards were examined. Post-mortem examination: 2 year male. Severe Aspergillosis infection. No evidence of trauma. No tissues were collected.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 107 16-Jan-81

Species and numbers: 37 Ducks, mostly American Wigeon and some Mallards

Location: Region 2. Powell River

Comments: CWS file consisted of a BCEnv. Memorandum. It stated that on the evening of 16 January or morning of 17 January, 37 dead ducks were found around the edge of a 25' x 10' pond in an area of hobby farms and pastures. Several sick ducks were also observed. They had mucousy saliva and were trying to move by dragging themselves with their wings. A number of chemical containers were found 50 yards uphill from the pond. They were labelled 'Chrysoidine YN Liquid Dyestuff Solution in Acetic Acid; Caution: Corrosive'. These containers were empty, sealed and did not appear to be leaching any material. On the morning of the 19 January, a number of Wigeon and Mallards were observed in the pond; they appeared healthy and flew off when approached. There were also a couple of domestic geese in the pond which appeared to be healthy. A municipal sewage lagoon which was about 1/4 mile away was also visited on 19 January. There was one Mallard which appeared to have been dead for some time and 2 dead Wigeon.

Lab report: BCAg #81-483: Six ducks were examined; 5 from the pond and 1 from the sewage lagoon. Post-mortem examination: ***Duck #1***: Very severe pulmonary edema. Intestines flaccid and dilated. Only fine grit in gizzard. ***Ducks #2-6***: Pulmonary edema. Grass in proventriculus and gizzard. Histology: Lung - inflammatory cell infiltrates in air passages, mucosa and submucosa. Liver - One bird had Cholangitis; the rest had no specific microscopic lesions. Virology: Duck picorna/adenovirus positive. Bacteriology: Gut - *E. Coli*. Diagnosis: Cholangiohepatitis and Bronchitis.

Toxicology: BCEnv: Gut contents (pooled): Diazinon 11.6 ppm. BCAg

	As	Cu	Zn	Fe	Mn	Pb	Cd	Hg
livers	<0.5	11.7	98	217	25	0.5	0.60	<0.5
kidneys	<0.5	9.8	52	124	3.1	0.6	1.09	<0.5

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 108 2-Feb-81

Species and numbers: 1 Hawk

Location: Not indicated.

Comments: CWS file contained only AgCan Specimen Record. No additional information was included.

Lab report: AgCan #V81-091: Immature. Post-mortem examination: Evidence of advanced post-mortem autolysis precluding any meaningful pathological observations. The bird appeared well fleshed. Virology: Negative for any chick embryo lethal agents. Parasitology: Negative.

Toxicology: BCEnv

	% moisture	Cu	Zn	Pb	Cd	As
kidney	72.3%	2.5	19.7	L3.0	L0.3	L1.2

	Gut contents	Fat	Liver
Aldrin	-	L0.08	-
Benzene Hexclor	-	L0.08	-
Birlane	L1.0	-	L1.0
Bromacil	2.51	-	-
Chlordane	-	L0.2	-
Dasanit	3.2	-	L2.0
Diazinon	L0.1	-	L0.1
Dieldrin	-	L0.02	-
Disyston	L1.0	-	L1.0
Dyfonate	L1.0	-	L1.0
Heptachlor	-	L0.02	-
Lindane	-	L0.02	-
Malathion	L1.0	-	L1.0
Methoxychlor	-	L0.08	-
Mevinphos	-	-	L0.08
Parathion	L1.0	-	L1.0
Thiodan	-	L0.08	-

Probable cause of death: Pesticide poisoning - Fensulfothion (Dasanit) and Bromacil

Record number: 109 2-Feb-81

Species and numbers: 1 Gull

Location: Not indicated.

Comments: CWS file contained only AgCan Specimen Record. No additional information was included.

Lab report: AgCan #V81-092: Post-mortem examination: No evidence of trauma. Necropsy: Very thin bird with no fat reserves and severe nephrosis. Other organs appeared normal. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative for *Salmonella*. Parasitology: Negative.

Toxicology: BCEnv

	% moisture	Cu	Zn	Pb	Cd	As
kidney	77.9	3.3	46.0	L2.21	2.21	1.1

	Gut contents	Liver
Aldrin	-	-
Birlane	L1.0	L1.0
Dasanit	L2.0	L2.0
Diazinon	L0.1	L0.1
Disyston	L1.0	L1.0

Dyfonate	L1.0	L1.0
Malathion	L1.0	L1.0
Mevinphos	L0.08	L0.08
Parathion	L1.0	L1.0

Probable cause of death: Undetermined

Record number: 110 12-Feb-81

Species and numbers: 4 Mallards

Location: Not indicated.

Comments: CWS file contained only 4 AgCan Specimen Records. We grouped all of the birds in the same event since they were sent to the lab on the same day, by the same person and were still fresh condition (i.e. had not been. No additional information was included in the file.

Lab report: AgCan #V81-123, 124, 125, 126: Four Mallards were examined; #123 and 125 were adult males, #124 and 126 were adult females. Post-mortem examination: All birds showed no evidence of any infectious or contagious disease. Necropsy: All birds were normal in appearance. Virology: Negative for any chick embryo lethal agents. Parasitology: ***Mallard #123***: Positive for thorny-headed worms and intestinal fluke ova. ***Mallard #124***: Positive for nematode ova. ***Mallard #125***: Negative. ***Mallard #126***: Positive for intestinal flukes.

Toxicology: BCEnv

	% moisture	As	Cd	Cu	Pb	Zn
kidney #123	74.1	L1.3	2.3	7.5	L2.6	24.9
kidney #124	75.7	L1.5	1.9	20.2	L2.7	28.2
kidney #125	73.7	L1.3	1.3	3.4	L2.6	21.3
kidney #126	73.5	L1.3	1.9	6.9	L2.7	23.1
liver #?	70.2	L1.5	0.6	34.6	L3.0	40.2

	Muscle #123	Muscle #125	Fat #125	Muscle #126	Fat #126
Aldrin	L0.08	0.08	0.08	0.08	0.08
Benzene Hexaclor	L0.08	0.08	0.08	0.08	0.08
Chlordane	L0.2	0.2	0.2	0.2	0.2
Dieldrin	L0.02	0.02	0.02	0.02	0.02
Heptachlor	L0.02	0.02	0.02	0.02	0.02
Lindane	L0.02	0.02	0.02	0.02	0.02
Methoxychlor	L0.08	0.08	0.08	0.08	0.08
Thiodan	L0.08	0.08	0.08	0.08	0.08

Probable cause of death: Undetermined

Record number: 111 23-Feb-81

Species and numbers: several Goldeneye

Location: Region 2. Vancouver - False Creek / Spruce Harbour

Comments: CWS Report: Several dead Goldeneye were observed over a few days. One carcass picked up.

Lab report: AgCan #V81-153: One bird was examined. Post-mortem examination: Female. No evidence of trauma or any infectious or contagious disease. Necropsy: While the internal organs were normal in appearance, the bird was somewhat thin. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for lice but negative for internal parasites. Cause of death: Could not be determined.

Probable cause of death: Undetermined

Record number: 112 13-Mar-81

Species and numbers: 6-7 Western Grebes, 2 Diving Ducks, 1 Canada Goose

Location: Region 2. Vancouver - False Creek

Comments: CWS Report: There were reports of 4 or 5 Grebes acting erratically and then dying below the Granville Street Bridge over a three day period. Two diving ducks and a Canada Goose were in distress and swimming in circles for several hours before dying. A resident who lived near False Creek turned in another dead grebe on 14 March. False Creek was searched by boat along both shores from the mouth to Main Street. During the search, another dead Western Grebe was found and a large number of live Barrows Goldeneye, Surf Scoters, 3 species of grebes, loons, cormorants, herons, wigeon, mallards, coots and geese were observed.

Lab report: AgCan #V81-232: Two Western Grebes were examined. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: Birds were extremely thin and wasted. No food was observed in gastrointestinal tract. Muscles and organs were congested in appearance. Usual feather "ball" was found in gizzards. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative for *Salmonella sp*. Parasitology: Negative.

Toxicology: BCEnv

	% moisture	As	Cd	Cu	Pb	Zn
Grebe #1 liver	75.3	L1.2	L0.3	11.5	L2.5	83.1
Grebe #2 liver	75.7	L1.2	L0.2	6.1	L2.4	45.4

	DDE	DDD	Aroclor 1260	HE	Dieldrin	OPs
Grebe #1 gut contents	0.09	-	0.22	-	-	ND
Grebe #1 muscle	2.15	0.30	5.15	0.03	0.04	-
Grebe #2 gut contents	0.04	-	0.07	-	-	ND
Grebe #2 muscle	-	0.02	1.69	0.02	0.02	-

Probable cause of death: Undetermined

Record number: 113 3-Apr-81

Species and numbers: 9 Glaucous-winged Gulls

Location: Region 2. New Westminster - BC pen [penitentiary??]

Comments: CWS Report: Nine young birds were found on the lawn of the BC pen. Although most birds were dead, one was captured alive. The bird was salivating, unable to fly or run and had green cloaca.

Lab report: AgCan #V81-262, 263: Two birds were examined. Extensive Aspergillosis. No tissues were collected.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 114 15-Apr-81

Species and numbers: 3 Gulls

Location: Not indicated.

Comments: CWS file contained only a AgCan Specimen Record. No additional information was included in report.

Lab report: AgCan #V81-294: Three birds were examined; all were juveniles. ***Bird A***: Died 22 April 1981. Necropsy: Evidence of extensive non-mycotic air sacculitis. No evidence of parasitism. Virology: Negative. Parasitology: Negative. ***Birds B & C***: Died 15 April 1981. Both birds showed extensive lesions of Aspergillosis.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 115 15-May-81

Species and numbers: 4-6 Finches

Location: Region 2. Tsawwassen

Comments: CWS Report: Four to six finches died on a residential property near the house over a two week period. All birds had growths on the side of their beaks (only on one side of head). They became inactive and listless and then died. A similar incident occurred in 1980. Sample of bird feed was collected.

Lab report: AgCan #V81-345: One bird was examined. Post-mortem examination: Adult male. No evidence of trauma. Avian pox lesions on head, beak and legs. Virology: Positive for a chick embryo agent; indistinguishable from avian pox. Bacteriology: Negative. Parasitology: Positive for a heavy infestation of *Coccidia sp.*

Probable cause of death: Infectious disease - Coccidiosis and Avian Pox

Record number: 116 22-May-81

Species and numbers: 6 Canada Geese

Location: Region 8. Penticton

Comments: CWS Report: Juvenile birds. Goose #1 had 39.6 grams of gut contents (mostly sand); Goose #2 had 52.5 grams of gut contents (45.5 grams grass and 7.0 grams sand).

Lab report: AgCan #V81-353: Two Geese were submitted. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: The general condition of the birds was good. Their gizzards showed small areas of erosion due to parasites. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for gizzard worms. Fecal flotation's were negative.

Toxicology: BCEnv: The gut contents of both geese were screened for pesticides. Goose #1 had 2.64 ppm Diazinon and Goose #2 had 10.73 ppm Diazinon.

	% moisture	As	Cd	Cu	Pb	Zn
Goose#1 liver	73.4	L1.3*	L0.3	8.8	L2.7*	41.0
Goose#2 liver	73.2	L1.3*	L0.3	11.5	L2.7*	41.5

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 117 25-May-81

Species and numbers: several Scoters

Location: Region 2. Whiterock - Crescent Beach

Comments: CWS Report: This bird appeared sick. There were several scoters which were acting "strange" and although they were unable to fly, they avoided capture.

Lab report: AgCan #V81-358: One Scoter was examined. Post-mortem examination: Adult male. No evidence of trauma. The bird was thin and anemic with air sacculitis and lung congestion. No food in the gastrointestinal tract. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for a heavy load of tapeworm. Intestinal flukes were also observed.

Toxicology: BCEnv

	% moisture	As	Cd	Cu	Pb	Zn
liver	77.2	L1.1	0.9	25.3	L2.3*	49.2

Probable cause of death: Undetermined

Record number: 118 25-May-81

Species and numbers: 1 Evening Grosbeak

Location: Region 2. Tsawwassen

Comments: CWS Report: No details included.

Lab report: AgCan #V81-357: Post-mortem examination: Adult male. No evidence of any infectious or contagious disease. Necropsy: There was a skull hemorrhage and brain congestion. Organs appeared normal. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for *Coccidia sp.*

Toxicology: BCEnv #107174W gut contents: OPs - ND.

Probable cause of death: Undetermined

Record number: 119 13-Jan-82

Species and numbers: 1 Gull

Location: Region 2. Richmond

Comments: CWS Report: A dead Gull was found dead on the school grounds. It was lying on a field with its wings extended. The history recorded in the AgCan Specimen Record said some people found a sick bird (species not indicated) about a week earlier in the same location. They took the sick bird to an Animal Shelter but it died.

Lab report: AgCan #V82-033: Post-mortem examination: Adult male. Well fleshed bird with a mild air-sacculitis. The liver was pale in colour and showed extensive hemorrhage.

All other organs appeared normal. Stomach contents included: banana peel, leaves, sand-paper, pieces of chip-board, paper, chicken bones, sand and plastic chips. Bacteriology: Negative. Virology: Negative. Parasitology: Negative. Death due to liver hemorrhage (similar to fatty liver syndrome seen in poultry). Diagnosis: Death due to liver hemorrhage (Similar to fatty liver syndrome seen in poultry).

Probable cause of death: Disease - Liver hemorrhage

Record number: 120 29-Jan-82

Species and numbers: 6 Canada Geese

Location: Region 8. Okanagan Lake - Penticton area

Comments: CWS Report: Dead geese washed up on the shore of Lake Okanagan; some of the carcasses had been scavenged.

Lab report: AgCan #V82-071, 072: Two carcasses were submitted. ***Goose #71***: Post-mortem examination: Juvenile female. No evidence of any infectious or contagious disease. Necropsy: Well fleshed bird with considerable bruising to skin. Thoracic air sacs, lungs and trachea well full of sand. Gizzard was full of food and sand. No worms observed. Organs appeared normal with exception of a mild enteritis. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Cause of death could not be determined. ***Goose #72***: Post-mortem examination: Female. No evidence of trauma. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Cause of death could not be determined.

Toxicology: AgCan #V82-071, 072 liver: lead and heavy metals ND; BCEnv OP scan: Goose #1 - gut contents Diazinon 0.04 ppm, liver ND; Goose #2 - gut contents ND, liver ND

Probable cause of death: Undetermined

Record number: 121 3-Feb-82

Species and numbers: 5 Canada Geese

Location: Region 8. Okanagan Lake - Carr's Landing, west of Winfield near Vernon.

Comments: CWS Report: Two dead geese were found in the water. A third sick goose was caught and placed in a shed where it died within one hour. Two more sick geese were observed on the lake shaking their heads.

Lab report: AgCan #V82-087, 88, 89: Three birds were examined. ***Goose #87***: Post-mortem examination: Adult male. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of a mild nephrosis and fluid in the pericardial sac. The bird was well fleshed. Gizzard held sand and yellow seeds. One or two areas of the bowel showed signs of inflammation. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. ***Goose #88***: Post-mortem examination: Adult male. No evidence of any infectious or contagious disease. Necropsy: Evidence of lung congestion and enteritis. There was bruising of the breast muscle and pericardial fluid was present. Sand and yellow seeds observed in gizzard which showed erosion due to parasites. Virology: Negative for chick embryo lethal agents.

Bacteriology: Negative. Parasitology: Positive for gizzard worms. ***Goose #89***: Post-mortem examination: Adult female. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of an anemia well fleshed bird showing lung congestion and pericardial fluid. Parasitic erosion was noted in gizzard; the cecum was inflamed; a lead shot was found in the intestinal mesentery. Virology: Negative for chick embryo lethal agents. Bacteriology: Positive for *Acinetobacter anitratus*, the significance of which could not be determined. Parasitology: Positive for gizzard worms.

Toxicology: AgCan all livers: lead ND; BCEnv OP scan of all three gut contents: trace levels of Diazinon detected in one gut but not detected in other two guts.

Probable cause of death: Pesticide poisoning - Diazinon suspected

Record number: 122 1-Mar-82

Species and numbers: 1 Bald Eagle

Location: Region 6. Queen Charlotte Islands - Sandspit

Comments: CWS Report: This bird was one of a group of five eagles submitted by the BC Env Fish and Wildlife Branch in Victoria to the BCEnv Lab for OCs and mercury residue analysis on 25 March 1983. Tissues were collected from four birds; the fifth eagle were was too badly decomposed to obtain samples. The note identified this eagle as an adult male which was electrocuted in Sandspit in March 1982. There were no histories for the rest of the birds. Therefore, there is no reason to suspect that these four remaining birds were found at the same location or during the same time period. However, since tissues from these birds were sent to the BCEnv lab for analysis on 25 March 1983, we have grouped them together in the same record. Cross reference Record Number 136.

Toxicology: BCEnv

	opDDT	ppDDT	DDE	DDD	Aroclor 1242	Aroclor 1254	Aroclor 1260	Hg
liver	L0.02	L0.02	9.6	L0.02	L0.1	L0.1	5.6	3.73
kidney	L0.02	L0.02	4.7	L0.02	L0.1	L0.1	2.3	B
heart	L0.02	L0.02	1.7	L0.02	L0.1	L0.1	0.7	1.40
lung	L0.02	L0.02	0.96	L0.02	L0.1	L0.1	0.4	1.15
muscle	L0.02	L0.02	3.2	L0.02	L0.1	L0.1	1.7	1.08

	Oxychlordane	trans-Nonachlor	HE	HCB	β-BHC
liver	0.01	0.26	0.06	0.14	0.18
kidney	0.13	0.15	0.07	0.10	0.17
heart	0.09	0.08	0.07	0.09	0.13
lung	0.06	0.05	0.02	0.04	0.06
muscle	0.12	0.15	0.08	0.10	0.17

Probable cause of death: Trauma - Electrocution

Record number: 123 4-Mar-82

Species and numbers: around 6 Canada Geese
Location: Region 8. Osoyoos
Comments: CWS Report: Birds were found dead. One goose carcass was submitted to a lab for examination but the carcass was too decomposed to determine cause of death.
Probable cause of death: Undetermined

Record number: 124 4-Mar-82

Species and numbers: 12 Waterfowl including 7 Mallards, 1 American Wigeon, 1 Northern Pintail, 2 Trumpeter Swans, 1 Loon and 2 Domestic Geese, 1 Domestic Duck and 1 Chicken.
Location: Region 6. Queen Charlotte Islands - Tlell River
Comments: CWS Report: Domestic geese and chicken had been feeding on the river flats among wild waterfowl; a number of the birds died within one week. The owner found two dead wild waterfowl in his yard and observed one sick swan in the stream in front of yard. The next day, two domestic geese were found dead and he killed the chicken because it was obviously ill (depressed, lethargic and its comb turning black). He had observed the geese shaking their heads and making "peculiar swallowing motions" prior to their death. The swan which was separated from the other birds, was observed to be stretching and shaking its neck. It did not move when approached. Power poles along Tlell River had been treated with PCP 2-3 months earlier. Cross reference Record No. 125 (same general location).
Lab report: The two domestic geese and chicken were examined by a veterinarian in Tlell; one of the two Trumpeter Swan was sent to AgCan.; the rest of the carcasses were not examined. ***Geese***: Both were fat females with active ovaries and shelled and ready to lay eggs in their oviducts. Both birds had hemorrhagic ova and one bird had some cheese like material from a ruptured yolk around the ova. The livers were not swollen but did appear slightly streaked and quite friable. Both geese had full crops and intestinal tracts. The upper GI (crop and esophagus) were full. Below the gizzard, the contents of the small intestines were black/blue; the material in the bowels was caterrhel like; the mucosa was covered with obvious peticchia - it was hyperemic. The intestinal contents from crops and gizzards of all three birds were not abnormal and besides a bit of grain had no common denominator. ***Chicken***: Rooster in good body condition. Enlarged bursa of fabricuis similar to lymphoid leukosis. Comb and wattles were slightly swollen and covered with dry crust of blood. ***Trumpeter Swan***: AgCan #V82-240: Post-mortem examination: Adult female. No evidence of trauma or any infectious or contagious disease. Necropsy: The bird was well fleshed. Five buck shot and one fishhook were removed from the gizzard. The gizzard had a perforation abscess. The liver was dark green in colour. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative.
Toxicology: BCEnv: Trumpeter Swan

	% moisture	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg	Hg
liver	70.9	L2.0	46.0	36.4	3500	1.2	32.3	0.3	133.3	155.4	0.24
kidney	81.4	L2.0	2.0	16.0	236.8	1.9	32.9	1.9	74.6	14.1	0.09

muscle	72.9	L1.6	13.3	18.7	85.6	0.3	L1.6	1.6	29.3	262.1	L0.05

	opDDT	ppDDT	DDE	DDD Rhothane	Aroclor 1242	Aroclor 1254	Aroclor 1260
liver	L0.02	L0.02	0.02	L0.02	L0.1	L0.1	L0.1
muscle	L0.02	L0.02	0.02	L0.02	L0.1	L0.1	L0.1

Probable cause of death: ***Trumpeter Swan***: Metal toxicosis - Lead; ***All others birds***: Undetermined.

Record number: 125 11-Mar-82

Species and numbers: 1 Oldsquaw

Location: Region 6. Queen Charlotte Islands - East Coast near Tlell

Comments: CWS Report: The duck was found wandering on the road, unable to fly It was held for four days and appeared to be doing quite well until it died suddenly on 15 March. Cross reference Record Number 124 (same general area).

Lab report: AgCan #V82-251: Post-mortem examination: Adult male. No evidence of trauma or any infectious or contagious disease. The bird was very thin bird. Organs appeared fairly normal with the exception of the liver which appeared shrunken. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for massive numbers on intestinal flukes of the Notocotylidae family.

Toxicology: BCEnv

	% moisture	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg	Hg
liver	73.8	6.3	20.4	64.2	6862	4.2	L3.1	8.1	66.3	242.4	2.0
kidney	80.7	3.1	10.4	33.2	237.4	1.4	L1.9	0.8	75.8	130.7	0.64

	opDDT	ppDDT	DDE	DDD Rhothane	Aroclor 1242	Aroclor 1254	Aroclor 1260	PCP
gut contents								0.101
liver	L0.02	L0.02	0.15	L0.02	L0.1	L0.1	L0.1	0.044

Probable cause of death: Undetermined

Record number: 126 15-Apr-82

Species and numbers: 1 Canada Goose

Location: Region 8. Okanagan Lake - Westbank, near Kelowna

Comments: CWS Report: Bird was found dead on shore.

Lab report: AgCan #V82-348: Post-mortem examination: Adult male. No evidence of trauma or infectious or contagious disease. Necropsy: Evidence of mild air sacculitis and minor gizzard inflammation (non parasitic). The gastro-intestinal tract was empty. The general condition of the bird was poor, the bird was thin and wasted. Virology: Positive for Newcastle Disease virus which was characterized as a non-pathogenic (Lentogenic)

strain. Bacteriology: Negative. Parasitology: Negative. Conclusion: Death due to anorexia and debilitation.

Toxicology: AgCan liver: lead ND

Probable cause of death: Disease - Starvation

Record number: 127 27-Apr-82

Species and numbers: 2 Mergansers

Location: Region 2. Vancouver - Trout Lake

Comments: CWS file consists only of BCAg Specimen Record. History on record stated the pesticides were suspected but the birds may have been shot by kids.

Lab report: BCAg #82-2498: Two birds were examined. Post-mortem examination: Mature males. ***Merganser #1***: Smaller of the two birds. It was very emaciated and in poor body condition, internal examination revealed no body fat stores. Large quantity of rubber strips were present in its gizzard. They appear to be obstructing the gizzard and there is very little material except fluid in the intestine. Lungs were extremely edematous. No other abnormalities were noted. There was no evidence of parasites. ***Merganser #2***: The bird was in good body condition. There were prominent ulcerations in the thoracic and abdominal proventriculus and a large hemorrhagic necrotic mass firmly attached to the hemorrhagic proventriculus serosa. The proventriculus in this area contains a large number of fish bones and it appears as if these bones had penetrated the wall of the proventriculus leading to an extremely sever focal necrotizing peritonitis. No other significant abnormalities were observed. No evidence of parasites. Lungs were moderately edematous. No evidence of trauma in either of the birds. Bacteriology: Heavy mixed coliform and *Strep. sp.* from all tissues. Comment: Death in Merganser #1 is attributed to inanition (emaciation) most likely resulting from an obstructed gizzard. Death in Merganser #2 is attributed to a severe focal peritonitis due to penetration of the proventiculus with fish bones and resultant infection.

Probable cause of death: ***Merganser #1***: Disease - Starvation (caused by obstructed gizzard); ***Merganser #2***: Disease - Peritonitis (caused by fish bone penetration).

Record number: 128 26-Jul-82

Species and numbers: 12 Canada Geese

Location: Region 2. Aldergrove

Comments: CWS Report: Geese died in the vicinity of a cauliflower field that had been treated with Dasanit (Fensulfothion) on the 22nd or 23rd July. Eleven carcasses were found on 26 July; an additional carcass was found the next day in the same general area but away from the previous group.

Lab report: BCAg #82-4320, 4360: A total of 12 specimen of mixed age and sex were submitted. Post-mortem examination: Most of the geese were in extremely advanced stages of decomposition and unsuitable for examination. Four geese were examined. Each of these birds were also in extremely advanced state of post-mortem decomposition. Tissues from 3 carcasses were collected for toxicology. No further studies were done.

Toxicology: BCAg

	Dasanit
#4320 liver pooled from 2 geese	2.0
#4360 liver from single goose submitted	4.0
soil #1	8.46
soil #2	8.07
vegetation #1	94
vegetation #2	75

Probable cause of death: Pesticide poisoning - Fensulfothion (Dasanit)

Record number: 129 11-Aug-82

Species and numbers: >70 Common Murres

Location: Region 1. Juan de Fuca Strait - approximately 8 miles south-west of Sooke

Comments: CWS Report: Birds were found in open water. Seine boats were fishing in the area. Possible cause of death was drowning.

Lab report: AgCan: V82-722: Four birds were submitted. Post-mortem examination: No evidence of infectious or contagious disease. Necropsy: Well fleshed birds with severe lung congestion and sero sanguirous fluid in mouth and trachea. Heart and blood vessels of ceruical ovea also congested. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: History and necropsy indicate death by drowning as a result of misadventure.

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 130 13-Aug-82

Species and numbers: 24 Passerines including 21 American Robins, 2 European Starlings, 1 House Finch

Location: Region 2. Richmond

Comments: CWS Report: Birds died in trees adjacent to a golf course and cauliflower / broccoli field. Histories included in AgCan Specimen Records implied 13 juvenile Robins and 2 Starlings were found on the golf course and 8 juvenile Robins were found dead in the broccoli field north of the golf course. Thiodan (Endosulfan) containers were also found in the agricultural field.

Lab report: AgCan #V82-698, 699: Twenty-one juvenile Robins and 2 Starlings were submitted. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: No evidence of pathological change. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative.

Toxicology: BCEnv

Specimen # and Tissue type	Thiodan	Dasanit
#698 gut contents (pool of 8 robins)	L0.08	0.99
#698 liver (pool of 8 robins)	L0.08	0.11
#699 gut contents (pool of 13 robins)	L0.08	0.22

# 699 liver (pool of 13 robins)	L0.08	0.05
soil from field - between rows	0.69	0.57
soil from field - within rows	0.42	15.58*
broccoli leaves	L0.04	9.95

Probable cause of death: Pesticide poisoning - Fensulfothion (Dasanit)

Record number: 131 29-Oct-82

Species and numbers: 1 Whistling Swan [Fulvous Whistling Duck??]

