

BIRD MANAGEMENT PLAN OUTLINE

Bird Management Plans for individual properties should offer sufficient information to allow the grower to make informed decisions on dealing with bird problems. The type of information and the level of detail required may vary according to the nature and scale of the problem.

The following checklist provides an indication of the type of information that may need to be collected to assist growers to write their own Bird Management Plan.

More detailed information for growers, especially on options for management actions, can be found in *Guidelines for Best Practice Bird Management*[#].

Property Map

A property map should be prepared detailing:

- different crops
- varietal blocks
- surrounding vegetation
- features around the property
 - powerlines
 - roads
 - dams
 - other watering points
- sensitive areas such as
 - your house(s)
 - neighbour' houses
 - nearby townships
 - horse stables.

Bird Problem

The following information should be prepared and marked on the property map.

Where damage occurs

- where most damage occurs on individual blocks
- bird flight paths
- areas often frequented by birds
- areas of high human activity
- alternative feed
- alternative feed sites

[#] Animal & Plant Control Commission, GPO Box 2834, Adelaide 5001

Which species cause damage

- list the pest species known to visit your property
- determine an order of importance for each species based on damage caused
- determine which species are causing damage in which crop/variety block
- determine a pattern of presence for each species
 - those present most of the year (locals)
 - those present as the crop ripens (visitors)

When damage occurs

- record expected harvest dates for each crop/variety block
- record when damage starts
- compare the data to previous years to establish any patterns

What is the cost of bird damage to the property

Here you should have two components

- a record(s) from previous years experience, and
- an ongoing record of what is happening through *the current year/season*

For each year estimate the following:

- the amount of crop lost due to birds, as a percentage of total crop
- the value of crop lost due to birds, as a dollar value
- the level of reduced quality of fruit that has occurred.

For each year estimate the cost of bird control activities:

- initial cost of equipment
- annual depreciation costs of equipment
- consumable items (fuel, ammunition, etc)
- labour

Add the above sub-totals together to achieve an annual cost to the business.

Management Resources

The following information should be recorded as part of the plan

List the devices you intend to use

- visual scarers eg. hawk-kites, scarecrows, plastic bags on poles, streamers
- noise scarers eg. firearm, gas gun, electronic bird scarers
- noise and movement eg. motor bike without a muffler, model or real aircraft
- exclusion netting
- habitat management eg. decoy feeding, strategic mowing, irrigation
- culling

Management Strategies

The following information should be recorded as part of the plan

Aims

State the aim(s) you seek to achieve:

- a reduction in the loss of crop
- an increase in yield
- a reduction in current control costs.

Management Actions

Briefly describe what you intend to do to achieve your aim(s):

- how you intend to manage the main pest species (as listed above)
- when you intend to manage the problem
- where you intend to manage the problem

Prepare approaches for both 'local' and 'visitor' species detailing:

- the management resources you are going to use
- the actions you are going to implement to maintain the ongoing effectiveness of each resource.

Monitoring

Document the monitoring of

- each management resource that you have used
- each action plan you have implemented
- what needs to be done to improve the effectiveness of both the resource and the action plan.

Monitoring records could include:

- an estimate of loss from the same place(s) within the crop on regular occasions throughout the season/period
- a regular estimate of the number and species of birds feeding on the crop at a particular time of the day.

Communications

The following information should be recorded as part of the plan:

- list of neighbours on your property boundaries and their contact details
- List other sensitive receptors eg. schools, hospitals, churches.

Record what of your information you will supply to those neighbours:

- name(s) of owner/manager
- contact details including mobile and after hours phone numbers.

List what action you intend to take to notify your neighbours:

- prior to the commencement of the season
- during the season
- when there are unusual circumstances

List the method of communication you intend to use:

- phone call
- fax/e-mail
- personal visit
- letterbox drop.
- record the date neighbours were contacted.

List what action you or your staff **will** implement as a result of a complaint by a neighbour.

Record what action you **did** undertake on receiving a complaint from a neighbour.

SAMPLE BIRD MANAGEMENT PLAN

This sample plan has been prepared to assist growers in developing their own property-specific bird management plan. The intention of this document is not to tell growers what to do but rather to suggest the type of information that could be put into a Bird Management Plan. It should enable a grower to demonstrate that a responsible attitude has been adopted with attempts to effectively reduce losses caused by birds and that the potential impacts of the bird control activities beyond the grower's property boundary have been considered. Although this sample plan is for a vineyard, the principles will be similar for most primary production properties.

BIRD MANAGEMENT PLAN FOR "ORANA" VINEYARD

O'Briens Rd, Ashenville SA 5111

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"Orana" is a 25 ha property with 15.5 ha of grapes in a major grape growing district of South Australia. A small seasonal creek runs through the middle of the property. There are open pasture paddocks to the west, native scrub and a powerline on the east, a neighbouring vineyard owner's house to the north-west and a non-producer's residence to the north-east across O'Briens Rd.

