

2001
BC Landscape & Nursery Association
Wildlife Survey

Final Report
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EXECUTIVE SUMMARY

A BC nursery growers wildlife damage survey was conducted in December 2001. The survey obtained responses from 81 growers representing 51% of the nursery acreage in the province.

The data suggests that nursery growers may be sustaining damage from wildlife in the range of \$750,000, annually. The level of damage has increased 50% in the 1996 to 2001 period, compared to an increase in acreage of 10.75% in the same period.

Wildlife damage was indicated by 53% of the respondents on roughly 39% of the acres surveyed. Some 23% of operators indicated no damage and no need to undertake damage control measures and a further 23% had implemented measures that eliminated wildlife damage.

Wildlife damage to nursery crops tends to be low intensity and non-fatal, it does however reduce the quality of the plants or increase the growing time to sale. Almost 75% of damage incidents result in less than 5% of plants affected with 60% of incidents resulting in damaged plants.

Mice and rabbits accounted for almost 60% of the cost of wildlife damage in 2001. Damage by deer represented 25% of the estimated lost value. The potential for deer damage may however be under-emphasized since some operators in the most susceptible areas have installed fencing.

While a variety of controls are used by growers, the two most effective wildlife damage control measures consist of fencing (exclusion) and poisoning (extermination). The expenditure of growers who fenced their property averaged \$650 per acre while those who implemented control measures other than fencing expended an average of \$200 per acre.

Collectively, growers are in favour of financial assistance to manage wildlife better and are against compensation measures in principle. There is, however a recognized exception where unsustainable or introduced populations are involved. Growers also indicated a need for education, research and training about improved wildlife damage control.

Land uses in proximity to nursery operations in high damage regions tends to consist simultaneously of public or private natural areas, suburban/urban residential and commercial/industrial. None of these adjacent land uses has plans for managing wildlife populations.

A list of recommendations for further action is found in Section 8.0.

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1.0 REPRESENTATION OF THE SURVEY

In 2000, the BC nursery industry was estimated to comprise 305 growers farming 8,860 acres¹. Based on this estimate, response to the 2001 BCLNA wildlife survey represents 27% of the growers (81) and 51% of the acreage in the BC industry (4540 ac).

This survey received responses from an estimated 27% of nursery growers in BC. Acres surveyed represent about 51% of the provincial nursery acreage indicated in a 2000 Statistics Canada survey.

As Table 1 indicates, the largest area of nursery operations are located in the GVRD (32%), FVRD (29%), the Okanagan (19%) and the Kootenay region (16%). Overall, growers rent about 31% of their land base, although the proportion of rented land rises to 58% in the GVRD.

The average size of surveyed BC nursery operations was 56 acres in 2001. The largest average size of nursery operations is in the Kootenay region (234 ac), followed by the Okanagan (62 ac), the FVRD (61 ac) and the GVRD (56 ac). The operations of smallest area (less than 10 ac) are found on South Vancouver Island, the North Coast and the North Interior.

2.0 Incidence and Distribution of Wildlife Damage

Approximately 53% of the survey respondents and 38.5% of the acres indicated wildlife damage in 2001 (see Table 2).

Of the 4,540 acres surveyed, wildlife damage was reported on about 1750 acres in 2001. Based on the Statistics Canada year 2000 reporting of total nursery area in BC, it is estimated that approximately 3,432 acres may be affected by wildlife, annually.

The largest areas of nursery operations sustaining wildlife damage are located in the GVRD (638 acres), the Okanagan (591 acres), the Kootenay (276 acres) and the FVRD (157 acres). These 4 regions account for 95% of the 1750 acres in the survey at risk to wildlife damage.

¹ Statistics Canada Catalogue 22-202, Year 2000. Ornamental and Fruit Nursery Stock and Sod.

As Table 2 shows, the regions with the lowest proportion of acres with wildlife damage are the Thompson and FVRD. The highest percent of acres with wildlife damage are located in the Sunshine region (71%), the Okanagan (68%), North Vancouver Island (54%) and the GVRD (44%).

Regions indicating the highest proportion of acres with wildlife damage are the Sunshine coast, the Okanagan, North Vancouver Island and the GVRD.

The third and fourth columns of Table 2 indicate the number of operations that reported damage control was not required and undertook control measures to control damage, respectively. Out of 81 respondents at the provincial level, 23% (19) of the respondents suffered no wildlife damage and wildlife control measures were not required. Those operations with no wildlife control requirements tend to be located in the FVRD and GVRD.

A further 23% (19) of respondents take measures to protect their operations from wildlife, of which in 12 instances (15% of respondents) perimeter exclusion fencing is installed. Perimeter exclusion fencing to protect nursery operations is most prevalent in the Okanagan, GVRD, Kootenay and North Island regions.

About 53% of survey respondents indicated nursery damage due to wildlife. Roughly 23% of survey respondents indicated no wildlife damage and no need to undertake damage control measures. A further 23% reported no damage but took measures to protect their operations from wildlife.