Location: Region 2. Delta - Westham Island

Comments: CWS Report: The young bird was found sick. It refused to eat and died after three days in captivity. Note: Species was listed in the report as Whistling Swan, but in this region it is more likely a Fulvous Whistling Duck.

Lab report: AgCan #V82-898: Post-mortem examination: Juvenile female. No evidence of trauma. Necropsy: Evidence of air sacculitis and a mycotic infection of the lungs. The bird was anemic in appearance. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for unidentified larvae in feces. Positive for gizzard worms.

Toxicology: AgCan liver: lead ND

Probable cause of death: Disease - Mycotic Pneumonia

Record number: 132 30-Oct-82

Species and numbers: 1 Canada Goose

Location: Region 7. Parsnip River, at confluence with Hominka River

Comments: CWS Report: The goose could not fly because it had large tumours on its wings. The bird was shot.

Lab report: AgCan #V82-918: Post-mortem examination: No evidence of infectious or contagious disease. Necropsy: Evidence of widespread tumors located in muscle tissues and subcutaneously. Most organs appeared normal. The bird was thin and wasted in appearance. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative: Histology: All neoplasms microscopically were similar in appearance and consisted of proliferated Schwan's cells having characteristic whorling and occasional lymphocytic infiltration. Occasional capilaration and zones of necrosis were present. Conclusion: Neurofibroma.

Probable cause of death: Disease - Neurofibroma

Record number: 133 17-Nov-82

Species and numbers: 2 Great Blue Herons

Location: Region 2. Pender Harbour - Porpoise Bay

Comments: CWS Report: Birds were found dead.

Lab report: AgCan: #V82-956: Both birds were submitted. Post-mortem examination: One juvenile male and one juvenile female. No evidence of any infectious or contagious

disease. Necropsy: Much evidence of post-mortem change. Male was thin and anemic; female was well fleshed. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Cause of death could not be ascertained.

Probable cause of death: Undetermined

Record number: 134 22-Dec-82

Species and numbers: 1 Cooper's Hawk

Location: Region 2. Surrey

Comments: CWS file contained only the BCAg Specimen Record Form. History from the record reported that the bird was found injured and that it was taken care of for a few days and seemed to improve but died. Suspect heavy parasites.

Lab report: BCAg: #82-6991: Post-mortem examination: Mature. The bird was extremely thin and the body tissues exhibited mucoid degeneration. Each eye contained a corneal ulcer. There was no ingesta in the crop. Bacteriology: All tissues - no bacterial growth. *Salmonella/Arizona* - negative. Parasitology: Negative in intestinal tract.

Toxicology: BCAg liver and kidney were screened for OCs: DDE 51.9 ppm, Aroclor 1260 30.7 ppm.

Probable cause of death: Undetermined

Record number: 135 21-Jan-83

Species and numbers: 2 Common Murres

Location: Not indicated

Comments: CWS file consisted only of the AgCan Specimen Record. No history was included.

Lab report: AgCan #V83-049: Two birds were examined. Post-mortem examination: Neither bird showed evidence of any infectious or contagious disease. Necropsy: ***Bird A:*** Severe bruising to base of neck. ***Bird B***: Very thin. Much post-mortem change. The gizzard had been pierced by spicules likely derived from a marine animal (squid?). Virology: Both birds were negative for any chick embryo lethal agents. Bacteriology: Both birds were negative. Parasitology: Positive for lice on both birds.

Probable cause of death: Undetermined

Record number: 136 25-Mar-83

Species and numbers: 4 Bald Eagles

Location: Not indicated

Comments: CWS Report: These birds were part of a group of five eagles submitted by the BCEnv Fish and Wildlife Branch in Victoria to the BCEnv Lab for OCs and mercury residue analysis on 25 March 1983. Tissues were collected from three of these four eagles since one carcass was too badly decomposed to obtain samples. The note only identified one eagle as an adult male which was electrocuted in Sandspit in March 1982; it is not reported here (cross reference Record number 122). There were no histories for the rest

of the birds. Therefore, there is no reason to suspect that these individuals were obtained from the same location or during the same time period. However, since all of the tissues were sent to the BCEnv Lab for analysis on 25 March 1983, we have grouped them together in the same record.

Toxicology: BCEnv

	opDDT	ppDDT	DDE	DDD	Aroclor 1242	Aroclor 1254	Aroclor 1260	Hg
Eagle B								
liver	L0.02	L0.02	0.25	L0.02	L0.1	L0.1	0.1	1.45
kidney	L0.02	L0.02	0.66	L0.02	L0.1	L0.1	0.4	19.4*
heart	L0.02	L0.02	1.7	L0.02	L0.1	L0.1	1.3	0.77
lung	L0.02	L0.02	0.67	L0.02	L0.1	L0.1	0.4	0.42
muscle	L0.02	L0.02	1.8	L0.02	L0.1	L0.1	0.9	0.55
fat	L0.02	L0.02	46.*	L0.02	L0.1	L0.1	36.*	K
Eagle C								
liver	L0.02	L0.02	0.14	L0.02	L0.1	L0.1	L0.1	1.43
kidney	L0.02	L0.02	0.04	L0.02	L0.1	L0.1	L0.1	7.6*
heart	L0.02	L0.02	0.04	L0.02	L0.1	L0.1	L0.1	0.55
lung	L0.02	L0.02	0.04	L0.02	L0.1	L0.1	L0.1	1.16
muscle	L0.02	L0.02	1.0	L0.02	L0.1	L0.1	0.5	0.82
fat	L0.02	L0.02	32.*	L0.02	L0.1	L0.1	19.*	K
Eagle D								
liver	L0.02	L0.02	L0.02	L0.02	L0.1	L0.1	L0.1	1.89
kidney	L0.02	L0.02	L0.02	L0.02	L0.1	L0.1	L0.1	2.61
heart	L0.02	L0.02	0.04	L0.02	L0.1	L0.1	L0.1	1.06
lung	L0.02	L0.02	0.04	L0.02	L0.1	L0.1	L0.1	1.06
muscle	L0.02	L0.02	0.06	L0.02	L0.1	L0.1	L0.1	0.84
fat	L0.02	L0.02	2	L0.02	L0.1	L0.1	1.2	K
brain	L0.02	L0.02	L0.02	L0.02	L0.1	L0.1	L0.1	0.55

	Oxychlordane	trans-Nonachlor	HE	HCB	β-BHC
Eagle B fat	0.71	2.6	0.21	0.27	0.86
Eagle C fat	0.79	2.9	0.28	1.2	0.57
Eagle D fat	0.07	0.47	0.03	0.31	-

Probable cause of death: Undetermined [***Eagles B & C***: Mercury - sub-lethal exposure]

Record number: 137 23-Mar-83

Species and numbers: >6 Northwestern Crows

Location: Region 2. Burnaby

Comments: CWS Report: Crows were acting "funny", became paralyzed, were unable to fly and then died.

Lab report: AgCan #V83-257: Four birds were examined. Post-mortem examination: Adults. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of skull hemorrhage and severe brain congestion the cause of which could not be determined. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Conclusion: Cause of death could not be determined.

Toxicology: BCEnv #83032301 OPs: gut contents ND, liver ND; Strychnine: gut contents 93.7, liver 2.35 ppm.

Probable cause of death: Pesticide poisoning - Strychnine

Record number: 138 11-May-83

Species and numbers: 1 Barn Owl

Location: Region 2. Burrard Inlet

Comments: CWS file contained only BCAg Specimen Record. History on record indicated that the bird was picked up live around the BC Grainaries wharf area. There were lesions or ulcers in its mouth. It was treated by a veterinarian with atropine and cortisone.

Lab report: BCAg #83-2581: Post-mortem examination: Bird in poor body condition with serious atrophy of depot fat. There was scant feed material in the gizzard. Extensive necrosis of the soft palate area and tissues dorsal to the soft palate. The bird apparently died as the result of starvation probably related to necrotic debris on the oral cavity. Histology: Liver, lung, myocardium, kidney - no specific microscopic lesions, Soft palate - inflammatory reaction in assorted muscle. Diagnosis: Inanition. Pharyngitis.

Probable cause of death: Disease - Starvation

Record number: 139 12-May-83

Species and numbers: 1 Common Snipe

Location: Region 9. Whitehorse - Marwell area

Comments: CWS Report: Bird was found flopping around on the ground unable to fly. It was picked up, held for half an hour and then euthanized.

Lab report: AgCan #V83-433: Post-mortem examination: Adult female. No evidence of any infectious or contagious disease. Necropsy: A well fleshed bird with skull hemorrhage and brain congestion. Body organs appeared normal. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Conclusion: Undetermined - possibly trauma of unknown origin.

Toxicology: BCEnv #83051201 liver and gut contents: Abate (Temephos) ND.

Probable cause of death: Undetermined

Record number: 140 16-Jun-83

Species and numbers: 11 Canada Goose

Location: Region 2. Mission - Ruskin (Silvermere) Lake

Comments: CWS Report: Goslings were found dead.

Lab report: AgCan #V83-505: All specimen were submitted (8 fresh and 3 frozen). Post-mortem examination: All birds were immature. No evidence of trauma or any infectious

or contagious disease. Necropsy: Evidence of green staining at vent and some areas of inflammation in the intestinal tract. Nephrosis was present. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Cause of death: Undetermined.

Toxicology: BCEnv #83061603: Gut contents from each of the individuals were pooled into 3 composite samples which were screened for OPs. Diazinon was detected in each of the pooled samples: 18.9, 4.92, 8.03 ppm

Probable cause of death: Pesticide poisoning - Diazinon

Record number: 141 4-Aug-83

Species and numbers: >40 Grebes

Location: Region 2. Point Roberts

Comments: CWS Report: The birds washed up on beach. They were suspected to have drowned in fishing nets. No additional information included in file.

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 142 5-Aug-83

Species and numbers: 3 Swallows

Location: Region 2. Cultus Lake

Comments: CWS Report: Birds were found dead on a residential property. The case history on BCAg Specimen Record stated that a similar incident had occurred two years ago. Suspected cause of death: pesticides.

Lab report: BCAg #83-4036: Three previously frozen swallows were submitted. Post-mortem examination: Birds were in very thin condition. There were no contents in the gizzards and intestines except for bile suggesting birds had not fed for some time. One bird also showed considerable urate deposition. No other significant lesions were noted.

Toxicology: BCEnv results were listed in BCAg Report. Liver, kidney, stomach and gut contents were screened for OPs and OCs: ND

Probable cause of death: Undetermined

Record number: 143 11-Sep-83

Species and numbers: 12 Common Murre

Location: Region 1. Sooke - Otter Point

Comments: CWS Report: All 12 birds were found in the first tide line. Two of the birds were examined; no marks were observed but suspect that they may have been caught in fishing nets and asphyxiated.

Lab report: AgCan #V83-776: Two birds were examined. Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of lung congestion, blood tinged fluid in trachea and carotid arteries engorged with blood. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: History indicates death due to drowning.

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 144 22-Sep-83

Species and numbers: 15 Mallards

Location: Region 2. Sumas Prairie - Lakemount Marsh

Comments: CWS file consisted on only BCAg Specimen Record. History on record stated that the birds were in good shape. Possible pesticide problem. They were part of a flock of about 1500-2000 birds.

Lab report: BCAg #83-4825: Fifteen birds were received; eight adult males and seven adult females. Post-mortem examination: All of the ducks demonstrated similar findings. Marked pulmonary consolidation with multiple yellow necrotic nodules throughout both right and left lungs. Occasional mycotic plaques were also present on the abdominal air sacs in some. A moderate fibrinous air sacculitis was also noted. Each bird had moderate infestation of lice. There were also epicardial hemorrhages and most birds demonstrated plaques in the gizzard mucosa. Some black mucous was present throughout the alimentary tract in most birds. Apart from the above common findings, individual birds demonstrated the following: ***Male #1***: Flukes in the larynx and upper trachea and round worms also noted in intestine. ***Male #2***: One fluke in the larynx. ***Male #3***: Mycotic plaques and fibrinous debris present in the thoracic air sacs and surrounding the syrinx. ***Female #4***: Large mycotic plaques in the thoracic air sacs and pulmonary pleura. ***Female #5***: Fluke in the larynx. ***Female #6***: Mycotic plaques in trachea. Two of the fifteen birds demonstrated some focal nodules in the intestinal tract similar to the necrotic nodules noted in the lung suggestive also of mycotic infection. Histopathology: Multiple irregular well defined foci of necrosis found throughout all sections of lung examined and in these foci are large numbers of necrotic neutrophils and numerous fungal hyphae. The hyphae are thin, septate, and branching, characteristic of *Aspergillus sp.* The intervening pulmonary parenchyma is hyperemic and congested. Surrounding these foci of necrosis are large macrophages and in some areas fibrous connective tissues. No visible lesions in sections of intestine examined. Comment: Death in these birds is attributed to severe pulmonary Aspergillosis. There is also evidence of trachea flukes.

Toxicology: The BCAg Specimen Report stated the livers had been forwarded to the BCEnv Lab for pesticide analysis - no results were attached.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 145 3-Oct-83

Species and numbers: 3 Mallard

Location: Region 2. Delta - Burns Bog Landfill

Comments: CWS Report: Birds were found weak and unable to fly. Suspect lead poisoning.

Lab report: AgCan #V83-839: Three birds were submitted. Post-mortem examination: Two adult male and one adult female. No evidence of any infectious or contagious disease. Necropsy: Evidence of anemia but generally well fleshed birds. No gizzard erosion noted. Two of three birds had livers showing a greenish tinge of colour. Lead shot was found in the gizzards of all three birds. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative.

Toxicology: AgCan liver: lead detected in three birds (values not included). BCEnv #831003

	% moisture	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg
liver	74.7	L2.5	20.7	40.0	1.33	1.0	50.9	L0.25	L5.1	44.5	125.5
muscle	73.0	L2.7	7.3	14.9	55.6	0.3	L2.7	L0.3	L5.4	32.1	0.3

Probable cause of death: Metal toxicosis - Lead

Record number: 146 5-Oct-83

Species and numbers: > 12 European Starlings

Location: Region 2. Delta - Westham Island

Comments: CWS Report: There were 4 dead and 8 live birds. The live birds fell out of the a pear tree. They had leg weakness and were unable to fly but were otherwise alert. The live birds recovered (most within four hours, two birds overnight) and were subsequently released.

Lab report: AgCan #V83-838: Four carcasses were submitted. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. All body organs were normal in appearance. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Comment: History would suggest that ingestion of fermented and putrid fruit may have been responsible for birds condition.

Toxicology: BCEnv #831005 OP scan: liver - Dasanit trace, Dasanit sulfone trace; gut contents - Dasanit 0.13, Dasanit sulfone 0.35 ppm

Probable cause of death: Pesticide poisoning - Fensulfothion

Record number: 147 8-Nov-83

Species and numbers: several Finches

Location: Region 2. Vancouver

Comments: CWS Report: An individual reported several birds on their residential property had growths on their faces. Suspect avian pox. No carcasses submitted. No other information was included in report.

Probable cause of death: Infectious disease - Avian Pox

Record number: 148 25-Dec-83

Species and numbers: > 120 Pine Siskins

Location: Region 8. Enderby - Deep Creek Rd.

Comments: CWS Report: Approximately 120 birds were found dead along a 100 foot section of Deep Creek Rd. one mile north of Hullcar Hall near Enderby at 10:15 a.m. Most of the birds had been alive around 9:00 a.m. but they seemed to react slowly and were disoriented. A similar episode (birds slow to react and hit by vehicles) with a smaller flock was reported the same morning approximately six miles north of Hullcar Hall on Deep Creek Rd. Salt or pesticide toxicosis suspected.

Lab report: AgCan #V84-105 contained very little information; only that virology and bacteriology were negative. The CWS Report stated that 6 birds were submitted for post-

mortem examination: All birds were in good flesh with some fat; their gut was 'enflamed' and appeared irritated. Crop, gizzard and gut contents were collected but do not appear to have been analyzed for contaminants.

Probable cause of death: Trauma - Vehicle collision

Record number: 149 12-Mar-84

Species and numbers: 1 Gull

Location: Region 2. Delta - Westham Island

Comments: CWS Report: Bird was found dead under a power line.

Lab report: AgCan #V84-320: Post-mortem examination: Adult female. No evidence of trauma or any infectious or contagious disease. The bird was very thin. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for *Capillaria species*. Cause of death: Could not be determined.

Probable cause of death: Undetermined

Record number: 150 12-Mar-84

Species and numbers: several Northwestern Crows

Location: Region 1. Victoria

Comments: CWS Report: Birds were observed to have fallen out of trees and were found dead.

Lab report: AgCan #V84-319: Two birds were submitted. Carcasses were too decomposed for examination.

Probable cause of death: Undetermined

Record number: 151 13-Mar-84

Species and numbers: >24 Gulls

Location: Region 2. Richmond - Steveston Island

Comments: CWS Report: Birds were found washed on shore at the north end of Steveston Island.

Lab report: AgCan #V84-330: Four carcasses were submitted. All birds had a severe infection of Aspergillosis. No further work was done.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 152 23-Mar-84

Species and numbers: 6-8 American Robins

Location: Region 2. Chilliwack

Comments: CWS Report: Birds were found dead in the vicinity of a sawmill and wood treatment plant. No samples were submitted.

Probable cause of death: Undetermined

Record number: 153 23-Mar-84

Species and numbers: 1 Sharp-shinned Hawk

Location: Region 1. Sidney

Comments: CWS Report: The hawk was found in convulsions and unable to fly; it was euthanized with trichlorothane. Suspect pesticide poisoning.

Lab report: AgCan #V84-474: Post-mortem examination: No evidence of infectious or contagious disease. Necropsy: Evidence of skull hemorrhage behind left eye. Brain congestion was also noted. Birds general condition was good. Cause of head trauma could not be determined. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative.

Toxicology: AgCan Records said tissues were held for pesticide analysis; no indication that samples were sent for analysis.

Probable cause of death: Undetermined

Record number: 154 23-Mar-84

Species and numbers: 2 Swans

Location: Region 8. Penticton

Comments: CWS Report: No details included.

Lab report: AgCan #V84-378, 379: ***Swan #378***: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of severe gizzard erosion and inflammation with many gizzard worms. The proventriculus was swollen and full of *Acuaria sp.* proventricular worms. Enteritis and bloody feces were also noted. One lead pellet found in the abdominal cavity. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for gizzard and proventriculus worms. Nematode ova also noted in intestinal content. Conclusion: Death due to massive parasitism. ***Swan #379***: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Well fleshed bird which showed a wound area and pellet in gizzard. Post-mortem change was also noted. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Death due to gun shot trauma.

Toxicology: AgCan liver (both swans): lead negative

Probable cause of death: ***Swan #378***: Disease - Parasitism (mixed species); ***Swan #379***: Trauma - Gun shot

Record number: 155 29-Mar-84

Species and numbers: 4-5 Ducks

Location: Region 2. Vancouver - Point Grey Rd and MacDonald St.

Comments: CWS Report: Several dead ducks were found along the tide line. They were badly decomposed and scavenged. No specimens collected.

Probable cause of death: Undetermined

Record number: 156 10-Apr-84

Species and numbers: >20 Waterfowl, 2 American Wigeon and 1 Mute Swan
Location: Region 1. Victoria - Beacon Hill Park
Comments: CWS Report: Approximately 20 dead birds had been reported earlier (date not specified) but none of the carcasses were examined since all of the carcasses had been disposed. Three birds (2 American Wigeon and 1 Mute Swan) which were found in the same location several days later were sent to lab for post-mortem examination.
Lab report: AgCan #V84-475, 476, 477: ***Wigeon #475***: Post-mortem examination: Female. No evidence of any infectious or contagious disease. Necropsy: Evidence of lung edema and bird had been de-feathered on back and front. All other organs appeared normal. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Lung Edema - usually associated with a stress syndrome. ***Wigeon #476***: Post-mortem examination: Adult female. No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of gun shot type wound through the back macerating the abdominal contents. The left wing was broken. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Death due to gun shot trauma. ***Swan #477***: Post-mortem examination: Female. No evidence of any infectious or contagious disease. Necropsy: Evidence of greenish discoloration of internal organs. The general condition of the bird was good. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive for *Clostridium sp.* Parasitology: Negative. Conclusion: Death due to Clostridiosis.
Toxicology: AgCan liver from each of the 3 birds: lead negative BCEnv #84041501: Assume gut contents and liver from Wigeon #475 since it was the case which stated that tissues were held for pesticide analysis. OP scan: gut contents - Diazinon 1.9 ppm, Methoxychlor 0.49 ppm; liver - Diazinon 0.1 ppm, Methoxychlor 0.08 ppm
Probable cause of death: ***Wigeon #475***: Pesticide poisoning - Diazinon; ***Wigeon #476***: Trauma - Gun shot; ***Swan #477***: Disease - Clostridiosis; ***Waterfowl:***: Undetermined.

Record number: 157 9-May-84
Species and numbers: 1 Common Snipe
Location: Region 9. Yukon - Whitehorse, Marwell Area
Comments: CWS file only consisted of AgCan Specimen Record. Suspect Abate (Temephos) poisoning.
Lab Report: AgCan #V84-617: Post-mortem examination: Adult male. No evidence of any infectious or contagious disease. Necropsy: Bird was well fleshed with good fat layer under skin. Some pale skull hemorrhage. Brain very congested. Internal organs were normal in appearance. Crop and proventriculus void of food. Gizzard contained a small amount of brownish mash which seemed to have hair in it. Bowels were a good colour and virtually empty of feces. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative.
Toxicology: BCEnv #84051501 Abate: gut contents 0.9 ppm, liver <0.3 ppm
Probable cause of death: Pesticide poisoning - Temephos (Abate)

Record number: 158 15-Jun-84

Species and numbers: 6 Ducks

Location: Region 2. Ladner - Crescent Dr.

Comments: CWS Report: Five dead duckling were found along with one weak duckling that later died. No evidence of examination or follow-up investigation.

Probable cause of death: Undetermined

Record number: 159 17-Aug-84

Species and numbers: 5 Grebes, 1 Gull, 1 unidentified Waterfowl species

Location: Region 1. Esquimalt

Comments: CWS file consisted of a report from the BCEnv which states the carcasses were found in the Esquimalt Lagoon. There was no indication of follow-up or post-mortem examination.

Probable cause of death: Undetermined

Record number: 160 7-Sep-84

Species and numbers: several hundred Cassins Auklets

Location: Region 1. Pacific Ocean - off west coast of Vancouver Island

Comments: CWS Report: A fisherman from the Dept. of Fisheries in Queen Charlotte City reported to CWS that several hundred dead and sick Cassins Auklets were widely scattered off the west coast of Vancouver Island. Some of the birds were dead. Many of them were too weak to avoid collisions with boats. No indication of post-mortem examination or follow-up investigation.

Probable cause of death: Undetermined

Record number: 161 12-Sep-84

Species and numbers: 10-100 Diving Ducks

Location: Region 7. Fort Saint John - Cecil Slough

Comments: CWS Report: A number of birds were delivered to CWS from the BCEnv. The birds had been found dead in the Cecil Slough which is in an agricultural area. No indication of post-mortem examination or follow-up investigation.

Probable cause of death: Undetermined

Record number: 162 5-Nov-84

Species and numbers: >100 Ducks mostly Mallards and 1 Grebe

Location: Region 8. Vernon - Kal Lake area

Comments: CWS Report: More than 100 dead Ducks (mostly Mallards) were found along the shore at the north end of Kal Lake and around a small pond on a near-by ranch. The pond was on the main creek and therefore had tremendous outflow. Some of the carcasses were fresh; some had been dead 3-4 days; some were partly scavenged. There were

1,000-2,000 live ducks still in the area. They were observed foraging in a corn field and a grain field.

Lab report: No official reports were included in the file. However, the CWS Report stated that some ducks were sent to BCAg for post-mortem examination and the cause of death was attributed to Pneumonia and Aspergillosis likely contracted from the condition of the grain.

Probable cause of death: Disease - Pneumonia/Aspergillosis

Record number: 163 5-Dec-84

Species and numbers: 1 Ruddy Duck

Location: Not indicated.

Comments: CWS file consisted of only the AgCan Specimen Record.

Lab report: AgCan #V84-1228: Post-mortem examination: Female. No evidence of any infectious or contagious disease. Necropsy: A very thin and wasted bird with no food in crop or gizzard. Some brain congestion was noted, probably due to trauma of unknown origin. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Positive for Capillaria species roundworms and tapeworm segments were also found.

Probable cause of death: Undetermined

Record number: 164 9-Sep-85

Species and numbers: 5 Canada Geese

Location: Region 2. Abbotsford - Judson Lake

Comments: CWS file consisted of only the BCAg Specimen Report. History from the Report stated that a total of 5 wild birds were found dead around Judson Lake last week. Birds were captured alive but weak and unable to walk properly. They were held overnight and died the next day. Suspect pesticide poisoning (Fensulfothion).

Lab report: BCAg #85-5412: Two geese were submitted. Post-mortem examination: Each of the birds were in poor body condition with marked pectoral muscle atrophy. The esophagus and proventriculus were markedly dilated and filled with a large quantity of coarse fibrous feed material. Some grit and similar fibrous feed material was also present in the gizzards. Occasional small lead pellets of variable size were found in the gizzard of one bird but not the other. No evidence of parasites or other disease problem. Diagnosis: Lead intoxication.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd
goose #1 - liver	0.36	42	102	917	3.0	23	<0.1
goose #1 - kidney	-	9.6	32	186	3.5	20	<0.1
goose #1 - liver	0.30	12	97	1263	4.3	42	<0.1
goose #2 - kidney	-	5.9	31	174	3.4	44	<0.1

Probable cause of death: Metal toxicosis - Lead

Record number: 165 19-Nov-85

Species and numbers: about 18 Mallards

Location: Region 2. Delta - Trunk Rd. (golf course)

Comments: CWS Report: A golf course had a flock of 50-60 free flying winter residents. Approximately 18 birds in this flock were suspected of being poisoned by Diazinon after being offered commercial feed during a period of cold weather. Diazinon was used for leatherjacket control; the last application had been at the end of September. Ducks were fed on a gravel area where the spray containers were filled. The birds may have picked up contaminated gravel while foraging for feed.

Lab report: AgCan #V85-820: Three Mallards were submitted. Post-mortem examination: Two adult males and one adult female. Microscopy of kidney section revealed one zone of mononuclear cells and macrophages infiltration. The lung had subbronchial infiltration of mixed inflammatory cells in and around one major bronchus. The intestinal sections had hemorrhagic intestinal mucosa, or necrotic plugs (feces) with scattered bacterial colonies. Liver had diffuse degeneration of hepatocytes. Trachea and heart sections had no remarkable findings. Virology: Negative. Bacteriology: *E coli*. isolated. History suggests pesticide poisoning.

Toxicology: BCEnv #851102001: Crop contents (notes don't specify if composite sample) screened for OPs: Diazinon 20.0 ppm.

Probable cause of death: Pesticide poisoning - Diazinon F

Record number: 166 5-Dec-85

Species and numbers: 7 Mallards

Location: Region 2. Aldergrove

Comments: CWS Report: Birds were found in a ditch over a two day period.