1. PROBLEM DEFINITION

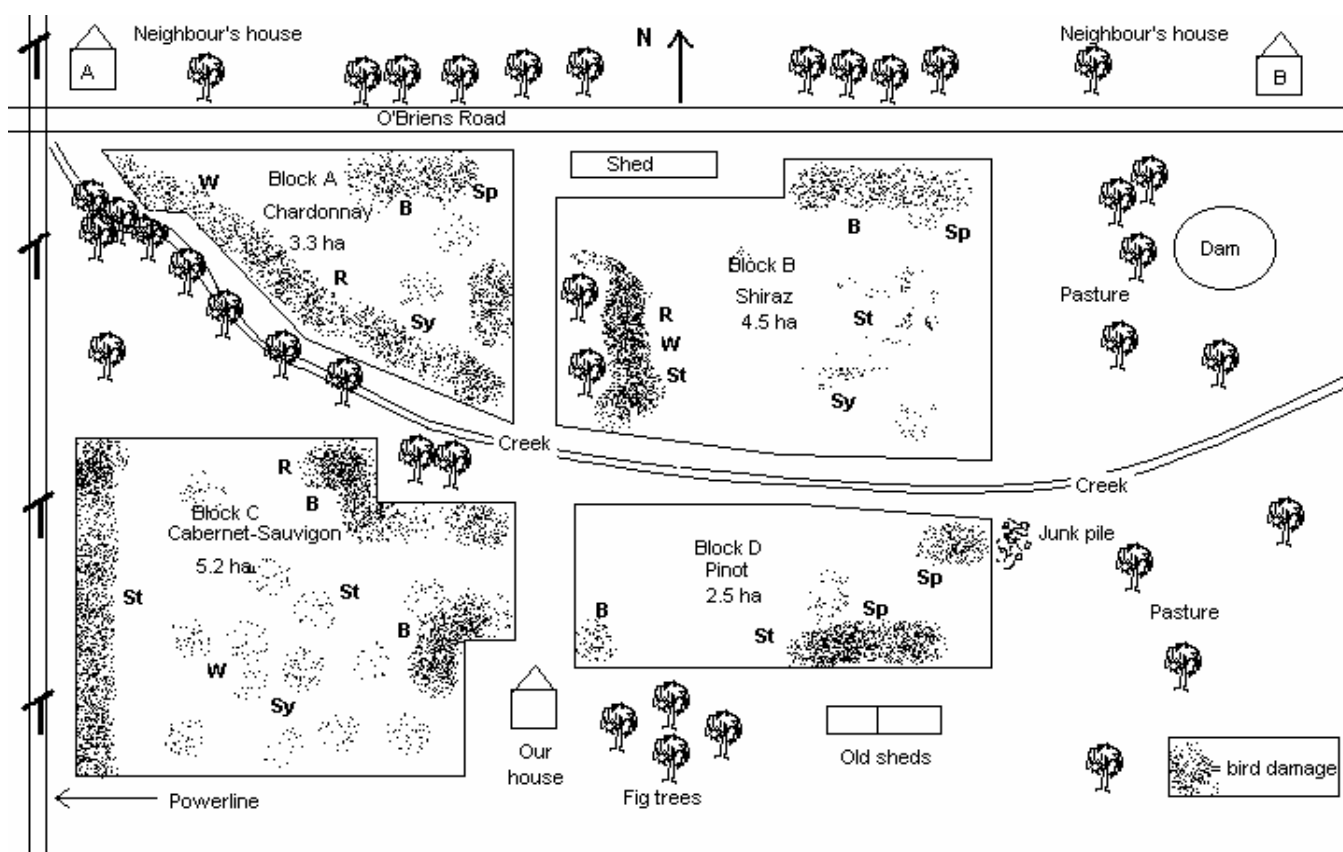
a) Where damage occurs on my property?

So that I can see where to put my major effort and devise suitable management actions, I have marked a map of my property (see over page) with the:

- different varietal blocks,
- features that I think contribute to damage (eg a powerline, patches of native scrub along the creek, other structures birds use as cover before entering the crop (eg road-side feral olives and box-thorns, a junk pile with a lot of old wire netting, an old shed where sparrows and starlings roost in the roof etc), several large isolated trees used as launch sites),
- features that I think reduce damage (eg areas of high human activity near the packing and machinery sheds),
- areas that might offer alternative food (several old fig trees and a pasture paddock adjacent to a dam), and
- sensitive areas such as the location of neighbouring residences.

I know from previous years, which parts of the different blocks get the most damage and which areas which seem to be in birds' flight paths – these have been shown on the map.

"Orana" Property Map



Code to bird species

- B = Blackbird
- R = Rosella
- Sp = Sparrow
- St = Starling
- Sy = Silvereeye

b) Which species cause damage and what damage do they cause?

Last year I spent some time early in the mornings when the grapes were ripening to watch and record who was doing what in the vineyard. This allows me to prioritise species against which to direct my best efforts. I recorded rosellas, wattlebirds, starlings, silvereyes, crows, currawongs, magpies, blackbirds, sparrows, red rumped parrots and goldfinches in the vines. I did not see magpies, red rumped parrots or goldfinches doing any damage. Although I could hear currawongs calling and occasionally saw them in the vines, I decided that they, like the crows, were few in number and I could give them a low priority. I have ranked my impression of the main species causing damage in each block in the table below:

