

# **THE USE OF AUDIBLE BIRD SCARE DEVICES IN BRITISH COLUMBIA IN 2001**

Report to the Minister of Agriculture, Food and Fisheries.

British Columbia Ministry of Agriculture, Food and Fisheries

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# Table of Contents

	Page
Executive Summary .....	4
1 Introduction .....	10
2 Background .....	11
2.1 Birds.....	11
2.1.1 European Starling.....	11
2.1.2 American Robin .....	12
2.1.3 American and Northwestern Crow .....	13
2.2 Crops .....	14
2.3 Bird Control Methods .....	15
2.3.1 Scarers .....	15
2.3.2 Exclusion.....	17
2.3.3 Bird Population Reduction .....	17
2.3.4 Chemical repellants .....	18
2.3.5 Methods used in BC.....	18
2.4 Neighbouring residents .....	19
2.5 Summary .....	21
3 Regulations affecting farm land use and farm practices .....	24
3.1 British Columbia.....	24
3.2 Ontario .....	27
3.3 United States .....	28
3.4 Europe.....	29
3.5 New Zealand .....	29
3.6 Australia .....	31
4 Complaints.....	34
4.1 Commodity.....	35
4.2 Type of Device .....	36
4.3 Nature of complaint.....	37
4.4 Average separation distance .....	39
5 Discussion .....	41
5.1 The rules for audible bird scare devices. ....	41
5.2 Are the current Wildlife Damage Control Guidelines followed? ....	42
5.2.1 Hours of operation .....	42
5.2.2 Density of propane cannons.....	42
5.2.3 Relocation of propane cannons.....	43
5.2.4 Firing direction of propane cannons .....	43
5.2.5 Maintenance of cannon timers .....	44
5.2.6 Wildlife Predation Management Plan .....	44
5.2.7 Other propane cannon issues.....	44
5.2.8 Other audible bird scare devices .....	45
5.3 Starling population and control.....	45
5.4 Effectiveness of bird-scaring tactics.....	46
5.5 Noise perception is dependent on attitude .....	47

5.6	Sound level measurement .....	49
5.7	Netting.....	51
5.8	Other issues.....	52
6	Recommendations .....	54
6.1	Endorse and Add to Current Guidelines .....	54
6.1.1	Propane Cannons (Category 'A').....	54
6.1.2	Category 'B' bird scare devices .....	56
6.1.3	Both Category A & B Scare Devices .....	56
6.2	Develop Provincial Standards for Farm Bylaws .....	58
6.3	Local government land use planning .....	58
6.4	Local government audible bird scare device committees.....	59
6.5	Netting fund.....	60
7	Concluding Remarks .....	61
8	Bibliography.....	62

## **EXECUTIVE SUMMARY**

This report has been prepared at the request of the Minister of Agriculture, Food and Fisheries to address complaints regarding the use of audible bird scare devices to protect agricultural crops from damage by birds. All noise complaints in 2001 were directed to one ministry staff member for documentation and investigation. The Farm Practices Board continued to address “formal” complaints during this period.

### **Background**

Crop destruction by birds is a worldwide agricultural concern. Birds can eat the product or damage it by pecking or knocking it to the ground. In BC, the European starling causes the most crop damage followed by robins, crows and various songbirds.

In an attempt to minimize crop losses, a variety of different protection methods are used. Audible bird scarers are the most commonly used followed by bird netting and visual bird scarers. Blueberries, sweet cherries and grapes are the main crops being protected by farmers. Blueberries are concentrated in South Coastal BC and cherries and grapes are mainly grown in the Okanagan Valley. The area planted to blueberries and grapes has expanded from about 2400 to about 5900 hectares over the last 10 years. Propane-fueled exploders, also known as propane cannons, are used on about half of the farms producing these crops.

The production of these crops occurs in the most densely populated areas of the province. In fact, over 15% of BC’s farm population live in areas defined as urban by Census Canada. In addition about three-quarters of the people living in farming areas are non-farmers. Population growth rates in these areas have been among the most rapid in Canada.

### **Regulations**

British Columbia has taken steps to preserve its farmland. In the early 1970’s an Agricultural Land Reserve (ALR) was established based on the capability and suitability of the land, present use and local zoning. The Reserve comprises about 5% of BC’s land base.

In 1996 a number of legislative changes were made in order to ensure that land within the reserve can be effectively farmed. Amendments were made to the *Local Government Act* and *Land Title Act* to give local governments greater planning opportunities for agriculture. Under the

*Local Government Act* local governments can now create farm bylaws to regulate farm practices subject to the minister's approval.

The enactment of the *Farm Practices Protection (Right to Farm) Act* (FPPA) in 1996 protects farmers from injunctions or liability in nuisance for their farm operations provided they follow normal farm practices on land within the ALR or on land zoned for agriculture. The FPPA enabled the creation of a Farm Practices Board, which formally hears complaints and determines what is 'normal farm practice'.

To assist in resolving conflicts between farmers and their neighbours, the Ministry of Agriculture, Fisheries and Food (Ministry) publishes guidelines for generally accepted farm practices. Due to the number of complaints regarding the use of propane cannons, the Board carried out a public review of the Ministry's Wildlife Damage Control Guidelines as they apply to the operation of propane cannons in 1999.

Under the FPPA, the provincial government may make regulations for defining 'normal farm practice' as well. Currently there are no farm bylaws or provincial regulations passed regarding the use of audible bird scare devices.

## **Complaints**

In an attempt to address peoples' concerns or complaints regarding the use of audible bird scare devices the Ministry of Agriculture, Food and Fisheries designated one staff person for the 2001 crop season to record and address complaints. Where the farm could be identified from the complainants' information, there was follow-up with the farmer. Where complaints were concentrated in an area, a survey was carried out to identify farms growing crops which may use bird scare devices.

A total of 76 complainants were recorded for 2001. Most of the complainants lived in Abbotsford, Surrey or Delta. This area grows a large portion of the blueberries, which is the commodity that received most of the recorded complaints. The centralized ministry office for receiving complaints began July 6 after the cherry season was well underway. Four complainants were recorded for cherries, 68 for blueberries and 5 for grapes. One complainant complained regarding both cherries and blueberries in the Okanagan.

Propane cannons received far more complaints than other devices with 72 complainants whereas birdcall devices, electronic noisemakers and orchard pistols received 1, 1, and 3 complainants respectively. One caller complained against the use of both a propane cannon and orchard pistol.

Most complainants indicated that the use of propane cannons interrupted their sleep due to all-night use or cannons starting early in the morning. About one-third of the complainants mentioned that they felt 6am was too early for cannons to start. Others argued that they should be able to sleep in (without scare devices being used) on Sundays and holidays. The frequency of firing of propane cannons was another issue commonly raised.

## **Discussion**

Ministry staff used the Wildlife Damage Control guidelines proposed by the Farm Practices Board in their 1999 report to evaluate the farm practices of the farms that received complaints. The most common failure to follow the guidelines involved not following the permitted hours of operation. All-night firing of propane cannons was the largest issue followed closely by cannons, which started too early and/or stopped too late in the day. Maintenance of cannon timers may have been part of the issue for cannons firing outside of permitted hours, however, the use of light sensors to switch cannons on and off was likely the major issue. Light sensors are not reliable switches for the 6am to 8pm permitted hours of operation. Clock timers are now available for cannons used in BC.

Farmers generally followed the cannon density and direction of firing guidelines. Frequency of cannon firing and separation distance between cannons and neighbouring residences are not specifically mentioned in the guidelines. However, ministry staff informed farmers that cannons should not fire more frequently than once every 3 minutes and a separation distance of at least 100 m should be maintained between cannons and neighbouring residences. Cannon separation distance was less than 100 m in about 5 cases, however, the farmers relocated the cannons to meet the criteria in all cases. Firing frequency was often a source of complaint and many farmers were reluctant to change the frequency. Some farmers who reduced the frequency at ministry staff request then switched back to the higher frequency in a matter of days.

Many complainants questioned the effectiveness of audible bird scare tactics. However, farmers using the devices found them to be an important tool in the protection of their crops. The literature reports that when various scare tactics are used in an integrated planned manner, they are effective in reducing crop loss and damage due to birds.

The perception of sounds as noise and a nuisance is dependent on the listeners' attitude. Level of annoyance varies depending on the individual.

People's contrasting perspectives on the function of rural areas has a significant effect on perception of a nuisance. While most farmers consider the rural area to be a 'place of business', many non-farm residents believe the rural area is a place that offers a lifestyle of open space, peace and quiet. In some cases, communicating the reasons behind the farm practices and/or perceptions helped to increase understanding of a situation and may have reduced the level of annoyance.

Sound level measurement is a complex operation that requires specialized training. Increasing separation distance from an audible bird scarer generally reduces the sound level. Using separation distance between a neighbouring resident and an audible bird scare device, as an approximation to sound levels, is easier to measure.

Covering crops with bird netting is often suggested as an alternative to using audible bird scare tactics to protect crops. However, this protection comes at a higher cost and requires more labour to erect and take down each season. Increased costs of production cannot be directly passed along to consumers in the global agricultural marketplace. Blueberries, cherries and grapes are all perennial crops that take a long time to mature while each have high establishment costs. The cost of bird netting exacerbates this issue.

Starling population control is often suggested as the key to the problem. Starling populations are stable or in decline and a search of the literature suggests that population control is not a practical solution for protecting crops from bird damage.

## **Recommendations**

### 1. Endorse and Add to Current Guidelines

There are three areas where the current guidelines do not provide specific guidance for operating propane cannons which are important in reducing the amount of noise neighbouring residents are exposed to. These areas are cannon firing frequency, separation distance and owner contact information. Separation distance provisions are also required for other fixed audible bird scare devices such as birdcall devices and electronic noisemakers. Propane cannons are described as Category 'A' devices. Fixed bird scaring devices that do not create impulse sounds are classified as Category 'B' devices (eg. birdcall and electronic noise devices).

#### Category 'A' devices

- **It is recommended that a firing frequency of no more than one firing per 5 minutes for single shot cannons and no more than 11 activations or 33 shots in any hour for a multiple shot cannon be included in the Guidelines. Multiple shots from a cannon are regarded as one activation if they occur in less than a 30 second period.**
- **It is recommended that a 150 m separation distance between a propane cannon and neighbouring residences be included in the Guidelines.**
- **It is recommended that a 300 m separation distance between propane cannon use and an urban-residential/ALR edge be included in the Guidelines.**

#### Category 'B' devices

- **It is recommended that a 100 m separation distance between a Category B device and neighbouring residences and a 200 m separation distance between a Category B device and an urban-residential/ALR edge be included in the Guidelines.**

#### Category 'A' and 'B' devices

- **It is recommended that devices operate only between 6:00 a.m. (6:30 a.m. for South Coastal region) and 8:00 p.m. local time or dawn to dusk, whichever is of lesser duration.**
- **It is recommended that a requirement for all fixed audible bird scare devices must be legibly marked with the operator's name and 24-hour phone number be included in the Guidelines.**
- **It is recommended that a local contact person be established for each farm where the owner/operator does not live within a reasonable distance of their farm(s) where audible bird scare devices are used.**
- **It is recommended that industry and/or local governments create a registry of stationary audible bird scare devices annually to be made available to enforcement agencies.**

#### 2. Develop Provincial Standards for Farm Bylaws

- **It is recommended that the new Guidelines (Wildlife Damage Control) be adopted as standards for farm bylaws.**



- **It is recommended that separation distances be used to regulate noise from audible bird scare devices rather than sound level limits.**

### 3. Local government land use planning

- **It is recommended that the ministry encourage local governments to use development permit areas and other means to establish buffers on the urban side of the ALR edge. Guidelines for landscaped and siting buffers should be developed by the ministry to aid local governments in implementing these buffers.**

### 4. Local government audible bird scare device committees

- **It is recommended that the ministry, local governments and industry form committees for the purpose of improving communication and the farmers' compliance with the Wildlife Damage Control Guidelines.**

### 5. Netting fund

- **It is recommended that one-time funding options be available to farmers for netting cropland for protection from bird predation. Funds may be prioritized to go to existing farms within 300 m of an urban-residential/ALR edge.**

## **Concluding Remarks**

This report recognizes the importance of crop protection from birds and supporting farming within the Agricultural Land Reserve (ALR). The report also acknowledges the impacts that scare devices have on nearby residents. Understanding and compromise is required from both the farming and non-farming communities.

Adoption of the recommendations will reduce the amount of noise the neighbours living closest to the scare devices will be exposed to. In urban areas adjacent to the ALR, residents will be exposed to reduced noise as well. Farmers will have fewer options to protect crops that are close to neighbouring residences and urban areas adjacent to the ALR. Financial assistance to farmers impacted by these changes is recommended.

## **1 Introduction**

This report has been prepared at the request of the Minister of Agriculture, Food and Fisheries to address complaints regarding the use of audible bird scare devices to protect agricultural crops from damage by birds. All noise complaints in 2001 (after July 6) regarding crop protection were directed to one ministry staff member for documentation and investigation. The Farm Practices Board continued to address “formal” complaints during this period.

The report includes background information on birds, crops, bird control methods and residents living in or near the Agricultural Land Reserve. Next regulations affecting farmland use and farm practices are described for British Columbia as well as other jurisdictions. The complaints against audible bird scare devices are then summarized and analyzed. Issues arising from the complaints are also discussed. Finally options and recommendations are presented for the Minister’s consideration.

## 2 Background

The conflict over the use of noisemakers as pest control devices in agriculture is centered on birds feeding on blueberries, cherries and grapes in neighbourhoods with relatively small lots and many residents living in or near a rural setting. Generally speaking, the acreage of these crops is increasing, as is the rural residential population. Although the provincial or regional bird population may be stable or declining, a local population could seasonally increase as the agricultural practices change to crops that provide good forage—such as berries and other fruit.

### 2.1 Birds

Crop destruction by birds is a worldwide agricultural concern. Birds can eat the entire berry or damage the fruit by pecking or knocking it to the ground. In BC, the European starling is the most destructive bird, however domestic robins, crows and various songbirds also eat the crops (Vielvoye 1978, Weber 1983, Roberts 1992).