Lab report: BCAg #85-6558: Seven birds were submitted. Post-mortem examination: Three adult drakes and four adult females. All birds demonstrated similar findings. There was a marked bilateral granulomatous pneumonia involving lungs of each of these birds. There was also diffuse fibrinous air sacculitis and numerous mycotic plaques present within the body cavity in several of the birds. The birds otherwise appeared in fair body condition. One bird had prominent hemorrhagic annular rings in the intestine. No other significant alterations were noted in the other birds. Bacteriology: Four lungs - All had Aspergillus. Comment: Death in these birds is attributed to Aspergillosis. It is likely that the heavy Aspergillus Pneumonia and air sacculitis in these birds is the result of ingestion of moldy feeds. Diagnosis: Aspergillosis. Mycotic Pneumonia.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 167 1-Mar-86

Species and numbers: 1 Bald Eagle

Location: Region 2. Surrey

Comments: CWS file consisted of a IVH Record and a BCAg Specimen Record. The case history stated that the bird was found beside the highway and died during transportation to

Monika's Wildlife Shelter. There were no visible injuries. An obvious intestinal problem was observed as well as lung congestion prior to death.

Lab report: BCAg #86/001210: Post-mortem examination: Extensive post-mortem autolysis had occurred. Only a small pellet of feed material was present in the gizzards. There was evidence of gizzard erosions and ulcerations involving the gizzard mucosa and distal proventriculus. Intestinal contents were normal. Adequate fat was present in the mesentery. Occasional white foci were evident on the epicardium. No other significant alterations were noted. Bacteriology: No bacterial growth. Virology: Negative. Histopathology: Myocardial vessels were large and prominent with a markedly thickened tunica media. In some vessels the lumen was indistinct due to the medial hypertrophy. Focal areas of ulceration with heavy inflammatory infiltrates were present in the gizzard. The underlying vessels of the tunica submucosa were also thickened and the tunica media was hypertrophied. Diagnosis: Arteriosclerosis. Lead toxicity. Mercury toxicity.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
liver	1.98	8.9	27	1896	4.8	18	0.1	<0.5	51	246	5.3
kidney	-	4.6	22	341	3.0	13	0.8	<0.5	141	198	55

Probable cause of death: Metal toxicosis - Lead and Mercury

Record number: 168 22-Mar-86

Species and numbers: 1 Cormorant

Location: Region 2. Burrard Inlet - Bedwell Bay

Comments: CWS file consisted of only BCEnv Pesticide Investigation Report. It stated that an injured cormorant was found near Bedwell Bay. It was convulsing and only lived for five hours before dying.

Toxicology: No post-mortem examination was included in file. However, the BCEnv Report indicated PCB levels in liver were >500 ppm.

Probable cause of death: Poisoning - PCBs

Record number: 169 16-Jun-86

Species and numbers: >41 Eared Grebes

Location: Region 5. Williams Lake - Westwick Lake

Comments: CWS Report: Dead nestlings were found in their nests. Approximately 45 Eared Grebes from the same colony were still occupying their nests. A second Eared Grebe colony of about 100 nests located further down the lake was unaffected. Coot and Yellow-headed Blackbird nests located nearby were also active. A graduate student studying the grebes examined the skulls of several dead grebes and determined they all had puncture wounds that matched the teeth and jaw of a mink skull (Berault, pers. comm.). There was a report of the Ministry of Highways spraying Atrazine along a nearby road on 24 May.

Lab report: A total of five specimen were examined for cause of death, two by BCEnv and three by AgCan. BCEnv. #86-3064: ***Grebe #1***: Post-mortem examination: Male. Enlarged gizzard with a large quantity of feed material, including several grubs within the gizzard. Lungs were slightly edematous. Intestinal contents were liquid and tan. Extensive

hemorrhage over the cranium and anterior cervical area with a fracture calvarium. Bacteriology: Negative. Virology: Positive for Herpes. Histopathology: An occasional prominent lymphoid follicle was present in some hepatic portal triads. In an occasional area, there was also evidence of focal irregular hepatocellular necrosis with lymphocellular infiltrates within the renal corticointerstitium especially in the renal medulla. Lung was diffusely congested, hyperemic and moderately edematous. No visible lesions in myocardium. ***Grebe #2***: Post-mortem examination: Adult female. Some hemorrhage over the calvarium region with a fractured calvarium. Gizzard contained some feed material and intestinal contents which were similar to Grebe #1. There was one prominent tapeworm in the intestine of the female. Bacteriology: Heavy *Aeromonas sp.* Virology: Negative for avian viruses. Histopathology: Epicardium - a few small lymphoid follicles were noted. Myocardium - no visible lesions. Lung -diffusely congested, hyperemic and edematous. An occasional interstitial aggregate of lymphoid cells were also noted in the renal cortex. Liver - no visible lesions. Comment: As noted on gross post-mortem examination, each of these birds showed evidence of marked trauma to the head and neck region and death in these birds is attributed to this trauma. The isolation of the herpes virus from the male is not likely significant. This virus is frequently isolated from numerous species, and it often a latent infection. There is, however, evidence of focal mild inflammation of the liver which is possibly associated with herpes virus. This virus is onsidered unimportant in terms of death in this animal. Diagnosis: Trauma. Focal Hepatitis. AgCan #V86-517: ***Grebe #3,4,5***: Three individuals submitted. Post-mortem examination: Mature. No evidence of any infectious or contagious disease. Necropsy: Skull and upper neck trauma similar to that due to a small caliber rifle shot. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Conclusion: Death due to trauma of unknown origin.

Toxicology: Water samples, liver, gizzard and proventiculus were analyzed for pesticides but no results attached.

Probable cause of death: Trauma - Undetermined origin

Record number: 170 16-Jun-86

Species and numbers: 1 Bald Eagle

Location: Region 1. Alert Bay

Comments: IVH Record: File referenced BCAg Specimen Record #86/003204. The case history stated that the bird was captured around 16 June in the Alert Bay area and had been cared for by a local individual who had been administering tetracyclines for the infection in the birds wing. When the individual found the treatment unsuccessful, the bird was sent to OWL. It arrived on 23 June and was found to have both wings extensively decaying with maggot infestation. The bird was euthanized.

Lab report: BCAg #86/003204: Histopathology: There was extensive necrotizing myositis with thrombosis and heavy infiltration of inflammatory cells. In one area there was some regenerative fibrosis. Diagnosis: Myositis. Suspected Etiology: Electrocution.

Toxicology: BCAg lead: liver <0.1 ppm, kidney <0.1 ppm; mercury: liver 5.3 ppm, kidney 9.3 ppm

Probable cause of death: Trauma - Electrocution [Mercury sub-lethal exposure]

Record number: 171 16-Sep-86

Species and numbers: 500 - 1,178 Sparrows, mostly Savannah but some Lincoln

Location: Region 2. Richmond

Comments: CWS Report, Mineau (1993): An estimated 500 to 1,178 Sparrows were involved in the incident; 152 Savannah and 5 Lincoln Sparrows carcasses were collected. Dead and dying birds were scattered over turnip and Lobok radish fields, primarily on the east side of the small radish field and south edge of the turnip field. There was no obvious cause of death. The grower had applied Diazinon G (10 lb./acre) when seeding the 3.95 acres of Lobok radishes and the 3.7 acres of turnips on 18 or 19 July. He claimed to have used Fensulfothion, but this was later disproved. Investigators determined that the grower had purchased granular and flowable formulations of Carbofuran on 20 Aug but there was no indication of when the fields were treated with it. Two soil samples from around plants were collected on 10 Oct, and found to contain several coloured granules. Carbofuran was registered for use on turnips but not radishes. Mineau (1993) reported that visits to the same field in the late fall/winter following this incident also revealed the presence of badly decayed duck carcasses. No formal surveys were attempted.

Toxicology: BCEnv: A sample of the gut contents was screened for pesticides and a carbamate peak was identified but the particular chemical was not determined. A second set of gut contents was collected and Carbofuran residues were confirmed (see table). Carbofuran residues were also detected in soil and vegetable samples. The data were summarized in the CWS file but official toxicology reports were not included.

Collection Agency	Sample	Carbofuran	OPs
BCEnv	gut contents (pool from 5 birds)	26.0	ND
BCEnv	gizzard and intestines	15-20	ND
BCEnv	unidentified sample	ND	ND
AgCan	soil (collected on rows, 5" deep)	1.9	ND
Dept. Health & Welfare	vegetables - turnips	0.10	ND
Dept. Health & Welfare	vegetables - radish	0.085	ND
Dept. Health & Welfare	vegetables - radish	0.05	ND

Probable cause of death: Pesticide poisoning - Carbofuran G

Record Number: 172 18-Nov-86

Species and numbers: 12 Waterfowl including 10 Mallard, 1 American Wigeon, 1 Northern Pintail

Location: Region 2. Surrey

Comments: CWS Report: Ducks were found in a ditch near a mill adjacent to the Canadian National rail line. All birds were together and quite decomposed; suspected "freezer dump" [hunter cleaning out a freezer??]. The report stated the birds were submitted to BCAg for x-ray and that they had all been shot.

Probable cause of death: Trauma - Gun shot

Record number: 173 21-Nov-86

Species and numbers: 5-6 Northwestern Crows and 1 American Robin

Location: Region 2. Richmond

Comments: CWS Report: Crows were observed falling to the ground. A number were already dead. The live birds were bleeding from mouths. The SPCA took the specimen to the Richmond Health Unit; samples were incinerated over the weekend.

Probable cause of death: Undetermined

Record number: 174 30-Dec-86

Species and numbers: 1 Hawk

Location: Region 2. Vancouver - Marine Dr.

Comments: CWS file consisted of only the AgCan Specimen Record. The bird was found sick in the back yard of a home on Marine Drive. It died.

Lab report: AgCan #V86-1125: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of bruising to side of neck. No food was observed in the gastrointestinal tract. Liver was soft and friable. The bird was well fleshed. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Immediate cause of death could not be determined.

Probable cause of death: Undetermined

Record number: 175 30-Dec-86

Species and numbers: 1 American Robin

Location: Not indicated.

Comments: CWS file consisted of only the AgCan Specimen Record.

Lab report: AgCan #V86-1126: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: A well fleshed bird with bruising on side of head, skull hemorrhage and brain congestion. Hemorrhage was also noted in thoracic cavity. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Death due to trauma of unknown origin.

Probable cause of death: Trauma - Undetermined origin

Record number: 176 30-Dec-86

Species and numbers: 1 Mallard

Location: Not indicated

Comments: CWS file consisted of only the AgCan Specimen Record. Bird was shot by hunter and later submitted to CWS for identification of parasites.

Lab report: AgCan #V86-1127: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Evidence of sarcocysts in breast muscle. Bird was well fleshed. Virology: Negative for chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative for internal parasites. Trauma was observed due to gunshot. Diagnosis: Sacrosporidiosis.

Probable cause of death: Disease - Sacrosporidiosis

Record number: 177 1-Jan-87

Species and numbers: 1 Trumpeter Swan

Location: Region 2. Maple Ridge - Coniagas Ranch

Comments: CWS file consisted of only the BCAg Specimen Record. This swan was submitted along with 6 geese to the BCAg Lab on 13 Jan 1988. The history stated that the swan was found dead on the Coniagas Ranch in 1987. Cross reference Record numbers: 179, 181, 182, 188, 193.

Lab report: BCAg #88-000219: Post-mortem examination: Immature. This animal externally appears in reasonably good body condition. The most prominent abnormalities were numerous small, linear white foci distributed throughout the entire length of the esophagus. Some ulceration was present in the centre of some of these foci. These focal areas were 1 - 2 mm in length and 1 mm in width. There was marked pulmonary edema and the animal had been solidly frozen. No other significant gross alterations were noted and the bird appeared in good bodily condition. Histopathology: Sections of the esophagus revealed marked dilatation of the submuscosal glands. These glands were lined only by thin attenuated epithelium and contained a large quantity of mucoid debris. Bacteriology: Negative. Comment: Gross and microscopic examination are typical of Hypovitaminosis A. Diagnosis: Hypovitaminosis A

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.82	193	39	508	2.7	<1	<0.1	166	338
kidney	-	17	18	310	2.6	<1	<0.2	112	276

Probable cause of death: Disease - Hypovitaminosis A

Record number: 178 5-Jan-87

Species and numbers: >12 Sparrows

Location: Region 2. Richmond

Comments: CWS Report: Birds were found dying on a bird feeder in an residential area. There was no indication that carcasses were collected for post-mortem examination.

Probable cause of death: Undetermined

Record number: 179 27-Mar-87

Species and numbers: 1 Canada Goose

Location: Region 2. Maple Ridge, Addington Marsh.

Comments: CWS file consisted of only the BCAg Specimen Record. This goose was submitted along with 5 other geese and a swan to the BCAg Lab on 13 Jan. 1988. No additional information about the history of the bird was included in report. Cross reference Record numbers: 177, 181, 182, 188, 193.

Lab report: BCAg #88-000219: Post-mortem examination: Immature female. This animal had marked proventricular dilation and atrophy of the gizzard musculature. No other significant alterations were noted. Bacteriology: Negative. Diagnosis: Lead toxicity.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.54	3	79	1258	3.1	3	0.6	101	217
kidney	-	7	52	243	3.7	5	1.3	208	191

Probable cause of death: Undetermined [Lead - sub-lethal exposure]

Record number: 180 24-Apr-87

Species and numbers: 3 Swans - 2 Mute Swans and 1 breed not specified

Location: Region 2. Vancouver - Stanley Park

Comments: CWS file consisted of three AgCan Specimen Reports. History from the first report (V87-367) stated that the Mute Swan was a resident of Lost Lagoon. It had been found lying near the lagoon and had suffered injuries from fighting. Large amount of mucus was leaking from its eye. The second report (V87-372) was stated that the Mute Swan was received on 28 April and it had also been collected from Lost Lagoon. Third report (V87-430) stated that the swan was found dead on 10 May on one of the islands at Stanley Park. It had been dead a couple of days. There was mucus discharge.

Lab report: AgCan #V87-367, 372, 430: ***Swan #367***: Post-mortem examination: Adult (7-8 year old) male. No evidence of trauma. Necropsy: Evidence of marked congestion of carcass and organs including multiple petichiation throughout the viscera and multiple pin-point necrotic foci in the liver. Liver was very friable. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive for *Pasteurella multocida* Parasitology: Negative. Histology: Tissues were autolysed but some foci of inflammatory infiltrate and necrosis were consistent with bacterial septicemia. Conclusion: *Septiceamic Pasteurellosis* (Fowl Cholera). ***Swan #372:*** Post-mortem examination: No evidence of trauma. Necropsy: Evidence of multiple pin-point necrosis in the liver, multiple petiechiation throughout the viscera accompanied by marked congestion and ascites, air sacculitis andocopharites were in evidence. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive for *Pasteurella multocida*. Parasitology: Negative. Histology: Consistent with a bacterial septicemia. Conclusion: *Septicaemic Pasteurellosis* (Fowl Cholera) AgCan #87-430 ***Swan #430***: Post-mortem examination: Mature. No evidence of trauma. Necropsy: Evidence of air sacculitis, pericarditis, marked congestion of viscera, multiple petiechiation of organs, multiple pin-point foci of necrosis in the liver. Virology: Negative for any chick embryo lethal agents. Bacteriology: Positive *Pasteurella multocida*. Parasitology: Negative. Conclusion: *Septicaemic Pasturellosis* (Fowl Cholera)

Toxicology: AgCan #V87-367, 372 liver: lead ND

Probable cause of death: Infectious disease - Avian Cholera

Record number: 181 15-May-87

Species and numbers: 1 Canada Goose

Location: Region 2. Surrey - 176th & Fraser Hwy

Comments: CWS file consisted of only the BCAg Specimen Record. This goose was submitted along with 5 other geese and a swan to the BCAg Lab on 13 Jan. 1988. No

additional information about the history of the bird was included in report. Cross reference Record numbers: 177, 179, 182, 188, 193.

Lab report: BCAg #88-000219: Post-mortem examination: Immature female. This animal demonstrated no evidence of any significant gross alterations. There was mild dilation of the proventiculus. Bacteriology: Negative. Diagnosis: Lead toxicity.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.53	17	56	1163	3.1	19	<0.1	52	181
kidney	-	11	44	418	2.8	25	<0.1	60	169

Probable cause of death: Metal toxicosis - Lead

Record number: 182 15-May-87

Species and numbers: 2 Canada Geese

Location: Region 2. Pitt Polder

Comments: CWS file consisted of only the BCAg Specimen Record. These geese were submitted along with 4 other geese and a swan to the BCAg Lab on 13 Jan. 1988. No additional information about the history of the bird was included in report. Cross reference Record numbers: 177, 179, 181, 188, 193.

Lab report: BCAg #88-000219: ***Goose #1***: Post-mortem examination: Male. This animal had marked proventricular dilatation with impaction. It was in poor condition with parenchymal organ atrophy. Bacteriology: Negative. Diagnosis: Lead toxicity. ***Goose #2***: Post-mortem examination: Male. This animal had marked proventricular dilatation, hepatic atrophy and inanition. Bacteriology: Negative. Diagnosis: Lead toxicity.

Toxicology: BCAg: It was impossible to determine from the lab report which toxicology data belonged to which bird.

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Goose #1 liver	1.18	15	192	3356	4.6	23	0.9	79	168
Goose #1 kidney	-	7	59	259	4.1	12	0.7	288	199
Goose #2 liver	0.67	11	115	3842	7.3	30	<0.1	395	152
Goose #2 kidney	-	11	7	353	4.6	27	0.8	78	176

Probable cause of death: Metal toxicosis - Lead

Record number: 183 22-May-87

Species and numbers: several European Starlings

Location: Region 2. Vancouver - 41 St. & Knight St.

Comments: CWS Report: Birds were found dead. No additional information was included and samples were not collected.

Probable cause of death: Undetermined

Record number: 184 22-May-87

Species and numbers: 1 Canada Goose

Location: Region 2. Vancouver - Stanley Park

Comments: CWS file consisted of only the AgCan Specimen Record. Bird was found in very weak condition. Fowl Cholera [also Avian Cholera??] was suspected because 3 swans had died in Stanley Park between 24 April - 10 May from Fowl Cholera (see Record Number 180).

Lab report: AgCan #V87-478: Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: The bird was in good flesh with no pathology except a marked air sacculitis. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Cause of death possibly due to air sacculitis of non-viral origin. No evidence of Fowl Cholera detected.

Probable cause of death: Disease - Non-viral air sacculitis

Record number: 185 25-May-87

Species and numbers: 3 Canada Geese

Location: Region 2. Indian Arm - Brighton Beach

Comments: CWS Report: Birds were found dead with no sign of wounds.

Lab report: AgCan #V87-487: One carcass was submitted for autopsy but it was too decomposed for examination.

Probable cause of death: Undetermined

Record number: 186 25-May-87

Species and numbers: 1 Pheasant

Location: Region 2. Richmond

Comments: CWS Report: Bird was found dead. Methoxychlor was sprayed on nearby trees five days before bird was found.

Lab report: AgCan #V87-486: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: A moderately well fleshed bird showing considerable post-mortem change. The right wing was broken and a lead pellet was found subcutaneously in the crop area. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Conclusion: Death probably due to trauma and stress of unknown origin.

Probable cause of death: Trauma - Undetermined origin

Record number: 187 17-Jun-87

Species and numbers: 100-200 Rock Doves

Location: Region 2. Surrey

Comments: CWS Report: An estimated 100-200 pigeons were observed dying over several weeks. Birds were observed returning from an agricultural field to the east and then dying while flying back to their roost. A few beds of radishes were treated with Fensulfothion G (Dasanit G) for root maggot control at planting 3 weeks prior to incident. The farmer reported that the granular compounds were applied with a powered solo applicator and they were not incorporated. Other crops were also growing in the same area but the farmer said Dasanit G was only used on the radishes. The farmers used scare devices

such, as fire crackers, only on the field adjacent to his house. The field in question was too far from the house to regularly use his scare techniques. Birds were observed eating seeds.

Lab report: AgCan #V87-717: Two carcasses were submitted. Post-mortem examination: No evidence of any infectious or contagious disease. Intestinal contents were negative for any Salmonella species.

Toxicology: BCEnv #87007963: Gut contents were scanned for OPs: Fensulfothion (Dasanit) 2 ppm. Soil and radish samples were also collected for pesticide analysis but no results were included in file.

Probable cause of death: Pesticide poisoning - Fensulfothion G

Record number: 188 6-Aug-87

Species and numbers: 1 Canada Goose

Location: Region 2. Pitt Polder - Pitt Wildlife Management Area

Comments: CWS file consisted of only the BCAg Specimen Record. This goose was submitted along with 5 other geese and a swan to the BCAg Lab on 13 Jan. 1988. No additional information about the history of the bird was included in report. Cross reference Record numbers: 177, 179, 181, 182, 193.

Lab report: BCAg #88-000219: Post-mortem examination: This animal was markedly autolytic but there was marked proventricular dilatation and atrophy of the liver and kidney. Bacteriology: Negative. Diagnosis: Lead toxicity.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.80	32	118	2865	11.7	31	0.2	306	179
kidney	-	15	47	506	9.2	27	0.3	400	216

Probable cause of death: Metal toxicosis - Lead

Record number: 189 28-Oct-87

Species and numbers: 1 Great Blue Heron

Location: Region 2. Richmond - River Rd. & Hollybridge Way

Comments: CWS file consisted of only the AgCan Specimen Record. The bird was reported sick but it was found dead.

Lab report: AgCan #V87-933: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Extensive abdominal hemorrhage as a result of trauma involving abdominal wall and liver. Virology: Negative for any chick embryo lethal agents. Bacteriology: Negative. Parasitology: Negative. Trauma probably due to gun shot (rifle). Conclusion: Death due to trauma of unknown origin.

Probable cause of death: Trauma - Gun shot

Record number: 190 23-Dec-87

Species and numbers: several Mallards, Canada Geese and around 9 domestic ducks

Location: Region 2. Surrey - south Cloverdale District

Comments: CWS Report: The complainant called the CWS to advise that over the past four years he had been loosing nine or so ducks (Moscovey) each year. Additional to this, wild ducks and geese (Mallards and Canada Geese) have also died. The birds first seem to go lame (drag one leg) with their wings hanging by their sides, then they appear to be very weak and stagger about unable to fly. It takes two to three days before they die. Results of post-mortem examination of 4 ducks by BCAg on 9 Sep 1980 reported cause of death due to fibrinous pneumonia (BCAg Specimen Record included in file). During a site inspection, the CWS staff recovered a Moscovey Duck for post-mortem examination. There were also three dehydrated Mallard carcasses which were not suitable for analysis. The yard (6.5 acres) appeared reasonably clean, with sheep, goat, rabbits, duck, pigeons and dog sharing the co-operative paddock, in different cages. He has never lost a sheep, goat or rabbit to disease. The complainant indicated he thought the disease problem originated where Breaks Brook fed into this ponds.

Lab report: AgCan #V88-027: One Muscovey Duck. Post-mortem examination: No evidence of trauma. Evidence of pneumonia, necrotic granular lesions on liver, breast muscle was severely wasted, crop was empty and blood was in the intestines. Bacteriology: Positive for *Hemolytic E. coli* from fecal material. Mycotic structures found in lung lesions. Parasitology: Negative. Conclusion: Death due to mycotic pneumonia, liver necrosis and hemorrhagic enteritis.

Probable cause of death: Disease - Mycotic Pneumonia/Liver Necrosis/Hemolytic Enteritis

Record number: 191 7-Jan-88

Species and numbers: 56 European Starlings

Location: Region: 2. Langley

Comment: CWS file consisted of only the BCAg Specimen Record which stated that a total of 56 birds were recovered under trees and in open fields and ditches. Some birds recovered fully within four hours; all others were dead on arrival. Poisoning with barbiturates was suspected. Death possibly by overdose and/or hypothermia. Ten Starlings recovered on 9 Jan 1988.

Lab report: BCAg #88/000182: One specimen was submitted. Post-mortem examination: These Starlings appeared in good body condition. Gross examination showed no evidence of any significant alterations. Comment: No indication of barbiturate or strychnine intoxication. Diagnosis: No visible lesions.

Toxicology: BCAg tissue: Barbiturates ND; gizzard content: Strychnine ND, Nicotine ND

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
liver	0.80	4.5	20	371	2.5	<2	0.1	-	131	205	<0.1
kidney	-	5.0	19	254	3.7	<2	1.1	<0.5	172	193	-

Probable cause of death: Undetermined

Record number: 192 13-Jan-88

Species and numbers: 8 Mallards

Location: Region 2. Langley - Glen Valley

Comments: CWS Report consisted of a hand written referral slip from BCEnv indicating location of die-off was Glen Valley and the BCAg Specimen Report diagnosing cause of death as pneumonia. History on the BCAg Report stated that the Mallards were found freshly dead, hemorrhaging from the mouth. Losses occurred over the past few weeks. Live birds were also found hemorrhaging from their mouths.

Lab report: BCAg #88/000217: Eight specimen were submitted. Post-mortem examination: Four female (#1-4) and four male (#5-8) Mallards. Each bird demonstrated identical findings. The birds had severe bilateral granulomatous pneumonia and a mild air sacculitis. The birds otherwise appeared in reasonable body condition. Bacteriology: lung - heavy mixed non hem. coliforms. Mycology: heavy *Penicillium sp.* Diagnosis: Granulomatous (Mycotic) pneumonia due to *Penicillium sp.*

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Mallard #1 liver	0.47	8	48	462	3.1	<1.0	<0.1	63	184
Mallard #1 kidney	-	10	40	318	3	<1.0	<0.1	38	184
Mallard #2 liver	0.57	12	55	1039	4.1	<1.0	0.2	92	203
Mallard #2 kidney	-	11	37	368	2.7	<1.0	1.2	104	181
Mallard #3 liver	0.58	13	40	520	3.7	<1.0	<0.1	103	188
Mallard #3 kidney	-	9	31	305	3.5	<1.0	<0.1	45	162
Mallard #4 liver	0.70	22	59	596	4.6	<1.0	<0.1	89	190
Mallard #4 kidney	-	13	44	230	3.2	<1.0	0.4	174	162
Mallard #5 liver	0.69	16	56	505	4.5	<1.0	<0.1	76	194
Mallard #5 kidney	-	11	32	254	3.2	<1.0	<0.1	65	164
Mallard #6 liver	0.31	13	36	503	3.8	<1.0	<0.1	164	196
Mallard #6 kidney	-	9	30	207	2.8	<1.0	0.2	176	171
Mallard #7 liver	0.63	21	58	784	4.6	<1.0	0.2	59	219
Mallard #7 kidney	-	11	33	270	3.2	<1.0	0.3	73	169
Mallard #8 liver	0.43	15	44	419	4.3	<1.0	<0.1	100	182
Mallard #8 kidney	-	14	35	196	3.6	<1.0	0.3	264	202

Probable cause of death: Disease - Granulomatous (Mycotic) pneumonia

Record number: 193 13-Jan-88

Species and numbers: 1 Canada Goose

Location: Region 2. Trepheway, north of Chilliwack

Comments: CWS file consisted of only the BCAg Specimen Record. This goose was submitted along with 5 other geese and a swan to the BCAg Lab on 13 Jan. 1988. No additional information about the history of the bird was included in report. Cross reference Record numbers: 177, 179, 181, 182, 188.

Lab report: BCAg #88-000219: This bird was a female. No post-mortem examination was conducted but toxicological data was included for liver and kidney tissues. Diagnosis: Lead toxicity.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg

liver	0.70	51	46	2735	2.4	77	<0.1	248	275
kidney	-	5	26	178	3.6	86	0.4	187	212

Probable cause of death: Metal toxicosis - Lead

Record number: 194 8-Mar-88

Species and numbers: 2 Swans

Location: Region 2. Sumas

Comments: CWS file consisted of only two BCAg Specimen Records. Information included in the record indicated that there was one dead swan in the flock of about 200 birds. One bird (Swan #1) was found on 8 March 1988; the other (Swan #2) on 14 March 1988.