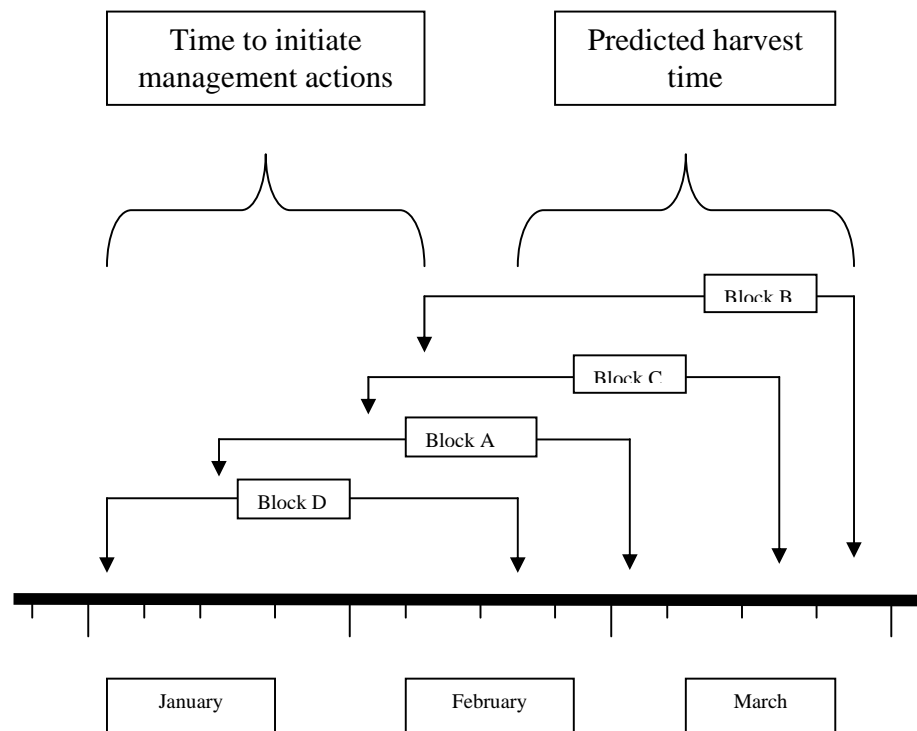
Block	Species	Local or visitor	Priority	Grape damage
A	Wattlebird	V	1	Neat 3-5 mm peck or hole or completely hollowed out fruit leaving skin only
	Rosella	L	1	Bite across fruit, often leaving seeds
	Silvereye	V	2	Small 1-2 mm triangular peck or hole
	Sparrow	L	2	Skin torn, fruit partly squashed, damaged fruit on ground under vine
	Blackbird	L	2	Fruit cleanly plucked off
B	Starling	V	1	Fruit cleanly plucked off
	Silvereye	V	2	
	Rosella	L	3	
	Wattlebird	L	4	
	Blackbird	V	4	
C	Sparrow	L	4	
	Starling	V	1	
	Blackbird	L	2	
	Wattlebird	V	3	
	Rosella	L	3	
D	Silvereye	V	3	
	Sparrow	L	1	
	Starling	V	2	
	Blackbird	L	3	

Starlings and blackbirds together probably account for more individual fruit loss (ie plucked fruit) than do wattlebirds, rosellas, silvereyes and sparrows (pecks, bites and tears) but the damage from these birds probably costs me more because these birds leave the damaged fruit on the vine to be harvested. In addition, the damaged grapes allow rots to develop and spread to undamaged grapes and this can be sufficiently widespread to result in down-grading of fruit at the winery.

c) When does damage start?

The first signs of damage usually appear 6-7 weeks before my average harvest date of each of the four grape varieties on my property. I have noted on a calendar below when to expect damage as this allows me time to prepare to initiate management actions including

- purchasing scaring items eg eye-spot balloons, hawk-kites
- constructing scare devices like scare-crows
- testing existing equipment eg gas gun, electronic scarer
- obtaining a Destruction Permit from National Parks & Wildlife Service[#] in case I need to shoot a few rosellas, and
- talking to my neighbours to give them information about what I will be doing, when it will happen and why I need to do it and to give us the opportunity to sort out any relevant issues.



d) How much do birds cost me.

The amount I am willing to spend on bird management is governed by the losses I am sustaining. This is made up of the value of the yield lost, dockage by the winery for reduced quality and current control costs. Based on last years figures:

[#] An application for a Destruction Permit can be obtained from a Local National Parks & Wildlife Service office or on the net at http://www.environment.sa.gov.au/parks/fauna_permits/pdfs/Destruction.pdf

Yield lost and dockage

Bloc k	Area (ha)	Total yield (t)	Damage (%)	Tonnes lost	\$'s lost
A	3.3	11.6	9	1.1	4,490*
B	4.5	21.7	6	1.3	2,470
C	5.2	20.2	3	0.6	1,100
D	2.5	9.0	5	0.5	600
Total				4.4	8,660

* = This loss includes a \$250/t dockage at the winery for excessive bird damaged fruit and botrytis.

Current control costs

Capital Items	Depreciated cost
1.5 ha Bird netting (10 m wide x 3000 linear m x \$0.30/m ²)	(over 6 yrs) \$1,500
2 x Gas guns with timers @ \$1,000 ea	(over 10 yrs) \$ 200
1 x Shot gun @ \$600	(over 10 yrs) \$ 60
1 x Electronic scarer @ \$1,500	(over 10 yrs) \$ 150
2 x hawk-kites @ \$200 ea	(over 4 yrs) \$ 100
4 x eye-spot balloons @ \$75 ea	(over 4 yrs) \$ 75
Running costs	
1 x person for bird control (4 hrs x 6 days/wk x 11 wks @ \$15.00/hr)	\$3,960
Net application and removal costs (labour + equipment)	\$ 700
800 km mileage (depreciation, fuel, insurance) for 4WD ute @ \$0.58/km	\$ 460
Labour to make 2 scare-crows	\$ 75
Consumable items	
Gas for gas guns	\$ 100
1000 x Shot gun shells [#]	\$ 250
100 x Birdfrite cartridges	\$ 400
1 x 12v battery	\$ 75
2 Reels reflective tape	\$ 35
TOTAL	\$8,140

TOTAL LOSS = \$16,800

[#] This includes requirements for harassment of "local" species throughout the year.

2. MANAGEMENT RESOURCES AVAILABLE

a) Visual scarers

2 hawk-kites
4 eyespot balloons
2 scare-crows
metallic reflective tape
30 plastic shopping-bags on 3 m bamboo poles

b) Noise scarers

2 double bang gas guns with timers
1 side-by-side 12 gauge shot gun
1 electronic bird scarer with 8 speakers

c) Noise and movement scarers

Farm ute and truck with radios
Old motorbike without a muffler
4 red tee-shirts for property staff

d) Exclusion

3,000 m of 10 m wide bird netting

e) Addition labour

1 person employed part-time to run bird control program – person has appropriate drivers licence, gun licence and knowledge of the Code of Practice for Humane Destruction of Birds[#].

f) Other resources

Destruction Permit from NPWS to shoot 20 rosellas if necessary.