2.1 Nursery Stock Damaged By Wildlife

As Table 3 indicates, about 38% of the total wildlife damage reports in the 2001 survey related to field trees². Other significant categories of nursery stock damage included container shrubs (26%), field shrubs (11%) and container trees (8%). Improvements and buildings represented significantly less likely targets of wildlife damage to nursery operations.

Field trees are most commonly affected by wildlife, accounting for 38% of damage incidents. Container shrubs accounted for a further 26% of wildlife damage incidents.

² Note that some growers indicated damage in more than one category.

2.2 Wildlife Types Causing Damage to Nursery Operations

The GVRD is the location for almost 32% of all incidents of wildlife damage reported in the 2001 survey³. The Okanagan and the FVRD each account for 27% of the damage incidents. No other region accounts for more than 5% of total wildlife damage reports.

Mouse and rabbit damage is relatively more frequent in the GVRD, FVRD and the Okanagan than elsewhere. Deer damage incidents are spread throughout all regions of the province but are relatively more frequent in the Okanagan and Kootenay regions. Elk problems are encountered on the Sunshine Coast.

2.3 Incidence of Damages to Nursery Operations by Wildlife Type, 2001

Table 4 presents a regional breakdown of animal types causing damage to BC nursery operations. The GVRD, Okanagan and FVRD accounted for over 80% of all damage reports in 2001.

The highest incidence of wildlife damage is caused by mice and rabbits, which account for 40% of all reported incidents in the 2001 nursery survey. Damage by deer (28%) and crows and other birds (12%) are the next most frequent types of wildlife impacts.

Mice and rabbit accounted for 40% of all wildlife damage incidents in 2001. Damage by deer represented 28% of occurrences.

2.4 Extent of Wildlife Damage to Nursery Crops

Table 5 indicates the distribution of wildlife damage incidents by the extent of damage caused to nursery crops. Roughly 46% of all damage reports fall into the “less than 1% of plants affected” category. About 25% of wildlife damage incidents affect more than 5% of the nursery crop. In 5% of incidences, more than 80% of the crop is damaged.

Table 6 presents simple averages of the percent of plants affected, broken out by region (compare with Table 4, which presents number of wildlife damage incidents). Damage caused by “crows & other birds” and “mice, rabbits & squirrels” tends to affect a higher proportion of the nursery crop than deer, “bear & moose”, beaver and coyote. Elk on the Sunshine coast are indicated to

³ An operation could report more than one wildlife damage incident if caused by more than one animal type.

damage 75% of the plants in the field.

2.5 Dollar Value of Wildlife Damage to Nursery Operations, 1996 to 2001

Based on the survey response, wildlife damages to nursery operations in 2001 totalled about \$383,000 (See Table 7). These damages are concentrated in the FVRD (39%), the GVRD (34%) and the Okanagan (22%).

Based on the representation of the survey, total wildlife damages to all BC nursery operations may have reached about \$750,000 in 2001.

The “mice, rabbits & squirrels” category accounted for almost 60% of the value of wildlife losses, or almost \$200,000 annually. Damage by deer amounted to \$83,500 and represented 25% of the total value of wildlife losses. Less significant damage was caused by “crows & other birds” (\$22,300), beaver (\$15,400) and elk (\$10,000). It should be noted that the natural exposure to deer damage is significantly understated since 15% of the growers sampled have constructed fencing to control deer.

Mice and rabbits accounted for almost 60% of the cost of wildlife damage to nursery operations in 2001. Deer damage represented a further 25% of the total value of wildlife losses.

Growers also estimated the damage committed by wildlife annually over the 1996 to 2001 period. As Table 8 indicates, the total value of wildlife damage has increased steadily from \$254,000 in 1996 to \$383,000 in 2001 for a 50% increase in damage. Wildlife damage to nursery operations has increased in most regions. In the same period (1996 – 2001) total acreage of nursery stock only increased from 8000 acres to 8860 acres or 10.75%.

The cost of wildlife damage is reported to have increased by about 50% between 1996 and 2001. Damage has increased in most regions.

2.6 Perceived Wildlife Damage Trends

As Table 9 shows, growers indicated most often that the rate of growth in damage by wildlife has varied from static to steadily increasing in the 1996 to 2001 period. The most common perceived reasons for the trend of increasing damage include weather-related depredation factors and changing wildlife

populations (Table 10). Those factors cited for reduced wildlife damage in the period include the use of self-financed damage control measures and more effective wildlife-sensitive nursery management.

Introduction of the elk population is considered to be responsible for the nursery damage in the Sunshine region.

2.7 Wildlife Types Causing Nursery Damage in the 1996 to 2001 Period

Table 11 indicates that the incidence of wildlife damage to surveyed BC nursery operations has increased in the 1996 to 2001 period. Tables 12 to 21 present damage incidence trends in each of the selected regions.

The FVRD, GVRD and Okanagan report an increasing number of wildlife damage incidents in the 1996 to 2001 period. The species associated with the increasing damage trend include deer, rabbits mice and crows. The Thompson, North Coast, and Northern Interior regions have low numbers of nursery operations and wildlife damage incidents. The Sunshine region has experienced unique widespread damage from an introduced elk population.