Lab report: BCAg #88/001388, 1481: ***Swan #1:*** Post-mortem examination: Swan appeared in fairly good body condition. There was diffuse peritonitis surrounding the duodenal loops with two perforated ulcers in the duodenum and a large quantity of roughage in that portion of the intestine. No other significant alterations were noted. Comment: Death of the animal was attributed to a fibrinous peritonitis secondary to ruptured duodenal ulcers, presumably due to excess coarse roughage. Diagnosis: Perforated duodenal ulcer. Peritonitis. Lead poisoning. ***Swan #2:*** Post-mortem examination: The large adult swan was in good body condition. There was very severe bilateral chronic air sacculitis involving the abdominal and thoracic air sacs. Air sacs were filled with a large quantity of cheesy exudate and fluffy grey/green surface strongly suggestive of *Aspergillosis sp.* No other significant alterations were noted. Bacteriology: Air sac: Aspergillosis. Diagnosis: Aspergillosis.

Toxicology: BCAg:

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Swan #1 liver	0.54	19	65	785	4.1	9	0.5	54	208
Swan #1 kidney	-	18	36	300	5.3	10	0.5	654	300
Swan #2 liver	0.51	23	42	7.4	4.4	<1	<0.2	98	190
Swan #2 kidney	-	5	35	196	3.5	<1	<0.2	221	199

Probable cause of death: ***Swan #1***: Metal toxicosis - Lead, ***Swan #2***: Infectious disease - Aspergillosis.

Record number: 195 14-Mar-88

Species and numbers: 1 Snow Goose

Location: Region 2. Delta - Westham Island, Alasken National Wildlife Area

Comments: CWS file consisted on the AgCan Specimen Record. Bird was found dead.

Lab report: AgCan #V88-272: Post-mortem examination: No evidence of any infectious or contagious disease. Necropsy: Massive internal hemorrhage due to trauma consistent with small bore rifle. Virology: Negative for any chick embryo lethal agents. Parasitology: Positive for gizzard worm. Conclusion: Death due to trauma.

Probable cause of death: Trauma - Gun shot

Record number: 196 11-May-88

Species and numbers: 1 Goldeneye
Location: Not indicated
Comments: CWS file consisted of only the AgCan Specimen Record. No case history was included.
Lab report: AgCan #V88-459: Post-mortem examination: No evidence of trauma or of any infectious or contagious disease. Necropsy: Evidence of a bird in poor physical condition. Gizzard empty, heart pale and flabby, nephrosis and poor fleshing. Conclusion: Cause of death undetermined.
Probable cause of death: Undetermined

Record number: 197 1-Jun-88
Species and numbers: 1 Common Loon
Location: Region 7. Chetwynd
Comments: CWS file consisted of the BCAg Specimen Record. No history was included except that the loon died in June 1988 and chemical poisoning was suspected as cause of death.
Lab report: BCAg #89/001185: Post-mortem examination: Adult. The bird was in fair body condition. Lungs were uniformly congested - this may have been a terminal, hypostatic reaction. Gizzard contained a small amount of grass, and some vertebrae from fish. The lower intestinal tract was essentially empty. Prominent amounts of urates within the proximal ureters and collecting areas of the kidneys. The body was decomposing - autolysis was well established. No evidence of Schistosomes within the aorta. Bacteriology: Lung, intestine - heavy coliform-type. Salmonella/ Arizona/ Campylobacter negative. No bacterial growth from liver. Histopathology: Tissues were unsatisfactory for examination. Final comments: Bacteriology revealed only non-pathogenic organisms. Condition of the specimen for post-mortem was very poor. Comments: Lead levels negative. Cadmium level high, but not in toxic range.
Toxicology: BCAg:

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
liver	1.71	5	34	366	2.7	<2	5.4	-	364	194	3.45
kidney	-	3	38	308	2.7	<2	8.7	<0.5	103	191	2.56

Zenon:

	OPs	ppDDT	ppDDE	HCB	Endosulfan	Dieldrin
liver & kidney	ND	0.029	0.35	0.021	0.012	0.13
stomach contents	ND	ND	0.028	ND	ND	ND

Probable cause of death: Undetermined

Record number: 198 12-Aug-88
Species and numbers: 3 Loons
Location: Not indicated
Comments: CWS file consisted of only the AgCan Specimen Record. No additional information was included.

Lab report: AgCan #V88-713: Three carcasses were submitted. Post-mortem examination: No evidence of trauma or any infectious or contagious disease. Necropsy: Evidence of very thin birds with wasted breast muscles, some air sacculitis and considerable gizzard erosion and hemorrhage. Parasitology: Positive for gizzard worms. Conclusion: Heavy gizzard worm infection in all three birds.

Probable cause of death: Undetermined

Record number: 199 26-Sep-88

Species and numbers: 10 Hawks

Location: Region 3. Lillooet

Comments: CWS Report: Ten hawks were suspected of being poisoned from the use of Zinc Phosphide to poison mice on a ginseng farm. Zinc phosphide was applied using a registered product (possibly ZP Rodent Bait, ZP Rodent Bait AG or Gopha-Rid).

Lab records: Two carcasses were sent for post-mortem examination; no reports were included in file.

Toxicology: Zenon #88013010 stomach contents (pool from 2 hawks): Zinc 170 ppm. A note from Zenon stated that Zinc Phosphide was not analyzed by organic methods currently in use. Therefore the sample was analyzed for Zinc. Based on the stoichiometry of Zinc Phosphide (Zn_3P_2), Zinc concentration of 170 ppm would allow for a maximum of 224 ppm Zinc Phosphide. It should be noted that this analysis is not specific to the compound but rather the element. They had analyzed other tissues (but not raptor stomach contents) and found on occasion levels comparable to those found in this case report. A note from a toxicologist with BCAg suggests that 170 ppm Zinc was not cause mortality in hawks.

Probable cause of death: Undetermined

Record number: 200 5-Oct-88

Species and numbers: >200 European Starlings and American Robins

Location: Region 2. Langley - Purcell St. & 224th St.

Comments: CWS Report: A note from BCEnv to CWS indicated that dead birds were dropping from trees. There were three main incidents, all of which occurred in the same area of Langley over several months. No cause was determined. It was suggested that a farmer probably mixed a strange concoction of chemicals to use as an insecticide. Approximately 44 Starlings were collected from an incident at Purcell St. and 224th St. on 5 Oct. of which 6 were sent to BCAg for post-mortem examination.

Lab report: BCAg #88/004868: Six birds were examined. Post-mortem examination: The intestinal tracts seemed flaccid, somewhat dilated, contained scant fluid ingesta with excess mucous. Gizzards contained coarse fibrous material, some portions of grain; [several??] birds also had numerous fly larvae. Other organ systems were grossly normal. Histopathology: Lung - congestion. Myocardium, esophagus, intestine, pancreas - no specific microscopic lesions. Bacteriology: Spleen and liver - moderate non-hemolytic coliform; intestine - heavy non-hemolytic coliforms and *Proteus*. Negative for *Salmonella/Arizona*. Comments: There is no evidence of infectious disease in the birds

examined. No specific toxic agent was identified. No bacterial pathogen was recovered. Diagnosis: No specific pathological finding.

Toxicology: BCAg crop content: Strychnine ND, Nicotine ND, Roquefortine ND. BCEnv #88010086: OPs and OCs screen of crop contents and liver - ND

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg
liver	0.67	6.2	27	642	2.0	<1	0.6	<0.5	68	228

Probable cause of death: Undetermined

Record number: 201 1-Dec-88

Species and numbers: estimated 40,000 Seabirds - Arctic and Common Loons, Common Murres, Red-necked and Horned Grebes, White-winged Scoters, Pigeon Guillemots, Glaucous-winged and Mew Gulls and probably more.

Location: Region 1. Pacific Ocean - offshore of Tofino

Comments: Birds washed ashore following the spill of 875,000 litres of bunker oil from the Nestucca barge (2,000 birds were picked up in BC; 8,200 more in Washington State).

Probable cause of death: Oil Spill

Record number: 202 23-Jan-89

Species and numbers: 1 Golden Eagle

Location: Region 8. Princeton

Comments: IVH Record: No information was included in file.

Lab report: IVH #610-89: Physical examination: Adult female. Weight 12 lb. Right simple humeral fracture and left compound humeral fracture. The bill of bird was split from tip. Etiology: Vehicle Collision

Probable cause of death: Trauma - Vehicle Collision

Record number: 203 27-Feb-89

Species and numbers: 1 Golden Eagle

Location: Region 1. Read Island

Comments: IVH Record: No information was included in file.

Lab report: IVH #107-89: Physical examination: Bird exhibited loss of function of left leg. Eventually it developed Bumblefoot and was euthanized on 15 May 1989. Etiology: Undetermined.

Probable cause of death: Undetermined

Record number: 204 17-Mar-89

Species and numbers: 3 Bald Eagles and 2 Glaucous-winged Gulls

Location: Region 2. Delta - Burns Bog (landfill)

Comments: CWS Report: Four sick or dead birds (2 eagles, 2 gulls) were found at the Burns Bog Landfill on 17 Mar. One eagle was found dead. The second eagle was found alive with signs of paralysis and lack of muscular control; it died shortly after admission to a

wildlife rehabilitation centre (OWL). Both gulls were found dead but had been observed vomiting prior to their deaths. A third Bald Eagle exhibiting the same symptoms had been picked up 2 weeks ago from the landfill by OWL. Specimens collected on 17 Mar were submitted to BCAg for post-mortem examination.

Lab report: BCAg #89/001109: Two eagles were examined. Post-mortem examination: ***Eagle #1***: The specimen submitted was the skinned body of a Bald Eagle - the feet, head and wings were missing. Large gull feet and bones were found in the gizzard. ***Eagle #2***: This specimen was a large, mature Bald Eagle. It appeared externally in good body condition. Apart from the post-mortem autolytic change, no significant gross alterations were noted. Abundant body fat was found in the omentum and at the heart base. A large quantity of white curdish material was found in the crop. The gizzard contained some yellow material. No feed was present in the intestine. Gall bladder was distended. No significant gross alterations were noted. Parasitology: Negative. Bacteriology: Miscellaneous bacteria only. Virology: Negative. Histopathology: Post-mortem autolysis and freezing artefacts were noted in all tissues. No significant alterations were present in myocardium, brain, liver or kidney. Comment: As noted above, we were unable to detect any significant gross or microscopic alterations in these specimen. Diagnosis: No significant pathological findings. BCAg #89/001108 Two gulls were examined. Post-mortem examination: ***Gull #1***: Bird had been partially predated. No other visible lesions were noted. Very little gizzard contents and no proventicular contents were noted. The kidney was missing. ***Gull #2***: Immature female. No visible lesions were noted. Comment: Significant abnormalities were not detected in the analysis done. Diagnosis: No significant pathological findings.

Toxicology: BCAg: There was no indication that any tissues were screened for OP/Carbamate insecticides.

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg	Hg
Eagle #1 liver	3.49	5	18	389	1.0	<2	0.2	58	156	5.4
Eagle #1 kidney	-	4	14	362	1.6	<2	0.8	67	157	ND
Eagle #2 liver	2.73	6	22	300	1.6	<2	<0.2	47	160	5.77
Eagle #2 kidney	-	4	18	247	2.2	<2	1.1	63	233	ND
Gull #1 liver	0.89	4	17	423	1.9	<0.2	0.6	77	159	-
Gull #2 liver	1.22	6	31	690	3.3	<2	1.0	72	265	-
Gull #2 kidney	-	4	28	239	2.2	<2	3.3	240	278	-

Probable cause of death: Undetermined

Record number: 205 23-Mar-89

Species and numbers: 2 Canada Geese

Location: Not indicated.

Comments: CWS file consisted of only the BCAg Specimen Record. The lab report indicated that these samples were part of an larger incident (see toxicology section) but no additional information was included except a reference to case #1762 which could not be located.

Lab report: BCAg #89/001183: Two carcasses, 1 goose fecal sample and 1 lake ice sample were submitted. Post-mortem examination: ***Goose #1***: Adult. Bird was in good body

condition with average fat stores present. Gizzard contained a small amount of feed material; lower intestinal tract contents were essentially normal. Some autolytic change was present. No distinct abnormalities were detected. Nares, trachea, esophagus - no visible lesions. No evidence of Schistosoma in proximal or mid-aorta. Mild dilation of right ventricle, of which the significance is unknown. ***Goose #2***: Adult. Autolytic. Carcass had been attacked by scavengers; much of the viscera and external musculature had been removed. The gizzard contained a moderate amount of feed contents, including some material resembling corn. Histopathology: Kidney - autolytic, diffuse congestion. Lung, heart, liver, intestine - no significant pathologic change detected. Frequent autolytic change. Freezing artefact. Bacteriology: All tissues - heavy hem. coliform. *E. coli* sensitive to: ampicillin, cephalothin, tetracycline, sulfa-trimethoprim, gentamycin, neomycin and nitrofuran compounds. Virology: Avian viruses negative. Parasitology: +1 Coccidia. Final comments: Unfortunately there were no clear cut diagnostic answers to explain why these birds died. Heavy coliforms were isolated from all tissues; however, this is probably post-mortem or terminal change. All tests for viruses including paramyxovirus were negative. No evidence of Schistosome seen in the aorta of these birds at any level. No lead shot detected.

Toxicology: BCAg: [liver and kidney ??]: lead and cadmium ND. The Lab Report stated that toxicology tests were ongoing, including checking for strychnine, metaldehyde and barbituates - no results were included in the report. It also indicated that tests for herbicides or pesticides were being processed in the previous clutch of birds from the same group. Results of an OP and OC scan of liver and stomach contents by Zenon which referenced BCAg #89-1183 were included in the CWS record. There were no previous lab reports which could be related to this event in the CWS files. Zenon:

	ppDDT	ppDDE	DDD	HCB	OPs
liver	0.13	0.46	0.025	0.019	ND
stomach contents	ND	0.014	ND	ND	ND

Probable cause of death: Undetermined

Record number: 206 1-May-89

Species and numbers: 30 Canada Goose

Location: Region 1. Victoria - Christie Point Bird Sanctuary in Gorge Inlet

Comments: CWS Report: The BCEnv Office received a phone call reporting goslings with neurological problems at the Christie Point Bird Sanctuary. They were staggering around and 'going up on their toes'. During the first week of May there were 30 goslings; by the end of August they were all dead. Some were eaten by racoons. The caretaker at Christie Point has seen Canada Geese dying each summer for the past 10 years, all with the same symptoms (staggering, etc.); only goslings seemed to be affected. There were 500 geese congregating to moult, of which 200 were residents. They were eating grass and bread from people. Gull in the area were sitting on eggs but did not produce any chicks. They were nesting on apartments with flat gravel roofs. Another person reported that gulls and Canada Geese seemed to be dying along the Island Hwy towards Esquimalt. Cross reference Record number 208 since some of the information was included in that record. No record of carcasses being submitted for post-mortem examination.

Probable cause of death: Undetermined

Record number: 207 1-Jul-89

Species and numbers: several Passerines including American Robins and Swallows

Location: Region 2. Richmond - Westminster Highway

Comments: CWS Report: Birds were found dead or weakened at the back of a residential property and on the road. The report stated that the robins were immature. No follow up action was taken.

Probable cause of death: Undetermined

Record number: 208 20-Jul-89

Species and numbers: 7 Canada Geese

Location: Region 1. Victoria area (some at a golf course)

Comments: CWS Report consisted of a list summarizing the dates and locations where dead or sick Canada Geese were found in the Victoria area between 20 July and 12 Sept. which had been prepared by BCEnv (see table). It was also noted that municipalities in Victoria used Diazinon regularly to treat manicured lawn. Three carcasses were submitted for post-mortem examination but no lab reports were included in the file.

Date	Location	Age	Comment
7-Jul-89	Lochside Dr. (btw Pat Bay Hwy & ocean) 1/4 mile from golf course	gosling	found dead
10-Aug-89	Island View Rd.	adult	euthanized
12-Aug-89	No location indicated		euthanized, analyzed
12-Aug-89	No location indicated		euthanized
27-Aug-89	Island View Rd.	adult	died, analyzed
1-Sep-89	Gorge Kinsan Park (owned by Munciple Nursery)	adult	euthanized, analyzed
12-Sep-89	Golf Course		

Probable cause of death: Undetermined

Record number: 209 14-Aug-89

Species and numbers: >40 Canada Geese

Location: Region 2. Richmond

Comments: CWS Report, Mineau (1993): Over 40 Canada Geese were found dead or convulsing in a turnip field on 14 Aug. It had been raining the previous day and there were puddles in the field. Carbofuran (Furadan 480F) had been applied the previous evening (13 Aug). The grower also sprayed the evening of 15 Aug and the morning of 16 Aug. The field was inspected for Carbofuran granules - none were found. Analysis of soil samples indicated that the insecticide had been applied at the correct rate (no data in file). Approximately 17 geese were brought in to the Vancouver Animal Emergency Clinic. They had mucus dripping from their nose. They were treated with atropine and later

charcoal. From the symptoms, the vet suspected pesticide poisoning. Eight of the hospitalized birds later died; the rest survived and were subsequently released. Two carcasses were sent to CWS for post-mortem examination. No granules were found in the gut contents which contained pieces of leaves, stems, flowers, seeds and clumps of soil.

Lab Report: BCAg #89/002850: Two Canada Geese were examined. Post-mortem examination: Adults. Birds appeared to be in good body condition without obvious fat reserves. One bird had a neckband, #11; the other bird did not appear to be identified. The unidentified bird had a large number of large tapeworms in the small intestine. The intestine was dilated, flaccid and gas-filed. Visceral organs were congested including lung, liver, kidney and spleen. Histopathology: Lung - congestion, aspiration of feed material. Myocardium - no significant microscopic lesion. Kidney - mild focal interstitial nephritis. Bacteriology: Lung - heavy hem. *Staph.*, heavy, *Actinobacillus sp.*; Liver - scant hem. *Staph.*; Spleen, kidney - light *Actinobacillus sp.* (biochem.) resembles *A. capsulatus*); Intestine - heavy coliform types. *Actinobacillus* sensitive to penicillin, tetracycline, nitrofuran, enrofloxacin. Virology: Corona virus positive.

Toxicology: Zenon #03003824, #03003810: Goose gut and stomach contents were screened for OPs/Carbamates. The file did not specify which lab which analyzed turnip samples.

	Carbofuran (ppm)
Goose #1 gut contents	1.5
Goose #1 stomach contents	0.055
Goose #2 gut contents	2.1
Goose # 2 stomach contents	0.350
turnip	68.7
turnip	32.1
turnip	1.7

BCAg:

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Goose #1 liver		9	44	275	6.2	<2	0.20	60	194
Goose #1 kidney	-	4	26	222	3.8	<2	<0.20	130	162
Goose #2 liver		11	43	632	4.8	<2	<0.20	59	176
Goose #2 kidney		5	25	624	3.6	<2	0.74	63	152

Probable cause of death: Pesticide poisoning - Carbofuran F

Record number: 210 30-Aug-89

Species and numbers: >123 Birds including 60 California Gull, 8 Glaucous-winged Gulls, 2 Herring Gulls, 1 Mew Gull, 1 Heerman's Gull, 21 Common Murre, 1 Pigeon Guillemot, 10 Rhinoceros Auklet, 1 Tufted Puffin, 2 Marbled Murrelets, 2 White-winged Scoters, 12 Brandt's Cormorants, 1 Sooty Shearwater, 1 Red-throated Loon.

Location: Region 1. Pacific Rim National Park, west coast Vancouver Island

Comments: CWS Report: CWS biologists collected 123 birds following numerous reports from tourists. The total kill could be larger because some species are difficult to locate carcasses among beach wrack and drift logs and part of the survey was conducted in a vehicle. There were also active scavengers such as eagles and ravens that may have

carried off smaller species. None of the remains were more than 10 to 12 days old; most were less than a week old, and 40% of the California Gull were collected within two or three days of dying. Two of the California Gulls had clear eyes and were dead only a matter of hours. On 31 August, a dead gull was brought into the warden's office, it showed no obvious signs of distress but simply declined in activity. On 1 September, three California Gulls were reported to be on the sand in a sluggish condition and unwilling to fly and a live Red-necked Grebe was picked up and released in Grace Bay. The dead birds were not evenly distributed along the beaches. Most fresh California Gulls were found near a large flock roosting beside Goldmine Creek in Florencia Bay. Most alcids, cormorants, and the Red-throated Loon were found on Long Beach. Scooned Beach was relatively clean (five birds) though many Pacific Sandlance washed up in that area. No Mergansers or shorebirds were found although these species were abundant. All but two of the Common Murres were young of the year, as were the Rhinoceros Auklets, Tufted Puffin, and Marbled Murrelets. The Pigeon Guillemot was an adult. Two of the Brandt's Cormorants may have been young of the year but the others were non-breeding subadults. Two of the Murres and all of the other juvenile alcids were unusually small and underdeveloped. The larger Murres and the Pigeon Guillemot were lean, but this may have been due to their wing moult, a period of stress. The roosting flock of California Gulls consisted mostly of adults, as did most of the dead birds of that species. All of the fresh birds were uninjured and had no net marks on the patagium. Five of the cormorants were dissected, all had stains and necrotic patches on their livers. Three had heavy loads of large parasitic worms in their stomachs. Five fairly fresh cormorants, eight Murres, and four freshly dead gulls were collected for post-mortem examination. A large sample of sandlance and stomach contents from five cormorants, four gulls and six Murres were delivered to Dept. of Fisheries and Oceans for toxicity testing. Mortality appears to be caused by some toxic agent. There was none of the severe stress usually associated with disease. The heavy parasite load in the cormorants is consistent with depression of the immune response. However, the mortality occurred during the post breeding dispersal of the alcids and wrecks of young are frequent. No lab reports or additional follow-up were included in the file.

Probable cause of death: Undetermined

Record number: 211 1-Sep-89

Species and numbers: 25 Quail

Location: Region 1. Saltspring Island

Comments: CWS Report: The CWS file consisted of only a letter written from BCEnv to the individual who reported the incident on Saltspring Island. It specified that the cause of death could not be determined.

Probable cause of death: Undetermined

Record number: 212 30-Sep-89

Species and numbers: 30-50 Ducks, mostly Mallards

Location: Region 2. Hatzic Lake

Comments: CWS Report: Ducks were found dead on 30 Sep and 2 Oct. Large flocks were still unaffected.

Lab Report: BCAg #89/003446: Seven carcasses were submitted. Post-mortem examination: Ducks were fat and in excellent body condition. They all had a severe granulomatous pneumonia, diffuse. Two birds had pericarditis. Two birds had moderate air sacculitis. Most birds had focal granulomatous ulcerative enteritis. Histology: Heart - epicarditis with hemorrhage, fibrin exudation; myocardial, endocardial hemorrhage. Lung - extensive granulomatous pneumonia with mycotic elements. Fungal hyphae were present in blood vessels with thrombosis. Virology: Negative by EM only. Bacteriology: No acid-fast bacteria found. Heart - light. Air sac, lung - moderate, heavy (all mixed non hem. coliforms). Intestines - coliforms. Coliforms sensitive to cephalothin, sulfa-trimethoprim, gentamycin, neomycin, nitrofuran, amikacin, enrofloxacin. *Salmonella/ Arizona/ Campylobacter* negative. Comment: The most significant finding in these birds to date is the severe mycotic pneumonia and mycotic enteritis. Diagnosis: Enteritis - mycotic, Pneumonia - mycotic.

Probable cause of death: Disease - Mycotic Enteritis, Mycotic Pneumonia

Record number: 213 19-Oct-89

Species and numbers: 1 Cooper's Hawk

Location: Region 1. Nanaimo - James Bay area

Comments: CWS Report: BCEnv mentioned that this bird was found dead in a memo to CWS which is filed under Record number 214 since it involves mostly waterfowl mortalities associated with that event. The Lab report is also included in Record number 214 since the hawk was submitted along with a number of waterfowl from that event.

Lab Report: BCAg #89/003679: Post-mortem examination: Bird was in fair body condition with mild reduction in muscle mass and moderate reduction in fat stores. The digestive tract was empty. The stomach contained a small amount of undigested fur fibre. The upper intestines contained a small amount of dark hemorrhagic content. There was no evidence of pneumonia. Bacteriology: No significant pathogens. Histopathology: Marked autolysis and freezing artefacts made interpretation difficult. Heart, kidney, spleen, liver - no lesions present. Intestines - autolysis. Numerous darkly pigmented unidentified spore-like bodies, probably of plant origin associated with bacterial rods and blood pigment. Significance unknown. Diagnosis: Open.

Probable cause of death: Undetermined

Record number: 214 20-Oct-89

Species and numbers: 166 Mallards, at least 1 Northern Pintail, 1 Green-winged Teal, 1 Coot [American Coot ??], 1 Green-backed Heron

Location: Region 1. Saanich - Island View/ Martindale Roads area.

Comments: CWS Report: Carcasses were picked up from 20 October to 31 October. Birds were found in ditches and an irrigation pond. During carcass collections and site investigation, lots of other Mallards and Canada Geese were observed which appeared to be healthy. 27 Oct. - 14 carcasses (13 Mallards, 1 Pintail); 30 Oct 6 Mallards

Lab Report: Three groups of carcasses were submitted for post-mortem examination: (1) BCAg #89/003679: 12 Mallards, 1 Coot, and 1 Green-winged Teal on 24 Oct., (2) BCAg #89/003725: 13 Mallards, 1 Pintail on 27 Oct., (3) BCAg #89/003751: 6 Mallards on 30 Oct. ***Group #1***: ***Mallards***: Post-mortem examination: Five fresh and 4 frozen carcasses. Birds were in poor body condition with moderate reduction in muscle mass and serious atrophy of fat. No feed was present in the digestive tract. There were severe bilateral granulomatous pneumonia and air sacculitis. Fungal colonies were visible in the bronchi and lining the air sacs. There were no other visible lesions. Bacteriology: Lungs, air sacs - large numbers of *Aspergillus sp.* Histopathology: Moderate autolysis made interpretation difficult. Pancreas, trachea, kidney - no lesions present. Heart - mild chronic-active epicarditis with prominent generalized vasculitis. Spleen - generalized diffuse fibrinoid necrosis and acute vasculitis. Intestines - moderate autolytic muscosa. Marked serosal congestion and edema with prominent acute vasculitis and occasional thrombosis. Marked generalized diffuse infiltration with heterophils and mononuclear inflammatory cells which extends in some areas into the muscularis. Air sac - severe thickening due to edema and marked infiltration wit heterophils and mononuclear inflammatory cells. Septate fungal hyphae and fruiting bodies were abundant. Liver- marked sinusoidal congestion and moderate generalized periportal chronic-active inflammation. Lung - severe generalized lobular consolidation with fibrin and mixed inflammatory cells. There was marked interstitial edema and infiltration with heterophils and mononuclear cells. Vasculitis and thrombosis were prominent features. Fungal hyphae were abundant. The entire lung was affected. Comment: All birds died from Aspergillosis due to inhalation of mold spores, most likely during feeding on moldy feed or agricultural waste of spilled grain or silage. The poor body condition attests to the chronicity of the pneumonia despite the apparent sudden deaths. Pesticide levels in the tissues are insignificant. Diagnosis: Aspergillosis. ***Coot***: Post-mortem examination: Bird was in good body condition with adequate muscle mass and fat stores. The digestive tract was empty. There was extensive retroperitoneal perirenal hemorrhage. There was no external evidence of trauma. There was no evidence of pneumonia. Diagnosis: Internal hemorrhage. ***Green-winged Teal***: Post-mortem examination: Bird was in good body condition with only mild reduction in muscle mass and fat stores. The digestive tract was empty. There were no visible lesions. Bacteriology: Lungs, liver - large numbers of *Pasteurella multocida*. Histopathology: Marked autolysis and freezing artefacts made interpretation difficult. Heart - diffuse subepicardial hemorrhage and mild infiltration of the superficial myocardium with mononuclear cells. Lung - marked congestion. Basophilic bacterial colonies within blood vessels were scattered throughout. Kidney, intestine - autolytic. No visible lesions. Liver - autolytic. Uninterpretable. Comment: This was the only bird in which *Pasteurella multocida* was isolated; it did not have Aspergillosis. I believe this to be an isolated case and in no way related to the Mallard deaths. Diagnosis: Pasteurellosis. ***Group #2***: Post-mortem examination: All birds had similar lesions. Body condition was poor to fair with moderate reduction in muscle mass and fat stores. No feed was present in the digestive tract. There was severe mycotic pneumonia and air sacculitis. Fungal colonies were present on the air sacs. Bacteriology: Heavy coliform growth in lung and spleen. No Pasteurella multocida isolated. Virology: Avian myxovirus seen in feces by EM. Histopathology: Trachea, pancreas, kidney - no

lesions present. Lung - severe granulomatous pneumonia. Fungal hyphae were abundant. Liver - moderate generalized periportal chronic-active inflammation. Heart - mild chronic-active epicarditis. Intestines - multifocal acute necrotizing enteritis extending into the muscularis and associated with abundant fungal hyphae and acute vasculitis of the muscularis blood vessels. Diagnosis: Aspergillosis. ***Group #3***: Post-mortem examination: All birds were in fair body condition with moderate reduction in muscle mass and fat stores. The digestive tract was empty. There was severe granulamatous pneumonia and mycotic air sacculitis. Diagnosis: Aspergillosis. ***Summary***: A BCEnv memo summarized the results of the necropsy: 23 Mallards and 1 Pintail died from severe Aspergillosis, 1 Green-winged Teal died from acute Avian Cholera and was negative for Aspergillosis, 1 Coot died of acute physical trauma and did not have Aspergillosis or signs of Avian Cholera. Approximately half of these birds were sampled for Avian Cholera and results were negative.