#### 2.1.1 European Starling

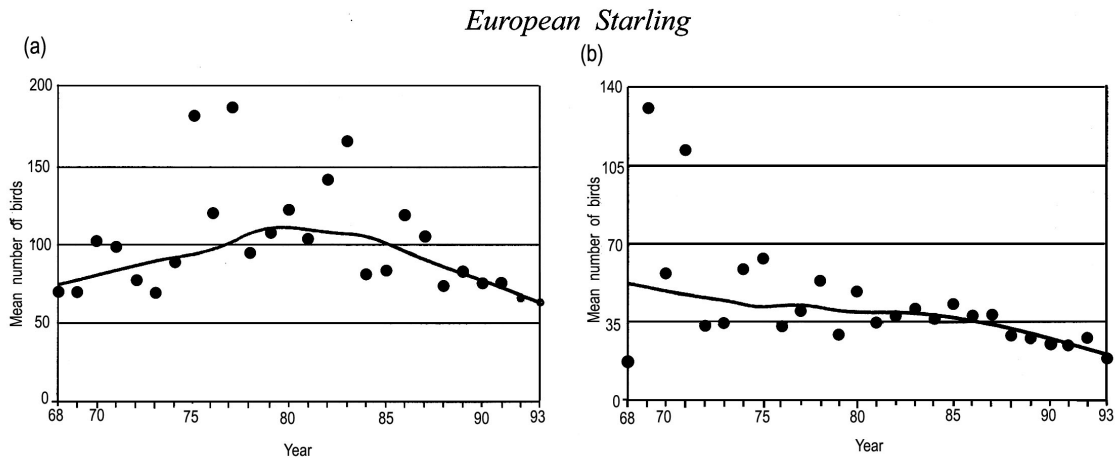
The European Starling was introduced to North America during the late 1800's in New York City. It was first reported in BC in 1945 (Campbell et al 1997). By the early 1950s, it was abundant in the Interior and southwestern BC (Vaudry 1979). Starlings are now a well-recognized problem species in rural and urban environments.

Starlings forage in large flocks on a variety of fruits and berries, as well as corn and livestock feed. These flocks are capable of destroying entire crops in a matter of days. The birds also consume insects and may have a role in controlling insect pests. Starlings may be responsible for the spread of pathogens affecting livestock and humans, especially when present in large numbers.

The Christmas Bird Counts for Vancouver and Ladner between 1957 and 1993 show that the starling population has generally declined from the 1980s to 1993. Similar declines have been observed in other west-coast areas in the United States. Breeding bird surveys (Figure 1) show that the number of starlings on coastal routes decreased 4% annually from 1968 to 1993, while on interior routes, 2% annually (Campbell et al. 1997).

European Starlings are an introduced species and as such are exempt from protection under the provincial *Wildlife Act*. They can be killed as long as the method is legally acceptable in the specific municipality.

**Figure 1.** An analysis of Breeding Bird Surveys for the European Starling shows that (a) the number of birds on coastal routes decreased at an average annual rate of 4% ( $P < 0.05$ ) over the period 1968 through 1993, and (b) the number of birds on interior routes decreased at an average annual rate of 2% ( $P < 0.001$ ) over the same period. (Reprinted from Campbell et al. 1997).



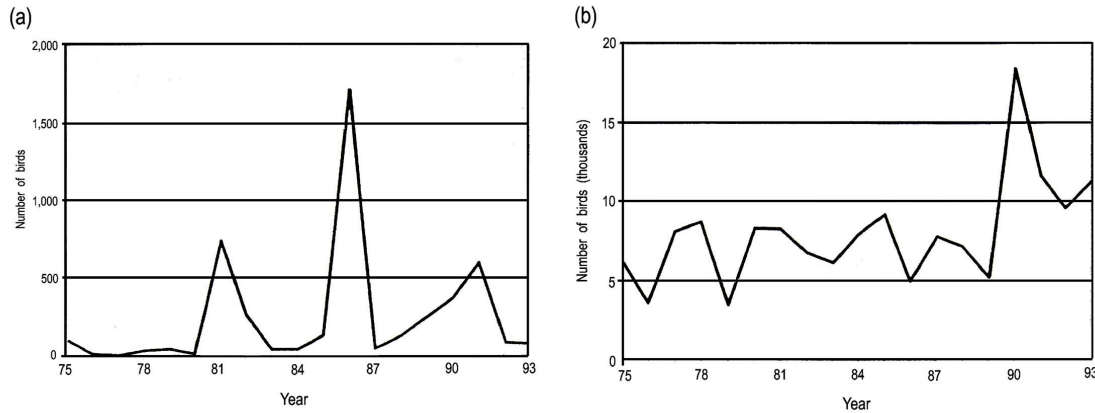
### 2.1.2 American Robin

The American Robin is widely distributed throughout the province, although it is most prevalent in the southwest area. The bird is ubiquitous and frequents fields, open woodlands, and rural and suburban habitats eating insects and berries. Agricultural areas, especially those with blueberries, vineyards and orchards, attract large numbers of summering and autumn migrant birds. Many of the migrant birds come from wintering areas in California, Oregon, and Washington. During these periods, the robin tends to flock, however, this behaviour subsides gradually in early spring as the birds become territorial (Campbell et al. 1997). The robin is typically a ground feeder and, as such, can go unnoticed in the crop.

A substantial number of robins overwinter or are resident in the southern and coastal regions of the province. The Christmas Bird Counts (Figure 2) show that the American Robin population has remained relatively low in the Southern Interior between 1975 and 1993 except for sharp population increases in 1981, 1986 and 1991. In the southwestern part of the province, the population has slowly increased in the same years with the exception of a sharp increase and subsequent decline in 1990 (Campbell et al. 1997).

Robins are protected under the *Migratory Birds Convention Act* and cannot be legally killed. Frightening them to protect a crop is permitted.

**Figure 2.** Fluctuation in winter numbers of the American Robin (1975 to 1993) in (a) the Southern Interior (Vernon, Princeton, Vaseux Lake, Oliver-Osoyoos) and (b) the Georgia Depression (Vancouver, Nanaimo, Ladner, Duncan, Victoria) ecoprovinces, based on Christmas Bird Counts. (Reprinted from Campbell et al. 1997).



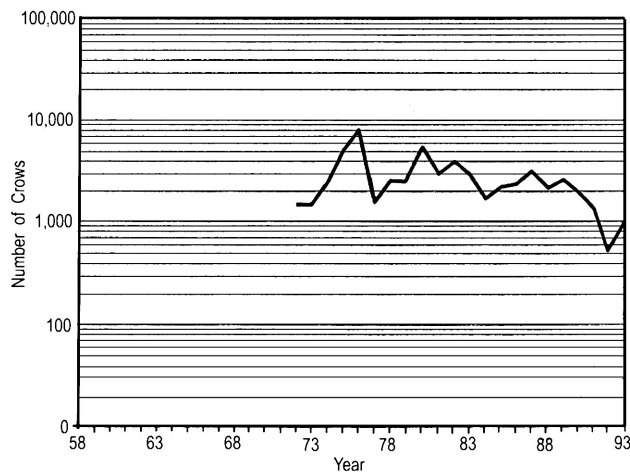
### 2.1.3 American and Northwestern Crow

The Northwestern Crow occurs in southwestern British Columbia while the American Crow is found east of the coastal mountains. Crows are omnivorous and readily adapt their diet to the available food supply. About one-third of the crow's diet consists of animal matter such as insects, reptiles, eggs and young birds, and carrion, while the remainder of the diet consists of plant matter. This is primarily corn but also includes fruit, nuts, wheat and melons (Johnson 1994). The crow tends to forage in large flocks in non-breeding seasons. It is now more abundant around urban areas than the natural environment, reflecting the bird's adaptability. Garbage landfills have been particularly important in providing a winter food source (Campbell et al. 1997). Roosting sites can pose a health hazard.

Christmas Bird Counts (Figure 3) from 1975 to 1994 in southwestern coastal British Columbia shows the crow's winter attraction to cities compared with rural areas. However, the agricultural areas remain important food sources. The number of crows in a coastal agriculture environment (Pitt Meadows) generally declined from 1971 to 1993 (Campbell et al. 1997).

Crows are not protected under the *British Columbia Wildlife Act*. They can be killed as long as the method is legally acceptable in the specific municipality.

**Figure 3.** Fluctuations in Northwestern Crow numbers in winter in an agricultural area of Pitt Meadows based on Christmas Bird Counts from 1957 to 1993. (Reprinted from Campbell et al. 1997).



## 2.2 Crops

Wildlife predation on crops and livestock feed is a problem for many BC agricultural commodities. Most of the complaints concerning the use of audible bird scare devices are associated with blueberry, cherry and grape commodities in southwestern BC and the Okanagan Valley. Although audible devices are used to protect sweet corn from damage, noise complaints have been minimal. Livestock feed on dairy, beef and mink farms is another target of birds and some of these producers have begun to use audible scare tactics. This control method is also being used to protect freshly planted crops such as corn and cranberries. Audible scare tactics have also been used to prevent migrating widgeon from feeding during the night on forage crops in the Fraser Delta.

Birds are not the only predators targeted by audible scare tactics. This method is used to keep deer out of orchards, bears away from beehives, and raccoons out of grapes. These are all examples of nighttime use against nocturnal animals. Fortunately, using audible scare tactics at night is not common practice and has not resulted in many, if any, complaints to the ministry.

This report will focus on the three crops of blueberries, cherries and grapes which suffer the greatest losses and for which audible scare tactics are commonly used. Blueberries and grapes in particular have expanded in recent years resulting in increased use of audible bird scare tactics. The data is from personal communication with the ministry staff specialists for each crop.

**Table 1. Crop area (hectares)**

<b>Crop</b>	<b>1982</b>	<b>1992</b>	<b>2000</b>	<b>2001</b>
<b>Blueberries</b>	970	1820	2430	3440*
<b>Cherries</b>	920**	810	730	810
<b>Grapes</b>	1210+	570	2020	2430

*\*In 2001 only 2430 hectares produced fruit. An additional 300 hectares will be planted in the fall of 2001 and spring of 2002.*

*\*\*Data is for the year 1981*

All three crops are important from a national perspective. BC has the only significant production of highbush blueberries in Canada, and BC and Ontario are the only two cherry and grape growing regions in Canada. The total value of the blueberry, sweet cherry and grape industries in 1999 was 33, 7 and 15 million dollars respectively.

### 2.3 Bird Control Methods

Over the years, agricultural researchers have tried to identify effective and economical ways of dealing with crop predation by birds. They can generally be classified in the following categories.

#### 2.3.1 Scarers

These devices are used to frighten the birds away. For scarers to be effective other food sources must be available. The scarcer the alternative food sources, the more difficult it is to drive birds away from the crop.

Scarers include both audible and visual deterrents or scare devices.

- a) Audible deterrents include firearms, electronic noisemakers, recorded bird distress calls and predator calls, gas-fueled exploders and even motorcycles. All these tactics are used in BC.

A shotgun to kill some birds is one of the oldest techniques, however, the shot may become embedded in fruit, making it unsaleable. Shells are available for orchard pistols and shotguns which can be launched into flocks of birds making loud 'bang' or screeching' sounds.

Gas-fueled exploders create a loud blast by igniting gas (propane) in a barrel. These devices are also known as propane cannons, propane exploders, bird-bangers or gas guns. These devices are

available in a wide range of configurations, from mechanically controlled single-shot units, to fully electronic, randomized, rotating multi-shot units.

Electronic noisemakers broadcast electronic synthetic sounds that are unsettling for birds. The AV Alarm® is a familiar trade name in the industry for this type of device.

A new generation of electronic sound devices uses digital technology to broadcast bird distress calls or predator calls selected for the birds to be scared away. The digital sound quality is much better and does not degrade like the bird calls on cassette tapes that were used in the past. Because they sound like real birds they are usually not as objectionable to neighbours (Fraser et al. 1998). Electronic sound devices (birdcall and random noise devices) are considered less irritating to neighbours than propane cannons (Fraser et al. 1998, National Farmers Union).

People walking through the crop banging sticks or metal pails or blowing horns are long standing techniques that reinforce the effect of automated noisemakers. People on motorbikes also work well to keep birds out of the fields. Orchard pistols that fire 'screecher' and 'banger' shells are often used to reinforce the effect of propane cannons. These sounds are often louder than the cannons themselves and launched into flocks of birds by the operator. The shells are more expensive than "shots" from a propane cannon and an operator is required continuously. However, shots are only fired where birds are present.

Bird scare devices must be varied and moved regularly to maintain their effectiveness over time. The integration of several different types of devices is also very important for ongoing effectiveness (Fraser et al. 1998, National Farmers Union, Fitzwater 1982, Porter et al. 1994, Booth 1994, Freare 1984).

Birds have a hearing range similar to humans, so if people can hear it, then birds can hear it (Fraser et al. 1998, Porter et al. 1994). Ultrasonic sounds cannot be used to scare birds.

- b) Visual deterrents such as scarecrows, Mylar strip or flash tape, balloons, kites and fake predators are also used. Visual methods are generally less successful than audible scare tactics (Fraser et al. 1998). These devices also require frequent movement to maintain effectiveness over time. Visual scare devices located so that they are associated with the audible scare devices become



visual cues (dummy audible devices) for the birds. Streamers and flashtape, however, are impractical to move.

### 2.3.2 Exclusion

The total exclusion of birds from a crop through the use of netting is a more expensive crop protection method, but it is one that is being employed by a number of growers. Nets need to be placed over individual trees, rows of plants or raised over entire fields to effectively keep birds off crops. Cherries, especially older plantings with very large trees, are more difficult to net than lower crops such as blueberries and grapes. Blueberries are selectively harvested several times in the season and require the use of overhead nets. Increased costs for hand labour is causing blueberry farmers to switch to mechanical harvest, which means the overhead nets must be high enough to allow mechanical harvesters to pass underneath. The higher nets require a more expensive support system and the height makes the annual tasks of spreading out the net and rolling it up again more difficult and time consuming. Grape growers often use nets applied to the rows of vines.