Provincially, reports of wildlife damage have increased for most wildlife types. The FVRD, GVRD and the Okanagan regions contain the bulk of BC nursery operations and account for most of the increased incidences of wildlife damage.

Operations in North Island and South Island regions report low incidences of deer, rabbit and mouse damage.

2.8 Type of Damage Incurred by Nursery Operations

Table 22 shows that 60% of wildlife incidents consist of damage to nursery plants. As Table 22 shows, plants are destroyed in 25% of incidents while about 8% of damage is related to equipment (e.g., chewed PVC irrigation pipes).

Damage to plants characterizes 60% of reported wildlife damage incidents. In about 25% of incidents, plants are destroyed by wildlife.

3.0 Wildlife Damage Control Measures by Nursery Growers

Tables 23 presents a breakdown of wildlife damage control measures reported by BC nursery growers in selected regions. Roughly 31% of the 81 respondents

(25/81) indicated that wildlife control measures were not required, either because of the absence of wildlife, the insignificant level of damage or because growers had already implemented effective wildlife damage control measures (also see Table 2). A high proportion of respondents in the FVRD and the GVRD reported that wildlife damage control measures are not required.

Roughly 31% of respondents indicate that wildlife control measures are not required either because of the absence of wildlife, the insignificant level of damage, or because they already had implemented effective wildlife damage control measures.

Among those respondents indicating wildlife damage control measures, fencing is the most common measure used in the GVRD, North and South Vancouver Island, the Kootenay and the Okanagan. The trapping of beaver to control damage is relatively more frequent in the GVRD.

Guard animals are kept to control wildlife damage on nursery operations in most regions, as is the use of repellents. Poisoning of vermin is a standard nursery practice in most regions.

3.1 Effectiveness of Wildlife Damage Control Measures

Respondents were asked to rate the effectiveness of control measures they had implemented in their nursery operations. As Table 24 indicates, although exclusion fencing was rated as 78% effective on average, the measure is reported to be significantly less effective in controlling rabbits and elk.

Scare devices and repellents are rated from about 3% to 40% effective in controlling damage, respectively. Options resulting in the death or removal of problem wildlife are rated between 36% and 61%, relatively less effective since damage often occurs before the remedy is applied.

Patrolling and the use of guard animals are considered to be slightly less than 50% effective, on average, as measures for controlling wildlife damage to nursery operations.

The most effective wildlife damage control measures undertaken by nursery growers are perimeter fencing and poisoning.

3.2 Cost of Wildlife Damage Control Measures

Expenditure data was generated in the survey from respondents who are currently experiencing damage to their nursery operations. Information on capital expenditures by operators who are no longer realizing damage from wildlife was also collected on a follow-up basis.

The most expensive capital improvement undertaken by nursery operators to control wildlife damage is perimeter fencing. An average fencing cost of \$650/acre is indicated in the survey. In 2001, surveyed growers indicated that up to 904 acres were fenced at an estimated cost of \$588,000. The cost of perimeter fencing per acre is higher for smaller fenced parcels than larger parcels.

The average cost per acre of constructing perimeter fencing to control wildlife is indicated to be \$650. Surveyed nursery growers also report average capital expenditures of \$200 per acre on wildlife damage control measures other than fencing.

The capital expenditure made by growers on damage control measures other than fencing is estimated at about \$295,000. This represents an average investment of \$200 per acre.

The total annual expenditure reported by surveyed nursery growers to maintain improvements and operate wildlife damage control measures is reported at \$43,600 in 2001. Costs related to the maintenance of some improvements that resulted in elimination of wildlife damage have not been reported.

4.0 REGULATIONS AFFECTING THE ABILITY TO CONTROL WILDLIFE

Nursery growers were asked whether their properties are subject to bylaws which limit hunting, bow hunting and trapping on their property. As Table 25 shows, roughly 55% and 33% of nursery operators know they are subject to bylaws governing firearm use and trapping/bow hunting on their properties, respectively. A significant number also responded "Don't Know".

A small number of operators indicated that they did not control wildlife on their property. One of the main reasons given is that they are willing to tolerate wildlife and the damage associated with their presence.

While a relatively high proportion is unaware of the applicable bylaws in their area, almost 90% of nursery growers indicated that they attempt to control wildlife damage on their farms.

5.0 LAND USE IN PROXIMITY TO NURSERY OPERATIONS

Table 26 shows the land uses reported adjacent to nursery operations in the FVRD, GVRD and the Okanagan. In all three regions, nursery operations tend to be simultaneously proximal to land uses that include public or private natural areas, suburban/urban residential and commercial/industrial.

With the possible exception of public conservation areas, none of the land use designations adjacent to nursery operations currently has plans for managing wildlife population densities.

6.0 GROWER OPINIONS ABOUT WILDLIFE DAMAGE COMPENSATION

Table 27 summarizes responses by those growers experiencing wildlife damage to the question "...do you feel government should compensate nursery growers for losses due wildlife?" Out of 42 responses, 38% answered "Yes" and the remaining 62% answered "No".