Toxicology: BCAg #89/003679 ***Group #1***: Kidneys from 4 Mallards were pooled and analyzed by BCAg: As<0.5, Hg <0.3 ppm. Livers from same 4 Mallards were pooled and analyzed by BCAg: As<0.5, Hg <0.3 ppm. The combined livers as well as gizzards from 2 Mallards were also screened for OCs and OPs by Zenon:

	opDDT	ppDDT	ppDDE	HCB	Endo.	Dieldrin	Chlorpyr.	PCBs	OPs
Gizzards (pool of 2)	ND	ND	0.01	0.002	0.04	ND	ND	ND	ND
Liver (pool of 4)	0.01	0.01	0.02	0.0025	0.065	0.01	ND	ND	ND

Probable cause of death: ***Mallards and Pintail***: Infectious disease - Aspergillosis, ***Green-winged Teal***: Infectious disease - Avian Cholera, ***American Coot***: Trauma - Undetermined origin. ***Green-backed Heron***: Undetermined

Record number: 215 18-Nov-89

Species and numbers: 1 Golden Eagle

Location: Region 7. Fort Nelson (landfill)

Comments: IVH Record: The bird was found at the Fort Nelson landfill. When approached, the bird collapsed in the snow with wings outstretched. The eagle was delivered to a local man who previously had rehabilitated a variety of birds including a Golden Eagle. The eagle was not eating on its own; it was being force fed. It died the following afternoon. A second eagle was seen in the same area a week earlier with had poor feather condition. Only a skinned carcass was submitted to the hospital.

Lab report: IVH #83-90: Radiograph: Unrevealing. Post-mortem examination: The bird was in emaciated condition with severe pectoral muscle atrophy. No pericardial, omental or subcutaneous fat was present. The crop was full of kidney which apparently had been force fed. The intestinal tract was empty with minimal ingesta. The stomach contained no gastric nematodes. The gall bladder was distended (anorexia). The heart was small (atrophy) and the testicles were small (probably immature). Etiology: Inanition.

Toxicology: CWS lead: kidney ND, bone ND

Probable cause of death: Disease - Starvation

Record number: 216 20-Dec-89

Species and numbers: 1 Golden Eagle

Location: Region 7. Prince George - Frost Lake

Comments: IVH Record: The eagle was caught in a leg-hold trap approximately 25 miles east of Prince George near Frost Lake. Another immature Bald Eagle [Golden??] was caught and released in the same area one week earlier. There was a pair of mature Bald Eagles at Buckhorm Lake which is only 5 miles away at the time. The weather had been mild so some eagles had stayed in the area.

Lab report: IVH #39-90: Physical examination: Adult male. Weight 8.25 lb. Physical parameters: Hallus claw 4.9 mm. Wing chord 60 cm. Photos were taken of head, body, feet, and tail. Radiograph: No abnormal findings. Post-mortem examination: There were excoriation's and swelling in distal tibiotarsal bone (suspect area entrapped in leg-hold trap). There was congestion of blood vessels in the intestinal tract (stress). Bird was in good body condition with a layer of adipose tissue in omentum. The sex being male is determined by the short wing chord and confirmed on abdominal examination as the testicles well developed (breeding age). The tail plumage is indicative of a bird older than three years. Etiology: leg-hold trap.

Toxicology: CWS kidney: lead ND

Probable cause of death: Trauma - Trapped (leg-hold)

Record number: 217 28-Dec-89

Species and numbers: >200 Northern Pintail.

Location: Region 2. Surrey - 184th St. & 44th Ave.

Comments: CWS Report: Birds were found dead over a period of time. The cause of death was listed as Aspergillosis but no lab report was included in the file.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 218 3-Jan-90

Species and numbers: 2 Barn Owls

Location: Region 2. Richmond - Vancouver International Airport

Comments: CWS Report consisted of only a BCAg Specimen Record. History on the Specimen Record stated that one owl looked like it had starved; the other was healthy looking.

Lab Report: BCAg #90/000022: Two carcasses were submitted. Post-mortem examination: Birds were in poor body condition with moderate reduction in muscle mass and serious atrophy of fat stores. The digestive tracts were empty and gall bladders full. One owl had numerous subcutaneous fly larvae along its neck and within a wound in the right axilla. The kidneys were marginally swollen and pale. Numerous roundworms were present in the stomach and intestines. The gastric mucosa was roughened and dark black. The proximal intestines contained hemorrhagic content. Toxic ingestion suspected. Bacteriology: Lung, liver, intestine - heavy growth of fecal *Streps*. Histology: Marked autolysis and freezing artefact made interpretation extremely difficult. Lung, heart - no

lesions present. Liver, intestines, kidney - uninterpretatable. Stomach - marked mucosal ulceration; digested blood and cellular debris within the lumen.. Diagnosis: 1. Fly strike, 2. Nematodirus, 3. Gastric ulceration, 4. Suspect toxic ingestion (unknown compound)

Probable cause of death: Undetermined

Record number: 219 3-Jan-90

Species and numbers: 6 Northern Pintail and 1 Mallard

Location: Region 2. Surrey area

Comments: CWS Report consisted of only a BCAg Specimen Record. No additional information was included.

Lab report: BCAg #90/000022: Six Pintails and one Mallard were submitted. Post-mortem examination: ***Pintails***: Birds were in excellent body condition with adequate muscle mass and fat stores. The crop and gizzards contained several annelid worms and whole corn kernels. The lungs were markedly congested and odematous. No lead shot was detected in the gizzard content. Suspicious of acute septicemia or poisoning. ***Mallard***: Male. Bird was in excellent body condition with adequate muscle mass and fat stores. Digestive tract was empty. Penis was prolapsed. The liver was mildly enlarged and pale. Suspicious of cholera or botulism. Virology: Negative. Histopathology: Marked autolysis and freezing artefact made interpretation difficult. Lung, intestines, kidney, heart - no lesions were present. Liver - moderate generalized periportal chronic inflammation with occasional secondary lymphoid follicle. Bacteriology: Heavy mixed coliforms isolated (note: Pasteurella, if present, may have been masked by this heavy overgrowth. Comment: Cholera organism was not isolated due to heavy bacterial overgrowth but may still have been present. Diagnosis: Suspect acute septicemia or poisoning by unknown compound.

Probable cause of death: Undetermined

Record number: 220 25-Jan-90

Species and numbers: 1 Glaucous-winged Gull

Location: Region 2. Richmond - Blundell Rd.

Comments: CWS Report: Gull was found alive but died soon after capture. There were no apparent injuries.

Lab report: BCAg #90/000388: Post-mortem examination: Bird was in excellent body condition with abundant muscle mass and fat stores. No feed was present in digestive tract. The liver had numerous hemorrhagic fissures throughout its surface and a fresh blood clot was present over its ventral surface. Virology: Negative. Bacteriology: No significant pathogens. Histopathology: Marked freezing artefacts made interpretation difficult. Liver, spleen, lung, kidney, heart - no lesions present. Intestine - abundant amorphous basophilic globules of varying size and shape present within the lumen. Significance unknown, possibly due to ingestion of an oil-based substance? Diagnosis: Liver rupture.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg

liver	1.31	4	30	466	4	<5	0.4	61	170
kidney	-	7	35	218	1	<5	1.9	91	167

Probable cause of death: Disease - Liver Rupture

Record number: 221 1-Feb-90

Species and numbers: 1 Golden Eagle

Location: Region 2. Port Coquitlam - Tree Island

Comments: IVH Record: Case history stated that the bird was found on Tree Island near the Port Mann Bridge in Feb 1990.

Lab report: IVH #156-90: Physical examination: Weight 6.5 lb. Bird was emaciated. Physical parameters: Hallux claw 5.1 mm. Wing chord 60 cm. Bill depth 2.8. Post-mortem examination: All muscles were severely atrophied and pale in colour. The liver was small. The gall bladder was large. Tentative cause of death: Inanition

Toxicology: CWS lead: kidney 3.68 ppm, bone 8.592 ppm; mercury: liver 0.783 ppm

Probable cause of death: Disease - Starvation

Record number: 222 25-Jun-90

Species and numbers: 1 Golden Eagle

Location: Region 6. Smithers

Comments: IVH Record: The eagle was found in a weakened state. It was dead on arrival to the IVH.

Lab Report: IVH #144-90: Physical examination: Female. Age 1989. Weight 6.5 lb. Moderate number of small species of lice were observed. Physical parameters: Hallux claw 5.3 mm. Wing chord 64.5 cm. Bill depth at cere 3.0 mm. Pad length 146 mm. Tail with white base and outer one third blackish, line between white and dark well demarcated (therefore last year's chick). Radiograph: Well healing distal transverse fracture of the left ulna (over 4 weeks old in healing). Post-mortem examination: The bird was in a thin emaciated state. The mucous membranes and skin were pale in colour. The skin tented indicating dehydration. The keel was prominent. A small firm callous was present in the distal left ulna with no movement. A 2 cm deep laceration in the medial aspect of the left medial digit extending into the underlying tissues were present. Inspisated necrotic material was present in the lesion indicating chronicity. Serious atrophy was present around the heart (heart weight 18.63 gm). There was no subcutaneous, epicardial or abdominal fat. Blood in the lungs and heart was very thin indicating anemia. The total solids was low. The stomach was empty except for two 3 cm evergreen twigs and necrotic plant like material. The gall bladder was extended. Histopathology: N90-3591. No histopathological abnormalities. Etiology: Undetermined trauma. Comments: The findings are consistent with the diagnosis of starvation, secondary to trauma.

Toxicology: CWS lead: kidney 0.45 ppm

Probable cause of death: Trauma - Undetermined origin

Record number: 223 26-Jun-90

Species and numbers: 1 Golden Eagle

Location: Region 1. Wild Deer Lake, south of Duncan

Comments: IVH Record: The eagle was found at Wild Deer Lake, south of Duncan in the Shawnigan Logging District. It was unable to fly. The bird was sent to a local wildlife rehabilitation center (NIWRA).

Lab Report: IVH #145-90: Physical examination: Female. Age 1987. Weight 9.5 lb. Bird was in thin condition and did not have lice. The eagle was bright and alert although easily handled and non-aggressive. A large 15 cm swelling was evident over the right humerus. 18 ml of serosanguinous material was aspirated from the cyst. Crepitation and discomfort were noted with extension of the wing. Two cutaneous horns were noted on the right foot (hallux claw and medial digit). The injury was considered to be inoperable because of the extensive osteomalformation and joint involvement. Wing amputation would have been necessary to minimize animal suffering. Since this would eliminate this birds chance for recovery and release, the eagle was euthanized with 5 ml sodium barbital intravenously. Physical parameters: Hallux claw 5.7 mm. Wing chord 65 cm. Bill depth at cere 3.0 mm. Pad length 150 mm. Tail with white base and outer one third blackish, line between white and dark not well demarcated. Two irregular narrow darker bars proximal to the wide dark terminal bar, irregular barring (photos). Two middle feathers darker than the outer feathers indicatin, most recent feathering indicative of 1987 eagle. Lab results: PCV 35%. TS 3.1 g/dl. Plasma protein 4.0 g/dl. Hct 24% Radiograph: Large callous formation over distal humeral fracture. Post-mortem examination: The right distal humerus was found to consist of a medial fracture with one fragment rotating 180°. All three fragments were stable in a large callus. Subluxation of the radius was present. No evidence of osteoarthritis was noticeable. A small parasite which had infiltrated into the crop was found. The ovaries were immature and inactive. The stomach was full of rabbit (fed at rehabilitation center). A small amount of abdomenal fat was found. Moderate amounts of epicardial fat was present (heart weight 30.73 gm). Diagnosis: Traumatic fracture of distal humerus with excessive osteous malformation. Histopathology: N90-3592. Skin (cutaneous horns) - the skin had marked orthokeratotic hyperkeratosis, while the epidermis was of normal thickness. Both sections were similar. Each contained one area of epidermal ulceration, and in this area there was a moderate superficial infiltration with inflammatory cells and extensive infiltration of the superficial keratin to form an inflammatory crust. Tissue underlying the epidermis consisted of extremely dense fibrous dermal connective tissue with a minimum of cells and vascularity. Lung - there was moderate pulmonary congestion and some edema (attributed to euthanasia). Intestine - the musoca was largely sloughed and autolyzed, but there were no evident lesions. Adrenal gland, esophagus, liver, spleen, skeletal muscle, brain, kidney, intestines - no significant lesions. Pathological Diagnosis: 1. Cutaneous hyperkeratosis with multifocal ulceration and focal superficial dermatitis. Comments: The pathogenesis of these cutaneous horns were not evident histologically. Etiology: Undetermined trauma. Comments: Although this bird was slightly anemic and hypoproteinemic, it was in considerably good condition considering the fact that it was unable to fly for more than 4-6 weeks.

Toxicology: CWS lead: kidney 0.98 ppm

Probable cause of death: Trauma - Undetermined origin

Record number: 224 5-Jul-90

Species and numbers: 1 American Robin

Location: Region 2. Tsawwassen (golf course)

Comments: CWS Report: This juvenile robin was dead found in a small stand of trees between a concession stand and the maintenance yard at a golf course during a bird survey. As no other birds were found in the area over the next few days, no action was taken.

Probable cause of death: Undetermined

Record number: 225 5-Jul-90

Species and numbers: 12-15 American Robins and Finches

Location: Region 2. Surrey - 83rd Ave.

Comments: CWS Report: Birds were found in an area surrounded by blueberry fields by a local resident. After several unsuccessful attempts to contact the individual to learn more details and visit the site, no further action was taken.

Probable cause of death: Undetermined

Record number: 226 25-Jul-90

Species and numbers: 1 Golden Eagle

Location: Region 4. Windermere

Comments: IVH Record: No additional information was included in file.

Lab report: IVH #171-90: Bird vomited up food. It also died within a few days. Lab results: TP 10 g/dl (human lab normal >60 g/dl). No indication that post-mortem examination was conducted. Etiology: Inanition.

Probable cause of death: Disease - Starvation

Record number: 227 14-Aug-90

Species and numbers: 5 Canada Geese

Location: Region 1. Victoria area (some at a golf course)

Comments: CWS Report consisted of a memo from BCAg summarizing Canada Goose mortalities in the Victoria area between 14 Aug and 29 Aug. SPCA were concerned about the number of sick birds found in such a short time (one sick goose per month is about normal) could indicate a disease or a low-level pesticide poisoning. However, BCAg did not think it appear that the birds were suffering from pesticide poisoning. Five of the 10 sick or listless geese were euthanized.

Date	Location	Symptom / Fate
14 Aug	Royal Oak Golf Course	Sick, unable to fly, euthanized
14 Aug	Beaver Lake Park	Caught, euthanized
19 Aug	Beaver Lake Park	Caught, euthanized
23 Aug	Sayward Rd	Caught, euthanized

24 Aug	Palmer Rd near Cedar Hill Golf Course	Caught, euthanized
25 Aug	Gorgeville Golf Course	Sick, staggering but standing, lived
26 Aug	Gorge Kinsmen Park	Sick, unable to fly, lived
28 Aug	Beaver Lake Park	Sick but recovered
29 Aug	McKenzie & Quadra	Sick but recovered

Lab report: Two carcasses were sent to the BCAg. BCAg memo reported that one of the geese had a bone marrow ailment. No official lab reports were included in the file.

Probable cause of death: ***One Goose***: Disease - Bone marrow ailment; ***Rest of Geese*** - Undetermined

Record number: 228 12-Sep-90

Species and numbers: >54 Pine Siskins

Location: Region 2. Sardis

Comments: CWS Report: One afternoon, a local resident was sitting in his back yard and Pine Siskins started falling from trees in his yard. The birds would flop about a bit with their feet clamped up and then die. Fifty four were found dead in the yard, though the cat had eaten some. The yard was adjacent to a broccoli field. The resident collected a handful of birds and approached a farm worker who was spraying the broccoli field. The spraying was being done with a long boom pulled by a tractor. There was some drift over the yard. The farm worker would not, or could not speak English. He stopped spraying for about half an hour but then resumed spraying. Bird carcasses were collected on 13 September; soil and plant samples were collected 26 September.

Lab Report: Telephone report from BCAg: Four carcasses were sent to the lab. The birds had no gross physical abnormalities, good fat content and appeared to be healthy. The tissues were too damaged by freezing to do histopathology. There was no evidence of bacteria or parasites. Crops were empty.

Toxicology: Zenon #030209634: Gizzards were pooled and screened for OPs -ND. Broccoli and soil sample results were never received.

Probable cause of death: Pesticide poisoning - Suspected

Record number: 229 14-Sep-90

Species and numbers: 1 Cormorant

Location: Region 1. Rocky Point, north of Sooke

Comments: IVH Record: No case history was included in record.

Lab report: IVH #441-90: Physical examination: Body condition rating: Thin. Paralysis of legs. Radiograph: No abnormal findings. Treatment: Euthanized. Post-mortem examination: Thigh muscles emaciated (?spinal injury or Newcastle Virus). Report stated tissues were sent to a lab for analysis but no results were included in file.

Probable cause of death: Undetermined

Record number: 230 26-Sep-90

Species and numbers: 1 Red-tailed Hawk

Location: Region 2. Abbotsford

Comments: CWS Report: The bird was hit by a car on Hwy #1 between Bradner Rd. and Mount Lehman Rd. It was still flaccid and warm when collected. No post-mortem examination was conducted.

Probable cause of death: Trauma - Vehicle collision

Record number: 231 8-Oct-90

Species and numbers: about 500 Common Murres

Location: Region 1. Sooke

Comments: CWS Report: A fisher reported dead birds on the water stretching from Race Rocks to Sheringham Point. Estimates from boaters were 500 dead birds. Twenty five Common Murres were shipped to CWS for analysis. Examination of the birds showed abrasions on the leading edges of the wings consistent with being caught in gill nets. The Washington Dept. of Fisheries informed CWS that a gill net fishery had been open from Cape Flattery to Port Angeles for the past few days. Conclusion: The dead birds probably drowned in fisherman's nets and moved into Canadian waters as a result of tide and wind action. Carcasses were donated to the Simon Fraser University Archaeology Dept.

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 232 15-Oct-90

Species and numbers: several Ducks and 2 Dogs

Location: Region 2. Delta - Boundary Bay dike at the end of 72nd St.

Comments: CWS Report: One sick and one dead dog were reported to CWS following spraying of a field. The dogs had been drinking from a ditch that also contained several waterfowl which were unable to fly. Delta Municipality workers were reported to have been spraying on the dike in the same immediate area. No sick or dead birds were located during a site inspection on 18 October. A water sample was collected during the inspection by the Assistant Environmental Control Officer of Delta and a Research Officer from the Provincial Waste Management Branch.

Lab report: Telephone report from BCAg: The dog had died of a viral *Lepto spira* infection. Soil and water samples were negative for pesticides.

Probable cause of death: Undetermined

Record number: 233 17-Oct-90

Species and numbers: 5 Passerines including 2 Starlings [European Starlings ??], 1 American Robin, 1 Hermit Thrush, and 1 Crow.

Location: Region 2. Vancouver - West 61th St.

Comments: CWS Report: A local resident observed five dead birds over three weeks. A concern was expressed about spraying by lawn care companies. One Hermit Thrush carcass had been collected by the resident and frozen.

Lab report: BCAg #90/003490: Post-mortem examination: Bird was in excellent body condition with abundant muscle mass and fat stores. The digestive track was empty.

There were no visible lesions. Bacteriology: All tissues yielded heavy mixed bacteria (most likely post-mortem overgrowth). Histopathology: Marked autolysis and freezing artefact made interpretation difficult. Lung, kidney, heart - no lesions present. Intestines, liver - uninterpretable though the intestinal lumen contained several nematodes in section. Diagnosis: Open. Comment: Cannot rule out acute toxicity.

Probable cause of death: Undetermined

Report number: 234 20-Oct-90

Species and number: 5 Ducks including 2 Mallards, 1 Northern Shoveler and 2 unidentified species

Location: Region 2. New Westminster - Slater Rd. in the Queensbrough area

Comments: CWS Report: All ducks were found in a water filled ditch which was a general repository for local garbage and garden waste. At the time there was considerable water flow. One Mallard carcass was collected and submitted for post-mortem examination.

Lab report: BCAg: Carcass too decomposed to examine.

Probable cause of death: Undetermined

Report number: 235 1-Nov-90

Species and numbers: about 20 Gulls, mostly California and Glaucous-winged Gulls plus 1 Western Grebe

Location: Region 2. Delta - Boundary Bay between 96th St. & 104th St.

Comments: CWS Report: Carcasses appeared less than 24 hours old with no blood or bullet wounds. One live but debilitated gull was in the water; its wings were drooping and its head was in and out of the water.

Lab report: BCAg #90/003620: Two gulls were submitted. Post-mortem examination: Carcasses were moderately decomposed. Birds were in fair general body condition with moderate reduction of muscle mass and fat stores. The digestive tract was empty. The kidneys markedly pale and swollen, otherwise no visible lesions. Bacteriology: Bacterial overgrowth (lung and liver: 3+ Proteus mixed with coliforms). Histopathology: Unsuitable for histological interpretation. Diagnosis: Nephrosis

Toxicology: Zenon #AV90-537 gull tissues [probably intestinal contents] were screened for OCs and OPs - ppDDT 0.440, ppDDE 0.200, Endrin 0.074, Malathion 0.030 ppm. BCAg:

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
livers	1.22	2.4	14	1166	2.3	<5	0.9	<0.5	30	166	0.2
kidneys	-	6.2	37	182	3.4	<5	2.08	-	168	146	0.2

Probable cause of death: ***Gulls***: Disease - Nephrosis, ***Grebe***: Undetermined

Record number: 236 6-Nov-90

Species and numbers: 18 Glaucous-winged Gulls

Location: Region 2. Whiterock - Crescent Beach

Comments: CWS Report: Gull carcasses were scattered along the shore along with the older remains of one Grebe. A sick gull was observed in the water; it was drooping to its left side, with its head hung low and its bill almost in the water. Other Loons, Grebes and Buffleheads in the area appeared to be healthy.

Lab report: BCAg #90/003644: Three gulls were submitted. Post-mortem examination: Birds were in good body condition with adequate muscle mass and fat stores. Digestive tract was empty with several tapeworms present in small intestine. Two birds had excessive straw coloured clear fluid within the pericardial sac. The spleen and liver were markedly congested. The lungs extremely wet and heavy with froth present at the tracheal bifurcation - suggestive of drowning. Bacteriology: No significant bacteria was isolated. Lung - heavy mixed non hem. coliforms. Intestine - heavy coliforms. Liver - no bacterial growth, *Campylobacter/ Arizona/ Salmonella* - negative. Virology: Negative. Histopathology: Lung, spleen, pancreas, trachea, heart - no lesions were present. Intestines - mild diffuse lymphocytic enteritis and mucus cell hyperplasia. Several tapeworm scolices present in section. Kidney (one section only) - occasional foci of interstitial infiltration with mononuclear inflammatory cells. Mild increase in secondary lymphoid follicles. Liver - mild generalized periportal mononuclear accumulation. Brain (one section only) - moderate generalized endotheliosis of arterioles with occasional mild lymphocytic cuff. Morphologic Diagnosis: Hydropericardium. Mild interstitial nephritis. Mild encephaloendotheliosis. Comment: Hydropericardium is a non-specific accumulation of fluid within the pericardial sac and has been associated with pesticide toxicity. The lesions in the kidney and brain are similar to those seen with Newcastle Disease but no virus was recovered (probably one bird only).

Toxicology: Zenon #03009910/AV90-537 gull liver and kidney tissues were screened for OCs and OPs - ppDDE 0.060 ppm. BCAg:

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
livers	0.92	5.7	37	440	3.4	<5	<0.5	<0.5	37	228	0.2
kidneys	-	-	-	-	-	-	-	-	-	-	0.2

Probable cause of death: Disease - Hydropericardium

Record number: 237 9-Nov-90

Species and numbers: >1 Gull

Location: Region 2. Delta - Boundary Bay

Comments: CWS Report: In the CWS Report for Record number 236, it was mentioned that BCEnv had found some more Gulls in a field near Boundary Bay. The carcasses were collected but there was no indication of post-mortem examination.

Probable cause of death: Undetermined

Record number: 238 11-Nov-90

Species and numbers: 12 Gulls

Location: Region 2. Delta - Boundary Bay around 16th Ave.

Comments: CWS Report: In the CWS Report for Record number 236, it was mentioned that the Corporation of Delta had received a phone call on 29 Nov. about a dozen dead gulls

which were found around 16th Ave in Boundary Bay about two and a half weeks ago. The phone call was from a neighbour of someone who had seen the dead birds. No follow-up investigation was conducted.

Probable cause of death: Undetermined

Record number: 239 18-Nov-90

Species and numbers: 3 Canada Geese

Location: Region 1. Victoria - Gorge Harbour, Murrey Dr.

Comments: CWS Report: Local resident observed 3 dead geese. Other geese were feeding in the area and appeared to be healthy. Residents were concerned about the large amount of foam in the water. However, BCEnv staff commented that the foam was just upstream of an area of reversing falls and foam is not uncommon.