In addition to the expense and inconvenience of netting there can be a negative impact on the birds. Occasionally birds trying to feed on protected crops may get entangled in nets, especially the overhead nets covering entire fields. Farmers often complain about people passing by the fields who stop and cut the nets to release the birds. This can require regular mending of the nets. One solution to this problem is to use nets with small openings and ensure they are kept taut; this will reduce the number of birds entangled. Small songbirds can still pass through small net openings and cause significant losses.

### 2.3.3 Bird Population Reduction

Shooting to kill birds that are feeding on a crop is not an effective crop protection method. The shooter will never kill enough birds to make a significant difference in the amount of crop damaged by the birds. The 'shot' may become embedded in the fruit contaminating it. A literature search revealed a variety of methods that have been employed to carry out population control including blowing up roosts with explosives, trapping birds, using pesticides and feeding them sterilants. None of these techniques are thought to be successful for controlling starling populations (Courtney et al. 1998, Porter et al. 1994, Feare 1982, Fitzwater 1982).

### 2.3.4 Chemical repellants

Currently, there are no compounds registered for use in Canada. While repellants are available in the US, the product is expensive and may have to be reapplied when washed off by the rain. Research and field-tests of a new formulation using grape flavour extracts as the active ingredients are being undertaken in the USA. Findings to date have shown that this product will not be acceptable on wine grapes due to residual flavours in the wine, which arise during the fermentation process (Fraser et al. 1998).

### 2.3.5 Methods used in BC

Three surveys on bird control in agriculture in BC have been carried out. The BC Ministry of Agriculture conducted a mail questionnaire amongst tree fruit and grape growers in the Okanagan Valley in 1975 (Vielvoye 1978). The ministry also carried out a mail questionnaire to blueberry growers in the South Coastal Region in 1983 (Weber 1983). The District of Pitt Meadows, Ministry, and BC Blueberry Development Council funded a study of bird damage to blueberries in Pitt Meadows in 1992 which included farm visits where fixed crop protection devices were recorded (Roberts, 1992). These surveys are summarized in Table 2, however, note that the surveys varied with regard to survey methodology, survey area and crop types.

**Table 2. Bird control method used on farms (%)**

Method	Survey		
	1975	1983	1992
Shoot to kill	21	*	-
Shoot to scare	18	48	-
Orchard pistol	11	*	-
Propane cannon	15	36	41
Av alarm/wailer	10	16	12
Bird calls	-	12	-
Netting	4	-	21
Trapping	2	11	-
Scarecrows	-	29**	7
Owl model	-	-	9
Streamers	-	24	2
Balloons	-	-	3
Hand clapping	-	13	-
None	-	12	34***
# of farms	78	86	58

'-' indicates information was not reported.

'\*' indicates that shooting with live ammunition and scare shells was combined and reported under shoot to scare.

‘\*\*’ report grouped scarecrows with similar devices

‘\*\*\*’ no fixed bird control devices were observed on these farms.

Across all three surveys, the most widely used control method was shooting with live ammunition or scare cartridges (about half the farms). While the Pitt Meadows survey did not record shooting information the practice was observed during the farm visits. The second most commonly used method was propane cannons. In the Pitt Meadows survey the third most common method was bird netting. While the use of netting was mentioned in the 1983 survey, statistics on the use of netting were not reported. Both the 1983 and 1992 surveys indicated that several different methods were often used together on the same farm.

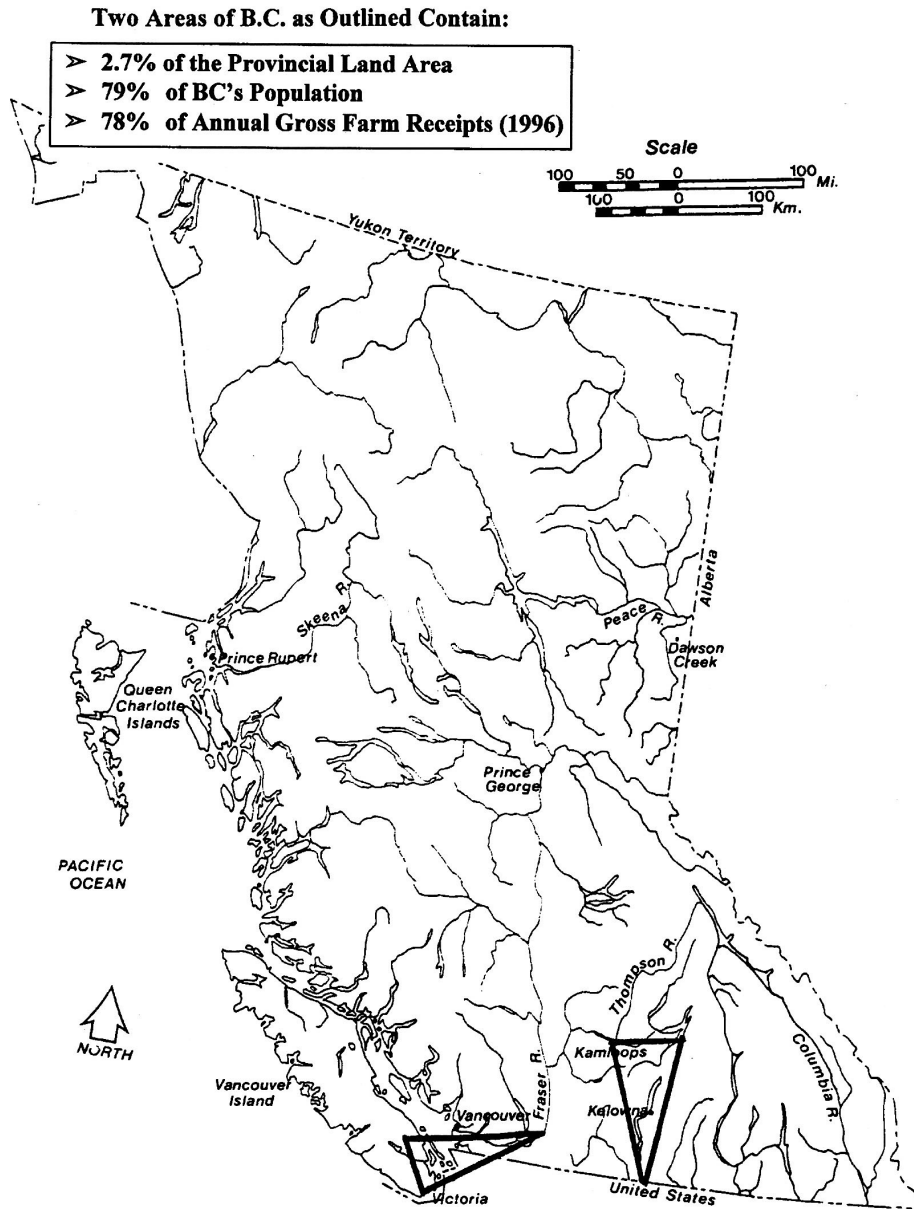
## 2.4 Neighbouring residents

Population has changed dramatically over the last quarter century. For the period 1971 to 1996 Census figures show that BC had the largest percentage increase of all Canadian provinces, 70.5 compared to a 33.8% increase for all of Canada. Richmond, Delta, Surrey, Langley and Abbotsford, the major blueberry growing area in southwestern BC, grew in population by 361% during this period. At the same time the farm population is decreasing in percentage terms to where only 1.8% of BC’s population in 1996 lived on farms (Smith 1998). An excerpt from the Land Reserve Commission’s publication Planning for Agriculture – Resource Materials (1998) provides an informative context for the situation.

“The Province’s population, partially in response to geography, has shown a clear tendency towards concentration and is today focused largely in two relatively small portions of the Province. 79% of BC’s 1996 population [3,724,500] resides within two triangular areas, one, in the Interior, centered on Kelowna and bounded by Osoyoos, Sicamous and Kamloops and a second, in the Southwest, centered on Vancouver and bounded by Hope, Victoria and Parksville. Yet, these two areas encompass only about 25,300 square kilometers or 2.7% of the Province.

Found within these same two areas (Figure 4) are several of BC’s most important agricultural communities, containing some of Canada’s most unique and productive agricultural land. The Lower Mainland [southwest corner of province], aided by the longest frost free period in Canada and the Okanagan Valley, one of only three main fruit and one of only two main grape growing areas in

**Figure 4. British Columbia's Population Triangles.**



Provincial Agricultural Land Commission 1995

Canada, are considered to be agriculturally of national significance. Together this 2.7% of BC accounts for over \$1.4 billion or 78% of the Province's total gross farm receipts (1995).”

Thus, in 1996, 79% of BC's population lived in the same area where 78% of the province's total gross farm receipts are generated. Blueberry production is concentrated in southwestern BC near Vancouver and cherry and grape production in the Okanagan Valley located in the interior of the province. Much of this farming occurs in or next to densely populated areas. These regions have two of the fastest growing populations in Canada (1996 Census).

Twenty-three of BC's key agricultural municipalities are ranked by total rural population (Table 3). Together they account for 37% of BC's total population and 27% of BC's rural population in 1996 and nearly 62% of the Province's total gross farm receipts. Farm population as a percentage of the total population in the farm areas is provided for the same municipalities in Table 4. On average, about three-quarters of the people living in farming areas are non-farmers.

From the period 1991 to 1996 the total provincial population increased by 13.5%. The total farm, rural and urban population increased at the rates of 12.7, 3.9 and 15.8% respectively. Apparently the majority of the population increase is occurring in urban areas, however the rural populations are still growing. In addition, over 15% of BC's farm population lived in urban areas (Smith 1998). Census Canada defines urban as “at least 1,000 persons at a population density of 400 per square kilometer [4 people per hectare].”

## 2.5 Summary

Birds, particularly starlings, forage on blueberries, cherries and grapes. Crop losses can be significant if devices to deter predation are not used. The use of audible bird scare devices is a commonly employed method to reduce the losses due to birds. With an increasing amount of blueberries and grapes being planted in or near communities with escalating populations, the potential for conflict is likely to increase unless changes are implemented to address the needs of both farm and non-farm populations.

**Table 3. Urban and Rural Population (1996) in Selected Municipal Jurisdictions with Significant Agricultural Production**

Total Annual Gross Farm Municipality Receipts (\$1995)	% of Prov. Population Total	Total		% of		Rural	
		Urban Population	% of Total	Urban Population	% of Total	Rural Population	% of Total
Langley	80,179	50,846	63.4%	29,333	36.6%	\$150,355,771	8.2%
Kelowna	89,442	66,102	73.9%	23,340	26.1%	\$34,692,072	1.9%
Surrey	304,477	289,387	95.0%	15,090	5.0%	\$106,866,115	5.8%
North Cowichan	25,305	12,612	49.8%	12,693	50.2%	\$13,089,259	0.7%
Maple Ridge	56,173	44,072	78.5%	12,101	21.5%	\$27,106,058	1.5%
Chilliwack	60,186	48,184	80.1%	12,002	19.9%	\$141,307,022	7.7%
Abbotsford	105,403	93,874	89.1%	11,529	10.9%	\$314,627,232	17.1%
Prince George	75,150	66,314	88.2%	8,836	11.8%	\$2,613,427	0.1%
Lake Country	9,007	2,300	25.5%	6,707	74.5%	\$10,090,013	0.6%
North Saanich	10,411	4,082	39.2%	6,329	60.8%	\$10,469,688	0.6%
Salmon Arm	14,664	8,528	58.2%	6,136	41.8%	\$8,627,492	0.5%
Summerland	10,584	4,619	43.6%	5,965	56.4%	\$10,346,330	0.6%
Kamloops	76,394	71,064	93.0%	5,330	7.0%	\$15,959,165	0.9%
Spallumcheen	5,322	-	0.0%	5,322	100.0%	\$33,897,082	1.8%
Vernon	31,817	28,727	90.3%	3,090	9.7%	\$5,750,719	0.3%
Kent	4,844	2,170	44.8%	2,674	55.2%	\$21,087,899	1.2%
Delta	95,411	92,920	97.4%	2,491	2.6%	\$65,177,713	3.5%
Coldstream	8,975	6,822	76.0%	2,153	24.0%	\$8,053,286	0.4%
Pitt Meadows	13,436	11,329	84.3%	2,107	15.7%	\$59,368,379	3.2%
Central Saanich	14,611	12,960	88.7%	1,651	11.3%	\$16,648,975	0.9%
Saanich	101,388	101,388	100.0%	-	0.0%	\$10,285,904	0.6%
Penticton	30,987	30,987	100.0%	-	0.0%	\$6,299,399	0.3%
Richmond	148,867	148,867	100.0%	-	0.0%	\$56,388,204	3.1%

Definitions: Statistics Canada

**Urban Area Population:**

Urban areas have minimum population concentrations of 1,000 and a population density of at least 400 per sq. km., based on the previous census population counts. All territory outside urban areas is considered rural. Taken together, urban and rural areas cover all of Canada

**Rural Area Population:**

Rural areas are sparsely populated lands lying outside urban areas.

Source: Statistics Canada, *A National Overview - Population and Dwelling Counts*, 1996, Cat. No. 93-357-XPB, Table 18, pages 240 - 244

**Table 4. ESTIMATE OF RURAL / FARM POPULATION SPLITS IN SELECTED MUNICIPALITIES - 1996**

<u>Municipality</u>	<u>Total Rural Population<sup>3</sup></u>	<u>Estimate<sup>1</sup>:</u>		<u>Estimate<sup>2</sup>: Farm Population</u>	<u>Farm Pop. as a % of Total Pop. in Farm Area</u>	<u>Farm Pop. as a % of Total Population</u>
		<u>Total Rural Population in Farm Area</u>	<u>No. of Farms<sup>4</sup></u>			
Langley	29,333	26,400	1,584	6,336	24.0%	7.9%
Kelowna	23,340	21,006	598	2,392	11.4%	2.7%
Surrey	15,090	13,581	744	2,976	21.9%	1.0%
North Cowichan	12,693	11,423	242	968	8.5%	3.8%
Maple Ridge	12,101	10,891	331	1,324	12.2%	2.4%
Chilliwack	12,002	10,802	924	3,696	34.2%	6.1%
Abbotsford	11,529	10,376	1,447	5,788	55.8%	5.5%
Prince George	8,836	7,952	63	252	3.2%	0.3%
Lake Country	6,707	6,036	282	1,128	18.7%	12.5%
North Saanich	6,329	5,696	74	296	5.2%	2.8%
Salmon Arm	6,136	5,522	208	832	15.1%	5.7%
Summerland	5,965	5,369	265	1,060	19.7%	10.0%
Kamloops	5,330	4,797	130	520	10.8%	0.7%
Spallumcheen	5,322	4,790	386	1,544	32.2%	29.0%
Vernon	3,090	2,781	48	192	6.9%	0.6%
Kent	2,674	2,407	133	532	22.1%	11.0%
Delta	2,491	2,242	186	744	33.2%	0.8%
Coldstream	2,153	1,938	152	608	31.4%	6.8%
Pitt Meadows	2,107	1,896	178	712	37.6%	5.3%
<u>Central Saanich</u>	<u>1,651</u>	<u>1,486</u>	<u>201</u>	<u>804</u>	<u>54.1%</u>	<u>5.5%</u>
<b>Total</b>	<b>148,479</b>	<b>133,631</b>	<b>8,176</b>	<b>32,704</b>	<b>24.5%</b>	<b>3.0%</b>

i.stats.RuralFarmPopSplit.doc

<sup>1</sup> Estimate of the rural population in or in close proximity of a farm area is based upon a 10% reduction in the rural population.