3. MANAGEMENT STRATEGIES

a) Aims

In the past, my bird control has been somewhat haphazard, poorly directed, begun too late and lacked evaluation. However, I am aware that several of the species that are a major problem for me are not easy to control and I want to be realistic in setting an objective for my Plan. Therefore my aim is to reduce my dollars lost by approx. \$4,000 and I will attempt to do this by reducing the amount of grapes lost to birds and improving the quality of my produce (fewer bird-pecked grapes going to the winery) without

[#] Available at http://www.environment.sa.gov.au/parks/fauna_permits/pdfs/hum_dest_birds.pdf

significantly increasing my control costs. I want to achieve this in an economic, safe and socially acceptable way.

b) Management actions

The management techniques available to me are deterring and scaring birds, excluding birds and some property management to modify bird habitat or the availability of alternative foods.

I use a different approach with the two types of birds ('locals' & 'visitors') that cause me problems in my vineyard. 'Locals' (rosellas, blackbirds and sparrows) require some management over much of the year because they are permanent residents who appear to make my property part of their territory. I have been harassing rosellas and blackbirds (chasing/disturbing them, shooting at them) throughout the year to discourage them from thinking the vineyard blocks are safe places to feed. I have left them alone elsewhere on the property in the hope that they will learn to use alternative foods there. During winter and spring I have been removing as much of the sparrow harbour as possible and destroying blackbird nests particularly in and around the garden surrounding my house.

On the other hand I can only use short-term control techniques against 'visitors' (red wattlebirds, silvereyes and starlings) because they are only here in large numbers during veraison. Being migratory, they do not have territorial claims on my vineyard and are generally easier to move on than 'local' species.

None-the-less, because most bird management work needs to be done during veraison (one of my busiest times of the year), I will employ someone part-time as a bird-control person (BCP) specifically to run my management program. Generally the person will work for 3 hrs in the morning and 2 hrs in the afternoon, 6 days per week. BCP will start the work in early January, approximately 6-7 weeks before the Pinot harvest.

Scaring

BCP will 'train' birds to be afraid of humans and human activities. The training will involve shooting at or close to birds initially whilst on foot and then from a range of different vehicles used on the property (motorbike, ATV, ute, truck, tractor). BCP will vary the route taken when patrolling the property. To add to the variability, BCP will sometimes wear a red tee-shirt and sometimes not. Sometimes other people working on the property will also wear a red tee-shirt. I have two life-like scarecrows dressed in similar clothes to those BCP wears when shooting. The scarecrows also hold a gun-like stick. They too will sometimes wear a red tee-shirt. They will be moved every 1-2 days and will be kept in a shed when not in use.

On occasions, shooting will be combined with the sudden appearance of novel visual scaring devices such as the eye-spot balloons, plastic shopping bags on bamboo poles or strips of reflective tape tied to similar poles. As with the scare-crows, these devices will be moved regularly. The hawk-kites fly from a 5 m pole mounted on wheels for easy re-location – these too will be used sparingly and only moved to places when it becomes apparent that additional scaring is required.

BCP might use the gas guns or the electronic scarer from time to time but only after the initial 'training' period and only on an infrequent and irregular basis. These devices will be used in accordance with the EPA Guidelines on the Use of Noise Generating Bird Scaring Devices and the relevant local government By-Law. They will only be used when birds are trying to feed in the crops ie usually in the mornings and afternoons and definitely not all day nor every day. The 2 gas guns will be set to fire at approximately the same time so that it sounds like a shooter moving through the area but they will not fire more than 5 times an hour and for not more than 2 or 3 consecutive hours. They will be situated where birds are trying to enter a crop and usually in the crop pointing out rather than out of the crop pointing in. The gas guns will not be left out in the vineyard when not in use. The gas guns will not be used in Block B at all because it is too close to Neighbour B's house. At no time will they face towards Neighbour B's house.

Both the ute and the truck have car radios and from time to time one or both of these will be parked with the radio on near places where bird pressure is high. They will be moved regularly.

BCP will use the old motorbike that does not have a muffler on occasions both when shooting and when patrolling.

BCP will visually assess birds' reactions to all scaring devices on a daily basis. At the first sign that a device's effectiveness has waned ie birds seem to ignore it, its function will be modified or it will be moved or swapped for some other device. In Block B where silvereye damage can be worst, no scaring might be the best option. This is because silvereyes become very 'flighty' when frequently harassed and tend to put one peck only in each grape before moving on to another place in the crop - if not harassed they might stay in the area near cover and not spread damage through the block.

Exclusion

I will again use bird netting to protect the western section of block C against starlings that drop into the vines off the powerline. I will leave the first 3 rows uncovered (as a sacrificial crop) and then cover the next 14 rows, 2 rows at a time. It takes 5 people 4 hours to put the net on and fix the bottom of the net and 4 people 2.5 hours to get it off and pack it away. When necessary, scaring will also be carried out in the eastern part of the block but care will be taken to minimise disturbance on the western side otherwise the starlings may overfly the netting.

I might need to consider purchasing more throw-over netting because in Block B there are several stoney rises where the soil is shallow and leaf cover is always thin and starlings often attack these areas first.

I will use wire bird-netting to keep sparrows and starlings out of the old shed rooves.