Lab report: BCAg #90/004024: One goose was submitted. Post-mortem examination: Bird was in good body condition with adequate muscle mass and fat stores. Moderate decomposition. The digestive tract was empty. The intestines were dilated and the mucosa was roughened and necrotic. Bacteriology: Intestines - heavy *Clostridium perfringens*. Histopathology: Tissues were unsuitable. Diagnosis: Necrotic Enteritis. Comment: May be predisposed to by sudden feed change.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.34	6	61	696	2.6	17	<0.5	58	166
kidney	-	7	36	326	2.4	15	<0.5	65	129

Probable cause of death: Metal toxicosis - Lead

Record number: 240 29-Nov-90

Species and numbers: several Gulls

Location: Region 2. Delta - Deas Island

Comments: CWS Report: In the CWS Report for Record number 236, the Corporation of Delta reported dead Gulls at a Seafood Plant near Deas Island, Delta. These gulls had got into a container of fish waste and became oiled. Some gulls had died; others were cleaned and released by a wildlife rescue group.

Probable cause of death: Other - Mischief (with Oil)

Record number: 241 7-Dec-90

Species and numbers: about 1,000 Mallards

Location: Region 4. Creston

Comments: CWS Report: Dead and dying birds were observed. Live birds were throwing their heads back. No other details of the incident were provided.

Lab report: BCAg #90/004046: Three carcasses were submitted. Post-mortem examination: Birds were in good body condition with abundant muscle mass and fat stores. The digest tract was empty. There was severe granulomatous pneumonia with a small number of fungal plaques on the air sacs. There were a small number of focal intestinal granulomas.

Bacteriology: Lung, intestines - *Aspergillus sp.* Histopathology: There were massive granulomatous fungal pneumonia and focal enteritis. Virology: Avian Paramyxovirus positive. Diagnosis: Aspergillosis.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 242 7-Dec-90

Species and numbers: 1 Gull

Location: Region 2. Delta - Hwy 10 & 62nd Ave.

Comments: CWS Report: The gull was found by a large puddle in a field that was in the process of being filled with earth for housing construction. The incident was also mentioned in the CWS Report for Record number 236.

Lab report: BCAg #90/004025: Post-mortem examination: Bird was in excellent body condition with abundant muscle mass and fat stores. Crop was distended and the esophagus proximal to the proventiculus was markedly dilated with compression of the tracheal bifurcation. The esophagus at this point contained a firm 8 cm. mass of chopped red meat in a fine nylon mesh netting. Bacteriology: No significant pathogens were isolated. Virology: Lung - NDV suspect by FAT only. No viruses were isolated. Histopathology: Intestines, pancreas, liver, spleen, kidney, lung, heart - no lesions were present. Brain - small foci of gliosis present in the medulla. Diagnosis: Esophageal impaction. Comment: Note NDV suspect only. This cannot be given significance without virus isolation.

Probable cause of death: Trauma - Esophageal impaction

Record number: 243 10-Dec-90

Species and numbers: 3 Gulls

Location: Region 2. Delta - Hwy 7 & Hwy 99 Interchange

Comments: CWS Report: In the CWS Report for Record number 236, there was a report of 3 Gulls in a field at the Hwy 7 and Hwy 99 Interchange. Two of the birds had been dead a long time (carcasses were quite decomposed). The third Gull was still alive with a badly broken wing. It was killed but the carcass not collected. Aside from the broken wing, the bird appeared to be in good health.

Probable cause of death: ***Two Gulls***: Undetermined. ***One Gull***: Trauma - Undetermined origin.

Record number: 244 23-Jan-91

Species and numbers: 1 Glaucous-winged Gull

Location: Region 2. Delta - Boundary Bay

Comments: CWS file consisted of only the BCAg Specimen Record. The case history stated that the bird was found alive on 23 Jan. It was very thin and emaciated and died during the night.

Lab report: BCAg #91/000239: Post-mortem examination: One entire female juvenile gull was submitted. Lice were present on the carcass. The body was emaciated with loss of

muscle tissue. No evident of fat in any area on the carcass. There were elevated plaques in the oral cavity particularly in the pharyngeal region bilateral on either side of the larynx. There were multiple nodules in the wall of the esophagus throughout its entire length. Occasional nodules were present in tissues around the esophagus. There was blood in the trachea and scant fluid blood stained ingesta in the intestine. Histopathology: Brain, lung, trachea, ovary, myocardium, thyroid, proventriculus, pancreas - no significant microscopic lesion. Skeletal muscle - numerous sarcosporidia cysts. Liver - increased yellow-brown pigment, probably bilirubin. Focal granulomatous hepatitis. Duodenum - occasional roundworm. Pharynx - ulcerative pharyngitis. Bacteriology: Intestine - heavy mixed coliform type. Liver - no bacterial growth. Negative *Salmonella/ Arizona/ Campylobacter*. Virology: Negative. Comment: The elevated lead levels in liver and kidney are probably the most significant findings in this bird. Diagnosis: Lead poisoning. Emaciation.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	1.19	11	55	1146	3.7	14	2.2	66	140
kidney	-	7.7	218	40	2.1	11	5.0	45	145

Probable cause of death: Metal toxicosis - Lead

Record number: 245 5-Feb-91

Species and numbers: 70 Glaucous-winged Gulls

Location: Region 1. Pacific Rim National Park, west coast Vancouver Island

Comments: CWS Report: About 70 dead Gulls washed ashore south of Green Point Campground in the Pacific Rim National Park. There was a garbage dump nearby. Two gulls were sent to CWS for post-mortem examination. No lab reports or additional information was included in file.

Probable cause of death: Undetermined

Record number: 246 2-Apr-91

Species and numbers: 4 Varied Thrush

Location: Region 1. Quadra Island - Heriot Bay

Comments: CWS Report: A resident on Quadra Island found three dead and one sick thrush within a one week period. The live bird was unable to fly. None of the birds were found near windows, nor were they presented by cats. No carcasses were submitted for examination.

Probable cause of death: Undetermined

Record number: 247 11-Apr-91

Species and numbers: 1 Swan

Location: Region 2. Harrison Hot Springs

Comments: CWS file consisted of the BCAg Specimen Record. Case history stated the swan had been following people around for the past week, spending a lot of time on shore and

it was not eating - all of which were totally unusual. The owner suspected lead poisoning or possibility of having been shot.

Lab report: BCAg #91/001392: Post-mortem examination: Adult male. On gross inspection, this animal had a large mass of nylon fishing line obstructing the esophagus about two thirds of the way down the neck. Several strands of line reached anteriorly into the mouth where they seemed somehow to be firmly attached when applying pressure on the mass below. On complete incision of the esophagus, the ends of the nylon were loose and there was no hook - they were probably looped over the tongue. This mass of nylon fishing tackle had completely obstructed the esophagus, probably leading to starvation and dehydration. Internally, there was severe visceral gout with urates prominent within the epicardium of the heart and throughout the kidneys. The gizzard was contracted, relatively and virtually empty save for the usual normal grit. There were no other significant findings. There was no evidence of trauma or injury. Lungs were normal. Bacteriology: Lung, intestine - heavy hem. *E. coli*. Liver - no bacterial growth. *Salmonella*, *Campylobacter* - negative. *E. coli* sensitive to enrofloxacin, neomycin, nitrofuran, tetracycline. Morphological Diagnosis: 1. Obstruction of the esophagus with fishing tackle. 2. Renal and visceral gout. Initial Comments: The gout was severe in the kidney tissue and had extended also to other organs. The gout was suspected to have been secondary to dehydration. The animal could not have taken in enough moisture or drink normally because of the blockage of the esophagus. Eating, of course, was out of the question so a degree of starvation was also likely if the animal had lived long enough. A sad case. Final Comments: Nylon fishing line within the stomach was wrapped about the tongue, maintaining its presence in the esophagus. The animal died virtually of dehydration and starvation. Tests for heavy metals such as lead were negative. No significant bacteria detected on bacterial culture. Copper level was high and probably, at least in part, related to the starvation situation.

Toxicology: BCAg: Copper levels were high but not toxic.

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.87	430	76	760	2	<5	<0.5	93	106
kidney	-	2	21	137	3	<5	0.7	318	154

Probable cause of death: Trauma - Esophageal obstruction (fishing tackle)

Record number: 248 4-Aug-91

Species and numbers: about 20 Canada Geese and 2 Crows

Location: Region 1. Greater Victoria area (golf course)

Comments: CWS Report: At least 20 dead and sick Canada Geese were reported from various locations around Greater Victoria between 4 Aug and 13 Aug; most birds were found at the Cedar Hill Golf Course and Swan Lake on 9 and 10 Aug. Clinical signs of 11 geese prior to death were generalized weakness and large volumes of clear fluid from the mouths and nostrils. Tremors, convulsions and paralysis were not noted. The majority of the geese were juveniles; only one individual was identified as an adult. Seven carcasses were examined by BCAg. Two crows were also found near the Cedar Hill Golf Course on 17 Aug. A letter from the vet at BCAg speculated that the cause of death was due to salt toxicity.

Lab report: BCAg #91/002699, 2759, 2856: A total of 7 Geese were submitted (4 birds in Group #1 on 12 Aug and 3 birds in Group #2 on 16 Aug) and 2 Crows. ***Group #1***: Post-mortem examination: Birds were in fair general body condition with mild reduction in muscle mass and fat stores. Hydration was adequate. All four were juveniles. The digestive tract was empty except for a small quantity of bile-stained sandy grit in the gizzard. No lead pellets were seen. There was mild to moderate dilation of the proventriculus and distal esophagus. The intestines were flaccid and contained a small amount of mucoid content. There was mild to moderate right ventricular dilation. The liver was moderately congested. The spleen, air sacs and lungs had no visible lesions. Parasitology: Fecal flotation - negative. Bacteriology: No significant pathogens. Virology: Negative. Histopathology: Freezing artefact made histological interpretation difficult. There was marked venous congestion in all tissues. Lung, heart, intestines, bursa - no lesions were present. Spleen - mild generalized lymphoid depletion with occasional secondary lymphoid nodules. Sinusoidal congestion is prominent. Liver - mild generalized periportal accumulation of mononuclear inflammatory cells. Kidney - there are occasional random foci of interstitial mononuclear cell aggregation. There was moderate generalized degeneration of distal convoluted tubules with occasional tubular epithelial necrosis an infiltration with mixed inflammatory cells. A small number of developing cocci were present. Diagnosis: Mild to moderate acute renal tubular degeneration. Comment: Cause of death was undetermined. There had been a recent insult to the kidneys but lesions were not severe enough to be the direct cause of death. It is still possible that as yet an unidentified toxic agent was responsible. Infectious disease has been ruled out. ***Group #2***: Three geese were submitted. Post-mortem examination: Birds were in fair general body condition with mild reduction of muscle mass and fat stores. The digestive tract was empty except for a small amount of sandy grit in the gizzard. Two birds were juvenile and had similar lesions. The heart was flaccid and moderately dilated. The proventriculus was mildly dilated. There were no other visible lesions. The third bird was an adult. The left foot was markedly swollen and the phalangeal joints contained a moderate amount of dry caseous exudate. The tendon sheaths also contained dry caseous exudate and necrotic friable tendons. The spleen was mildly swollen and the liver was moderately congested. Muscle mass was moderately reduced in this bird. Bacteriology: Juveniles - Negative; Adult - heavy *Staph. aureus* isolated from the joints and tendons. Virology: Negative. Histology: Heart, proventriculus, intestines, liver, lung - no lesions present. Kidney - mild generalized of interstitial aggregation of mononuclear cells. Occasional tubular necrosis with infiltration of acute inflammatory cells. Rare mineralized tubules. Diagnosis: Open. Comment: Infectious disease and by most commonly implicated poisons ruled out. Cause of death could not be determined. ***Crows***: Post-mortem examination: Carcasses were mildly decomposed. Both birds were in good general body condition with adequate muscle mass and fat stores. A small amount of vegetative material was present in the gizzard. The juvenile bird had extensive retroperitoneal and pulmonary hemorrhage. No fractures or external trauma was detected. The adult bird had no visible lesions. The intestines contained numerous tapeworms. Bacteriology: No significant pathogens. Diagnosis: Open. Comment: The young bird appeared to have died due to acute hemorrhage, most likely trauma induced. No cause of death could be attributed to the adult bird.

Toxicology: ***Group #1***: Zenon #10008005: liver (pooled), kidney (pooled), stomach contents (pooled) were screened for OCs, OPs and Carbamates - all ND except for stomach contents which had 0.15 ppm Acephate (considered negligible). BCAg liver & kidney composite, stomach content: Strychnine ND, Nicotine ND. ***Group #2***: Zenon #16008-9: crop contents (pooled) and liver/kidney composite were screened for OCs, OPs and Carbamates - crop contents had 0.44 ppm Fensulfothion and liver/kidney composite had 0.32 ppm Tetrachlorvinphos. BCAg stomach contents: Hg - ND

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
Group1-1 liver	0.45	20	30	206	4	<5	<0.5	<0.5	45	157	<0.1
Group1-1 kidney	-	6	24	197	3	<5	<0.5	-	99	173	<0.1
Group1-2 liver	0.51	14	34	284	5	<5	<0.5	-	38	198	<0.1
Group1-2 kidney	-	6	21	281	3	<5	<0.5	-	72	157	<0.1
Group1-3 liver	0.43	22	35	296	4	<5	<0.5	-	49	182	-
Group1-3 kidney	-	4	20	241	2	<5	<0.5	<0.5	97	182	-
Group1-4 liver	0.41	10	25	320	4	<5	<0.5	-	55	174	-
Group1-4 kidney	-	4	20	185	4	<5	<0.5	<0.5	74	173	-
Group2-1 liver	0.38	22	4	39	283	5	<5	<0.5	73	166	<0.1
Group2-1 kidney	-	4	21	255	3	<5	<0.5	-	101	176	<0.1
Group2-2 liver	0.64	11	120	504	2	<5	<0.5	-	80	144	<0.1
Group2-2 kidney	-	12	61	202	2	<5	<0.5	<0.5	120	121	<0.1
Group2-3 liver	0.55	21	37	345	4	<5	<0.5	-	54	188	-
Group2-3 kidney	-	3	19	226	2	<5	<0.5	<0.5	88	157	-

Probable cause of death: ***Canada Geese***: Pesticide poisoning - Organophosphate suspected, ***Juvenile Crow***: Trauma - Undetermined origin, ***Adult Crow***: Undetermined.

Record number: 249 11-Sep-91

Species and numbers: 8 Glaucous-winged Gulls

Location: Region 2. Delta - Boundary Bay, 104th St.

Comments: CWS Report: A local wildlife rehabilitator (OWL) reported 6 dead and 2 sick gulls at 104th St. on the foreshore. The live gulls were fairly thin, very thirsty and having trouble breathing.

Lab report: BCAg #91/003132: Two frozen Gulls were submitted. Post-mortem examination: One had extensive post-mortem autolysis and therefore not examined. The other was in better condition but the only pathological finding was that the bird appeared paler than normal. Histology: Liver - there was a large Schistosome present in one of the large vessels. The liver was extremely congested. Heart - there were a few foci of mononuclear cell inflammatory cells between the myofibrils (nonsuppurative myocarditis). Bacteriology: No bacterial growth from the liver. Diagnosis: 1. Mild non-suppurative myocarditis. 2. Schistosome infection. The significance of a single Schistosome in the liver of one Gull was uncertain as there did not appear to be any associated inflammatory reaction with this parasite. Schistosomes are known to be parasitic and pathogenic to wild ducks.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	As	Ca	Mg	Hg
liver	2.16	5	41	780	5	<5	1.4	-	68	180	0.2
kidney	-	5	32	202	2	<5	4.0	<0.5	77	155	-

Probable cause of death: Disease - Non-supporative Myocarditis

Record number: 250 11-Sep-91

Species and numbers: 16 Gulls

Location: Region 2. Richmond - Sunbury Grounds in the Fraser River

Comments: CWS Report: This die-off was reported in the CWS file for Record number 249. A employee of the Canadian Pacific Forest Products reported 10 dead and 6 sick gulls on a logboom which was located in the middle of the Fraser River, near the old Richmond dump, about 1 mile east of Lafarge Concrete (at the foot of Nelson in Richmond) and about 1 mile downstream (west) of Vito Shipyards on River Rd. in Delta. There were 'feathers all over the place' and the sick birds were lethargic and unable to fly. A total of 50 gulls were in the area. No carcasses were collected and there was no follow-up investigation.

Probable cause of death: Undetermined

Record number: 251 29-Nov-91

Species and numbers: 1 Swan

Location: Region 2. Delta - Westham Island

Comments: CWS Report: Immature swan was found dead.

Lab report: CWS #LFV91-924. Post-mortem examination conducted at IVH. Physical examination: Body condition rating: Emaciated. Suspected cause of death: Inanition. Possible etiology: Starvation, exhaustion from migration.

Toxicology: CWS brain ChE 21.3 µmol/min/g

Probable cause of death: Disease - Starvation

Record number: 252 6-Jan-92

Species and numbers: 2 Black-billed Magpies

Location: Region 7. Dawson Creek

Comments: The CWS file consisted of a BCEnv Pesticide Investigation Report #16-92. Two dead magpies were collected on a ranch 3 miles south of Dawson Creek (one on 6 Jan, second on 25 Jan). Fenthion was suspected cause of death since several magpies had died the previous November after cattle had been treated with Spotton (Fenthion) to control grubs. Carcasses were submitted to BCAg for post-mortem examination - no lab oratory reports were in the file but report stated that Fenthion poisoning was the cause of death.

Probable cause of death: Pesticide poisoning - Fenthion

Record number: 253 7-Feb-92

Species and numbers: >2 Canada Geese

Location: Region 2. Vancouver - False Creek

Comments: CWS Report: The bird was found listless critical condition near False Creek. It was admitted to a local wildlife rehabilitator (Wildlife Rescue Association, WRA) but died later the same day. The WRA reported that this was the second bird which had been brought in from the same locale in critical condition and that there had been reports of other birds to the Vancouver SPCA.

Lab report: CWS #92-308, WRA #086: Post-mortem examination was conducted by IVH. Physical examination: Adult male. Weight 4.9 kg. Body condition: Obese. Physical parameters: Wing chord 485 cm. Post-mortem examination: Bird had lots of abdomenal fat. No pathological lesions were grossly evident. The gizzard contained plant material and a small amount of grit. Suspected cause of death: Undetermined, possible toxicosis. Possible etiology: Undetermined.

Toxicology: CWS brain ChE 21.3 μmol/min/g

Probable cause of death: Undetermined

Record number: 254 29-Feb-92

Species and numbers: 29 Trumpeter Swans, 1 Tundra Swan, 1 Common Goldeneye

Location: Region 2. Abbotsford - Judson Lake

Comments: CWS Report: Between 29 Feb and 15 March, a total of 32 Trumpeter Swans (29 dead, 3 sick) were found at Judson Lake. The majority of the birds were found between 29 Feb and 2 March. After 2 March, the most of the ducks, Canada Geese and swans using the Lake appeared to be healthy. Judson Lake is a shallow, marshy lake about a kilometre long that straddles the international boundary south of Abbotsford. It is surrounded by vineyards, pastures and a few houses. Most of the dead Trumpeter Swans had lead shot in their gizzards. The shot was judged to be mostly #4 or #5 shot, which is used in duck hunting. Most of the shot was irregular in shape and had worn down to the size of #6 shot or smaller. The cause of death was diagnosed as lead poisoning. Swans in the Judson Lake area are usually in mixed-species flock (Tundra and Trumpeter), whereas in Washington State single-species flocks of Trumpeters are common. Since all of the afflicted birds were Trumpeters, it is possible that they obtained the shot while wintering in Washington and were in the process of migrating north. Local residents reported greater numbers of swans this year and the birds remained longer than usual. The swans had been there about a month. One resident saw them fly from the south-east which is consistent with their having come from Washington State. One Tundra Swan and a Common Goldeneye were also found dead in Judson Lake on 6 March. The wildlife rehabilitator (Monika) examined these birds and determined neither bird had died from lead poisoning; the Tundra Swan died of Aspergillosis and the cause of death of the Goldeneye was unknown.

Lab Report: This incident was thoroughly investigated and documented. Basic post-mortem examinations were conducted on 14 swans; seven were performed by a wildlife rehabilitator (Monika's Wildlife Shelter) and 7 were autopsied by Dr. Ken Langelier. Complete post-mortem examinations of 10 swans were performed by the BCAg. Liver and kidney tissues from 5 birds were analyzed for a spectrum of minerals/metals; brain ChE activity was also determined. Lead residues were measured in 12 liver and kidney

tissues as well as 3 blood samples by the NWRC. The lab reports and toxicological data have been summarized for this incident. The only details presented in this report are from the post-mortem examination of the 10 swans by BCAg. Blood samples collected from the 3 live swans brought into the wildlife rehabilitation centre had a mean lead level of 3.54 ± 0.81 ppm (range: 2.84 - 4.43). Lead levels were measured in liver and kidney from 17 swans. Mean lead level in the kidney was 28.7 ± 17.4 ppm (range: 5 - 70.4) and 18.6 ± 11.6 ppm (range: 6-48.8) in the liver. Shot was found in the majority of the gizzards. Lead shot was detected in 22 swans; the number of pellets in an individual bird ranged from 1 to 36 for a mean of 8.6 ± 3.8. Steel shot was detected in 4 birds; mean number of pellets was 1.5 ± 1.0 (range: 1-3). BCAg #92/000816: Eighteen Trumpeter Swans were submitted for analysis. Post-mortem examination: Birds were in various degrees of decomposition ranging from skeletal remains to dead within hours of collection. Of the 18 birds submitted, 12 were suitable for examination. Birds were in poor to fair body condition with marked to moderate reduction in muscle mass and fat reserves. There were no palpable fractures or external evidence of trauma. The proventriculus was dilated and the esophagus was impacted with grass. The gall bladder was full and the intestinal tract contained a small amount of bile-tinged fluid. The liver was shrunken with a greenish hue. The lungs were clear in all birds except one which there was marked congestion and numerous fungal plaques (assume *Aspergillus*). Lead pellets in variable degrees of erosion were present in the gizzards of all birds examined ranging from 6 to 36 pellets (average 10). Bacteriology: No significant pathogens isolated. Virology: Negative. Histopathology: No all birds were suitable for examination. Heart, brain, lung - no lesions were present. Intestines - mild lymphocytic-plasmacytic enteritis. Spleen - mild lymphoid depletion and mild generalized accumulation of hemosiderin within macrophages. Kidney - mild multifocal areas of tubular epithelial vacuolation with occasional necrotic mineralized tubules. No inclusions seen with acid-fast staining. Liver - mild to moderate generalized periportal accumulation of mononuclear inflammatory cells. There was mild to moderate accumulation of hemosiderin within Kupffer cells and marked generalized distension of canaliculi with bile. Diagnosis: Lead poisoning.

Toxicology: BCAg brain ChE activity of 5 swans: 10.03, 9.02, 8.34, 8.14, 10.03 µmol/min/g (considered within the normal range for swans).

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Swan #1 liver	1.22	10	133	1500	3.8	6	0.6	62	151
Swan #1 kidney	-	9	36	177	3.5	11	0.5	142	175
Swan #2 liver	0.73	181	69	1600	2.2	6	<0.5	52	174
Swan #2 kidney	-	5	35	144	2.9	14	0.6	459	198
Swan #3 liver	0.50	42	84	1800	2.2	14	<0.5	118	176
Swan #3 kidney	-	6	41	161	3.6	28	<0.5	434	196
Swan #4 liver	0.89	121	93	2400	3.0	8	0.6	156	187
Swan #4 kidney	-	5	55	142	3.9	5	1.2	104	145
Swan #5 liver	0.77	51	48	1900	2.1	10	<0.5	145	194
Swan #5 kidney	-	6	51	276	4.9	11	0.7	1036	298

Probable cause of death: ***Trumpeter Swans***: Metal toxicosis - Lead, ***Tundra Swan***: Infectious Disease - Aspergillosis, ***Goldeneye***: Undetermined

Record number: 255 11-Mar-92

Species and numbers: 1 Surf Scoter

Location: Region 2. Whiterock

Comments: CWS Report: The bird was found on the beach, close to the 'Point'. It was weak, very cold and having difficulty breathing. It was euthanized shortly after admission to the wildlife rehabilitation centre (Monika's Wildlife Shelter).

Lab report: CWS #92-129, Monika #136: No post-mortem examination was conducted.

Probable cause of death: Undetermined

Record number: 256 23-May-92

Species and numbers: 1 Mallard

Location: Region 2. Langley

Comments: CWS Report: The Dept. of Fisheries and Oceans reported 1,500-2,000 Coho Salmon smolts were killed in a stream in Langley. The fish died after a nearby greenhouse had fumigated with an OP insecticide, Sulfotep. Apparently, the irrigation system in the greenhouse came on shortly after the fumigation and the insecticide entered the stream through the tile bed drainage system which ran under the greenhouse and into the stream. Sulfotep residues were detected in both water samples and fish tissues. A local resident collected a dead Mallard which was found in a nearby stream. She also reported that herons, geese and ducks which had been feeding in the creek had not been seen since the fish die-off. The fish were being eaten by crows; no dead crows were reported.

Lab report: BCAg #92/002047: One frozen Mallard was submitted. Post-mortem examination: Bird in fair general body condition but carcass almost completely eviscerated by predation. Diagnosis: No diagnosis made. Comment: It is unlikely that the bird died of pesticide poisoning.

Toxicology: BCAg brain ChE activity: 9.33 μmol/g/min (within normal range for mallards).

Probable cause of death: Undetermined

Record number: 257 30-Jun-92

Species and numbers: 9-11 European Starlings

Location: Region 2. Delta - Boundary Bay Airport

Comments: CWS Report: A farmer brought in a sick Starling to a local wildlife rehabilitator (OWL) which had "serious neurological problems". It was euthanized. The farmer observed several other dead starling in the area. A total of 9-12 Starlings were reported to have been involved in the incident. A post-mortem examination was not conducted on the carcass.

Probable cause of death: Undetermined

Record number: 258 23-Jul-92

Species and numbers: 2 Great Blue Herons

Location: Region 2. Sunshine Coast

Comments: CWS Report: The live Herons were brought into a local wildlife rehabilitator (Sunshine Wildlife Rescue) from different areas of the coast. They were staggering very badly and died quite suddenly soon after their arrival to the clinic. The rehabilitator suspected poisoning by Dioxins; starvation more likely was cause of death. Carcasses were sent to CWS by courier but they never arrived.

Probable cause of death: Undetermined

Record number: 259 15-Aug-92

Species and numbers: >31 Birds, mostly Common Murres and a few Rhinoceros Auklets

Location: Region 2. Whiterock - Crescent Beach

Comments: CWS Report: A 'bunch' of sick and dead birds were found along Crescent Beach between 15 Aug and 20 Aug. On 16 Aug, 5 dead adult Murres and 1 live juvenile Auklet were taken to a local wildlife rehabilitator (Monika's).The Auklet was in convulsions and died shortly after arrival. All birds appeared healthy to Monika. One Murre was examined - liver, intestine, kidney were grossly enlarged. Some of the carcasses were sent to BCAg for post-mortem examination. On 18 Aug, another 15 Murres were collected. Thirteen of them were dead on arrival; blood was observed in either their glottis and/or esophagus. Two birds were still alive when caught and they had blood running down their bills and necks. Feathers were not damaged on any of the birds. There were suggestions that the birds had drowned after being entangled in fishing nets as cases of this sort are occur every year about this time of year.