Among those who favour compensation, the main reasons for wanting compensation are related to inability to control wildlife individually and the apparent societal desire to maintain populations that some perceive to be beyond habitat carrying capacity.

38% of survey respondents favour compensation to growers for wildlife damage. These growers consider it not possible to control wildlife populations individually but perceive a societal desire to maintain wildlife on their property

Those nursery operators who do not favour wildlife damage compensation options consider it more desirable to allow operators to be allowed to control wildlife on their own properties, either by tolerating them or through management. A number of responses also indicate a reluctance to introduce programs or government expenditures in this area.

62% of survey respondents do not favour compensation to growers for wildlife damage. These growers consider it more desirable to allow operators to deal with wildlife on their own property.

7.0 GROWER OPINIONS ABOUT FINANCIAL ASSISTANCE

Table 28 summarizes responses by those growers experiencing wildlife damage to the question "...do you feel that nursery growers should be financially assisted to prevent or reduce damages due to wildlife?" Out of 42 responses, 62% answered "Yes" and the remaining 38% answered "No".

Among those who favour financial assistance, the main reasons are related to inability to control wildlife individually and the perceived unfairness of having farmers bear what should be a societal expense of maintaining public property (i.e., wildlife). Other reasons include the need for proactive research and training to assist growers in developing management systems that minimize exposure to wildlife damage.

62% of survey respondents favour assistance to growers to prevent or reduce damages due to wildlife damage. These growers consider it more equitable for society to pay some of the cost of maintaining public wildlife property.

In general, those nursery operators who do not favour financial assistance insist that wildlife can be managed by growers or that the damage be tolerated. Nevertheless, there is a perceived need for education, training and advice related to wildlife issues.

38% of survey respondents do not favour financial assistance to growers to prevent or reduce damages due to wildlife damage. These growers consider that wildlife can be managed or the damage should be tolerated.

Regardless of perspective on financial assistance, growers indicate a need for education, research and training to improve wildlife management systems and skills on farms.

8.0 ISSUES ARISING AND RECOMMENDATIONS

Issue Arising	Recommendation
1. Wildlife damage is costing BC nursery operators about \$750,000 annually	Initiatives to reduce nursery exposure to wildlife have the potential for significant payoffs in reduced wildlife damage costs
2. Different species are causing damage in different regions	Any wildlife damage control strategy needs to be regional oriented and sensitive to regional wildlife control problems
3. Rodents are responsible for about 60% of the damage caused to nursery operations by wildlife	Extermination is currently the most practised method of rodent control. Growers need other and more effective methods and management skills to deal with this wildlife damage issue. Information and research on more benevolent wildlife management practices is urgently required.
4. Support for compensation mechanisms among growers is relatively low	Compensation does not address the reason for the damage or provide incentives to reduce exposure. Compensation options should not be pursued except where there is intent by government to maintain or introduce species at unsustainable levels and damage control measures are not feasible
5. Support for financial assistance mechanisms among growers is relatively high	Effective measures to control damage would be expected to reduce future exposure to wildlife damage. Government should consider financial assistance where its wildlife management objectives are contributing to the damage and where the remedies required are prohibitive to individual growers
6. Nursery operators indicate a need for information about wildlife management	Research, education and training initiatives dealing with wildlife damage control issues should be pursued
7. Although the vast majority of nursery operators undertake measures to control wildlife damage on their farms, a significant proportion are not aware of bylaws pertaining to wildlife	Materials should be developed to increase the awareness of nursery growers about the applicable bylaws and regulations pertaining to wildlife in their area

Table 1
Grower Representation and Land Tenure of the 2001 BCLNA Wildlife Damage Survey

Region	# of Operations	Acres Owned	Acres Rented	Total Acres	Average Size (acres)	Percent of Sample
FVRD	22	862.25	470	1332.25	61	29.3%
GVRD	26	599.33	844	1443.33	56	31.8%
Kootenay	3	681	22	703	234	15.5%
North Coast	1	5	0	5	5	0.1%
North Interior	1	8	0	8	8	0.2%
N. Vancouver Island	6	73.1	3	76.1	13	1.7%
Okanagan	14	828.53	43	871.53	62	19.2%
S. Vancouver Island	5	16	8	24	5	0.5%
Sunshine Coast	1	42	0	42	42	0.9%
Thompson	2	35	0	35	18	0.8%
Total	81	3150.2	1390	4540.21	56	100.0%

Table 2

Incidence of Wildlife Damage to Nursery Operations in BC

Region	# Reporting Damage	# Reporting No Damage and Not Requiring Damage Control Measures	# Reporting No Damage and Having Damage Control Measures in Place	# Reporting No Significant Damage and Exclusion Control Measures in Place	Acres Reporting Damage	Damaged Acres as Percent of Total Acres in Region (see Table 1)	Damaged as Percent of Total Acres Subject to Damage
FVRD	12	8	2	1	156.3	11.7%	8.9%
GVRD	15	6	5	3	637.8	44.2%	36.5%
Kootenay	1	0	2	2	276	39.3%	15.8%
North Coast	1	0	0	0	5	100.0%	0.3%
North Interior	1	0	0	0	2.5	31.3%	0.1%
North Island	2	0	4	3	41	53.9%	2.3%
Okanagan	7	1	6	3	591	67.8%	33.8%
South Island	3	2	0	0	10	41.7%	0.6%
Sunshine	1	0	0	0	30	71.4%	1.7%
Thompson	0	2	0	0	0	0.0%	0.0%
Total	43	19	19	12	1749.6	38.5%	100.0%