Property management

There are 2 aspects of property management available to me to alter bird behaviour. I have been reducing the favourability of certain habitats for sparrows by removing feral olives and box-thorns on the roadside, removing or burying old rolls of wire-netting especially in the junk pile near Block D and bird-proofing the shed rooves. I also want to try to improve habitat for some other species so as to provide an alternative food to lure them away from my grapes. Roughly once a week I will slash a strip through the pasture paddock to lower the vegetation height and make weed seeds available to rosellas. As they are also used to eating apples on nearby orchards, I will try to encourage them by putting chopped apple on the strip and then, if they are accepted, I will try oats or sunflower seeds. By irrigating some small slashed areas close to my dam (and well away from the vines), I will promote weed seed production for rosellas and provide moist ground where starlings can dig for insects.

The old fig trees east of my house produce ripe fruit at about the same time as the Pinot begin to ripen so I will endeavour to not disturb birds that feed on them as they are an attractive alternative to grapes.

c) Monitoring and evaluation

As already stated, BCP will monitor the effectiveness of scaring devices on a daily basis. This will simply entail closely watching (using binoculars) how birds react in the vicinity of each device. In addition, BCP will set up monitoring 'posts'. There will be 4 of these within each block and each will be an area where at least 30 randomly selected bunches will be examined for damage once per week. An estimate will be made of the total number of grapes either missing (plucked off) or damaged (bitten, squashed or torn) for each bunch and an average calculated for all bunches at the 'post'. These records will allow me to regularly monitor how damage is progressing and provide me an opportunity to review the management program if I think too much damage is occurring and a change is required.

Finally, just before each block is harvested, BCP will sample at least 100 bunches taken throughout the block to make a quantitative estimate of the percent grapes lost due to birds. I also intend to keep good records on how much money I spend on my management activities. A record will also be kept of any dockage for bird damaged fruit at the winery. These figures will help me to determine if my aims have been achieved and assist decisions for next year.

4. COMMUNICATION

Pro-active

There are only 2 residences within 500 m of my vineyard. On December 25th I rang neighbour A and neighbour B to tell them that I will need to be initiating my bird management program in the next 2 weeks and I would be making limited use of 2 gas guns, an electronic scarer, shooting and a motorbike without a muffler. I briefly explained why I needed to do this and roughly what I was planning to do, in particular with respect to the gas guns. I could not be precise in saying when and where various

devices would be used as their use depends on changing things around in response birds' reactions to them. I asked if they had any objections to this. Neighbour A had no objections as they have their own vineyard to protect and no-one would be home during the day. Neighbour B on the other hand, who is a non-farming resident, was concerned about noise impacts especially from the use of the gas guns. I agreed not to use them in Block B ie the block closest to their house, not to use them every day (not that I had planned to do so) and not to use them on Sundays. They thought that the electronic scarer would not concern them as much and would not object to its being used at least infrequently in Block B. I suggested they let me know if it did worry them.

Reactive

It is possible that even though I use noise scaring devices infrequently, neighbour B might complain to the Local Council that he is being subjected to amounts and levels of noise from me and other growers in his immediate vicinity that are in excess of the legal limits. If this occurs, I will contact the other growers and with some suggestions as to how we, collectively, could minimise the noise impact on neighbour B. The sorts of suggestions might be to have a roster nominating who could use their noisy devices in the mornings or in the afternoons or on which days, or we could double the time between bangs or halve the number of devices in use at any one time. We may well need to contact our local industry representative to assist in setting up such a co-operative scheme.

GUIDELINES FOR BEST PRACTICE BIRD MANAGEMENT

Dr Ron Sinclair¹
Animal & Plant Control Commission
Department of Water, Land & Biodiversity Conservation

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There is no single solution to the problem of bird damage to crops. This is because features which influence bird species, numbers and feeding behaviour are different on every property. Even within a property, things like distance to birds' roosting or perching sites, land-use next door affecting the supply of alternative foods, and neighbours' bird scaring efforts will affect the level of bird damage. Consequently, what works well in controlling birds on one property may be ineffective on a neighbour's place. Also, the number and variety of pest birds not only vary from place to place according to local conditions, but also with seasons.

The following guidelines are offered to assist growers to develop a bird management plan based on best practice. In deciding which damage reduction techniques to adopt, each grower should use local knowledge and match it with his/her own circumstances.

WORK TO A PLAN

A plan consists of 5 elements; *identification and definition of the problem, setting an objective, reviewing available options, implementing control measures*, and finally *monitoring and evaluating success* measures against your initial objective. Without a plan you could be wasting your time and money because you will not really know if your efforts have been worthwhile.

1. IDENTIFY THE NATURE AND EXTENT OF THE PROBLEM

Before doing anything, and before spending any money, ***understand what is your problem***. It is not just that birds are eating your fruit.

Step 1

It is important to ***identify which bird species are causing the damage***. This can be done only by close observation.

Remember, not all birds seen in crops cause damage. Some are farm-friendly and aid productivity by feeding on insects. Others may be merely passing through. Observing bird behaviour in the crop can give you valuable information as to who is causing the most damage.

Step 2

Determine ***when*** the damage commences, and at what stage of ripening most damage occurs.

Don't wait for damage to occur before taking steps to prevent it. Once birds locate a food source, they will continue to use it as long as they feel safe – and why not?

Step 3

Observe *where* the damage occurs – for example, on outside rows, in patches, close to native vegetation etc or all over the block.

This will help you to know where to concentrate control effort and not waste it in areas where little damage occurs.

Step 4

Note *the form* that the damage takes; for instance in grapes, plucks, pecks, bites, single berries, whole bunches.

This information can help identify species causing damage and the severity of damage with respect to quality – for example, pecked (silveryeye, wattlebird) or bitten (rosella, sparrow) grapes may leak juice onto other grapes encouraging wild fungus growths and a downgrading of quality on receipt at the winery, in contrast to plucked fruit (starlings, crows) which is cleanly removed.