Lab report: BCAg #92/002941: Four birds (3 Murres, 1 Auklet) were submitted. ***Murre #2309***: Post-mortem examination: Weight 686 grams. There was extensive air sacculitis, granulomatous pneumonia. Parasites were present in the intestine. No feed material was present. Preliminary bacteriology: Lung, air sac - moderate coliforms and alpha *Strep*. Histopathology: Lung - congestion, foreign material, bacteria in air passages. Liver - focal mild hepatitis. Kidney, myocardium - no specific microscopic lesion. Virology: Negative. ***Murre #2310***: Post-mortem examination: Weight 1172 grams. Carcass was in fair body condition. There was pulmonary edema. No feed material was present. Histopathology: Lung - congestion, foreign material, bacteria in air passages. Liver - focal mild hepatitis. Kidney, myocardium - no specific microscopic lesion. Virology: Negative. ***Murre #2311***: Post-mortem examination: Weight 990 grams. There was extensive pulmonary edema. Bird was in fair body condition. No feed material was present. Preliminary bacteriology: Spleen - light alpha *Strep*. Histopathology: Lung - congestion, foreign material, bacteria in air passages. Liver - focal mild hepatitis. Kidney, myocardium - no specific microscopic lesion. Virology: Negative. ***Auklet #2313***: Post-mortem examination: Weight 297 grams. There was focal granulomatous pneumonia present. No feed material was present. Histopathology: Myocardium, kidney, liver - no specific microscopic lesions. Lung - granulomatous pneumonia, fungal hyphae present. Extensive heterophil infiltrates. Virology: Negative. ***Comment***: Two birds died as a result of drowning. One bird had extensive air sacculitis and granulomatous pneumonia. The Auklet had a granulomatous pneumonia with heterophil infiltrates and fungal elements. ***Diagnosis***: Aspiration Pneumonia. Mycotic Pneumonia.

Toxicology: Brain ChE activity: Murre #2309 - 10.56, Murre #2310 - 11.89, Murre #2311 - 9.80, Auklet #2313 - 14.2 μmol/g/min (considered within normal range for seabirds). BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg	Hg
#2309 liver	1.68	0	33	629	4.5	<2	0.2	52	242	0.8
#2309 kidney	-	7.3	26	98	1.7	<2	0.9	78	209	0.7
#2310 liver	2.69	4.5	17	414	3.9	<2	1.7	58	242	1.1
#2310 kidney	-	2.9	18	219	1.8	<2	7.8	92	249	0.9
#2311 liver	4.24	5.1	20	382	4.4	<2	2.4	69	257	0.8
#2311 kidney	-	3.7	18	183	1.7	<2	14.5	105	304	0.8
#2313 liver	1.97	6.3	51	582	4.0	<2	0.3	63	261	0.3
#2313 kidney	-	4.9	22	143	2.0	<2	0.3	196	280	0.2

Probable cause of death: ***Murre #2309, Auklet #2313***: Disease - Granulomatous, Pneumonia, ***Murre #2310, #2311***: Trauma - Drowned (fishing net entanglement), ***Rest of Birds***: Undetermined

Record number: 260 15-Aug-92

Species and numbers: 20-30 Evening Grosbeaks

Location: Region 7. Prince George

Comments: CWS Report consisted of the BCEnv Pesticide Investigation Report #15-92: A total of 20-30 sick and dead Grosbeaks were observed around a bird feeder from mid-August until early October. A few Pine Siskins also died, but apparently in normal numbers in relation to the size of the flock. While these deaths were occurring in the Prince George area, there were similar reports from the Dawson Creek area. Several people had reported dead or dying birds, particularly Grosbeaks, falling from trees. See Record number 261 for more details.

Lab report: No official lab reported were in the file although the results were summarized in the BCEnv Pesticide Investigation Report. Eight Grosbeaks from Prince George were submitted on 8 September. Results were inconclusive with only *E. coli* being noted in the birds. Other bacteria were not detected. Another 3 Grosbeaks from Prince George were submitted on 23 October. Again, there was no specific diagnosis. Hemorrhagic enteritis (blood in intestinal tract) was noted which the vet though may be symptomatic of rodenticide poisoning. Carcasses were negative for *Salmonella*. The vet thought the birds were probably poisoned by something.

Probable cause of death: Undetermined

Record number: 261 15-Aug-92

Species and numbers: >100 Evening Grosbeaks and several Pine Siskins

Location: Region 7. Dawson Creek area

Comments: CWS Report: This incident was mentioned in the BCEnv Pesticide Investigation Report in Record number 260. The Report said a local wildlife rehabilitator in Dawson Creek had received calls from scattered pockets around the area from people finding dead birds, particularly Grosbeaks. One incident occurred near Gundy, 30 miles south-east of

birds, particularly Grosbeaks. One incident occurred near Gundy, 30 miles south-east of Dawson Creek. One women had reported up to 6 dead birds a day for 3-4 weeks in the summer for the past 2 years. The birds appeared fluffed up and unable to fly. An individual from Wembley (near Grand Forks) also reported lots of dead and dying birds over the last couple of years; he blamed industrial pollutants as the cause of death. Several Pine Siskins were been submitted for post-mortem examination. No official report was included in the file but the report stated that there was no evidence of chemical poisoning. The birds appeared in normal condition. Local Conservation Officers in Grand Forks had noticed die-offs other years, particularly in late fall after the first frost. Most mortalities were associated with feeders. One incident which occurred several years ago was associated with birds feeding on fermented berries.

Probable cause of death: Undetermined

Record number: 262 21-Aug-92

Species and numbers: >20 European Starlings

Location: Region 2. Ladner - Crescent Slough

Comments: CWS Report: An individual called to report a number of dead birds which were found in his backyard which was across the slough from a turnip field. One live Starling was found; it was unable to fly but was not in convulsions. The field had been sprayed with an insecticide the evening before the deaths occurred. A man working on the farm thought the farmer had applied either Dasanit SC 0.91/acre (Fensulfothion) or Furadan (Carbofuran).

Lab report: BCAg #92/003022: Three juvenile starlings were submitted. Post-mortem examination: Birds were in excellent general body condition with abundant muscle mass and fat stores. A small amount of leafy material was present in the gizzard otherwise the digestive tract was empty. The liver, kidney and lungs were markedly congested, otherwise there were no visible lesions. Bacteriology: No significant pathogens were recovered. Histology: No lesions present in major organs. Diagnosis: Acute pesticide poisoning (organophosphate or carbamate). Comment: Acute pesticide poisoning is still highly suspect despite negative findings in tissues submitted to Zenon.

Toxicology: BCAg pooled brain ChE activity - 0.63 μmol/g/min (normal brain ChE level for passerines is around 22 μmol/g/min). This suggests severe inhibition by organophosphate or carbamate insecticides. The file indicated that tissue samples [gizzard contents] had been screened by Zenon for OPs - no pesticides were detected. No official report was included in file.

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	-	4.0	16	806	0.7	1.4	0.2	46	196
kidney	-	4.5	15	276	4.8	<1.0	0.2	79	195

Probable cause of death: Pesticide poisoning - Organophosphate or Carbamate

Record number: 263 1-Sep-92

Species and numbers: 19 Steller's Jays and 1 Northern Flicker

Location: Region 1. Ladysmith to Qualicum

Comments: The CWS Report consisted of a note from Dr. Ken Langelier. He reported that Jays were observed at feeders in larger numbers than usual and that some of the birds were emaciated and having respiratory difficulty. Post-mortem examination of several birds revealed Aspergillosis infection (confirmed histologically by BCAg). Some cases of cat attacks also had significant *Aspergillus* growth in their lungs, air sacs or myocardium. These weakened birds were less capable of eluding the predation. Of the 19 birds turned in, 10 were examined for *Aspergillus* and 7 were found to be positive. Sick and dead birds were found throughout September and early October. The vet remarked that 12 cases in one month probably indicates a much larger number of birds which have died and were not found or turned in, or attacked by cats but not presented.

Probable cause of death: Infectious disease - Aspergillosis

Record number: 264 8-Sep-92

Species and numbers: 1 Mallard

Location: Region 2. Ladner - Crescent Slough

Comments: CWS Report: The bird was found near a turnip field in the Crescent Slough. The bird was in convulsions when found, and died shortly after arrival to the wildlife rehabilitation center (OWL). Suspected pesticide poisoning.

Lab report: BCAg #92/003187: Post-mortem examination: The bird was in poor general body condition with moderate reduction of muscle mass and serious atrophy of fat stores. The proventriculus and esophagus were distended with pond weeds and garden slugs. The intestinal tract was empty. The gall bladder was distended with bile. The gizzard contained nine partially eroded lead shot. Bacteriology: No significant pathogens. Histopathology: Heart, kidney, intestines - no lesions present. Lung - marked congestion. Liver - marked generalized hepatocellular accumulation of bile and prominent bile lacking in canaliculi. Diagnosis: Lead poisoning.

Toxicology: BCAg

	Pb	Cd	Ca	Mg
liver	53	0.3	36	163
kidney	55	0.4	67	129

Probable cause of death: Metal toxicosis - Lead

Record number: 265 10-Sep-92

Species and numbers: 8 American Goldfinches

Location: Region 2. Pitt Meadows

Comments: CWS Report: A women phoned to report a number of dead and live birds falling from a neighbours hazelnut tree. In total, 8 dead and 5 live birds were reported over several days. The live birds were not aware of their surroundings, talons were clenched, their heads were rolling but they were not in convulsions. Feces showed it had been foraging in nearby blueberry fields. The women reported that the farmer had sprayed the blueberry field on 9 Sept. The farmer reported that the field had been treated with fertilizer and the rodenticide Ramik-Brown (Diphacinone).

Lab report: BCAg #92/003263: Seven birds were submitted. Post-mortem examination: Four birds had virtually empty gizzards and crops; three birds had blueberries in their gizzards and/or crop. Livers appeared moderately swollen. There was marked hemopericardium in one bird. There was mild, patchy congestion in the lungs of two birds. Birds were in good body condition. Bones, skin appeared normal - no obvious evidence of trauma. Histopathology: Lungs - diffuse moderate pulmonary congestion. Liver - vessels were dilated and congested. There was sporadic to rare portal aggregates of inflammatory cells, with occasional hepatocyte necrosis which was seen on one section only. Intestine - autolysis present. No parasites seen. No significant pathology. Trachea. heart, ovary, gizzard, kidney, esophagus - no visible lesions. Bacteriology: Negative. Negative for *Salmonella/ Campylobactor*. Final comments: No diagnostic lesions were seen microscopically in these birds other than moderate pulmonary or lung congestion. Bacterial culture results were virtually negative, no pathogens were detected. Toxicology report indicates insignificant levels of heavy metals (lead, mercury). Cholinesterase activity in these birds on the basis of brain analysis is suspiciously low. These findings are suspect for Carbamate poisoning. Comment: No pesticides were positively detected in the specimens submitted to Zenon. Considering the history, there is still concern about the possibility of OP or Carbamate toxicity.

Toxicology: BCAg brain ChE activity (pool from 5 birds): 5.87 μmol/g/min. The normal ChE activity for Goldfinches is not available but ChE activity of other bird species range from 8-30 μmol/g/min. suggesting that the birds could have been exposed to an OP or Carbamate insecticide. Zenon #10008030 crop contents (pool from 4 birds) screened for OPs and OCs and Diphacinone: ND

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg	Hg
liver	-	6.0	23	>500	2.5	<2	0.2	40	223	<0.1

Probable cause of death: Pesticide poisoning - Organophosphate or Carbamate suspected

Record number: 266 27-Sep-92

Species and numbers: 1 Canada Goose

Location: Region 2. Abbotsford - Judson Lake

Comments: CWS Report: An injured adult Canada Goose was found on the west side of the lake. Its wings were droopy and it couldn't fly. It was banded (#838-75382).

Lab report: BCAg #92/003474: Post-mortem examination: Bird was in fair body condition with moderate reduction in muscle mass and serious atrophy of fat stores. The digestive tract was empty except for a small amount of bile-stained digesta. Two steel and 138 lead shot were recovered from the gizzard. Diagnosis: Lead poisoning.

Toxicology: BCAg

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.49	9	65	1635	4.8	35	0.7	72	230
kidney	-	6.1	21	326	5.5	40	1.1	124	226

Probable cause of death: Metal toxicosis - Lead

Record number: 267 13-Oct-92

Species and numbers: 5 Passerines - 4 American Robins and 1 Cedar Waxwing
Location: Region 2. East Vancouver - Hoy St.
Comments: CWS Report: An individual reported 5 dead birds in his back-yard. Three of them were bleeding from their mouths. Nothing in the vicinity seemed unusual.
Lab report: BCAg #92/003650: Two Robins and a Waxwing were submitted. Post-mortem examination: All birds were juveniles in good general body condition with abundant muscle mass and fat stores. The digestive tract contained recently ingested seeds and berry hulls. There was a large blood clot present in the thoracic cavity. There was a small amount of bruising and hemorrhage in the pectoral muscles with an occasional puncture wound. Ribs were fractured through the costochondrial junctions. Hemorrhage was present throughout the lungs and trachea. One bird had hemorrhagic intestinal content. Bacteriology: No significant pathogens recovered. Diagnosis: Trauma. Comment: Vet suspected cat attack; bodies looked crushed.
Toxicology: BCAg brain ChE activity: Robin #1: 13.73, Robin #2: 16.80, Waxwing: 12.22 μmol/g/min. The normal ChE activity range for Robins and Waxwings is 15-21 and 15-29 μmol/g/min, respectively, thereby suggesting the passerines were probably not exposed to OP or carbamate insecticides. Crop contents were screened for anti-coagulant rodenticides: ND.
Probable cause of death: Trauma - Predation

Record number: 268 26-Oct-92
Species and numbers: 3 Mallards and 1 Crow
Location: Region 2. Sardis
Comments: CWS file consisted of only two BCAg Specimen Report. Cases are presented together since the birds were found together in the Sardis Park.
Lab report: BCAg #92/003830, #92/003831: ***Mallards***: Three carcasses were examined. Post-mortem examination: Birds had similar lesions. All three had multiple granulomas throughout the lungs and air sacs, focally fibrinous pericarditis. Histopathology: Lung - multiple granulomata randomly distributed throughout the lung parenchyma. There were numerous fungal hyphae in and around the granulomata and also invading vessels. Diagnosis: Pulmonary Aspergillosis. ***Crow***: Post-mortem examination: Crow had intracranial hemorrhage on the right side of the brain involving the dura matter, otherwise no other visible lesions. Diagnosis: Suspect organophosphate toxicity. Trauma.
Toxicology: ***Crow***: BCAg brain ChE activity: 4.96 μmol/g/min. The normal brain ChE activity in passerines ranges from 15 to 20 μmol/g/min indicating exposure to organophosphate or carbamate insecticides. The lab report indicated that liver and kidney tissues were sent to Zenon for OPs and OCs screening: Isopropyl triphenylphosphate 0.27 ppm. Note: Isopropyl triphenylphosphate is not an organophosphate pesticide. It is probably an industrial chemical which would not likely be toxic at the low doses detected in this bird. We have listed the cause of death as Organophosphate or Carbamate poisoning (due to the depressed ChE) but have not specified a particular agent.
Probable cause of death: ***Mallards***: Infectious disease - Aspergillosis, ***Crow***: Pesticide poisoning - Organophosphate or Carbamate

Record number: 269 1-Nov-92

Species and numbers: 1,000 Pine Siskins and much lesser numbers of Evening Grosbeaks and House Sparrows

Location: Regions 1 & 2. Throughout both Regions but mostly confined to the Lower Fraser Valley (Region 1) and central Vancouver Island (Region 2).

Comments: CWS Report: A Wildlife Health Advisory reported avian mortalities throughout Vancouver extending north to Squamish, east to Chilliwack and west to Nanaimo on Vancouver Island. Similar die-offs were reported in Washington State, primarily on the Olympic peninsula. Mortalities were first reported in late October. Species affected were be primarily Pine Siskins, but Grosbeaks and Sparrows were also reported. Crude estimates of the total mortality in Canada were in the thousands, perhaps ten thousand. The outbreak was likely related to inclement weather on the west coast and increased use of bird feeders. Mortalities were reported in the Lower Fraser Valley from October through December; post-mortem examinations were conducted on about 40 carcasses, the majority of which were positive for *Salmonella*. Salmonellosis bird die-offs in Central Vancouver Island were summarized by Dr. Ken Langelier. As of 7 Jan 1993, there were 41 reported cases (35 Pine Siskins, 4 Evening Grosbeaks, 2 House Sparrows).

Lab report: BCAg examined many samples during November and December. Ten reports were filed: #92/004369; 4447; 4516; 4538; 4569; 4570; 4620; 4626; 4664). In most cases *Salmonella typhimurium* was isolated. Specific details are not presented in this report.

Probable cause of death: Infectious disease - Salmonella

Special Note: For the summary tables and figures, we arbitrarily estimated a total of 1000 birds died in BC & Yukon Region, 800 in the Lower Fraser Valley (Region 2) and 200 on Vancouver Island (Region 1).

Record number: 270 4-Nov-92

Species and numbers: 1 Oldsquaw

Location: Regions 2. Richmond - Colville Rd.

Comments: CWS Report: The bird was very thin and weak with pupils fluctuating in and out upon arrival to wildlife rehabilitation centre (WRA). Its droppings were chalky green. The bird died on 7 Nov.

Lab report: CWS #LFV92-808, WRA #2844: No post-mortem examination was conducted.

Probable cause of death: Undetermined.

Record number: 271 23-Nov-92

Species and numbers: 3 Gulls

Location: Region 2. Sardis

Comments: CWS file consisted of only the BCAg Specimen Report. The case history on the Specimen Report indicated that the gulls were found in the Sardis Park. They were disoriented and their legs were shrivelling up to nothing. Thirty-three various birds were reported to had already died in this park. Cross reference Record number 268 since the birds were found together.

Lab report: BCAg #92/003971: One gull submitted. Post-mortem examination: Bird in excellent general body condition with abundant muscle mass and fat stores. The digestive tract was empty. There was a single skin puncture over the right flank with underlying muscle hemorrhage. There was extensive retroperitoneal hemorrhage over the kidneys and extensive hemorrhage throughout both lungs. There was lateral compression fractures of several ribs on the right side. Bacteriology: Lung - heavy *E. coli*. Otherwise no significant pathogens recovered. Histopathology: Lung - extensive hemorrhage throughout the terminal air spaces. Inflammation was minimal. Kidney - extensive subcapsular organizing hemorrhage. Diagnosis: Trauma. Comment: Suspect gun shot wound.

Toxicology: BCAg brain ChE activity - 11.3 μmol/g/min (within the normal range for gulls)

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	1.09	6.5	39	257	5.4	1.0	0.4	31	203
kidney	-	3.1	25	186	2.3	<1.0	0.7	70	181

Probable cause of death: Trauma - Gun shot

Record number: 272 24-Dec-92

Species and numbers: several Gulls

Location: Region 2. Burnaby - Marine Way

Comments: CWS Report: An employee of a Florist Wholesaler reported several dead and 4-5 sick gulls staggering or lying outside the shop. He indicated that sick gulls were often seen in the area. The birds in question had disappeared and could not be examined. The caller was asked to report any additional or new sick birds. No further action was taken.

Probable cause of death: Undetermined

Record number: 273 1-Jan-93

Species and numbers: > 12 Pine Siskins

Location: Region 1. Brentwood Bay

Comments: CWS Report: A die-off of at least 12 Pine Siskins occurred in January/February in Brentwood Bay near Sidney. CWS staff collected carcasses but there was no indication of post-mortem examination.

Probable cause of death: Undetermined

Record number: 274 12-Jan-93

Species and numbers: about 83 Ducks including 21 Northern Pintail, 15 Green-winged Teal, 2 Mallards, 2 Wigeon [American Wigeon ??], 1 Surf Scoter

Location: Region 2. Whiterock - Crescent Beach

Comments: CWS Report: Dead and sick ducks were reported along Crescent Beach from 12 Jan to 25 Jan. The first dozen found on 12 Jan were taken to a local rehabilitation centre but they all died; the autopsy revealed they died of starvation (lab report not included).

Lab report: BCAg #000226, 227: Three carcasses were submitted under two Specimen Records. ***Pintail***: Post-mortem examination: Adult male. Weight 485 g. Bird was in poor general body condition with marked reduction in muscle mass and serious atrophy of fat stores. The digestive tract was empty. There were no other visible lesions. Bacteriology: No significant pathogens recovered. Histopathology: Heart, lung, pancreas, intestines, trachea, kidney, liver - no lesions were present except the occasional nematode in the intestine. Diagnosis: Emaciation. Comment: No evidence for infectious disease. ***Two Teals***: Post-mortem examination: Adult males. Average body weight 214 g. Birds were in poor general body condition with marked reduction in muscle mass and serious atrophy of fat stores. The digestive tract was empty. There were no other visible lesions. Bacteriology: No significant pathogens recovered. Histopathology: Heart, lung, pancreas, intestines, kidney, liver - no lesions were present. Diagnosis: Emaciation. Comment: No evidence for infectious disease. Mortality may have been precipitated by cold weather. Is it possible that these were poorly acclimatized juveniles?

Toxicology: BCAg brain ChE activity: Pintail: 13.64, Teal #1: 13.84, Teal #2: 13.93 μmol/g/min. (the normal range for waterfowl is 9-14 μmol/g/min).

Probable cause of death: Disease - Starvation

Record number: 275 15-Jan-93

Species and numbers: >9 American Robins

Location: Region 1. Victoria - Kipling St.

Comments: CWS Report: A resident called on 5 Feb to report 'scores' of robins dying in their back yard since mid-January. There were a lot of robins visiting the area each night - the neighbors were complaining about the abundance of droppings deposited on the cars. The site was visited on 5 Feb; 2 fresh carcasses were collected and sent to BCAg for post-mortem examination. No lab reports were included in the file. The area was visited on 8 Feb; there was one head, a pile of feathers and a badly mangled carcass but no specimens worthy of collection.

Probable cause of death: Undetermined

Record number: 276 17-Jan-93

Species and numbers: 9 Ducks including 4 Cinnamon Teals, 2 Northern Pintail, 1 Mallard

Location: Region 2. Tsawwassen

Comments: CWS Report: A resident called to report 7 dead and 2 dying ducks in a pool of water by his home on the beach. Several carcasses were submitted to BCAg for examination. The CWS Report said that BCAg determined the ducks looked emaciated and that they had probably starved. No lab report was included in the file.

Probable cause of death: Disease - Starvation

Record number: 277 17-Jan-93

Species and numbers: 1 Great Blue Heron

Location: Region 2. Delta - 64th St.

Comments: CWS Report: A resident called to dead adult heron in the ditch by his house. It appeared to be healthy. Given the time of year, it likely starved to death. It was not submitted to BCAg for post-mortem examination.

Probable cause of death: Disease - Starvation

Record number: 278 21-Jan-93

Species and numbers: 36 Barn Owls

Location: Region 2. Lower Fraser Valley

Comments: CWS Report: Dead or sick owls were submitted to various rehabilitation centres in the Lower Mainland. Most of the sick birds either subsequently died or were euthanized. An additional 20 Barn Owls were reported to have died in Washington State between Bellingham and Mount Vernon around the same time. Local rehabilitators believed that the birds died from starvation due to deep snow cover making hunting difficult. No carcasses were submitted for post-mortem examination.

Probable cause of death: Disease - Starvation

Record number: 279 1-Feb-93

Species and numbers: 5 American Robins

Location: Not indicated.

Comments: The CWS file consisted of only two BCAg Specimen Records. The history stated that dead robins were collected between 1 Feb and 5 Feb. No additional information was included in the file.

Lab report: BCAg #93/00537, 538: Post-mortem examination: All birds had similar conditions. Birds were in good general body condition with adequate muscle mass and fat stores. Digestive tract was empty. Intestines contained numerous tapeworms. Spleen was mildly swollen and congested. Liver was moderately swollen and congested with generalized multifocal caseation necrosis. Bacteriology: No significant pathogens were recovered. Histopathology: Marked autolysis and freezing made interpretation difficult. Lung, heart, intestines, kidney, pancreas - no lesions were present. Liver, spleen - marked generalized multifocal caseation necrosis associated with numerous colonies of monomorphic bacteria (gram negative). Diagnosis: Acute hepatic necrosis. Comment: Bacterial isolation did not correlate to bacteria seen microscopically. Histologic lesions indicate a bacterial etiology.

Toxicology: BCAg brain ChE activity: 3 Robins - 14.58, 14.55, 13.03 μM/g/min (within the normal range for robins).

Probable cause of death: Disease - Acute hepatic necrosis

Record number: 280 3-Feb-93

Species and numbers: about 50 Glaucous-winged Gulls

Location: Region 2. Coquitlam - Mayfair Industrial Park area

Comments: CWS Report: Dead Gulls were reported in the Mayfair Industrial Park under the Port Mann Bridge as well as nearby in a stand of cottonwoods at the foot of Mary Hill

Road, the Gilford Mall and several residential homes. Carcasses were reported over a couple of weeks. Gulls appeared to be in good condition with no obvious injuries. One local resident reported gun shots and birds "falling from the sky".

Lab report: BCAg #93/000615: Four carcasses were submitted. Post-mortem examination: Body weights ranged between 1.1 and 1.3 kg. All birds were in excellent general body condition with abundant muscle mass and adequate fat stores. A small amount of feed material was present in the crop and gizzard. There was extensive hemorrhage throughout the lungs, pericardial sac, air sacs and abdominal cavity. There were several tears in the liver capsule, extending from which was clotted blood. There were no palpable wing or leg fractures and no external bruising or lacerations. There were numerous fractures of the ribs at the costochondral junctions and of the pelvic bones. Bacteriology: Lung, liver, spleen, intestines - moderate to heavy *E. coli* isolated. Histopathology: Liver - there was mild to moderate generalized periportal accumulation of lymphocytes and plasma cells. Some sections had generalized hemorrhage. Lung - there was extensive hemorrhage throughout the bronchi and terminal airways. Inflammation was minimal. Kidney - one section had several interlobular foci of hemorrhage. Inflammation was minimal. Diagnosis: Trauma/hemorrhage. Comment: No evidence for infectious disease or prior debilitation. Final Virology: Chlamydia negative on McCoy and Clearview tests.

Toxicology: BCAg brain ChE activity: Gull 8.48, 9.62, 10.38, 12.01 μmol/g/min (within normal range for gulls).

Probable cause of death: Trauma - Undetermined origin

Record number: 281 22-Feb-93

Species and numbers: >15 Rock Doves, Northwestern Crows, and Gulls

Location: Region 2. Langley - 54th Ave.

Comments: CWS Report: A caretaker called about some dead birds which were found on the roofs of his buildings. He reported 'many dead birds' on two of his roofs. He didn't know how many birds may be involved since there were eight buildings in the complex.

Lab Report: BCAg #93/000807: The carcasses were too decomposed for examination. The vet suggested that the birds probably died during a recent cold spell and started to decompose when weather became warmer.

Probable cause of death: Undetermined

Record number: 282 16-Mar-93

Species and numbers: 7 American Robins and 1 Passerine

Location: Region 1. Victoria

Comments: CWS Report: A resident called on 22 March to report finding 8 dead birds (7 robins and 1 songbird) in a residential area on 16 March. All of the birds appeared undamaged except for blood on their bills. The individual collected and froze 2 specimen on 20 March. The site was visited on 22 March; no additional carcasses were found in the area.

Lab report: BCAg 93/001290: Gross post-mortem examination: Birds were in excellent general body condition with adequate muscle mass and fat stores. A small amount of

fibrous feed material was present in the gizzard. One bird had a fractured skull with massive cranial hemorrhage. The second bird had abdominal hemorrhage associated with several tears in the liver capsule. Bacteriology: No significant pathogens were recovered. Diagnosis: Trauma.

Toxicology: BCAg: Brain cholinesterase activity - 14.25 µmol/min/g (within normal range for robins).