<sup>2</sup> Estimate of Farm population is based on the number of farms x 4.0 persons per farm (B.C., in 1996 had 2.6 persons per dwelling).

<sup>3</sup> Source: Statistics Canada. Rural = non-urban areas, Urban = at least 1,000 persons at a population density of 400 per sq. kilometre.

<sup>4</sup> Source: Statistics Canada: 1996 Census of Agriculture Profile Data – British Columbia and ‘Special Run’ tabulations provided by Statistics Canada, Nov. 3, 1998.

### 3 Regulations affecting farm land use and farm practices

In this section an explanation is given of the current BC regulatory framework as it relates to farmland use, activity and in particular, audible bird scare devices. Information is also provided on how Ontario and other countries are attempting to address the impacts from noisemakers.

#### 3.1 British Columbia

The challenge of preserving farming in British Columbia grows with each passing year. Farm lands face increasing pressure from urban development and competing resource uses. Ensuring compatibility between different land and resource uses is a necessary component to preserving farmland. It will require a shared vision based upon co-management partnerships, where settlement and resource planning are integrated in a meaningful way. Maintaining our land base for farming will also involve ensuring that BC farmers are able to use farmland and water efficiently and effectively without unnecessary and unfair restrictions. Therefore, it is important that a stable environment exists for the farming community to encourage long term commitment and investment (Land Reserve Commission, 1998).

An important first step to creating that stable environment began in 1973 with the enactment of BC's *Land Commission Act*. This Act enabled a special land use zone to be established in partnership with local governments to protect BC's dwindling supply of agricultural land. This zone is called the "Agricultural Land Reserve" (ALR) and comprises about 5% of BC's land base. ALR boundaries were originally established based on the capability and suitability of the land, its present use, local zoning and input from public hearings.

To ensure land within the reserve can be effectively farmed, local government plans and bylaws need to provide a fair and supportive regulatory climate for agriculture. The enactment of the *Farm Practices Protection (Right to Farm) Act* (FPPA) and consequential amendments to the *Local Government Act* (previously the *Municipal Act*) and *Land Title Act* in 1996 now give local governments greater planning opportunities for agriculture.

Under section 916 of the *Local Government Act* (LGA), the minister responsible for the FPPA can create bylaw standards to guide local governments in the review and development of zoning and farm bylaws. These standards can be found in the "Guide for Bylaw Development in



Farming Areas”. Until a regulation under section 918 is passed, zoning bylaws are not affected by the standards and minister’s approval is not needed. However, once a regulation is passed, local government zoning bylaws can not prohibit or restrict the use of land for a farm business in a farming area unless the local government receives the approval of the minister. Farm bylaws are the only other type of bylaw that requires the minister’s approval. Currently, no bylaw standards or farm bylaws have been created for the use of audible bird scare devices.

Changes to the *Land Title Act* give additional discretionary powers to approving officers. They can now refuse a subdivision plan if at the time of subdivision there is inadequate buffering of the development from farming and the location of roads would unreasonably or unnecessarily increase access to land in the ALR.

While the *Land Commission Act* and sections of the *Local Government Act* and *Land Title Act* affect the use of farmland, the FPPA affects the activity or conduct of farm operations. The following quotation outlines provisions of the Act (Farm Practices Board 1999):

“The purpose of the FPPA is to protect farmers from injunctions or liability in nuisance for their farm operations provided three conditions are met: (a) the farm operation is conducted in accordance with normal farm practices; (b) the farm operation is conducted on agricultural land (either agricultural reserve land or land zoned for farming under municipal by-laws); and (c) the farm operation does not contravene a land use regulation or the *Health Act, Pesticide Control Act or Waste Management Act*.

The FPPA defines ‘normal farm practice’ as follows:

“normal farm practice” means a practice that is conducted by a farm business in a manner consistent with

- (a) proper and accepted customs and standards as established and followed by similar farm businesses under similar circumstances; and
- (b) any standards prescribed by the Lieutenant Governor in council.

The FPPA also enabled the creation of the Farm Practices Board, which provides a balanced approach to resolving concerns about farming for those BC residents who live near farms.

To date, neither the Farm Practices Board nor Cabinet has provided any general definition of “normal farm practice” in relation to the operation of propane cannons.

On a more informal level, the BC Ministry of Agriculture, Food and Fisheries (MAFF) has issued “Guidelines”. The Guidelines do not have the force of law but provide a series of practices currently expected of BC farmers.”

The Ministry’s original Farm Practice Guideline (June 15,1996) for “Wildlife Damage Control” was based on the Pitt Meadows Noise Bylaw. Pitt Meadows struck a committee of farmers, residents and government staff to develop a Noise Bylaw for bird-scaring devices in the early 1990’s.

The Farm Practices Board reviewed the use of propane cannons and issued their report in May 1999. The Board suggested adoption of the following revised Guidelines for the operation of cannons.

*Farmers:*

- *should operate cannons only between 6:00 a.m. and 8:00 p.m. local time or dawn to dusk, whichever is of lesser duration;*
- *should operate no more than one cannon per two hectares of cropland at any one time;*
- *should try to alternate or relocate cannons being used on a farm operation at least every 4 days;*
- *should try to locate and/or aim cannons away from residences in close proximity to the farm;*
- *should maintain cannons, including timing mechanisms, to ensure they operate properly and not outside the recommended hours of operation;*
- *should, commencing in the year 2000, use cannons only as part of a wildlife predation management plan; and*
- *may, once a farm has an established wildlife predation management plan, use cannons for the protection of crops immediately prior to ripening to prevent habituation by birds.*

Concerns regarding noise from farm practices may be addressed by Ministry staff as part of an informal concern resolution process. The first step is to determine whether the farmer is following generally accepted practices. If it is generally accepted, the practice will be explained in an effort to resolve the concern. If it is not generally accepted, the farmer will be encouraged to change the practice. The Farm Practices Board is responsible for making formal determinations of “normal farm practice” under the Act.

A complainant does not have to use the informal ministry process. They can file a complaint directly with the Board. The complainant may also

take a concern to the Board if they are not satisfied with the outcome of the informal ministry process.

Board members and/or staff attempt to mediate a solution through a “settlement agreement” prior to moving to a formal hearing. There have been six cannon complaint settlement agreements signed to date. The agreements are with three blueberry farms in southwestern BC and two grape farms and one cherry farm in the Okanagan Valley. If the complainant is dissatisfied with the manner in which the farmer follows the settlement agreement, they can proceed with a formal hearing to determine “normal farm practice” for their circumstances. The “settlement agreement” does not determine what “normal farm practice” is for that set of circumstances. Alternatively, if a settlement agreement is not reached, a formal hearing will be held if desired by the complainant or farmer.

The Farm Practices Board has held two formal hearings regarding the use of bird-scaring devices (Morgan Creek Homeowners Association vs Sekhon Farm in June 2000 and Clapham, Steckler and McLean vs Monga in July 1997). Neither decision deviated from the Guidelines in place at the time of the hearing.

The FPPA (Part 4, Section 12(2)(b)) also provides the provincial government the power to make regulations for the purpose of defining “normal farm practice”. Currently there are no regulations under the FPPA defining “normal farm practice”.

### 3.2 Ontario

Ontario is the other province that grows blueberries, cherries and grapes with grapes being by far the largest of the three crops produced. Robins and starlings cause much of this province’s crop damage (Fraser et al. 1998).

Ontario updated their *Farm Practices Protection Act (1988)* with the *Farming and Food Production Protection Act (FFPPA)*, in May 1998. The Act established the Normal Farm Practices Protection Board (NFPPB) to hear from parties involved in formal complaints that cannot be resolved through local mediation efforts (Fraser, 2000).

Ontario’s guidelines for the use of propane-fired cannons are (Fraser et al. 1998):

- *Set at intervals greater than 3 minutes.*
- *Use between sunrise and sunset when birds feed.*
- *Operate no more than one unit per 2 ha (5 acres), unless it is absolutely necessary.*
- *Avoid operating near neighbours' houses.*
- *Ensure that propane tank valves do not leak, as this can cause units to blast unintentionally, even when they are shut off.*
- *Move the units around to keep the birds off-guard.*
- *Use electronic clock timers that automatically shut off the units.*

### 3.3 United States

States with fruit production were contacted to determine the rules and regulations regarding the operation of noisemakers as pest control devices. Michigan, British Columbia, New Jersey, North Carolina and Georgia are the major (highbush) blueberry production areas in the world. California, Oregon, Washington and British Columbia are the major sweet cherry production areas in North America. California is the major grape producer with Oregon, Washington, New York and Michigan producing lesser amounts.

Right to Farm laws have been enacted by all fifty states. Most of these laws were passed between 1978 and 1984 and closely follow a North Carolina statute. The general approach is to provide for agricultural activities to not be considered as a nuisance if the activities are consistent with "generally accepted agricultural and management practices" and were established before any other, more recent activities.

New Jersey Division of Fish, Game and Wildlife and the Connecticut Department of Agriculture both require "Noisemaking Permits". New Jersey requires 300 ft separation from neighbouring dwellings and allows operation from ½ hour before sunrise to ½ hour after sunset. The sound level is limited to 128 dB at 100 ft from the device. Connecticut's separation distance is 500 ft with the same hours of operation for scaring birds. The sound level limit between 10pm and 7am is 80 dB and 100 dB for the rest of the day measured from the property line on any receptor residential property. Permits were free of charge in both states. New Jersey and Connecticut estimated that they issue 100 and 30-35 permits respectively. Of 169 Townships in Connecticut only 2 had ordinances that would prohibit noisemakers but those Townships did not have farmland.

In other States contacted, California, Oregon, North Carolina and Washington, there were no permits required. The Californian Counties of Sonoma and Tulare passed ordinances regulating the use of noise making devices to repel birds and other agricultural pests. The Tulare

ordinance restricts use of “propane exploders and gas cannons” within 660 ft of any neighbouring residence. They also provide recommended guidelines for use of propane guns.

No permits or ordinances were identified in Washington or Oregon.

### 3.4 Europe

In the United Kingdom the National Farmer Union has produced a BIRD SCARERS Code of Practice which has gone through many revisions over the last forty years. Local Environmental Health officers determine statutory nuisance and use the Code of Practice as a guide (Payne 2001). The Code cautions “think carefully about the use of propane gas guns”. Avoid using propane cannons within at least 200 m of a sensitive building before 7am or before 6 am elsewhere when sunrise is earlier. Do not fire cannons more than four times in any one hour. All the reports from a multiple chamber gun should count as one report if heard within 30 seconds.

A manufacturer of propane cannons in the Netherlands was contacted regarding regulations. The company, DAZON B.V., reported that the rules varied city by city in the Netherlands. The example they provided for one city was a distance of at least 100 m between birdscarer and nearest house, use limited to between 6am and 9pm and a frequency of maximal 20 blasts per hour. Dazon B.V. was unaware of any rules in the Netherlands that restrict sound level.

Contact with specialists in other countries went unanswered.

### 3.5 New Zealand

Hastings District, a wine grape growing area on the North Island exempts mobile agriculture equipment from its general noise standards. The District Council, after public consultation and input from acoustics experts, has passed specific performance standards for audible bird scare devices. These standards passed in July 2000 are now under appeal.

The devices are to be operated only during the months December to May inclusive and only from sunrise to sunset. Discrete sound events of the device (each event shall not exceed 3 shots within a 1 minute period) shall be limited to 4 an hour or to a total of 12 individual shots an hour. A notice with the name, address and telephone number of the person responsible for the device operation is to be fixed to the road frontage of the property on which the device is being used.

Gas guns (propane-fueled cannons) shall not exceed the following noise limits within the notional boundary of any residential building (rural zone) or within any residential zone. Notional Boundary: “means a line 20 meters from the façade of any dwellinghouse, or any building being part of a residential activity, visitor accommodation, hospital, education facility, marae or church or the legal boundary whichever is closer to the dwellinghouse or building”.

Rural zone	115 dBC peak	150m*
Residential zone	100 dBC peak	420m

\* Separation distance is a guideline only for rotating gas guns or gas guns pointing towards the relevant boundary. In situations where a gas gun is fixed away from the relevant boundary and/or noise barriers are used, a smaller separation will be required.

Users of audible avian distress alarms shall adopt the Best Practicable Option to keep the noise produced to a reasonable level. These devices are allowed for the same times as gas guns and require a notice on the property frontage as well (Hastings District Council 2000).

Malborough District Council located at the north end of the South Island of New Zealand contains the largest grape growing area in the country. Malborough went through a similar process to that of Hastings and adopted new standards (Proposed Resource Management Plan) dated January 9, 2001. These standards are also being appealed.

