



Landcare Research
Manaaki Whenua

Priorities for Research on Improving Management of Rooks (*Corvus frugilegus*)



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Priorities for Research on Improving Management of Rooks (*Corvus frugilegus*)

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Summary

Project and Client

- Tools for effective rook management are limited. Councils involved in rook management have developed a comprehensive list of research needs. Horizons Regional Council (HRC) sought advice from Landcare Research (EnviroLink project 994-HZLC83) on prioritising these needs and developing high-level research briefs for the highest priority projects.

Objectives

- Facilitate a workshop for councils involved in rook management to review research needs and identify the highest priority projects
- Develop high-level research briefs for the highest priority projects

Methods

- Summaries of research needs identified at the two most recent rook workshops were circulated to participants as background information.
- A one-day workshop to identify research priorities was held at Landcare Research, Palmerston North on 31 May 2011 involving Horizons, Greater Wellington, Hawke's Bay, Waikato and Bay of Plenty regional council rook management staff.
- Additional input was solicited from councils by email to assist with refining of research topics.

Results

Four aspects of rook management were identified where research and synthesis of information were considered to have the greatest potential to improve the efficiency and effectiveness of rook management. These areas were:

- Surveillance and detection of rooks
- Movements of rooks
- Changes in rook population characteristics as indicators of success
- Alternative control techniques at low rook density

Conclusions

- Addressing the four key research priorities would improve the efficiency and effectiveness of rook control and enable better-informed decisions about the goals of rook management, sustained control or eradication.

- Envirolink is the most obvious and immediately likely source of funding for those key research projects that can be considered as advice, but councils may need to fund those areas that involve primarily research themselves (through a consortium approach), through application via farmer groups to the Sustainable Farming Fund, or by approaching other suitable funding agencies.

Recommendations

Regional councils should:

- Agree jointly on priorities for support and/or timing among the four key research topics
- Discuss and agree on funding mechanisms for the various research topics
- Approach appropriate research providers to develop funding proposals jointly

1 Introduction

The actual or potential impact of rooks (*Corvus frugilegus*) on arable farmers is generally accepted by regional councils as a cause for concern and a reason for controlling rook populations (Cowan et al. 2010). Tools for effective rook management are, however, limited. Councils involved in rook management have previously developed a comprehensive list of research needs. Horizons Regional Council (HRC) sought advice from Landcare Research (Envirolink project 994-HZLC83) on prioritising these needs and developing high-level research briefs for the highest priority projects.

2 Background

Regional councils of areas affected by rooks met recently and identified key information gaps that are barriers to successful rook control. This project seeks to build on that exercise by confirming research priorities identified in previous exercises and enabling action to address those research priorities by developing high-level project briefs for the projects, including how the research will potentially improve management of rooks, recommendations of research funding, and potential timelines to complete the research. By having regional councils who control rooks involved, this project provides for a coordinated approach to research on rooks that will benefit management action and avoid duplication of research effort.

3 Objectives

- Facilitate a workshop for councils involved in rook management to review research needs and identify the highest priority projects
- Develop high-level research briefs for the highest priority projects

4 Methods

Summaries of research needs identified at the two most recent rook workshops were circulated to participants as background information. These were Rook Workshop notes, Taupo, April 2010, and Rook Workshop notes, NPCA Technology Transfer meeting, Wellington, 24 November 2010 (Appendix 1). A one-day workshop to identify research priorities was held at Landcare Research, Palmerston North on 31 May 2011 involving Horizons, Greater Wellington, Hawke's Bay, Waikato and Bay of Plenty regional council rook management staff (Appendix 2). Based on input from council staff involved in rook management prior to the workshop, research needs were reviewed in the following areas:

- Justifying rook management
- Finding rooks/surveillance
- Rook biology
 - movements, dispersal

- response to control – behaviour, reproduction
- Rook control
 - ground control
 - aerial control
- Measuring success

Facilitated discussion among participants was used to generate a list of research areas with the potential to make the greatest difference to the efficiency and effectiveness of rook management. These were then assigned a priority rank (1 = highest, 2 = next highest, etc.) separately by participants from councils with long-standing rook populations, and those with emerging rook problems. The sum of ranks was then used to identify the top three priorities for each group of councils.

After the workshop, additional input was solicited from councils by email to assist with refining of research topics.