Step 5

Note if pest birds are also *feeding on something else* nearby.

This may offer an alternative food which might be encouraged to decoy or lure birds off your crop.

Step 6

Calculate *how much money* birds are costing you.

Estimate the level of damage (ie % crop lost) and convert this to a dollar value. Where appropriate, allow for any dockage for reduced quality of bird damaged fruit. Add the cost of current control measures (including depreciated cost of equipment and vehicles, running costs like fuel, insurance, ammunition, gas etc and labour, including your own).

2. YOUR PLAN OBJECTIVE

Obviously, you want to reduce damage in your crop to the lowest possible level in the most cost-effective, environmentally acceptable and safe way. But it is important to set a definable objective that you can measure. For example, you may set your sights on reducing losses due to birds by a half and this might be either in fruit loss, fruit quality and/or control or input costs. With damage at a level of only 1% it might be difficult to further reduce the percentage loss without a relatively large dollar investment and the benefit to cost ratio may be poor. If however the loss was closer to 10%, it is likely that increased control costs will be easily recouped because it is easier to reduce damage from 10% to 5% than from 1% to 0.5%.

Your objective should be to increase returns, not to see how many birds you can shoot!

3. REVIEWING MANAGEMENT STRATEGIES

The following are a range of management strategies that could be considered in a plan for reducing damage caused by troublesome birds.

- a) A single long-term form of management. So far, the only single enduring method of damage reduction is the erection of a bird-proof enclosure using permanent netting. While this is probably the most effective form of protection for crops, it is often not feasible because of high costs.
- b) Sustained management. This involves trying to keep pest bird numbers low over a long time by shooting, scaring or some other means. This is only useful if the birds are a small resident population and you will need to know something of the size, distribution, and mobility of the species to be able to assess how successful you have been. On the other hand, if the birds are widespread and/or migratory, then killing a few in or near your crop will have little impact and new birds will quickly take their place.

Remember: If the pest bird is a native species, it may not be possible to get a Destruction Permit which will allow a grower to reduce numbers to such a low level that it has benefit to crop yield. Also, such a permit would not allow the killing of birds outside the property boundary.

- c) Targeted management. This is where control measures are used only when required. Bird numbers are not held down all the time, only when the risk of damage is high. Examples of this are the use of scaring devices or 'throw-over' netting at the time fruit is ripening.
- d) Crisis management. Regrettably, this is what happens most of the time and involves the use of control devices (usually a gas gun) only when the level of bird damage has become intolerable. Unfortunately, by this time it is too late to be of much value because significant damage will already have occurred and the birds will have developed feeding habits that are difficult to change.
- e) Do nothing. This is an option if the costs exceed the benefits that may be achieved from using control measures. This applies especially to situations where control might increase losses and this will be explained in more detail below.

Of these five options, the most viable will usually be targeted management, where damage reduction techniques are applied when the risk of damage is high. However, if the main pests are resident species, such as sparrows, blackbirds or Adelaide rosellas, then sustained control may be more effective.

Issues to Consider before Implementing Management

The main damage reduction actions available to growers are scaring/deterring birds, reducing bird numbers, excluding birds and crop/habitat management to influence resources available to birds. When choosing actions appropriate to your situation consider:

- are they technically possible? For example, permanent nets might not be practical in vineyards.
- will they work? The effectiveness of some noise generating scaring devices for long-term bird control is not proven.
- are they economic? It is essential to assess the benefits and costs of using control measures.
- are they environmentally acceptable? Some techniques (such as the use of repellents) may either harm non-target species or leave residues in both the soil and fruit.
- are they politically and socially acceptable? It is essential to consider the legal implications of using firearms and poisons, and to be aware of the regulations with respect to chemical registration, chemical trespass, animal welfare, destruction of native species, and noise. Be conscious of and considerate about the potential impact of bird management actions on neighbours.

4. IMPLEMENTING MANAGEMENT ACTIONS

Know Your Opponents

Do not treat all pest birds as if they were a single species. You do not treat all weeds as a single species, all insects as a single species or all mildews as a single disease. Birds differ greatly in their ecology and behaviour, and this influences the ways in which they respond to different forms of control. For instance, some species, such as the Adelaide rosella, live in pairs or small family groups and remain within a small area all year round and are therefore hard to shift. Others, such as the starling, form large flocks which are highly mobile and move with the seasons from place to place and are usually easier to move on.

Scaring/Deterring

Scaring simply moves birds away from the immediate vicinity of the scaring device. However, this effect is only temporary and may not have much impact on fruit loss unless a sustained effort is made to deter the pest birds during the time the fruit is ripening. In fact, unless the scaring process is truly effective, scaring devices may have the effect of increasing fruit loss. For example, startled birds might leave or drop fruit they are eating every time a scarer fires off only to start on another when they return later. If left undisturbed, they might eat their fill from the one fruit or bunch. Also, the increased

amount of flying caused by the disturbance will mean the birds use more energy and so become even hungrier.

Understand what scares birds. It is the unusual, the sudden, the unexpected, the unknown or unfamiliar, or something that mimics a predator or the response to a predator.

Even the simplest form of bird scarer will be effective – for a time. But birds are inquisitive, and each time they encounter a scarer they learn more about it. After a while they learn which devices are a real threat and which can be ignored.

Excessive use of a non-threatening scarer could be self-defeating. Birds might associate such a scarer with food and its continued use might attract rather than repel birds.

Visual Scarers

The most common are scare-crows, plastic shopping bags, plastic hawk silhouettes, kites in the shape of birds of prey, reflective mirrors or tape, balloons displaying big eyes, coloured bunting and spinning metal strips.