The standards for “Percussive or explosive devices” or gas-guns and excluding firearms follow. No Category A audible bird-scaring device:

- Shall be operated between 7:00pm and 6:30am prior to the introduction of daylight saving and 8:00pm and 7:00am during daylight saving months;
- Shall be operated within 800 meters of any rest home, public or private hospital;
- Shall be operated within 100 meters of a public road;
- May emit sound at a level greater than 65 dBA weighted sound exposure level measured at or within the boundary or notional boundary of the nearest residential dwelling (excluding a residential dwelling on the same property as the audible bird-scaring device);
- Shall be set to operate at any greater frequency than 12 times in any period of one hour, that is 12 single discharges or four groups of three discharges;
- Shall be set at a greater density than one device per five hectares of land in any single land holding, except that in the case of a single

land holding of less than five hectares in area, one device shall be permitted; and

- Shall be operated unless a legible notice is fixed to the road frontage of the property on which it is being used, giving the name and telephone number of the person responsible for its operation.

Other bird-scaring devices had the same restrictions for time of day, distance from rest homes and hospitals and permitted sound exposure level. The frequency limit is as follows; no device shall be operated for any continuous period exceeding two seconds or at a frequency greater than 10 times in any hour in the case of airhorns, sirens, or any amplified signal.

Marlborough's acoustics specialist preferred a measure of sound energy called "Sound Exposure Level (SEL)" rather than using peak levels as used by Hastings District Council. A sound exposure level of 65 dBA is equivalent to the sound energy produced by a sound level of 65 dBA continuing for one second. The 65 dBA SEL was reported approximately equal to a separation distance of 260 m.

### 3.6 Australia

Four states within Australia were contacted.

#### Victoria

A December 2000 report to the Minister for Agriculture titled LIVING TOGETHER IN VICTORIA'S RURAL AREAS states (Healy 2000):

"The issues involved in Right to Farm are of growing importance in Victoria with a rapidly changing farm sector and increasing urban interfaces with rural communities. The issues also need to be seen in context of the importance of the agriculture and food industries for Victoria's economy."

The report makes six recommendations including vendor statements on the sale of land regarding agriculture, government education program particularly for urban settlers adjacent to agriculture production areas, establishment of a Rural Disputes Settlement Center, and that the State Planning Policy Framework include a policy commitment to protect agricultural activities which fall within acceptable industry performance standards. Specific rules regarding the use of audible bird scare devices were not received from Victoria. The suggested vendor statement was:

*'Important notice to purchasers:*

*The property may be located in an area where commetcial agricultural production activity may affect your enjoyment of the property. It is therefore in your interest to undertake a proper investigation of the possible amenity and other impacts from adjacent properties and the agricultural practicws and processes conducted there.'*

Fruit and nut crops represent the largest sector of Victoria horticulture, being valued at around \$520 million per annum at the farmgate. The production of grapes (including table, wine and dried) accounts for one third of the gross value of production of this sector.

### South Australia

The South Australia Environmental Protection Agency produced a set of guidelines in 1995 in conjunction with their Department of Primary Industries in an attempt to strike a balance between primary production methods and the impact these methods have on the community. Over time, these guidelines have been refined through exposure to a range of stakeholders including industry, community groups and local councils. They have formed the basis for a number of council bylaws including Adelaide Hills and the City of Onkaparinga.

Adelaide Hills restricts the use of gas guns to 7am and 8pm, 6 detonations per hour, 200 m from a neighbouring residence, hospital or school and one device per 4.2 hectares. A detonation is a single emission. Other noise devices may be activated 6 times per hour and one activation is a single noise emission or one which produces a continuance sequence of noise emissions but which does not exceed 30 seconds in duration.

Onkaparinga restricted gas guns to the 7am to 7pm, 5 discharges (single detonations), 300 m from a neighbouring residence, hospital, or school and one device per 4 hectares. Electronic devices are allowed a maximum duration of 30 seconds and a minimum off interval of 15 seconds. The required separation distance for these devices is 200 meters. The scare device is to be clearly marked with the owners full name and 24 hour contact phone number(s).

### Western Australia

Grape production for wine is a growing commodity. Draft Environmental Management Guidelines For Vineyards (February 2001) have been prepared in a collaborative effort. Collaborators include the Department of Environmental Protection, Water and Rivers Commission and



Agriculture Western Australia and is intended to provide guidance on the best management practices for the viticulture industry. The table and wine grape industry members played a major role in the development of these guidelines. The use of gas guns in all but remote areas is discouraged in this document.

## New South Wales

The NSW Environment Protection Agency has general guidelines, legislation and regional contacts (website details below) for noise pollution, BUT this does not include complaints and conflicts arising as a result of scare devices. As of July 1999 (EPA legislation) regulatory responsibility lies with local council. This means any complaints or conflicts are dealt with on a local council level. Some councils have guidelines others deal with it on a case-by case basis.

One grape growing area, Orange City Council, have no guidelines for bird scare use. But if in a rural area priority is given to the farmer. Netting is encouraged as an alternative. Two other councils, Cowra and Mudgee, have guidelines on time intervals (only to be used between 7am and 7pm) within rural zones (Tracey 2001).

## 4 Complaints

The minister directed the ministry to appoint one staff person to take all complaints regarding noise for the 2001 crop season. Bert van Daltsen located in the Abbotsford office was assigned the task with the assistance of other ministry staff. Bal Khosa, a summer student, was hired to address complaints regarding the use of noisemakers by blueberry growers in the South Coastal Region. Regional ministry staff assisted with complaints in the Okanagan Valley. Contact information including an '800'-telephone number was delivered to Abbotsford, Mission, Langley, Surrey and Delta Municipal offices. This information was also posted on the ministry's webpage.

Some of the complaints were received after the use of audible bird scare devices were no longer being used but the complainants wanted their objection recorded in this report. When calls were received from complainants, details of the complaint were recorded and information on the rules for device use was provided. Where the farm could be identified from the complainant's information, there was follow-up with the farmer. Where complaints were concentrated in an area, a survey was carried out to identify farms growing crops which may use bird scare devices. During the roadside survey a record was kept of those farms from which audible bird scare devices could be heard operating.

Complainants by municipality:

Abbotsford	34
Surrey	19
Delta	10
Kelowna	3
Chilliwack	2
Langley	1
Maple Ridge	1
Mission	1
Pitt Meadows	1
Oliver	1
Osoyoos	1
Penticton	1
Winfield	1

There were a total of 76 complainants recorded. Some complainants called more than once and were recorded as one complainant as were different complainants from one household. Some complainants called regarding more than one farm and some farms had more than one

complainant. Sixteen additional complainants made themselves known to the Minister's office. These complaints were made too late to be investigated and included in the report.

The District of Pitt Meadows has actively addressed complaints regarding the use of audible scare tactics over the years which included developing a Noise Bylaw in 1992 that set the standard for the ministry's Wildlife Damage Control Guideline. The District's bylaw enforcement staff met with a committee of farmers prior to the crop season to discuss the investigation of noise complaints from audible bird scare devices. District staff addressed the complaints and called on a committee of local farmers for assistance when required. Staff indicates the process has worked well. The one complaint recorded in this report for Pitt Meadows this year was when the bylaw enforcement officer contacted the ministry for assistance with one specific farm that was not following the guidelines.

The complaints were grouped into four areas of the South Coastal region and one Interior area (Okanagan Valley). Details of the complaints are summarized by the commodity, type of bird scare device, nature of the complaint and separation distance between the device and the complainant's residence. One Okanagan farm used a propane cannon to protect both cherries and blueberries and one Abbotsford farm received complaints against both the use of a propane cannon and an orchard pistol. The two complainants in Chilliwack lived on the Chilliwack side of Boundary Road while the farm was located on the Abbotsford side.

The majority of complaints that were recorded originated in the South Coastal region between Abbotsford and Delta. These calls were made directly to the ministry's Abbotsford office, which was designated, starting on July 6, as the office to receive all complaints regarding audible bird scare devices province wide. The ministry offices in the Okanagan often were the first point of contact and recorded only those complaints where the caller wanted to formally register a complaint with the ministry. In the Okanagan, it is estimated that only one in nine callers registered complaints.

#### 4.1 Commodity

The majority of complaints were recorded against blueberry farms (Table 5). The blueberry farms are concentrated in the South Coastal region of the province and the cherries and grapes are in the Okanagan Valley. The reason for the discrepancy in complaints in the two areas is likely due to the location of the Abbotsford office and the manner in which the calls were recorded. Callers to the ministry's Oliver and Kelowna offices

may not have followed up with a call to the Abbotsford office on the toll free line. The cherry season was largely over before the centralized complaint taking was implemented this year. One grape farm in Surrey received 2 complaints regarding propane cannon use. The complaints in the Okanagan Valley included 4 cherry farms and 3 grape farms. One of the cherry farms also had blueberries and used a propane cannon on both crops.

**Table 5. Summary of commodities receiving complaints.**

Item	Abbotsford	Surrey	Delta	Other South Coastal areas	Okanagan Valley	Total
Blueberry	34	17	10	6	1	68
Cherry	0	0	0	0	3	4
Grape	0	2	0	0	3	5

#### 4.2 Type of Device

Seventy of the complainants were concerned about the operation of propane cannons (Table 6) while there were 3 regarding orchard pistols and 1 each regarding a 'Bird Guard' and 'Av Alarm'. The Bird Guard plays recorded bird distress call and predator calls on loudspeakers and the Av Alarm plays electronic noise.

Most people find the use of propane cannons more objectionable than the other two types. One complainant requested that the farmer substitute a bird call device for the propane cannon. The farmer indicated that he would consider it for use on his blueberry crop however, he had found the unit ineffective in protecting his cherry crop from birds. Another complainant concerned with the use of a 'bird call' device to protect blueberries reported that she preferred the use of propane cannons to the 'bird call' device. One farmer in Abbotsford used an orchard pistol as his only audible bird scare tactic and received complaints from two of his neighbours in Chilliwack.

**Table 6. Summary of Scare Devices Used**

Item	Abbotsford	Surrey	Delta	Other South Coastal areas	Okanagan Valley	Total
Cannon	32	19	10	4	7	72
Distress	1	0	0	0	0	1
Noise	1	0	0		0	1
Pistol	1	0	0	2	0	3

### 4.3 Nature of complaint

“All-night” operation (Table 7) of propane cannons received the most vocal complaints. All-night operation of audible bird scare devices may prevent sleep and occurs at a time when the background noise is the lowest. The ministry was made aware of several instances where the local police force was called. In some instances the police turned the device off and left a notice for the farmer. In another instance, an Abbotsford resident obtained the cell phone number of the absentee farmer who lived an hours drive away and called him to inform him of the problem. The farmer drove out to turn the cannon off. When ministry staff visited him the following day after receiving a complaint, the farmer indicated that this was the first instance in four years where this had occurred. The farmer relied on his tenants and a neighbour to let him know when cannon timers malfunctioned. In this case, both parties had left to attend a music festival in the interior of the province. In other circumstances, complainants indicated that they were unable to contact the farmer and the device continued through the night.

**Table 7. Nature of complaint.**

Item	Abbotsford	Surrey	Delta	Other South Coastal areas	Okanagan Valley	Total
All-night	8	9	1	1	0	19
Off-hour	12	7	5	1	0	25
Timing	11	3	2	3	3	22
6am	9	3	2	3	5	22
Sunday	0	2	3	0	1	6
Animals	7	2	0	0	0	9
Absent	15/27	5/8	8/8	0/6	2/7	30/56
Farms	21+	5+	6+	5	6	43
Total	34	19	10	6	7	76

“Off-hour” in Table 7 refers to complaints where devices were operated outside the hours of use (6am to 8pm) in the Ministry’s Wildlife Damage Control Guidelines and recommended by the Farm Practices Board.

“Timing” refers to how frequently the device ‘fires’. “6am” refers to whether complainants objected to the devices starting at 6 o’clock in the morning and “Sunday” refers to complaints about not being able to sleep in on Sundays and holidays. The most common complaint was audible devices starting early (before 6am) and sometimes running late (after 8pm). Devices that started early were most objectionable as they woke people from their sleep before their alarm clock. One complainant indicated that she would willingly have the propane cannon operate later in the evening if the device would be started later in the morning. Some

complainants indicated that they would like to have at least one day in a week when they could sleep in and others mentioned that they wanted to sleep in when they were on holiday or when it was a Statutory holiday.

Devices using light sensors to control operation were more likely to start early or finish late because it is impossible to calibrate these to the time-of-day with changing weather conditions. One brand of propane cannon was commonly sold with a light sensor, however, the supplier has indicated that a 'time clock' controller for these units is now available. Farmers will have to convert their light sensor controllers to time-clocks or operate them manually.

Timing or frequency of cannon firing was also a common complaint. Most audible bird scare devices have an adjustable frequency of firing. One brand of propane cannon is usually sold with an adjustable gas valve to control the firing interval from 30 seconds to 30 minutes when it fires a single shot. Some farmers set their cannons at the most frequent firing interval (30 seconds) from the start of the season on. This practice is strongly discouraged as it leads to the birds habituating to the device very quickly and is very annoying for the neighbours.

"Animals" refers to complaints where the callers were concerned about the impacts on domestic animals, livestock and wildlife. The animals included dogs, horses, cattle and wild birds. "Absent" refers to farm owners who do not live on the property for which the complaint was received. It is likely that most of the complaints about an audible device running all-night were on farms where the farmer did not live on the property. Records were kept of absentee ownership where the farm that was the source of any noise complaint was identified. These are reported in Table 7 as absentee owners/ number of instances where the source farm was identified by complainant or ministry staff. When the complainants lived some distance from the farm the source of the complaint was more difficult to identify. Three areas that received numerous complaints where the source was difficult to identify were from residents near Colebrook Road and 152 Street in Surrey; residents between 152 and 176 Street and south of 32 Avenue in Surrey; and Bateman Park/Old Clayburn Road area of Abbotsford. Some complainants frustrated by lack of sleep went out to identify the farm themselves. Other complainants indicated that they did not think they should have to identify the source of the noise themselves.

"Farms" refers to the number of farms identified by the complainant or ministry staff as responsible for the noise complaint. There were likely more farms involved in Abbotsford and Surrey. There was also one unidentified source of complaint in Delta as indicated by the "+" symbol in Table 7.

“Total” refers to the total number of complainants living in that community. As mentioned, 2 complainants living in Chilliwack (other South Coastal area) were actually complaining about a neighbouring farm in Abbotsford.