5 Results

Notes from the review of rook research are summarised in Appendix 3. Four aspects of rook management were identified where research and synthesis of information were considered to have the greatest potential to improve the efficiency and effectiveness of rook management. These areas were (in no particular order);

- Better surveillance and detection tools
- Movements of rooks
- Changes in rook population characteristics as indicators of success
- Alternative control techniques at low rook density

5.1 Better surveillance and detection tools for rooks

- A. *In regions with well-established rook populations, the research focus would be on providing some certainty about how effective current methods are at identifying all rook populations/rookeries and how any deficiencies in detection could be addressed cost effectively.*

The key to cost-effective sustained control is efficient targeting of rooks, so effective location of rookeries and birds is essential. This will become even more important as those councils that currently have widespread rook populations move from control to eradication. The councils involved have large historical datasets on rook locations from existing surveys and stakeholder information. The first step in identifying whether improvements are needed to the effectiveness of current methods and/or whether new approaches offer additional benefits is to analyse and report on these data. The recommendations from that

exercise should then form the basis for the next stage in the project, which might include field measurements of the efficacy of current survey methods and/or the field testing of improved or new approaches to rook survey. The initial advice in terms of data analysis and reporting could be funded through a medium size (\$20K) Envirolink grant, and could be completed in 6 months, provided councils were prepared to make data available and help with its interpretation. Landcare Research has the capability to undertake this project.

- B. In regions with recent rook infestations and/or scattered populations, the research focus would be on how to find rooks more cost-effectively.*

As with project 5.1.A, the first step in this project should be an analysis and review of data from existing surveys. Some of the findings of project 5.1.A will be highly relevant to this project and both sets of analysis may be able to be undertaken within the same Envirolink grant. The feasibility of doing that would need to be assessed.

Finding rooks at low density would also benefit from the development of a spatial model of rooks that would be used to simulate the effectiveness of various control methods as a means of designing more effective sampling strategies for field testing. The initial review of available information about rook movements could be done as part of a medium Envirolink grant (\$20K) jointly between this project and project 5.3, and be completed in 6 months, provided councils were prepared to make data available and help with its interpretation. Landcare Research has the capability to undertake this project, and has already undertaken similar research, for example optimised approaches to detecting invading starlings in Western Australia (Anderson 2009).

5.2 Alternative control techniques at low density

- A. The research focus would be on new techniques for controlling rooks at low density (and urban rook populations).*
- B. A review should be undertaken of existing trial data (in conjunction with Dave Hunter, ECAN) and any other unpublished trial work in the regions.*

Rooks at low density are considered hard to control using current techniques. Cost effective new approaches or improvements to existing methods are therefore likely to provide significant benefits. Both these projects require an initial review of existing information in reports, published literature (particularly in relation to control of Corvids in general) and that held by councils. This could be done with a medium (\$20K) Envirolink grant, and completed in 6 months, provided councils were prepared to make data available and help with its interpretation. Landcare Research has the capability to undertake this project.

Implementation of any recommendations from the review about testing of new baits or methods would require funding. Since Envirolink does not fund research per se, funding would need to be found elsewhere – possibly from a consortium of councils or by development of a farmer group that could form the basis of an application to the Sustainable Farming Fund (www.maf.govt.nz/agriculture/funding-programmes/sustainable-farming-fund.aspx). There may be funding opportunities from the government science fund

through the Ministry for Science and Innovation, but this is likely to remain unclear until late 2011 or 2012 because of the recent restructuring of the science funding system.

5.3 Rook movements

- A. *The research focus would be on better understanding of natural long distance dispersal by rooks and providing more information about distances moved while foraging, and at different times of year.*
- B. *The research focus would be on effects of rook control on movement patterns and dispersal (fragmentation) – both short-term effects and long-term dispersal.*

Better understanding of rook movements will feed directly into project 5.1.B about detecting rooks and also provide essential information to improve control strategies at rookeries to minimise fragmentation and to improve current ground baiting strategies. While there is value in the review of rook movements suggested as a joint Envirolink initiative between this project and project 5.1.B, this project will almost certainly require additional research involving a combination of tagging, radio-tracking, and DNA analysis of rooks. Long-distance dispersal may be more cost-effectively explored using genetic analysis than radio-tracking; this would involve measuring the degree of relatedness between rook populations as a measure of dispersal (this approach is currently being used on possums). Radio-tracking, particularly with GPS transmitters, is likely to be more useful for characterising short-term and seasonal movements, and for examining the effects of control in fragmenting rookeries.