While these may have some value as scarers, they all suffer from certain disadvantages. For instance, kites need some breeze to keep them aloft, but when birds are most active at dawn and dusk, winds may be absent. On the other hand, gas-filled balloons can only be used in still conditions. Some silhouettes on the market are not of Australian birds of prey and so may not be recognised as being predatory.

In general, such scarers are only effective for a few days, after which the birds learn that they pose no real threat.

Scaring with Noise

The most common noise scarers rely on startling or fear for their scaring effect. These devices produce explosive bangs or electronically generated screeches, tweets, pops, whizzes, sirens, wails and hoots. Most devices emit the sounds at regular intervals, but one device is only activated when birds entering the crop are detected by radar.

Some scaring devices produce sounds which supposedly deter birds by ‘jamming’ their communications and by causing disorientation. Some older devices used ultrasound, although they were of little use because birds have little or hearing in that range.

Scaring with Predators

Bioacoustic sounds include distress or alarm calls of pest species in response to the presence of a predator and calls of predatory species. Some of these are actual recordings whilst others are electronically generated.

Growers need to be wary of claims made by some manufacturers of devices emitting bioacoustic sounds. Bird calls are extremely complex and are often unique to a particular region. Recorded or electronically generated calls may lose their biological detail when replayed through mechanical speakers, and there is little published proof that birds understand such recordings. Birds may merely regard the sounds as something unknown or unfamiliar in their surrounding and gradually become accustomed to them.

The use of predatory birds has sometimes been considered by growers. However, falconry is not permitted in South Australia, and besides, it is labour intensive and unlikely to be economically viable. Similarly, attracting naturally occurring predators to cropping areas and keeping there long enough to be beneficial is extremely difficult.

Scaring with Sounds and Movement

The use of motor bikes without mufflers, model aircraft, ultra-lights or full-sized aircraft to chase birds are examples of combining sound with movement. These devices can be effective however, the use of aircraft in particular, is very expensive especially if there is an accident. In addition, as mentioned above, if the birds are only scared away temporarily and fly considerable distances before they return to the crop, there may be more damage than if no control had been applied.

Remember, birds become accustomed to, and ignore, repeated sounds which represent no real threat. As an illustration, how often do you see birds feeding on grass verges adjacent to noisy roads and airport runways.

Killing Birds

It is commonly believed that every dead bird is one less to eat fruit and that reducing bird populations is a worthwhile cause. Shooting is the only legal way of killing birds but it is very labour intensive and rarely effective - or cost effective. Other birds soon move in to replace those that have been killed so to achieve any long-term reduction in bird numbers it would be necessary to reduce bird populations by at least 90 percent. Rarely would this be possible because of physical, biological, economic, legal and social reasons.

Shooting

Shooting should be considered as just one activity in a broader integrated bird-control program. It is a training technique to educate birds to associate the sharp, sudden noise with real danger, and real danger with humans and human activities. It should therefore be started before other scaring tactics which can be

introduced later to reinforce its scaring effects. If, for example, shooting is only initiated after birds have become used to a gas gun, they will not associate the loud bang with a real threat and the shooting will have much less of a scaring effect.

Whenever shooting is undertaken, it must be done in compliance with the Code of Practice for the Humane Destruction of Birds² and if protected native species are involved, the grower must have a valid Destruction Permit from National Parks and Wildlife, SA³.

Despite some old myths, birds do not seem to be afraid of bird carcasses so there is little point in trying to scare them away by hanging up their dead relatives.

Trapping

This is rarely suitable for use in vineyards and orchards. It is time-consuming, costly and slow, and there is no evidence that traps can take sufficient birds to have a significant impact on damage levels. Mist nets are illegal in South Australia, though National Parks and Wildlife, SA does permit a few trained individuals to work commercially on rural properties.

Exclusion

Exclusion netting is probably the best way of protecting fruit and it has become more popular, and more affordable, with the availability of strong, durable, UV-stabilised plastic nets. Nets are either permanently installed supported on a pole and cable or wire structure or used as throw-over cover supported by the crop foliage and only applied for a relatively short time each year.

Netting is not an economic solution for all situations. It can be justified when the increase in returns exceeds the cost of the netting. In the past this has mostly been with high value crops subjected to high levels of damage. However, in recent years the cost of throw-over netting has significantly reduced and new techniques have been developed for its application to and removal from both vine and tree crops. Throw-over net can cover single rows, multiple rows or even whole blocks. In fact, whole block cover for grapes is the cheapest per unit area and it allows spray equipment to be used under the net - areas exceeding 10 ha have been covered as a whole block. Skilled application teams of 4-5 people can cover between 5 and 8 ha of grapes per day. With care, the net can last for 6 to 8 seasons.

In future, netting may be the only way of protecting fruit given increasing concerns about the use of chemicals, noise-generating scaring devices and inhumane treatment of animals.

² Available at http://www.environment.sa.gov.au/parks/fauna_permits/pdfs/hum_dest_birds.pdf

³ Application available at http://www.environment.sa.gov.au/parks/fauna_permits/pdfs/Destruction.pdf

Crop/Habitat Management In Vineyards and Orchards

The location, fruit variety and surrounding habitat of rural properties are factors which can influence bird behaviour.