#### 4.4 Average separation distance

The separation distance between either the audible scare device or the closest crop and the complainant’s residence was measured on an airphoto for all the South Coastal locations (Table 8). Ministry staff estimated the distance for the Okanagan Valley locations. The complainants were divided into those that live within the Agricultural Land Reserve “ALR” and those that lived outside the ALR “Non ALR”. The complainants in the Okanagan were not classified as to whether they lived in the ALR or not but they were included in the ALR category for the purposes of the summary. The average separation distance between devices and neighbouring residences was 310 m (1000 ft) for complainants who lived within the ALR and 910 m (3000 ft) for complainants who lived outside the ALR. Some of the complainants furthest removed from propane cannons were mainly concerned about all-night or early morning operation.

**Table 8. Summary of separation distances.**

Item	Abbotsford	Surrey	Delta	Other South Coastal areas	Okanagan Valley	Total
ALR	340 (24)	100 (2)	170 (2)	610 (3)	160 (7)	310 (38)
Non ALR	800 (11)	1100 (8)	780 (6)	1500 (1)	*	910 (26)

There is not a specific separation distance requirement mentioned in the Wildlife Damage Control Guidelines, however, growers were advised that a minimum separation distance of 100 meters (330 feet) should be maintained between the audible scare device and neighbouring residences. In at least four (potentially five) cases a propane cannon had been used within 100 m of a neighbours residence and in one case another type of audible device was used within 100 m of a neighbouring residence.

At the other end of the scale, a complainant who estimated that she lived 3 to 4 kilometers away indicated that she heard cannons at night when they should be off and wanted them banned. Complaints were varied both in terms of separation distance and nature of the complaints. Complaints concerning all-night use were received from neighbours

whether they were nearby or distant from the audible scare device. Some complainants remarked that “they could put up with the cannons during the day, but not at night”. Some shift workers complained about the day-time noise when the propane cannons were over 700 m (almost ½ mile) away. When ministry staff parked outside the house, with windows rolled down and vehicle idling the propane cannons could not be heard. When the vehicle’s engine was turned off, the cannons could be heard but were quieter than other sounds generated in the cul-de-sac.



## 5 Discussion

In addressing the concerns of complainants, a wide range of issues were addressed. The more common and important topics are discussed in this section of the report.

### 5.1 The rules for audible bird scare devices.

Many complainants are unaware of the 'rules' for using audible bird scare devices. The rules for audible bird scare devices are explained in Section 3.1 of this report.

There are four types of rules including:

1. Informal ministry farm practice guidelines (Wildlife Damage Control),
2. Farm Practices Board settlement agreements or hearings,
3. Local government farm bylaws (approved by minister\*), and
4. Provincial regulation defining "normal farm practice"

\* bylaws must be approved by the minister before it comes into effect

To date concerns and complaints have been addressed by the first two steps. No local government has requested a farm bylaw for propane cannon use and a provincial bylaw standard for cannons has yet to be created. Also "normal farm practice" has not been defined by provincial regulation.

Generally the complaints addressed by this report are an example of concerns and complaints being dealt with informally by ministry staff. Local government staff, the farming industry and neighbours can deal with these complaints in a similar manner.

If a farmer is not following the Guidelines or the complainant feels that the Guidelines are inadequate for their circumstances, then the complainant may file a formal complaint with the Farm Practices Board. This will result in a settlement agreement or a specific determination of "normal farm practice" for the circumstances of the complaint. The Board may order a farmer to cease a practice that causes a noise disturbance if it is not determined to be a normal farm practice, or to modify the practice in the manner set out in the order, to be consistent with normal farm practice (refer to s6(1)(b) of the FPPA).

The ministry and a local government may agree to create a farm bylaw under the *Local Government Act* to directly regulate or prohibit farm operations in a manner consistent with the minister's standards or as

otherwise approved by the minister. In all cases farm bylaws must be approved by the Minister of Agriculture, Food and Fisheries. Farm bylaws can enable the customizing of “normal farm practice” for local conditions.

## 5.2 Are the current Wildlife Damage Control Guidelines followed?

Ministry staff used the recommendations of the Farm Practices Board review of propane cannons (1999) when discussing propane cannon use with farmers and their neighbours. These recommendations are listed in Section 3.1 of this report and are intended for propane cannon use. The use of other audible bird scare devices was not covered in the FPB review.

### 5.2.1 Hours of operation

*“Farmers should operate cannons only between 6:00 a.m. and 8:00 p.m. local time or dawn to dusk, whichever is of lesser duration;”*

The most common and emphatic complaint regarding the use of propane cannons is the operation outside the permitted hours of operation. For blueberries and cherries this restriction is normally 6am to 8pm except for the end of the blueberry season. Grapes are harvested later in the year and would be restricted to dawn to dusk operation.

All-night operation of devices is a serious breach of the guidelines and device operators must take more care in ensuring that it does not occur. Farmers not living on the property must take extra steps to ensure hours of operation are followed. Some local governments in other countries have required the registration of devices or the posting of notices with phone numbers to enable the contact of device operators and the ensure devices do not operate through the night. Penalties could also be imposed for this all-night operation of noisemakers.

### 5.2.2 Density of propane cannons

*“Farmers should operate no more than one cannon per two hectares of cropland at any one time;”*

When complainants called the ministry, none identified farms with too many propane cannons, however they were concerned about the general level of noise. In at least three instances, complainants questioned whether there was sufficient cropland to justify the use of an audible scare device. The smallest site using a noisemaker with a complaint was approximately 0.4 hectares. To date a minimum acreage of crop on which audible bird scare devices can be used has not been established.

When the complaints were investigated, ministry staff identified two farms that exceeded the limit of one cannon per 2 hectares (5 acres) of cropland. Four hectares are required before 2 propane cannons could be used, 6 hectares for 3 propane cannons and so on. In both cases the farmers used 4 propane cannons and required about one more hectare of cropland to justify the last propane cannon.

### 5.2.3 Relocation of propane cannons

*“Farmers should try to alternate or relocate cannons being used on a farm operation at least every 4 days;”*

This requirement is intended to require operators to maintain the effectiveness of the cannon during the cropping season by frequent relocation of the devices. On some farms, movement of the cannon was restricted by proximity to neighbours. Complainants did not comment on whether farmers were following this provision, however, some did remark that they did not feel the propane cannons they were observing were effective.

### 5.2.4 Firing direction of propane cannons

*“Farmers should try to locate and/or aim cannons away from residences in close proximity to the farm;”*

The propane cannon is louder when the cannon is pointed towards you than when it is pointed away from you. This effect should be taken into consideration when locating the cannon. Two cannon designs are commonly used in BC. One cannon design is mounted on a tripod where the barrel of the cannon pivots with each firing. The other design does not pivot. The pivoting design is less predictable for the birds and birds will take longer to habituate to it.

There were five instances where direction was an issue in close proximity to a residence. In two cases, the use of the cannon was part of an ongoing neighbour to neighbour dispute. After a farm visit by ministry staff, the use of the cannon was discontinued in both cases. In another two cases, birds were entering the field from trees and powerlines around houses and the cannons were located too close to the neighbours house. Both these farms were also using one too many cannons. Both farmers were instructed to modify their practices. The fifth case was related to one of the other audible bird scare devices, which was difficult to locate on a small property with a nearby neighbour. In an attempt to reduce the sound at the neighbour’s house the device and its loudspeakers were moved closer but pointed away from the house. This complaint was not resolved to the satisfaction of both the farmer and the neighbour.

### 5.2.5 Maintenance of cannon timers

*“Farmers should maintain cannons, including timing mechanisms, to ensure they operate properly and not outside the recommended hours of operation;”*

Cannons operating outside the prescribed hours was a common complaint. Maintenance may have been part of the problem. The use of light sensors as cannon controllers should be discontinued as these timers do not follow the 6am or 8pm restriction properly. A clock timer is now available for both makes of propane cannons commonly used in BC. In some cases, farmers turned the cannons on and off manually. In these cases they should use an alarm on their watch to remind them that 8pm is nearing to avoid forgetting about the time during the busy harvest period.

### 5.2.6 Wildlife Predation Management Plan

*“Farmers should, commencing in the year 2000, use cannons only as part of a wildlife predation management plan; and may, once a farm has an established wildlife predation management plan, use cannons for the protection of crops immediately prior to ripening to prevent habituation by birds.”*

Propane cannons should never be used as the sole bird scare tactic because birds will habituate to the cannon over time and it will lose its effectiveness in scaring birds. Farmers should develop a plan for their bird control program and should be able to explain it to their neighbours or agencies charged with regulating the use of audible bird scare devices.

The ministry has developed a factsheet (BCMAFF 2000), Integrated Bird Management –Blueberries, to assist farmers in preparing a ‘plan’. The factsheet has been mailed out through the BC Blueberry Council’s newsletter in the past and was made available to farmers while investigating complaints. The factsheet provides information that will be of assistance to cherry and grape growers as well. The majority of farmers contacted were using more than one bird scare technique.

As mentioned, preventing the operation of the cannon at night and following the start and stop times more closely are issues that farmers need to include in their plans. The frequency of cannon firing is also discussed in the ministry factsheet.

### 5.2.7 Other propane cannon issues

Two issues that were raised by complainants but not specifically addressed by the guidelines are separation distance and frequency of firing. The ministry’s unofficial (not required by the guidelines) position is that a 100 meter separation distance be provided between a rotating propane cannon and an occupied dwelling that is not on the same parcel

as the propane cannon. Similarly, cannon discharge frequency has been once every 3 minutes. The 2 or 3 firings in quick succession of multi-shot propane cannons have been considered one discharge.

The 100 m separation distance had been encroached upon in four or five complaints regarding propane cannons and in one case regarding the use of an electronic noisemaker. In most cases the 100 m separation distance was respected once it was brought to the farmers attention. Single firing cannons were often set at the device's maximum firing frequency of once every 30 seconds. Some farmers indicated a reluctance to decrease the firing frequency to once every 3 minutes due to the high bird pressure and were skeptical about the impact of rapid firing on the birds' habituation to the sounds. If they changed the setting to once every 3 minutes, some changed back to the maximum setting within a matter of days.

#### 5.2.8 Other audible bird scare devices

The Farm Practices Board was requested to review only the use of propane cannons, which has been the device subject to the most complaints. As a result, the ministry's Wildlife Damage Control Guidelines are being revised to reflect the changes suggested by the Board for the use of propane cannons and to address 'other devices' separately from propane cannons. Orchard pistols, bird call and electronic noise devices were the others with complaints recorded by the ministry this year.

#### 5.3 Starling population and control

Many people who first encounter the use of noisemakers as bird-scaring devices to protect crops feel that the real problem is too many starlings. While reducing the population of starlings would be very attractive to many farmers, this is very difficult to accomplish and even more difficult to maintain. All evidence to date suggests that this is not a practical solution. Even if the population of starlings was dramatically reduced, they are not the only birds feeding on agricultural crops. Killing or reducing the population of other birds feeding on crops would not be acceptable to society in general. Changing "pest" bird populations will also have ecological impacts that may not be acceptable such as increased insect populations and reduced predator bird populations (Courtney et al. 1998, Porter et al. 1994, Feare 1982, Fitzwater 1982).

## 5.4 Effectiveness of bird-scaring tactics

Many people who called to complain about noisemakers also questioned whether they actually scare birds. The simple answer is 'Yes they do'. The more appropriate question is "Why is a farmer's noisemaker not working effectively to scare birds?"

When a noisemaker is first used to scare birds it is the most effective. Over time the birds become more accustomed to the tactic and braver. One experiment documented (Porter et al. 1994) that the number of birds at a feeding site were dramatically reduced when a propane cannon was introduced (some birds were still present). Over time the number of birds increased. The cannon was then turned off. It took two weeks before the number of birds at the feeding site returned to pre-cannon levels. Just because some birds are present does not mean that the noisemaker is not having an impact.

To maximize the bird scaring effectiveness over the entire cropping season the noises should be irregular or random (unpredictable), change direction and location often and be integrated with other types of noises and bird-scaring tactics. Propane cannons are sold in many formats. The simplest format stands on the ground, does not rotate and fires single shots at regular intervals. The most sophisticated format fires multiple shots (often 3), rotates on an elevated tripod above the crop pointing in a different direction each time it fires, and the 'off' times between each firing sequence is random. Light sensors are a simple on-off switch for starting at dawn and stopping the cannon at dusk. The light level for the switch is normally adjustable. Timers with 24 hour clocks are more suitable for starting and stopping cannons at specific times such as 6am to 8pm. The commonly used clock timers allow the cannon to be either off or on in 15 minute intervals throughout the day. This feature would allow the user to program the device to be off for a period of time during the day.

The simple cannon format will require more management in relocating the cannon and changing firing frequency to prevent the birds from getting used to the scare tactic. The rotating, multi-shot, random firing cannon requires less management to maintain its effectiveness. However, it too should be moved regularly and have its firing frequency changed over the season.

In addition to making unpredictable noises, cannons should be managed differently as the crop season progresses. At the start of the season, the cannon firing frequency should be low. If the bird pressure grows and as

the birds begin to become used to the cannons the firing frequency should increase. Firing the cannons too frequently, especially at the beginning of the season, will cause the birds to habituate to the noise more quickly.

The cannon is designed to simulate gunfire as a bird-scaring tactic. The benefit of the gas-fueled gun is that it can be readily automated and the fuel is cheaper than gun ammunition. A hunter shooting and killing birds is probably the most effective scare tactic. However, because most bird species are protected from hunting, a better reinforcement of other scare tactics is to use a shell launcher (orchard pistol) with 'banger' or 'screecher' shells. One benefit of these over regular gunfire is that the sound is projected closer to the birds than would occur with normal gunfire when hunting. Using an integrated approach with many different scare tactics will be the most effective. This effect will be especially evident as the bird-scaring season progresses.

## 5.5 Noise perception is dependent on attitude

Noise is sound that is unpleasant or unwanted by the listener. The level of annoyance depends on the loudness, frequency and the listener's attitude to the sound. Fingernails scratching on a blackboard have little volume but may be very annoying to some people. On the other hand, the volume of sound from a racecar is large but is likely to be considered to be music to the ears of racing car enthusiasts (van Dalssen 2001).