Probable cause of death: Undetermined

Record number: 283 19-Jul-93

Species and numbers: 1 Golden Eagle

Location: Region 2. Pemberton - Duffy Lake Rd.

Comments: CWS Report: The eagle was found sitting by the side of the road. It was given 1 cup 'Lifeguard' (electrolytes) and some cod. The bird was admitted to the wildlife rehabilitation centre (OWL) on 20 July and was treated with 40 cc Ringers and 2 cc Dexamethasone 5. It was lethargic, smelled very fishy, and had a very pink left abdominal wall. His crop was palpated externally; contents were extremely vile. The bird also had severe diarrhoea. Three cc Pepto Bismol was administered orally. It was found dead in the morning of 21 July.

Lab Report: CWS #L93-726, OWL #93-140: Post-mortem examination was conducted by BCAg (#93/002966). Physical examination: Adult male. Weight 2.55 kg. Post-mortem examination: The eagle was emaciated with muscle wasting and serious atrophy of previous body fat stores. There was excess fluid within the pericardial sac. The pericardium had a whitish discoloration over the surface of the heart and there was some fibrin within the sac. There were a few areas of red discoloration throughout the lung. The crop was distended and contained some foul smelling feed, although there was no evidence of inflammation of the crop lining. Bacteriology: Lung - heavy mixed coliform types and Proteus. Liver - light hem. Staph. Heart - heavy as lung and liver (some hem. Staph.). Microscopic: Lung - heterophils and lymphocytes in the interstitium, within alveoli and vessels. Liver - intracanalicular bile retention. Kidney, brain - no visible lesions. Heart - lymphocytes and occasional heterophil in the epicardium. Virology: Avian viruses negative. Diagnosis: Emaciation. Septicemia. Pericariditis.

Toxicology: BCAg: brain ChE 13.38 µmol/g/min (normal range for Golden Eagles is 8.0-14.0 µmol/g/min)

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	0.85	7	165	1250	6.9	<2	0.38	52	198
kidney	-	6	49	148	4.1	<2	0.38	98	166

Probable cause of death: Disease - Starvation

Record number: 284 19-Sep-93

Species and numbers: 1 Turkey Vulture

Location: Region 1. Cedar - Harmac

Comments: CWS Report: The bird was found dead and appeared to have been shot.

Lab Report: CWS #VI93-084: Post-mortem examination was conducted by IVH. Physical examination: Adult male. Weight: 1.8 kg. Body condition rating: Good. Feather condition: Good. Post-mortem examination: Numerous shot gun pellets were found in the body. The left femur and left humerus was fractured. There was hemorrhaging in the abdomen. Cause of death: Gun shot.

Toxicology: CWS: brain ChE 26.15 μmol/min/g (within the normal range for Turkey Vultures)

Probable cause of death: Trauma - Gun shot

Record number: 285 27-Oct-93

Species and numbers: 3 European Starlings

Location: Region 2. Ladner - River Rd.

Comments: CWS Report: A bird with Avian Pox lesions on its head was delivered to CWS. It died shortly after arrival. Two other birds were seen in the same area with similar lesions. Note: The CWS Report identified the species as Brown Starlings, however, it is more likely they were European Starlings.

Lab report: BCAg #93/004181: Gross post-mortem examination: Bird was in poor general body condition with moderate reduction in muscle mass and fat stores. The digestive tract was empty. There was a 2x2cm flocculent swelling over the right eye. There was another 2x2 cm firm, dry, irregular mass on the medial left hock. The centres of these masses were caseous and foul-smelling. Bacteriology: Proteus isolated from the mass. Histopathology: There was an irregular squamous hyperplasia with abundant eosinophilic intracytoplasmic inclusion bodies. There were numerous foci of caseation necrosis and abundant mixed bacteria. Diagnosis: Pox.

Probable cause of death: Infectious disease - Avian Pox

Record number: 286 20-Nov-93

Species and numbers: 1 Common Loon

Location: Region 3. Lillooet - Seton Portage

Comments: CWS Report: Bird was found on a rock in a river at Seton Portage near Lillooet. It was delivered to a wildlife rehabilitator (WRA) in the Lower Mainland on 22 Nov. It died on 27 Nov.

Lab report: CWS #LFV93-812. Post-mortem examination was conducted by IVH. Physical examination: Adult female. Weight 2.3 kg. Body condition rating: Emaciated. Radiograph: Metal fishing sinker in stomach. Post-mortem examination: The bird was in emaciated condition with no subcutaneous or abdomenal fat. Hypostatic congestion was noted in the intestines. The gizzard was relatively empty except for 3 small pebbles (normal for loons) and a lead fishing sinker. There was very little erosion of the fishing sinker. Blood lead levels indicated lead poisoning. Extensive air sacculitis and fungal pneumonia was evident and may have been the initiating etiological agent in this case. The other possibility is that the lead absorbed may have immunosuppressed this bird making it susceptible to Aspergillosis. Suspected cause of death: Aspergillosis, lead poisoning. Possible etiology: *Aspergillus sp.*, lead fishing sinker.

Toxicology: BCAg #93/004565: blood lead 5.00 ppm, cadmium 0.004 ppm. CWS: lead - kidney 2669 ppm, bone 10.6 ppm

Probable cause of death: Metal toxicosis - Lead

Record number: 287 12-Dec-93

Species and numbers: 1 Canada Goose

Location: Region 2. Langley - 56th Ave & 200th St.

Comments: CWS Report: This goose was found in a marsh near 56th Ave and 200th St. exhibiting respiratory distress. It died shortly after admission to a local wildlife rehabilitation centre (Monika's Wildlife Shelter) .

Lab report: CWS #L93-614, Monika #2593: A complete post-mortem examination was not conducted. The rehabilitator examined the carcass and determined there was no evidence of Aspergillosis in the body and no lead or steel pellets were found in its gizzard although the gizzard lining was bile stained.

Probable cause of death: Undetermined

Record number: 288 18-Dec-93

Species and numbers: 1 Wigeon [American Wigeon??]

Location: Region 2. Ladner

Comments: CWS Report: This dead duck was found in the bush along with a dead cottontail rabbit and 2 dead bald eagles (labelled CWS #L93-736, L93-738). The OP insecticide Phorate was detected in the crop contents of each eagle indicating the cause of death was pesticide poisoning (data not included since part of CWS Secondary Poisoning Study initiated in 1991). The duck appeared to have been scavenged. Both the duck and cottontail carcasses were collected to determine if they were also pesticide poisoned.

Lab report: CWS #L93-968: Post-mortem examinations were conducted by IVH. Physical examination: Adult female. Radiograph: No abnormalities or shot were evident. Post-mortem examination: The breast muscle had been scavenged. There was gritty material in the gizzard. The bird had good layers of fat. There was no hemorrhaging suggesting cause of death was not traumatic. Suspected cause of death: Pesticide poisoning.

Toxicology: No pesticide residue analysis has been conducted to date.

Probable cause of death: Pesticide Poisoning - Suspected

Record number: 289 20-Dec-93

Species and numbers: 3 Great Blue Heron

Location: Region 2. Delta (airport)

Comments: CWS Report: A Great Blue Heron carcass was retrieved from railway tracks on 72nd Ave near the Boundary Bay Airport. The bird was very fat and in excellent body condition. The local wildlife rehabilitation centre (OWL) had reported that 2 other Great Blue Herons were also found around the same time and location but they had been quite emaciated and the carcasses had not been collected.

Lab report: CWS #L93-971: No post-mortem examination was conducted.

Probable cause of death: Undetermined

Record number: 290 8-Jan-94

Species and numbers: 1 Tundra Swan

Location: Region 2. Ladner

Comments: CWS Report: A swan with a broken wing in the water near the 42,000 block of Arthur Rd. was reported on 8 Jan. It was admitted to a local wildlife rehabilitation centre (Monika's) on 11 Jan and euthanzied on 12 Jan.

Lab Report: CWS #L94-622, Monika #22: Post-mortem examination was conducted by IVH. Physical examination: Adult female. Body condition rating: Fair. Feather condition: Good. Radiographs: Multiple gun shot pellets; gizzard was clear. Post-mortem examination: There was a compound left metacarpal fracture with secondary infection as well as pulmonary hemorrhage. Cause of death: Gun shot.

Probable cause of death: Trauma - Gun shot

Record number: 291 12-Jan-94

Species and numbers: 3 Dunlin

Location: Region 2. Delta - 88th St.

Comments: CWS Report: Three Dunlin were found dead in an agricultural field. It was the same general area was 2 Bald Eagles (labelled CWS #L94-745, L94-746) which had been electrocuted (data on eagles is not included since they are part of the CWS Secondary Poisoning Study initiated in 1991).

Lab report: CWS #VI94-041, 042, 043: Post-mortem examinations were conducted by IVH. ***Dunlin #41***: Physical examination: Adult male. Weight 47 g. Post-mortem examination: Hemorrhage wound to chest with internal trauma. Cause of death: Trauma. Suspected etiology: Predation secondary to toxicosis. ***Dunlin #42***: Physical examination: Female. Weight 49 g. Post-mortem examination: Bird was in excellent shape. Cause of death: Undetermined. Possible toxicosis. ***Dunlin #43***: Physical examination: Weight 49 g. Post-mortem examination: Bird was in excellent shape. Cause of death: Undetermined. Possible toxicosis.

Toxicology: CWS brain ChE activity of Dunlin #41, 42, 43 were 28.15, 24.95, 29.35 μmol/min/g, respectively (within normal range for Dunlin).

Probable cause of death: Undetermined

Record number: 292 27-Jan-94

Species and numbers: 89 Ducks - 67 Mallards, 19 Northern Pintail, 3 Wigeon [American Wigeon??]

Location: Region 2. Ladner - River Rd.

Comments: CWS Report: A total of 89 waterfowl were found dead or debilitated in an agricultural field near Ladner between 27 Jan. and 18 Feb., after a period of heavy rain. Most of the birds (96%) were found dead or died shortly after discovery. Sick birds displayed symptoms indicative of exposure to an anti-cholinesterase agent (convulsions,

constant swallowing, wobbly head, dilated pupils, inability to stand). Four birds were taken to local wildlife rehabilitation centres and they subsequently recovered. The agricultural field was about 3 acres. There were pieces of cabbage, potato, squash and rutabaga were scattered over it and approximately 20% of the field was flooded. According to the farmer, for the past several years the field had been used as a dump site for vegetable refuse and wood shavings. Vegetable culls had been dumped in the area since early December. Prior to that time, the cabbage culls had been fed to sheep which the farmer said were healthy. One dead Mallard was found in the field on 27 Jan; several bald eagles were observed in the field. Four more dead ducks were collected on 31 Jan; eagles were still in the area. On 1 Feb, 5 dead and 1 debilitated duck was collected. The farmer incorporated most of the vegetables into the field and levelled the area in an attempt to reduce the amount of standing water. Bald Eagle decoys were placed around the site to deter waterfowl from using the field. AgCan collected 3 soil, 4 water and 4 vegetable samples for pesticide residue analysis. Waterfowl were not observed in the field again until 11 Feb. On Feb. 15, approximately 40 sick and dead ducks were found on the field with about 20 bald eagles scavenging on the carcasses. The farmer cultivated the field, buried the exposed vegetables and dug a trench to drain the standing water which had gathered since 1 Feb. He also started to regularly visit the site to scare off the ducks. When he visited the site early in the morning of 16 Feb, large number of ducks were still using the field. Thirty-three dead and dying ducks were collected later that morning; 10 eagles were observed scavenging the carcasses. The farmer cultivated the field again. AgCan collected an additional 9 composite soil samples on 17 Feb. One last dead duck was collected 18 Feb. However, on 2 April, after another period of heavy rain, 2 Mallards which had been attempting to breed in a neighbouring ditch were found dead in the field. Their cause of death was not determined. During that same time period, a number of eagles with severely inhibited brain and/or plasma ChE activity (indicating exposure to OP/Carbamate Insecticides) were found dead or sick in the same general area. Significant pesticide residues were not detected in their crop contents. Their deaths/injuries could not be directly related to this event.

Lab report: BCAg #94/000403, 450, 501, 655, 707: A total of 22 Ducks were submitted between 27 Jan and 6 on 18 Feb. All of the birds were in similar condition. Post-mortem examination: They were in good/excellent body condition with adequate/abundant muscle mass and fat stores. Digestive tracts were either empty, full of a sour unrecognizable feed, or contained a mixture of mud, pasty white chunks, sandy grit and a few pumpkin or squash seeds. One Mallard had a very liquid intestinal contents and lots of grass in the crop. No lead pellets were seen in gizzard tissue. No signs of trauma or visible lesions. Bacteriology: No significant pathogens in most of the specimens. Some livers had scant alpha *Bacillus sp.* and light coliforms in the intestines. Histopathology: Liver, lung, intestines, pancreas - no lesion. Parasitology: One Mallard had 1+ *Capillaria.* Diagnosis: Organophosphate or Carbamate Toxicosis.

Toxicology: Zenon #419748: Crop contents from 2 Mallards were screened for OPs and Carbamates: One duck had 1.7 ppm Fensulfothion and 0.12 ppm Methamidophos; the other duck had 0.24 ppm Fensulfothion. NWRC: Plasma ChE activity was determined in 2 of the live ducks admitted to the rehabilitation centre: Duck #1: 317 µmol/min/l chemically reactivated to 794 µmol/min/l (blood taken immediately upon arrival to

rehabilitation centre), Duck #2: 742.5 µmol/min/l with no reactivation (blood taken after 1 day in rehabilitation centre). NWRC also analyzed the ChE activity in 27 brains, of which 9 had previously been tested by BCAg: All were severely inhibited (range: 0.5-3.95 µmol/min/g) and chemically reactivated indicating exposure to OP insecticides. BCAg: Brain ChE activity was measured in 15 ducks (range: 0.17-4.05 µmol/min/g). All were severely inhibited indicating exposure to OP or Carbamate insecticides (the normal brain ChE activity for Mallards is 7.0 - 11. 0 µmol/min/g). AgCan: 3 soil, 4 water and 4 vegetable samples collected 1 Feb: Pesticide residues - ND. Only 1 of the 9 soil samples collected on 17 Feb had detectable pesticide residues (4.9 ppm Parathion, 3.7 ppm Fensulfothion plus degradation products)

Probable cause of death: Pesticide poisoning - Fensulfothion and Parathion

Record number: 293 2-Mar-94

Species and numbers: 1 Tundra Swan

Location: Region 5. Kamloops

Comments: CWS Report: The swan was found 5 km east of Kamloops along the South Thompson River. The bird was in the river and unable to fly. It died en route to the wildlife rehabilitation centre. Other ducks and swans were observed in the area; when approached, they all flew off but this bird.

Lab Report: CWS #VI94-044: Post-mortem examination was conducted by IVH. Physical examination: Adult female. Weight 3.5 kg. Body condition rating: Emaciated. Feather condition: Good. Radiographs: Nail was found in the area of the gizzard. Post-mortem examination: A nail had exited from the gizzard. The bird was in an emaciated condition. Cause of death: Foreign body ingestion resulting in starvation.

Probable cause of death: Trauma - Foreign body ingestion

Record number: 294 3-Mar-94

Species and numbers: 1 Tundra Swan

Location: Region 2. Dewdney

Comments: CWS Report: The swan was found drifting down the Fraser River just upriver of Dewdney. It was dropped off at Monika's Wildlife Shelter already frozen. The individual which brought in the bird also reported several other sick swans and geese in the same area on different occasions.

Lab Report: CWS #L94-636: Post-mortem examination was conducted by IVH. Physical examination: Adult male. Weight 4.6 kg. Body condition rating: Thin. Feather condition: Good. Radiographs: Many metal pellets in gizzard. Post-mortem examination: Liver was dark green in colour. There were large amounts of bile. Twenty-five lead and four steel shot were found in the gizzard. The bird was emaciated. Cause of death: Suspected lead poisoning.

Toxicology: CWS brain ChE 16.8 µmol/min/g

Probable cause of death: Metal toxicosis - Lead

Record number: 295 5-Mar-94

Species and numbers: 1 Duck

Location: Region 2. Fraser River

Comments: CWS Report: This dead duck was found in the Fraser River with 2 dead Bald Eagles (labelled CWS #L94-767, L94-768). The brain ChE activity of both eagles was severely inhibited indicating a lethal exposure to an OP or Carbamate Insecticide. OP and Carbamate insecticides were not detected in the crop contents of one eagle; the other eagle had 0.32 ppm azinophos-methyl found in its crop contents. The duck was collected to determine if it was associated with the eagle mortalities.

Lab report: CWS #L94-503: Post-mortem examinations were conducted by IVH. Physical examination: Adult male. Body condition rating: Good. Post-mortem examination: The body cavity was open and parts (liver, kidney, gizzard) had been scavenged. The right wing had been fed upon. Suspected cause of death: Undetermined. Possible toxicosis.

Toxicology: CWS brain ChE 17.05 μmol/min/g (within the normal range for ducks).

Probable cause of death: Undetermined

Record number: 296 21-Mar-94

Species and numbers: about 30 Brandt's Cormorants

Location: Region 1. Pacific Rim National Park, west coast Vancouver Island

Comments: CWS Report: A number of dead Cormorants were on found along the high tide line on Long Beach by a Park Warden. Most birds were adults in breeding plumage; carcasses were intact but stiff with rigor mortis. No oil was detected on the carcasses. The Warden found another between 22 - 30 dead Cormorants and a dead Murrelet carcasses as he walked 3 km west along the shore from Long Beach towards Green Point. No carcasses were found on 2 km of Wiickkannish Beach. One gull was found in 1.5 km of Combers Beach. About third of the carcasses were scavenged by eagles, crows and ravens. The tide line had a lot of debris including logs, velella-velella jellyfish, and plastic. There had been stormy weather with rain and just above freezing temperatures for the past 5-6 days; hurricane force winds and some lighting had occurred the night before the incident. Few "tarballs" along the tideline (<1 kg along 20-30 m of shore). Some oil sheen were observed in pools and drainage streams on the sand below the high tide line. The carcasses do not appear to have been affected by the oil

Lab report: BCAg #94/003409: Two cormorants were examined. Post-mortem examination: Body weights were 2.7 and 3.05 kg. Birds were in excellent general body condition with adequate muscle mass and fat stores. The digestive tracts were empty. There was mild generalized bruising and edema of the subcutaneous tissues of the neck and shoulders. The lungs were extremely wet and edematous. One bird had multiple post-mortem fractures of the left humerus. Bacteriology: No significant pathogens recovered. Histopathology: Freezing artefacts made interpretation difficult. Heart, kidney, liver, intestines, trachea - no lesions present. Proventriculus - a small number of mucosal ulcers associated with imbedded nematodes. Lung - marked generalized congestion and accumulation of serious fluid within airway. Inflammation was minimal. Diagnosis: Trauma. Comments: Death most likely due to drowning, possibly following trauma induced by getting caught in fishing nets.

Toxicology: BCAg brain ChE activity: 31.56 and 29.86 μmol/g/min (within the normal range for cormorants of 12.0 - 38.9 μmol/g/min).

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
liver	2.23	4.3	26	292	3.7	<2	2.2	103	199
kidney	-	5.6	29	288	6.1	<2	0.8	72	247

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 297 23-Aug-94

Species and numbers: 1 Mallard

Location: Region 2. Delta - Westham Island

Comments: CWS Report: A Mallard was found dead (lying upside down in the water) in a wide ditch on Westham Island Rd by CWS Staff. Bird was reported to be in excellent body condition. No other birds were in the vicinity. The carcass was not collected; post-mortem examination was not conducted.

Probable cause of death: Undetermined

Report number: 298 7-Sep-94

Species and numbers: about 20 Rock Doves

Location: Region 2. Matsqui - 88th Ave

Comments: CWS Report: A women called CWS to report that 20 of the 30 pigeons on her property had died. She was concerned they may have been poisoned. She agreed to deliver several carcasses to BCAg for examination - no specimens were received by the lab.

Probable cause of death: Undetermined

Record number: 299 17-Sep-94

Species and numbers: 7 Finches

Location: Region 2. Burnaby - 17th Ave. & 19th St.

Comments: CWS Report: The CWS received a call on 17 Oct. The individual reported that for the last month, there had been a number of Finches (about 7) with abnormal growths on their heads and wings and swollen abdomens feeding at his bird feeder. All of the birds appeared to behave normally. Other birds (Chickadees and Sparrows) appeared unaffected. The feeder had recently been carefully cleaned. CWS Staff diagnosed the birds had Avian Pox. The note also stated that Wildlife Rescue had recently received a number of reports of Finches with Avian Pox in the Lower Mainland.

Probable cause of death: Infectious disease - Avian Pox

Record number: 300 12-Oct-94

Species and numbers: 6 Northern Pintails

Location: Region 2. Tsawwassen - Boundary Bay

Comments: CWS file consisted of only the BCAg Specimen Record. History included in the record indicated that four sick ducks were admitted to a local wildlife rehabilitator; 3 died and were submitted for examination, the other remains in care. Some dead ducks were reported on the beach. Ducks were extremely weak and unable to stand, blink or swallow. They suspect botulism.

Lab report: BCAg #94/004215: Post-mortem examination: Body weights ranged between 700 and 800 grams. Birds were in fair general body condition with adequate fat reserves and mild reduction in muscle mass. The digestive tract was empty. Two birds had ventral consolidation of the lungs. Otherwise, there were no visible lesions. Bacteriology: Lung, spleen, trachea: *Proteus*. Intestines: Heavy coliforms, *Shewanella putrefaciens*, *Clostridium perfringens*. Histopathology: Brain, intestine, pancreas, liver, kidney, heart - no lesions present. Lung - random focal bacterial granulomas in airways. Diagnosis: Granulomatous pneumonia (aspiration?). Virology: Negative. Comment: No evidence of infectious disease. Pneumonia was not severe enough to cause death. Botulism cannot be ruled out although the reduction in muscle mass suggests that these birds were affected for several days and botulism is more acute. Diagnosis: No specific diagnosis. Granulomatous Pneumonia.

Toxicology: BCAg: Brain cholinesterase activity: Duck #1,2,3: 14.53, 18.11, 18.96 (all within normal range of 9.0 - 19.0 in Pintail).

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
Duck #1 liver	2.44	20.4	39	756	5.6	<2	0.5	77	159
Duck #1 kidney	-	8.5	23	164	4.7	<2	4.9	87	162
Duck #2 liver	0.87	43.6	45	392	5	<2	0.3	73	187
Duck #2 kidney	-	7.1	23	150	5.9	<2	4	61	163
Duck #3 liver	1.1	16.6	38	719	4	<2	0.5	47	157
Duck #3 kidney	-	9.9	27	187	4.1	<2	1.1	72	161

Probable cause of death: Undetermined

Record number: 301 25-Oct-94

Species and numbers: 1 Pacific Loon

Location: Region 1. Nanaimo - Green Lake

Comments: CWS Report: Bird was found caught in a gill net and was presumed to have drowned.

Lab report: CWS #VI95-109: Post-mortem examination was conducted by IVH. Physical examination: Adult. Weight 3.1 kg. Body condition rating: very good (4/5). Feather condition: good. No clinical lesions were noted. Physical parameters: Wing chord 31.5 cm. Bill length 7.0 cm. TTL 10.5 cm. Radiograph: No abnormal findings evident. Post-mortem examination: Good body condition with good stores of coronary, omental and subcutaneous fat. Large amounts of blood tinged fluid were observed in the abdominal and thoracic air sacs. There was extensive subcutaneous hemorrhage of body and neck as well as bilateral pulmonary emphysema and congestion. Proventriculus and gizzard contained fish. Diagnosis: Drowning.

Toxicology: CWS brain ChE 21.55 μmol/min/g (within normal range for loons).

Probable cause of death: Trauma - Drowned (fishing net entanglement)

Record number: 302 9-Nov-94

Species and numbers: about 100 Glaucous-winged Gulls and 1 Crow

Location: Region 2. Chilliwack - Bailie Landfill

Comments: CWS Report: A total of about 100 dead or sick Gull were reported; 40 were found at the Bailie Landfill, and up to 60 more were floating down the Vedder River. A worker at the Landfill reported that he uncovered an area while plowing, the Gulls landed in the area to forage and immediately became sick. Some Gulls appeared to recover quite quickly. They were regurgitating and seemed quite thirsty. Some flew towards the river. The area where the Gulls landed was plowed under and the birds stopped becoming sick. It was not apparent what the Gulls were eating but the regurgitated material appeared pink and bread-like.

Lab report: BCAg #94/004618: Four birds were submitted. Post-mortem examination: All of the birds had pulmonary edema and two birds had hyperemia of the proventricular mucosa. Bacteriology: No *Salmonella* was found. Lung - heavy coliform and *Proteus sp*. Liver - coliform. Proventriculi - heavy *Pasteurella hemolytica*. Intestine - *Pasteurella hemolytica*. Histology: Tissues were combined. Lung - congestion and hemorrhage with one lung having carbon deposits around bronchi. Kidney - the occasional kidney had a few foci in and around the portal triads and also within the hepatic lobules. Heart - one heart had a single focus of lymphocytes. Proventriculus - mild submucosal inflammation consisting of lymphocytes and heterophils in the occasional proventriculus. Virology: Avian viruses negative. Diagnosis: Organophosphate toxicosis. Comment: The most significant finding in the birds is the uniform depression of ChE levels in the brain tissue. This indicates exposure to organophosphates or carbamates.

Toxicology: Zenon #03030806: Gut regurgitant was screened for OCs and OPs: carbofuran 62, diazinon 0.03, dichlobenil 0.01, metalaxyl 0.02, phorate 0.01 ppm. BCAg: brain ChE activity of 4 gulls were 4.4, 4.29, 5.9, 7.29 μmol/g/min (normal brain ChE activity in gulls ranges from 12 to 26 μmol/g/min).

	Se	Cu	Zn	Fe	Mn	Pb	Cd	Ca	Mg
livers	2.65	6.4	25	706	7	<2	2	41	260
kidneys	-	5.2	23	201	5.1	<2	3.8	189	240

Probable cause of death: Pesticide poisoning - Carbofuran

Report number: 303 15-Nov-94

Species and numbers: 1 Tundra Swan

Location: Region 2. Vancouver - Jericho Beach

Comments: CWS Report: A Tundra Swan was observed gliding in a pond around Jericho Beach on 14 Nov. It was sluggish and standing around a lot. An observer stated that the bird seemed 'too tame'. It was found dead and partly scavenged on 16 Nov; it was suspected to have died during the night of 15 Nov. It was the only swan in the area. Carcass was retrieved by CWS staff. It was too scavenged for post-mortem examination.

Probable cause of death: Undetermined

Report number: 304 15-Nov-94

Species and numbers: >1 Crows, Rock Doves and Jays

Location: Region 2. Surrey - 124th St.

Comments: CWS Report: A number of crows, pigeons and jays were reported to have landed on tress and subsequently dropped dead on the residential property.

Lab report: BCAg #94/005332: One crow was examined. Post-mortem examination: Bird was in poor general body condition with marked reduction in muscle mass and fat stores. The digestive tract was empty. There was marked fibrinous consolidation of the left lung. There was fibrinocaseous exudate in the left thoracic and abdominal air sacs. No evidence of trauma. Bacteriology: Negative for fungus. Lung, air sacs, spleen - *Proteus sp.* Histology: Marked infiltration of the pulmonary parenchyma with mixed inflammatory cells and fibrin. Airways were occluded with caseous debris. There were numerous granulomas centered on airways. Diagnosis: Granulomatous pneumonia and fibrinous air sacculitis. Comments: Inciting etiology could not be determined, although fungal infection has been ruled out.

Probable cause of death: Disease - Granulomatous Pneumonia and Air sacculitis