- ***Crop type.*** Being an isolated grower or having fruit which ripens early or late, can mean birds will concentrate on your crop. Where bird damage is likely to be severe, grow varieties which mature at about the same time as other growers to ‘dilute’ the damage.
- ***Location.*** Fruit blocks adjacent to native vegetation are likely to get higher losses, as are those adjacent to or crossed by power lines.
- ***Adjacent land.*** Land use adjacent to fruit blocks and surrounding the property is important as it influences the availability of alternative food. For example, there is a strong association between grazing stock and starlings, the birds feeding on soil insects disturbed by stock.
- ***Decoy feeding.*** The aim is to lure birds away from a crop to an alternative source of food. **The decoy food must be highly palatable and at least as nutritionally attractive as the crop otherwise there is little reason for birds to be attracted to it. The food needs to be available just before the crop becomes attractive to birds so that feeding patterns are established on the decoy rather than on the crop.** Scaring tactics need to be concentrated in the crop and kept well away from the decoy site.

There may be situations where the habitat can be manipulated to provide an attractive alternative food source. For example, irrigating pasture can make soil insects available to starlings. Rosellas too might be encouraged to feed on nearby pasture if some preferred food (such as sub clover or sour sobs) is available. Because these birds do not feed in long vegetation, periodically mowing strips of pasture or strategically grazing livestock can provide short pasture where food would be accessible to them.

The pasture sward grown between the rows of the crop can also influence damage levels. It can either offer an alternative (decoy) food or be an attractant that results in birds learning that the crop is a good place to find food and when the crop matures, it just becomes another course on the birds’ menu.

In some areas, growers have found particular varieties of fruit (eg figs and mulberries) that ripen just before their crops and they have strategically planted these ‘decoys’ to lure birds away.

GENERAL PRINCIPLES OF MANAGEMENT ACTIONS

Effectively keeping birds away from maturing crops is difficult and it requires a concerted effort and determination. It is usually only a matter of time before birds get used to almost any management action (apart from carefully applied netting). To prolong the effectiveness of a bird management program, it is important that growers adopt a multi-faceted approach to their management, including keeping a close eye on bird activity in their crop. The following are important points for a grower to consider:

- **Identify the species** that are causing damage.
- Develop a management plan which **targets the major pest species**. Do not assume that all bird species react in the same way to a particular control technique.
- With **sedentary local species** a variety of controls **used throughout the year** will reinforce the message that the crop area is not a safe place to feed.
- With **migratory visitor species** (eg starlings, wattlebirds) control must start when the **birds first appear**. They cause problems at about the same time each year, so be prepared and don't wait until fruit loss has become obvious.
- Birds learn feeding behaviours from other birds so **don't let damage get bad** before you do something about it.
- Remember **what scares birds**. Watch how they react to your management actions and keep changing what you do.
- To prolong the usefulness of scaring devices, use **many different types** - but not all at once. As soon as birds start to become accustomed to one type replace it with another.
- **Shooting** should be done **before** other scarers are used and its purpose is to **train** the birds to fear humans and human activities.

- **Use psychology** to beat the birds; vary the locations from which you shoot (different places, different vehicles), sometimes from hides, other times from out in the open. The shooter can sometimes wear brightly coloured clothing to be obvious but not all the time. Sometimes other staff on the property can wear the colourful clothing. The idea is to keep birds wary of everyone on the property and their activities .
- Leave **vehicles with their radio on** parked at different places and times around the crop so that there are human voices and music playing irregularly.
- Ensure that the **operating rate** of noise scaring devices is **low** to maintain the 'startle' effect. Several volleys in quick succession followed by a break of about 10-15 minutes seems best. If the scaring effect appears to be wearing off, **don't increase the rate of firing**. Remove the device and replace it with something completely different.
- **Limit the time** when scarers operate to those hours when birds are most actively feeding in the crop.
- **Scarecrows** can help, but make them **life-like, move them regularly** and **dress** them like the shooter.
- **Remove from sight** any scarer which has lost its effectiveness and don't leave them out all year expecting them to work when the crop ripens.
- **Camouflage** scarers that have no visual impact to stop birds learning about them. For example, hide gas guns in drums or in boxes and have other empty ones around the crop to confuse the birds.
- Rather than placing scarers at the edge of the crop pointing inwards (so pushing the birds further into the crop), place some scarers near the centre of the crop pointing outwards.
- Learn **where** birds enter the property, and place scarers to intercept their flight paths.

- If **netting** is to be used on only a few outside rows, **leave the first 2 or 3 rows uncovered**, then apply the netting. Keep control activities away from these outside rows as they will act as a sacrificial or decoy crop and stop birds foraging further in.
- **Seek the collaboration of neighbours**, so that they use measures which complement yours.
- **Be considerate of neighbours**. Avoid placing noise-generating devices near or pointing at houses, and ensure that they do not operate before 7.00 am or after 8.00 pm.
- Watch what **other foods birds eat** to indicate what might be useful as a **decoy** crop.
- Bird problems occur at the busiest time of the year for all growers, so consider **employing someone** (even part-time) just to run your bird control program.

5. MONITORING AND EVALUATING YOUR SUCCESS (OR FAILURE)

If you spend money and effort trying to reduce damage, it really does make sense to measure the effectiveness of your actions. Do not just rely on the number of birds seen around your property as a measure of success as it may bear a poor relationship with the actual amount of damage. Bird activity may be hard to see (silvereyes, blackbirds and rosellas) or they may enter the crop very early or late in the day and not be seen. There is no substitute for going into the crop and having a good look, and even better is looking in the same place on a regular basis. Better still is to mark small branches or canes with a piece of tape so the same fruit can be checked each time. Perhaps this monitoring can be worked in when monitoring for crop maturity through the season and prior to harvest.

If, at the beginning of the season, you set a realistic target as part of your plan (eg reducing losses due to birds by 50 percent), after harvest you can look at your yields and determine whether or not your management actions were successful. This comparison will tell you more about the success of your program than just knowing that you shot 150 starlings or that you ran your gas gun for an average of 10 hours per day for 6 weeks. It will also help you to set a target for next year and make decisions on the usefulness or otherwise of various management options.

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