Level of annoyance is very variable depending on the individual. The calls from complainants are also dependent on their willingness to take action and complain. The variation in level of annoyance was very evident in the complaints that were received even within the same household.

The complainant's attitude was often very apparent when taking calls as well. Many callers mentioned that when blueberry farm owners did not live on the farm themselves they did not hear the noisemakers. There are many reasons for this including farmers who own several different farms or farms with no dwellings. There is no evidence to suggest that whether a farmer lives on site plays a role in whether noisemakers are used to scare birds. However, ensuring that the noisemakers are turned on and off at the correct times will take a higher standard of care for absentee owners and operators.

Complainants also voiced opinions such as "cannons don't work", "blueberry farmers are making lots of money" and "farmers should use nets". All these statements reveal an attitude that is likely to make the use of noisemakers more annoying for the complainant. Cannons do

work when they are used properly and are reinforced with other techniques. Some complainants are even more frustrated that farmers are walking through fields banging pails, driving tractors or bikes through fields and blowing horns thinking that it is strange behaviour. In fact this is recommended practice to vary scare tactics and extend the effectiveness of devices such as the propane cannon.

The issue of whether there are birds present (feeding) is another area where the person's attitude is very evident. Complainants often indicate that birds are not present whereas the farmer walking through the fields will see many birds in the bushes, vines or trees that will not be visible to the observer from outside the farm. Farmers want to avoid the birds from becoming habituated to feeding on their crop. Once habituated to the crop the birds are even more difficult to scare away.

Further examples of attitude include the caller who thought "the farmer was a jerk because he turned up the loudness of the cannon to start at 6am and then lowered the noise level later in the day". This is an example of the listener perceiving a sound to be louder when the background noise is much lower (6am). The farmer did not change sound volume at all. Another example was a caller at the end of the blueberry season complaining about a farmer using a propane cannon on a farm where he had not used one all year. Within hours of the call the cannon was stolen during the day while workers were in the field. When the farmer was contacted he advised that the cannon was only used to scare bears out of the blueberries so the hand pickers would pick the last harvest without fear of the bears. Within a couple hours of relaying this information to the complainants the propane cannon was returned to the farm.

An Ontario study (McTavish & Lee 2000) noted that people's contrasting perspectives on the function of rural areas have a significant effect on perception of a nuisance. While most farmers consider the rural area to be a 'place of business', many non-farm residents believe the rural area is a place that offers a lifestyle of open space, peace and quiet. Ministry staff found these contrasting perspectives when addressing noise from bird scare devices even in the Agriculture Land Reserve.

Improved communication between the farmer and his/her neighbours may reduce a lot of the conflict over the use of noisemakers. Often neighbours do not know one another. Bringing the farmer and their neighbour together may prevent the hostility from developing to the point where finding solutions becomes very difficult.



## 5.6 Sound level measurement

The measurement of sound is a complex operation that is best carried out by trained personnel. Sound level meters are designed to respond to sound in approximately the same manner as the human ear and to give objective, reproducible measurements of sound pressure level. Meters generally consist of a microphone, a processing section and a read-out.

The microphone converts the sound signal to an equivalent electrical signal. The correct microphone for the application should be used and the microphone must be protected from wind, vibration and other environmental factors. The direction the microphone is pointed can also impact readings.

The signal from the microphone can be processed in different ways to account for a variety of factors. Weighting networks may be applied to mimic how the human ear hears noises at different frequencies. The most widely used is the “A” weighting and sound levels are indicated in dBA. Often sounds levels vary so the signals are reported as a Root Mean Square (RMS) values which are a special kind of mathematical average.

When measuring fluctuating sounds older (analogue) meters were standardized with “F” and “S” response characteristics. The “F” indicated fast and “S” slow. The “F” setting could be used with steady sounds and “S” with sounds that fluctuated too rapidly to read on the “F” setting. To measure sounds of short duration or impulse sound (less than 1-second duration) an “I” characteristic is needed. Although the perceived loudness of short duration sound is lower than that of continuous sound, the risk of hearing damage is not necessarily reduced. For this reason some sound level meters include a circuit for measuring the peak value of the sound, independent of its duration. Propane cannons, orchard pistols with “banger” shells and firearms are all examples of an impulse sound.

Measuring environmental noise involves measurement of the total noise at a particular location. The noise may be due to many sources including the reflections from people, buildings and other structures. Because environmental sounds come from various directions, the sound level meter should be omnidirectional. It must have a uniform response regardless of where the various sound sources are located. Wind direction and other factors can affect how sound travels. Vegetative growth (time of year) can cause surfaces to change from reflective to more sound absorbing thus affecting noise levels as well.

Hearing damage potential of a sound depends not only on the level but also the duration of the sound. Combined level and duration of sound are referred to as energy. For constant sound levels it is easier to provide an energy measurement. However, for varying sound levels it is possible to calculate a single value known as the “Equivalent continuous sound level” or Leq which has the same energy content and the same hearing damage potential as the varying sound. There are “Integrating Sound Level Meters” which can automatically calculate the Leq.

Sound propagation in air is similar to ripples on a pond of water. The ripples spread uniformly in all directions, decreasing in amplitude as they move further from the source. For sound in air, when the distance doubles, the amplitude drops by half – which is a drop of 6 dB. Thus, if you are one meter from the source and move one meter further away from the source, the sound pressure level will drop by 6 dB. If you move to 4 meters, it will drop by 12 dB, 8 meters by 18 dB and so on. However, this is only true when there are no reflecting or blocking objects in the sound path. Such ideal conditions are termed free-field conditions.

Many jurisdictions regulating audible bird scaring devices have chosen to use a separation distance rather than prescribing sound level limits. In some instances where sound level limits are used, an equivalent separation distance is provided based on “average” conditions. The separation distance is more understandable for the layperson and is easier to measure. Some jurisdictions have set maximum sound limits measured near the source to prevent louder devices from being used. Some jurisdictions have set peak sound levels and yet others have set sound energy limits measured near the neighbouring residences.

Changing weather and environmental conditions could cause a device that was conforming to peak sound limits when it was erected to exceed the limits a short time later. This variation in peak sound levels due to factors other than device operation creates difficulties for the device operator and the sound limit regulator. Measuring the sound energy of an individual device over a period of time will reduce the variability between consecutive readings compared to measuring peak sound levels over a period of less than a second. However, in an area where several devices are used on neighbouring properties, the sounds from each device would have to be isolated to determine if the limit for an individual device or farm is exceeded. This will require a more expensive sound level meter and more expertise from the operator.

## 5.7 Netting

Netting is often suggested as an alternative to using audible bird scare tactics to protect crops. The physical barrier of a net provides more security for a crop than the scare tactics. However, this protection comes at a higher cost and requires more labour to erect and take down each season. The decision to use netting is largely one of economics, dependent on the amount of berries eaten or damaged multiplied by the berry price minus the cost of harvest and post harvest handling.

For blueberries, installing a net over an entire field that will be harvested by hand is estimated to cost \$7200 per hectare (\$2900/acre) including the initial installation with an total annual cost of \$1890 per hectare (\$765/acre) including interest and depreciation costs. The total annual costs represent 11 to 18 cents per kilogram (5-8¢/lb) of blueberries (BCMAFF 2002a). Some complainants have suggested that this added cost of netting could be passed along to the consumer, however, in our global marketplace farmers compete in the open market without any ability to automatically pass on increased production costs. This is especially true where other production regions have less regulatory requirements.

Blueberries, cherries and grapes are all perennial crops that take a long time to reach maturity, 6-7, 7-10, 4-5 years respectively. These crops require a substantial investment during establishment of the plantings and a long wait before there is a return. This creates a cash flow problem. The high cost of netting to protect crops adds to the cash flow crunch. In the past, farmers were eligible for low interest loans to assist in land development, and bird netting was an eligible cost. Currently there is no assistance for the installation of bird nets to protect crops. In some cases farmers have indicated a willingness to switch from audible bird scare devices to netting if assistance was available.

Netting costs will vary between the crops (BCMAFF 2002b,c). In cherries, the nets are draped over the trees and don't require the same overhead support structure used in blueberry fields. This lowers the capital cost for the system. However, cherry trees are much taller than blueberries and grapes resulting in higher annual labour costs for installing and removing nets. Nets are much more workable in newer cherry plantings that use a training system to restrict the height of the tree to about 4 m (13 ft). Netting older, taller plantings of cherries, while possible, will be much more difficult. Where mechanical harvesters are used in blueberries, the nets must be much higher above the ground (4.5 m or

15 ft) than for hand harvested fields. This will increase both the capital and operating costs.

Another issue with nets is that of birds being entangled in the nets. Farmers must remove these birds from the net to minimize the bird's suffering. Farmers using nets have had visits from the Society for the Prevention of Cruelty to Animals (SPCA) because of complaints from a passerby. In some cases people have stopped and cut the net to release entangled birds or to create an opening for birds inside the nets to get out. The nets require regular repairs from other damage as well.

## 5.8 Other issues

The length and timing of the bird control season impact the amount of noise produced by audible bird scare devices. New varieties of cherries have extended what was about a 2 week bird control period to perhaps 2 months. The same is true of blueberries where the season is 3 or more months in areas where both early and late varieties are grown. The season can be extended further when two different crops are grown such as cherries and blueberries on a farm in Kelowna and blueberries and grapes on neighbouring farms in Surrey.

Many complainants noted that the blueberry harvest coincided with the summer holidays. This is also the same period when the days are long and the weather is warm, times when people would spend time out in their yards and would have the windows open in their homes. Grapes in comparison are harvested in the fall when the days are shorter and sunrise is after 6am and sunset before 8pm resulting in fewer hours of cannon operation per day and outside the summer holiday period. Operation of cannons in the fall generally had less impact on neighbours than summertime operation.

One remedy to the long summer hours would be to have a designated 'off time' for devices during the long summer days. The 'off-time' can be set on most time-clock style device controllers or done manually with the light sensor device controllers. Bird feeding is concentrated in the morning and evenings, which would allow a period around mid-day, where the scare devices may not be required (Roberts 1992). This trend is less apparent on cool, cloudy or wet days and later in the season. Birds may also adapt their behaviour to take advantage of a designated 'off-time'. Furthermore the observations have been made with resident bird populations and may not be valid for larger migrating flocks of birds.

The early morning start of the scare devices is also a common source of complaint. One researcher (Roberts 1992) counted the birds entering

blueberry fields in Pitt Meadows. The most common birds by far were starlings followed by robins and crows. The starlings' feeding pattern varied, however, starlings were not seen in blueberry fields before 6:30 a.m. during the surveys. Robins showed a clear daily pattern. Robins entered fields earlier in the mornings than did starlings, and were most active between 6:00 a.m. and 1:30 p.m. Crows were also observed in fields starting at 6:30 a.m. These observations were limited to the Pitt Meadows area and for one summer in late July and August.

Similar observations of birds feeding in the Okanagan Valley were not identified. The Okanagan Valley is east of Pitt Meadows and has an earlier sunrise. The difference is greatest around June 21 when Kelowna's sunrise is about 18 minutes earlier than Vancouver's.

## 6 Recommendations

The challenge to preserve farming worldwide grows each year as the global population increases at an exponential rate. Although BC is faced with these challenges, it is in a fairly unique position with the establishment of the Agricultural Land Reserve (ALR). For over 25 years the ALR has provided a place where commercial farming is the priority land use. The ALR offers a stable boundary between urban and farm uses where planning can be undertaken to minimize conflict between farmers and their urban neighbours.

The major noise conflict is in the use of propane cannons to protect blueberries, cherries and grapes from birds in the South Coastal and Okanagan Valley regions of the province. The area of cropland requiring protection and the number of people living in or near farming areas have both increased significantly during the last decade. It is likely that the conflicts over the use of noisemakers will also increase unless changes are made to address concerns from both farmers and their neighbours.

### 6.1 Endorse and Add to Current Guidelines

The Farm Practices Board reviewed the use of propane cannons and their report was dated May 1999. Among their recommendations was the suggestion that the ministry adopt a revised set of guidelines (refer to Section 3.1). The Board's "guidelines for the operation of propane cannons" should be endorsed in the Ministry's Wildlife Damage Control Guidelines. Based on the information gathered in 2001 in receiving and investigating complaints several additional points should be added to the Board's suggested guidelines.

#### 6.1.1 Propane Cannons (Category 'A')

Category 'A' bird scare devices create an impulse sound but excluding firearms and shell launchers such as orchard pistols. Propane cannons are the Category 'A' device currently used in BC.

The firing frequency of propane cannons is a common concern to neighbours. The "Wildlife Predation Management Plan", required by the guidelines, allows for a flexible approach to firing frequency. However, some farmers abused it. In order to prevent the regular occurrence of cannons firing too frequently, a definitive and less flexible standard is required for enforcement.

The following recommendation has the effect of halving the number of “shots” that would be allowed. Short intervals between cannon firing sequences will cause birds to quickly acclimate to the sounds reducing effectiveness over time. While the frequency required for scaring birds will vary depending on the birds, crops, alternate feed sources and other factors, the proposed standard is thought to be a reasonable compromise.

**It is recommended that a firing frequency of no more than one firing per 5 minutes for single shot cannons and no more than 11 activations or a maximum of 33 shots in any hour for a multiple shot cannon be included in the Guidelines. Multiple shots from a cannon are regarded as one activation if they occur in less than a 30 second period.**

The separation distance between a propane cannon and neighbouring residence is another issue that needs to be addressed. Informally, the ministry has mandated a 100 m separation distance, as this was the separation distance used in the Pitt Meadows Noise Bylaw. An increased separation distance would effectively lower the sound levels that the closest neighbours are exposed to and decrease the area protected by propane cannons. In this case, the areas of cropland closest to neighbouring residences may go unprotected or require netting. New plantings of crops requiring protection from birds should not be made near residences unless they are protected by netting. New houses built within 150 m of a blueberry field may prevent the use of a propane cannon where it was used earlier.

An increased separation distance may have varying impacts in the different municipalities or regional districts of the province. Areas with smaller parcel sizes or a greater density of rural residents will have more land area where propane cannons could not be used. However, increased separation distance will provide sound level reductions for the neighbours. A neighbouring residence would refer to a residence on a neighbouring property.