Table 3
Wildlife Damage to Nursery Operations by Region

Nursery Stock Damage	FVRD	GVRD	North Coast	North Interior	North Island	Okanagan	South Island	Sunshine	Thompson	Totals
Field Trees	7	7	1	0	1	6	1	1	0	24
Container Trees	0	2	0	0	1	1	1	0	0	5
Field Shrubs	3	1	1	1	0	1	0	0	0	7
Container Shrubs	3	6	0	1	1	5	1	0	0	17
Seedling Shrubs	0	0	0	0	0	1	0	0	0	1
Buildings	0	1	0	0	1	0	0	0	0	2
Irrigation Equipment	1	0	0	0	0	0	0	0	0	1
Culvert	0	1	0	0	0	0	0	0	0	1
Ditch	0	1	0	0	0	0	0	0	0	1
Cold Frames	0	1	0	0	0	0	0	0	0	1
Grasses	0	1	0	0	0	0	0	0	0	1
Bedding Plants	0	1	0	0	0	0	0	0	0	1
Seed Trees	0	1	0	0	0	0	0	0	0	1
Container Annuals	0	1	0	0	0	0	0	0	0	1
Totals	14	24	2	2	4	14	3	1	0	64

Table 4

Breakout by Region of Wildlife Types Causing Damage to Nursery Operations

Region	Deer	Crows & Other Birds	Elk	Mice, Rats & Squirrels	Voles & Moles	Rabbit	Bear & Moose	Beaver	Coyote	Opossum	Total	Percent by Region
FVRD	3	5	0	4	0	4	0	0	3	1	20	27.0%
GVRD	4	1	0	9	3	6	1	4	1	0	29	39.2%
Kootenay	1	0	0	0	0	0	1	0	0	0	2	2.7%
North Coast	1	0	0	0	0	0	0	0	0	0	1	1.4%
North Interior	0	0	0	0	1	0	1	0	0	0	2	2.7%
North Island	1	0	0	1	0	1	0	0	0	0	3	4.1%
Okanagan	5	1	0	5	0	0	1	0	0	0	12	16.2%
South Island	2	1	0	0	0	1	0	0	0	0	4	5.4%
Sunshine Coast	0	0	1	0	0	0	0	0	0	0	1	1.4%
Thompson	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total	17	8	1	19	4	12	4	4	4	1	74	100%
Percent by Wildlife Type	23.0%	10.8%	1.4%	25.7%	5.4%	16.2%	5.4%	5.4%	5.4%	1.4%	100%	

Table 5
Percent of Plants Affected by Animal Type

Percent of Plants Affected	Deer	Crows & Other Birds	Elk	Mice, Rabbits, Voles & Squirrels	Bears & Moose	Beaver	Coyote	Totals	Percent of Total Incidents
<1.1%	9	2	0	7	4	2	1	25	45.5%
>1.1%	8	3	1	17	0	1	0	30	54.5%
>5.0%	3	3	1	7	0	0	0	14	25.5%
>10.0%	1	2	1	5	0	0	0	9	16.4%
>20.0%	1	2	1	5	0	0	0	9	16.4%
>40.0%	0	1	1	4	0	0	0	6	10.9%
>80.0%	0	1	0	2	0	0	0	3	5.5%
Totals	17	5	1	24	4	3	1	55	100.0%

Table 6
Average Percentage of Plants Affected by Wildlife Type and Region

Region	Deer	Crows & Other Birds	Elk	Mice, Rabbits & Squirrels	Bear & Moose	Beaver	Coyote
FVRD	2.5%	5.5%		11.1%			0.5%
GVRD	2.3%	90.0%		19.9%	0.9%	1.5%	
Kootenay	1.0%						
North Coast	5.0%						
North Interior					1.0%		
North Island	5.0%			45.0%			
Okanagan	5.0%	1.0%		4.1%	1.0%		
South Island	7.5%	30.0%		0.9%			
Sunshine			75.0%				
Thompson							

Notes: * = No damage incidents were reported in the empty cells in this Table.

Table 7

Estimated Losses Due to Nursery Damage, by Wildlife Type and Region, 2001

Region	Deer	Crows & Other Birds	Elk	Mice, Rats & Squirrels	Voles & Moles	Rabbits	Bears & Moose	Beaver	Coyote	Opossum	Total	Percent by Region
FVRD	\$1,700	\$15,500	\$0	\$47,500	\$0	\$63,500	\$0	\$0	\$1,500	\$0	\$129,700	33.9%
GVRD	\$49,300	\$1,000	\$0	\$33,600	\$4,750	\$15,000	\$1,000	\$16,400	\$250	\$0	\$121,300	31.7%
Kootenay	N/A	\$0	\$0	N/A	\$0	\$0	N/A	\$0	\$0	\$0	N/A	N/A
North Coast	\$800	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$800	0.2%
North Interior	\$0	\$0	\$0	\$0	\$50	\$0	\$700	\$0	\$0	\$0	\$750	0.2%
North Island	\$1,500	\$0	\$0	\$1,231	\$0	\$500	\$0	\$0	\$0	\$0	\$3,231	0.8%
Okanagan	\$30,200	\$5,800	\$0	\$36,650	\$0	\$300	\$0	\$0	\$0	\$0	\$72,950	19.1%
South Island	\$4,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000	1.0%
Sunshine	\$0	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$50,000	13.1%
Thompson	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.0%
Total	\$87,500	\$22,300	\$50,000	\$118,981	\$4,800	\$79,300	\$1,700	\$16,400	\$1,750	\$0	\$382,731	100.0%
Percent by Wildlife Type	22.9%	5.8%	13.1%	31.1%	1.3%	20.7%	0.4%	4.3%	0.5%	0.0%	100.0%	

Table 8

Estimated Cost of Wildlife Damage to Nursery Operations, 1996 to 2001

Region	1996	1997	1998	1999	2000	2001
	Dollars					
FVRD	\$35,050	\$21,050	\$21,050	\$18,750	\$41,950	\$129,700
GVRD	\$202,100	\$202,900	\$214,500	\$90,700	\$95,700	\$121,300
Kootenay	N/A	N/A	N/A	N/A	N/A	N/A
North Coast	\$0	\$200	\$300	\$200	\$500	\$800
North Interior	\$0	\$0	\$0	\$0	\$0	\$750
North Island	\$499	\$499	\$499	\$499	\$499	\$3,231
Okanagan	\$15,500	\$15,500	\$16,200	\$16,000	\$16,000	\$72,950
South Island	\$750	\$500	\$500	\$500	\$3,750	\$4,000
Sunshine	\$0	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Thompson	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$253,899	\$290,649	\$303,049	\$176,649	\$208,399	\$382,731

Table 9

Wildlife Damage Trend, 1996 to 2001

Damage Trend (1)	Number of Responses
Rapidly increasing	1
Steadily Increasing	12
Static	11
Steadily Decreasing	4
Rapidly Decreasing	0
Cyclic	4
Total	32

Note: (1) Trend was constructed from damage estimates as follows: Static = Less than + or - 5% change annually; Steadily = 5-10% change annually; Rapidly = Greater than 10% change annually

Table 10
Wildlife Damage Trends and Perceived Reasons

Perceived Reason for Damage Trend	FVRD	GVRD	North Coast	North Interior	North Island	Okanagan	South Island	Sunshine	Thompson	Totals
Changing wildlife populations	2	1	0	0	0	0	1	0	0	4
Weather related	3	0	0	0	0	0	0	0	0	3
Self-financed damage control measures	0	1	0	1	1	0	0	0	0	3
Wildlife-sensitive nursery management	2	0	0	1	0	0	0	0	0	3
Appearance of non-native species	0	1	0	0	0	0	0	0	0	1
Introduced species	0	0	0	0	0	0	0	1	0	1
Neighbours clearing land and ditches	0	1	0	0	0	0	0	0	0	1
Increasing nursery acreage	0	1	0	0	0	0	0	0	0	1
Reduction in habitat	0	0	0	0	0	1	0	0	0	1
Wildlife becoming accustomed to people, dogs and noises	0	0	1	0	0	0	0	0	0	1
Totals	7	5	1	2	1	1	1	1	0	19

Table 11
Wildlife Types Responsible for Nursery Damage, BC, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	2	2	4	8
Elk	1	1	1	1	1	1	6
Rabbit	9	10	10	11	13	12	65
Deer	11	11	12	11	14	17	76
Beaver	3	3	3	3	3	4	19
Gopher, Mole, Vole	2	1	1	2	3	4	13
Mouse, Rat & Squirrel	13	14	15	18	15	19	94
Crow, Sapsucker, Woodpecker	2	3	3	4	6	8	26
Coyote	1	1	1	1	2	4	10
Opossum	0	0	0	0	0	1	1
Totals	42	44	46	53	59	74	318

Table 12
Wildlife Types Causing Damage to Nursery Operations, FVRD, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	0	0	0	0	0	0	0
Rabbit	2	3	3	3	4	4	19
Squirrel	0	0	0	0	0	0	0
Deer	0	0	0	0	2	3	5
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	5	6	5	6	5	4	31
Crow, Raven	1	1	1	2	3	4	12
Coyote	1	1	1	1	2	3	9
Opossum	0	0	0	0	0	1	1
Sapsucker, Woodpecker	0	0	0	0	1	1	2
Totals	9	11	10	12	17	20	79