Separation distances are intended for both rotating and non-rotating propane cannons.

**It is recommended that a 150 m separation distance between a propane cannon and neighbouring residences be included in the Guidelines.**

Proximity to urban-residential development is also a factor that farmers should consider when planning and carrying out their bird

management program. An increased separation distance from an urban-residential/ALR edge would be appropriate to minimize the impacts of audible bird scare devices outside of the ALR. Where possible, planners and developers should also provide a landscaped buffer or separation distance on the urban side of the ALR edge to minimize the impact on agriculture. This will avoid a “hard edge” where commercial agriculture and urban-residential areas are directly on opposite sides of “the fence”.

**It is recommended that a 300 m separation distance between propane cannon use and an urban-residential/ALR edge be included in the Guidelines.**

### 6.1.2 Category ‘B’ bird scare devices

Category ‘B’ bird scare devices are any other stationary device (not in Category A) which generate sounds that are used to scare or disturb birds. Examples are devices that broadcast birdcalls or other sounds through loudspeakers.

Category B devices are not as loud as propane cannons and therefore require less separation than propane cannons. The guidelines recommended by the Farm Practices Board would also apply to Category B devices as well. No firing frequency is provided, as the sounds are very different than those of propane cannons.

**It is recommended that a 100 m separation distance between a Category B device and neighbouring residences and a 200 m separation distance between a Category B device and an urban-residential/ALR edge be included in the Guidelines.**

### 6.1.3 Both Category A & B Scare Devices

The 6:00 a.m. start time for scare devices was a common source of complaints. In the South Coastal region of the province, observations of bird feedings suggest that starlings begin at 6:30 and robins begin at 6:00 a.m. As starlings are the most common birds feeding on blueberries in the early summer, a 6:30 a.m. start time for scare devices would serve to protect the crop and reduce the noise impacts on neighbouring residences. The Interior of the province has an earlier sunrise and thus a 6:00 a.m. start time for scare device would be retained for that region.



**It is recommended that devices operate only between 6:00 a.m. (6:30 a.m. for South Coastal region) and 8:00 p.m. local time or dawn to dusk, whichever is of lesser duration.**

Identifying the owner or operator of a noisemaker is often a difficult task especially when the devices are operating outside of the permitted hours of use. Marking the devices with 24 hour contact information would make it much easier for the owner to be contacted and have the unit turned off when it is operating outside of the guidelines.

**It is recommended that a requirement for all fixed audible bird scare devices to be legibly marked with the operator's name and 24-hour phone number be included in the Guidelines.**

Not all blueberry farms have resident owners or operators. In cases where the owner/operator does not live within a reasonable distance of a farm using audible scare devices, a local contact person should be established for each farm. This enables a quick response to situations where the guidelines are not being followed.

**It is recommended that a local contact person be established for each farm where the owner/operator does not live within a reasonable distance of their farm(s) where audible bird scare devices are used.**

In addition, a central list of stationary audible bird scare device locations and owners will assist in identifying potential sources of noise that does not meet the guidelines. Grower associations could compile the information and supply it to local governments and police departments. In some areas more than one association would be involved, as not all cannon users are members of grower associations. Alternatively, local governments could compile a registry, which would cover all audible scare devices in the area. The registry would be created annually and updated in season as required.

**It is recommended that industry and/or local governments create a registry of stationary audible bird scare devices annually to be made available to enforcement agencies.**

## 6.2 Develop Provincial Standards for Farm Bylaws

The most common complaints received were all-night firing, 'off-hour' firing and high frequency firing of propane cannons. While these actions are not in compliance with the guidelines, there are no direct penalties involved with not following the guidelines. Neighbours could apply for a formal hearing with the Farm Practices Board to determine that the farm is not following 'normal farm practice'.

Alternatively, local governments could address this issue by incorporating the Guidelines recommended in Section 6.1 into a Farm Bylaw. Farm bylaws incorporating specific standards for the operation of bird scare devices could include tickets for breaching the standards. The tickets or fines are likely to improve compliance for the operation of audible bird scare devices.

**It is recommended that the new Guidelines (Wildlife Damage Control) be adopted as standards for farm bylaws.**

Some complainants have advocated the use sound level limits to regulate the use of audible bird scare devices rather than separation distances. There are several disadvantages of this method. The enforcement of sound level limits would require expensive equipment and technical training that most bylaw enforcement officers do not have. A separation distance is a stable measurement while the sound levels from scare devices will change due to environmental conditions, topography and other factors. This variability in sound levels will create uncertainty for the device operator and the enforcement officer in determining whether the device meets a guideline or bylaw standard. The layperson will understand separation distance much better than a sound level limit as well.

**It is recommended that separation distances be used to regulate noise from audible bird scare devices rather than sound level limits.**

## 6.3 Local government land use planning

Creating a separation distance between a scare device and an urban residential-ALR edge effectively places a noise buffer within the ALR. Where possible, local governments should promote the use of both siting and landscaped buffers on the urban side of the ALR boundary to reduce urban-rural conflict. Establishing development guidelines within development permit areas is one way in which these buffers can be implemented. Solutions for areas where existing urban developments

have no separation or buffer with the ALR boundary should also be sought.

**It is recommended that the ministry encourage local governments to use development permit areas and other means to establish buffers on the urban side of the ALR edge. Guidelines for landscaped and siting buffers should be developed by the ministry to aid local governments in implementing these buffers.**

#### 6.4 Local government audible bird scare device committees

The District of Pitt Meadows uses a committee of local farmers to assist the bylaw enforcement officer in addressing noisemaker complaints. The farmers on the committee have been helpful to address issues that have arisen in achieving compliance with the guidelines. The bylaw enforcement officer is pleased with the results of this process. The membership of the committee could be expanded to include a ministry staff member. Together the committee could also employ a wider range of tools to reduce the conflict over use of audible bird scare devices. These committees could be developed in communities where local governments would like assistance in addressing the issue and would result in a more coordinated response by industry and government.

Improving communication between the farming and non-farming communities would increase the understanding of the entire community. Some callers wanted more information on why noisemakers were used and how they should be used. Notices in the local newspapers describing the upcoming crop and bird control season and the guidelines for noisemaker use will provide local residents with important information.

In many cases, complaints were received where the complainant had not spoken to the farmer regarding the concerns. Also, some farmers do not feel comfortable discussing the issues with their neighbours. An open-house meeting called by the growers association and local government with both residents and farmers invited could lead to improved understanding of the concerns of both sides.

Complainants normally expressed appreciation when their complaints were investigated and the findings were reported back to them. Often a farm visit was required to completely determine whether the guidelines were being followed or not. Timely follow-up on complaints is required. The ministry could provide assistance in the training of bylaw enforcement officers in the types and operation of audible bird scare devices and provide support when complaints are difficult to resolve.

Local committees could plan and carry out any or all of these activities.

**It is recommended that the ministry, local governments and industry form committees for the purpose of improving communication and the following of the Wildlife Damage Control Guidelines.**

## 6.5 Netting fund

Bird nets are one of the options to be considered when planning a bird damage control program. While the nets are generally considered very effective, the high cost both in initial capital and ongoing maintenance is the main factor working against their use. Other issues include the increased labour for erection, maintenance and dealing with entangled birds. Crops such as cherries and mechanically harvested blueberries will be the most expensive to net due to the height requirements.

If the recommendations are implemented for increased separation distances of audible bird scare devices from neighbouring residences (150 m) and particularly the urban-residential/ALR edge (300 m), there will be unprotected crop areas unless they are netted. The proximity of neighbours is one consideration farmers need to include in their crop selection process. If new restrictions on bird scaring devices are placed on existing farms, then they will face increased costs.

To assist farmers with blueberry, cherry or grape cropland within 300 m of an urban-residential/ALR edge, a 'netting fund' could be established. The Agriculture Environment Partnership Initiative Management Committee is a potential source of a netting fund. Local governments could provide leadership in developing innovative funding arrangements whereby the farmers and their neighbours share the cost of netting crops situated close to the ALR boundary.

**It is recommended that one-time funding options be available to farmers for netting cropland for protection from bird predation. Funds may be prioritized to go to existing farms within 300 m of an urban-residential/ALR edge.**

## 7 Concluding Remarks

The use of audible bird scare devices, particularly propane cannons is an ongoing contentious issue in certain parts of the province. Expanding production of blueberries and grapes and increasing numbers of residents in production areas is likely to cause conflict to escalate unless changes are implemented.

This report recognizes the importance of crop protection from birds and supporting farming within the Agricultural Land Reserve. The report also acknowledges the impacts that scare devices have on nearby residents. Understanding and compromise is required from both the farming and non-farming communities.

The recommendations outlines in this report endorse the Wildlife Damage Control Guidelines (for the operation of propane cannons) proposed by the Farm Practices Board with several modifications. The modifications are required to provide more structured guidance to farmers regarding separation distances between devices and neighbouring residents and the frequency of firing propane cannons. Separation distances for other fixed audible bird scare devices are provided. All other guidelines regarding the use of propane cannons would also apply to other fixed scare devices with the exception of firing frequency. Contact information is required on all fixed scare devices to facilitate contact when the devices are not operating within the guidelines.

A more concerted effort is required by farmers to operate the devices within the permitted hours of operation. Local government farm bylaws, which incorporate penalties, would improve compliance.

Local government land use planning can minimize conflict between new developments along the ALR boundary and farming within the ALR. Increased land subdivision or increasing the number of residences permitted within the ALR should also be avoided.

Adoption of the recommendations will reduce the amount of noise neighbours living closest to the scare devices will be exposed to. In urban-residential areas adjacent to the ALR, residents will be exposed to reduced noise as well. Farmers will have fewer options to protect crops that are located close to neighbouring residences and urban-residential/ALR edges. Therefore financial assistance to farmers impacted by these changes is recommended.

## 8 Bibliography

BCMAFF. 2000. Integrated Bird Management - Blueberries. BC Ministry of Agriculture, Food and Fisheries.

BCMAFF. 2002a. Netting for Bird Control in Blueberries-A Decision-making Guide. Blueberry Industry Factsheet. BC Ministry of Agriculture, Food and Fisheries. In Press.

BCMAFF. 2002b. Netting for Bird Control in Cherries-A Decision-making Guide. Cherry Industry Factsheet. BC Ministry of Agriculture, Food and Fisheries. In Press.

BCMAFF. 2002c. Netting for Bird Control in Grapes-A Decision-making Guide. Grape Industry Factsheet. BC Ministry of Agriculture, Food and Fisheries. In Press.

Booth, T.W. 1994. Bird Dispersal Techniques. In *Prevention and Control of Wildlife Damage – 1994*. E19-E23. Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

Campbell, R.W., N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, M.C.E. McNall and G.E.J. Smith. 1997. *The birds of British Columbia*. Vol. 3. UBCPress, Vancouver.

Courtney, S. P. 1998. A literature review on starling (*Sturnus vulgaris*) biology and control methods. Sustainable Ecosystems Institute, Portland Oregon.

Farm Practices Board, 1999. Review of British Columbia Ministry of Agriculture and Food Wildlife Damage Control Guidelines as they apply to the operation of propane cannons. BC Ministry of Agriculture, Food and Fisheries.

Fitzwater, W.D. 1982. Getting physical with birds. In *Proc. American Association of Cereal Chemists*, 31-44, Denver, Colorado, 29 Oct.

Fraser, H.W. , K.H. Fisher and I. Frensch. 1998. Bird Control on Grape and Tender Fruit Farms. Factsheet #98-035. Ontario Ministry of Agriculture, Food and Rural Affairs.

Fraser, H.W. 2000. The Farming and Food Production Protection Act (FFPPA) and Nuisance Complaints. Factsheet #00-033. Ontario Ministry of Agriculture, Food and Rural Affairs.

Freare, C. 1984. *The Starling*. Oxford University Press. Oxford.

Healy, T. 2000. Living Together in Victoria's Rural Areas. Department of Natural Resources and Environment, Victoria, Australia

Johnson, R.J. 1994. American Crows. In *Prevention and Control of Wildlife Damage – 1994*. E33-E40. Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

Johnson, R.J. and J.F. Glahn. 1994. European Starlings. In *Prevention and Control of Wildlife Damage – 1994*. E109-E120. Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

Land Reserve Commission. 1998. Planning for Agriculture-Resource Materials. BC Ministry of Agriculture, Food and Fisheries.

McTavish, G and D. Lee. 2000. Farmer and Neighbour Relations a Framework for Avoiding Farm-Related Conflicts. Ontario Ministry of Agriculture, Food and Rural Affairs.

Moquin, G. 2001. Pers. Communication. Connecticut Department of Agriculture, Hartford, CT. 25 Oct.

National Farmers Union undated. Bird Scarers Code of Practice. United Kingdom.

Payne, M. 2001. Pers. Communication. Michael Payne Environmental Consultants. Norfolk. 21 Nov.

Porter, R.E.R., M.R. Rudge and J.A. McLennan. 1994. *Birds and Small Mammals – A pest control manual*. Manaaki Whenua Press. Lincoln, New Zealand.

Roberts, W.M. 1992. Controlling bird damage to blueberry crops in Pitt Meadows: A study of bird behaviour and crop protection devices. Corporation of the District of Pitt Meadows.

Smith, B.E. 1998. British Columbia Population ...with relationships to Agriculture 1971 to 1996. BC Ministry of Agriculture, Food and Fisheries.

Tracey, J. 2001. Pers. Communication. Vertebrate Pest Research Unit NSW Agriculture, Orange, New South Wales, Australia. 11 Dec.

van Dalssen, K.B. 2001. Noise. Factsheet #200.311-1. BC Ministry of Agriculture, Food and Fisheries.

Vaudry, A.L. 1979. Starlings in British Columbia. Pest Control Notes, Entomology & Plant Pathology Branch. BC Ministry of Agriculture.

Vielvoye, J. 1978. Bird control questionnaire results. Grower Notes, Horticultural Branch, BC Department of Agriculture.

Weber, W. 1983. Bird damage to blueberries in the Lower Fraser Valley. Presentation to the Western Committee on Vertebrate Pests, Penticton, 18 Oct. BC Ministry of Agriculture & Food.