Table 13
Wildlife Types Causing Damage to Nursery Operations, GVRD, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	1	1
Elk	0	0	0	0	0	0	0
Rabbit	4	5	5	5	6	6	31
Squirrel	0	0	1	1	1	1	4
Deer	4	3	3	4	4	4	22
Beaver	3	3	3	3	3	4	19
Gopher, Mole, Vole	2	1	1	1	2	3	10
Mouse, Rat	4	4	5	6	5	8	32
Crow, Raven	0	1	1	1	1	1	5
Coyote	0	0	0	0	0	1	1
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	17	17	19	21	22	29	125

Table 14
Wildlife Types Causing Damage to Nursery Operations, Kootenay, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	1	1	0	1	3
Elk	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	0
Squirrel	0	0	0	0	0	0	0
Deer	1	1	1	1	1	1	6
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	1	1	1	1	1	1	6
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	2	2	3	3	2	3	15

Table 15
Wildlife Types Causing Damage to Nursery Operations, North Coast, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	0
Squirrel	0	0	0	0	0	0	0
Deer	0	1	1	1	1	1	5
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	0	0	0	0	0	0	0
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	0	1	1	1	1	1	5

Table 16
Wildlife Types Causing Damage to Nursery Operations, North Interior, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	1	1	1	3
Elk	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	0
Squirrel	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	1	1	1	3
Mouse, Rat	0	0	0	0	0	0	0
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	0	0	0	2	2	2	6

Table 17
Wildlife Types Causing Damage to Nursery Operations, North Island, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	0	0	0	0	0	0	0
Rabbit	1	1	1	1	1	1	6
Squirrel	0	0	0	0	0	0	0
Deer	2	1	1	1	1	1	7
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	0	0	0	0	0	1	1
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	3	2	2	2	2	3	14

Table 18
Wildlife Types Causing Damage to Nursery Operations, Okanagan, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	1	1	2	4
Elk	0	0	0	0	0	0	0
Rabbit	1	1	1	1	1	1	6
Squirrel	0	0	0	0	0	0	0
Deer	5	5	6	5	5	6	32
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	4	4	4	4	3	5	24
Crow, Raven	0	0	0	0	0	2	2
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	1	1	1	1	1	0	5
Totals	11	11	12	12	11	16	73

Table 19
Wildlife Types Causing Damage to Nursery Operations, South Island, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	0	0	0	0	0	0	0
Rabbit	1	0	0	1	1	0	3
Squirrel	0	0	0	0	0	0	0
Deer	0	1	1	0	1	2	5
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	0	0	0	1	1	0	2
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	1	1	1	2	3	2	10

Table 20
Wildlife Types Causing Damage to Nursery Operations, Sunshine, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	1	1	1	1	1	1	6
Rabbit	0	0	0	0	0	0	0
Squirrel	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	0	0	0	0	0	0	0
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	1	1	1	1	1	1	6

Table 21
Wildlife Types Causing Damage to Nursery Operations, Thompson, 1996 to 2001

Wildlife Type Responsible	1996	1997	1998	1999	2000	2001	Totals (1996- 2001)
	Number of Incidents						
Bear, Moose	0	0	0	0	0	0	0
Elk	0	0	0	0	0	0	0
Rabbit	0	0	0	0	0	0	0
Squirrel	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0
Beaver	0	0	0	0	0	0	0
Gopher, Mole, Vole	0	0	0	0	0	0	0
Mouse, Rat	0	0	0	0	0	0	0
Crow, Raven	0	0	0	0	0	0	0
Coyote	0	0	0	0	0	0	0
Sapsucker, Woodpecker	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0

Table 22
Type of Damage Associated with Wildlife Depredation

Type of Damage	Number of Responses	Percent of Responses
Crop damaged	29	59.2%
Crop destroyed	12	24.5%
Equipment damaged	4	8.2%
Building damage	1	2.0%
Extra staffing cost	1	2.0%
Fertilizer contamination	1	2.0%
Plugged drainage	1	2.0%
Total	49	100.0%

Table 23

Control Measures Undertaken by Nursery Growers to Reduce Wildlife Damage, By Region, 2001

Wildlife Damage Control Measure	FVRD	GVRD	Kootenay	North Coast	North Interior	North Island	Okanagan	South Island	Sunshine	Thompson	Totals
Poisoning	5	5	0	0	0	1	3	1	0	0	15
Fencing	2	8	3	0	1	5	6	3	1	1	30
Guard animals	3	4	0	0	1	3	5	0	0	1	17
Waste/weed management	2	0	0	0	1	0	1	0	0	0	4
Select plants/varieties not susceptible to wildlife	1	0	0	0	1	0	0	0	0	0	2
Use of repellents	4	2	0	1	1	0	4	0	0	0	12
Hunting	1	3	0	0	0	0	0	0	0	0	4
Trapping	1	4	0	0	0	1	1	0	0	0	7
Remove equipment from field	1	0	0	0	0	0	0	0	0	0	1
Patrolling	1	1	0	1	0	1	0	0	0	0	4
Scare devices	1	1	0	0	0	0	2	0	0	0	4
Invisible fence	0	1	0	0	0	0	0	0	0	0	1
None required	11	9	0	0	0	0	1	2	0	2	25
Control not possible	0	1	0	0	0	0	0	0	0	0	1
Total Measures*	33	39	3	2	5	11	23	6	1	4	127
Total Respondents	22	26	3	1	1	6	14	5	1	2	81

Note: * = Some survey respondents indicated more than one control measure.

Table 24

Effectiveness of Measures Taken by Nursery Growers to Control Wildlife Damage

Wildlife damage control measure	Number of Respondents Indicating Effectiveness of:										Average Effectiveness	
	Less than 5%	Greater than 5%	Greater than 10%	Greater than 25%	Greater than 50%	Greater than 75%	Greater than 95%					
Fencing	1	20	18	18	17	15	12					78%
Repellent	1	6	6	6	3	3	1					40%
Poisoning	0	9	8	8	6	5	2					61%
Guard animals	0	5	5	4	2	1	1					46%
Hunting	1	4	3	2	1	1	1					36%
Trapping	1	4	4	3	2	2	1					39%
Removing equipment	0	1	1	1	1	1	1					100%
Scare devices	2	1	0	0	0	0	0					3%
Patrolling	1	2	2	2	1	1	0					47%
Percent of Total Responses	11.9%	88.1%	79.7%	74.6%	55.9%	49.2%	32.2%					

Table 25

Regulations Affecting Wildlife Population Control by Nursery Operators

Questions relating to Wildlife Management on Nursery Properties	Yes	No	Don't Know
	Number of Responses		
Is your property affected by a municipal firearm discharge bylaw, which would limit hunting on your property?	23	6	13
Is your property affected by a municipal bylaw, which would restrict trapping or bow hunting on your property?	14	9	19
Do you attempt to control wildlife damage on your farm?	38	5	N/A
Reasons given for not controlling wildlife damage			Number of Responses
1. Wildlife damage must be tolerated if wildlife is to co-exist			3
2. Hunting and firearm use not allowed			2
3. Not enough damage			2
4. Wildlife is too difficult to control			1

Table 26
Location of Nursery Operations Experiencing Wildlife Damage Relative to Adjacent Land Uses
(within 2 Kilometres)

Adjacent Land Use	FVRD	GVRD	Okanagan
Suburban or urban residential	7	14	7
Commercial or industrial	5	10	5
Public parks (municipal, provincial, conservation area)	4	10	6
Private natural areas (where no hunting is permitted)	7	10	7
Golf course	0	1	0
Wilderness	0	0	0
Undeveloped partially forested property	1	1	0
Ravine/river	1	1	0
Crown forest land	1	0	0
Indian reserve	1	0	0
Highway	0	0	0
Total Respondents	10	16	8

Table 27
Grower Opinion about Government Compensation for Wildlife Losses

Opinion	Comment	# of Responses
38% say government should compensate growers	1. Farmers are not allowed to control wildlife	2
	2. Wildlife populations are beyond habitat carrying capacity	2
	3. Bylaws do not allow farmers to control wildlife	1
	4. Individuals cannot control the problem	1
	5. Not responsible to the environment or neighbours to use poisons to control wildlife populations	1
	6. Not necessarily financially	1
	7. Can see need under some circumstances	1
	8. Need to even the playing field	1
	9. Wildlife are public property	1
Opinion	Comment	# of Responses
62% say government should not compensate growers	1. Wildlife damage should be regarded as a legitimate cost of doing business	3
	2. Don't need more government expenditure	3
	3. Provided that farmers are allowed to address the problem	3
	4. Government subsidies lead to dependency	3
	5. Wildlife are natural and desirable	2
	6. Would like permission to hunt	1
	7. Programs are open to abuse	1
	8. Government should spend in other areas of higher priority	1
	9. Losses are already compensated for in inventory adjustments	1
	10. But can see the need in some circumstances	1

Table 28

Grower Opinion about Government Financial Assistance to Prevent or Reduce Damages Due to Wildlife

Opinion	Comment	# of Responses
62% say government should financially assist growers	1. Wildlife populations are beyond habitat carrying capacity	2
	2. Only for fencing out large ungulates	2
	3. Where hunting and trapping are not allowed and costs to prevent or reduce damages are extreme	2
	4. Need to encourage farmers to address damage in a responsible way	1
	5. Farmers should not be expected to bear the expense of wildlife preservation	1
	6. More effective to use professionals to manage damage issues	1
	7. Farmers should be encouraged to use pro-active solutions	1
	8. Could use guidelines on how to manage damage prevention	1
	9. If damage control is not initiated, level of damage will increase	1
	10. There is a need for research on methods of damage prevention	1
	11. Society currently uses farms as green space at zero cost	1
	12. Public expenditure is the only solution in some areas	1
Opinion	Comment	# of Responses
38% say government should not financially assist growers	1. Wildlife damage can be managed	2
	2. Losses due to wildlife are a cost of doing business and an incentive to reduce it	2
	3. Provided farmers can address the problem	1
	4. Wildlife should be assisted and damage tolerated	1
	5. Compensation is legitimate for introduced species	1
	6. Not convinced that damage is widespread or serious	1
	7. Government has other things to do of higher priority	1
	8. There is a need for education, training and advice	1
	9. Very concerned about the extirpation of wildlife	1