The most cost-effective approach to this would be through one or more PhD projects. The time frame for this would be 3 years (although information would become available progressively during that time). The cost per PhD student would be about \$30K/yr for stipend and fees, plus \$10–20K/year operating costs for equipment, travel, DNA typing, etc. A possibility would be to run the PhD projects through the Centre for Biodiversity and Biosecurity, a joint initiative between the University of Auckland and Landcare Research. Co-funding for the project might be accessed both through the University (PhD stipends for high quality students) and Landcare Research (operating costs, equipment, radio-transmitters). DNA analysis could be undertaken through Landcare Research's specialist wildlife DNA laboratory, EcoGene (www.ecogene.co.nz).

5.4 Changes in rook population characteristics as indicators of success

- A. *The research focus would be on assessing by modelling how changes in sex ratio and average age of the population could lead to collapse of rook populations (also need to confirm that changes in sex ratio and age structure are real).*

This project will test for the suspected collapse of rook populations subject to sustained control by nest baiting and identify the necessary control targets to achieve rookery collapse. The project could be undertaken using a medium (\$20K) Envirolink grant and completed in 6 months, provided councils were prepared to make data available and help with its interpretation. Landcare Research has the capability to undertake this project.

- B. *The research focus would be on how changes in age structure and sex ratio, and past, current and predicted distributions can be used to provide evidence of successful rook control.*

The predictions of current and potential distributions at regional level would build on the modelling work done in the report by Cowan et al (2010). It could be completed with a medium (up to \$20K) Envirolink grant within 6 months, depending on the exact scope of the exercise. Landcare Research has the capability to undertake this project.

The utility of changes in age and sex ratios as indicators of success would require research to demonstrate that the current suspected changes are actually occurring and occur across several sites. The cost of this would depend on the willingness of councils to collect samples of rooks for sex determination and aging, and the techniques used for sexing and aging. For example, the cost of sexing rooks from DNA would be about \$30/sample. The information collected would also be used to improve the modelling in project 5.4.A.

6 Conclusions

If regional councils were to address the four key research priorities identified in this review, they would be in a much stronger position to conduct efficient and effective rook control and to make more informed decisions about the goals of rook management, sustained control or eradication. Envirolink is the most obvious and immediately likely source of funding for the key research projects that can be considered as advice, but councils may need to jointly fund those areas that involve primarily research themselves (through a consortium approach) or through application via farmer groups to the Sustainable Farming Fund or other suitable funding agency.

7 Recommendations

Regional councils should:

- agree jointly on any priorities for support and/or timing among the four key research topics
- discuss and agree on funding mechanisms for the various research topics
- approach appropriate research providers to develop funding proposals jointly.

8 Acknowledgements

Thanks are due to regional council staff for sharing their extensive knowledge of rooks and rook management. Al Glen reviewed the draft report, which was edited by Anne Austin.

9 References

Anderson DP 2009. Modelling the probability of starling (*Sturnus vulgaris*) eradication in Western Australia. Landcare Research Contract Report 0910/061.

Cowan P, Booth L, Duckworth J, Glen A 2010. Future options for the management of rooks (*Corvus frugilegus*). Envirolink Project HZLC75 for Horizons Regional Council. Landcare Research Contract Report LC1011/052.

Appendix 1 - Rook Workshop, Taupo, April 2010

Waikato Regional Council Environment Waikato

RPMS Rule – In strategy since Mid 90s. Control undertaken since 1997, annual control. Similar numbers of birds each season. Estimates in 2009 of 250 birds. Until last year all control and surveillance was contracted out to EcoFX. Changed due to budget constraints and staff knowledge gap – desire to increase staff knowledge. Now – all surveillance in house, the control work contracted out. RPMS goal is to achieve zero density of know populations by 2013, and to reduce towards zero density any new infestations in the region.

2009 Surveillance / Awareness campaign

Mail-out rooks sighting forms and online sighting forms.

Engaged public

Called those who reported sightings. Followed up with site inspections for rooks. Rookeries that were found had helicopter confirmation flight to check if breeding.

Difficulties

Surveillance going on during roosting stage rather than breeding stage. Birds dispersing.

Control methods

First flight is to verify that birds are using nests for breeding e.g. eggs present

3 flights to do control using DRC with gun

First flight: treat nests with eggs

Second flight similar

Last flight: do all, chicks and eggs.

Unusual results

Saw unusual results last year

Breeding areas identified, nests were built but not used.

Other sites eggs present after surveillance flight but abandoned before control. This occurred in 5 separate sites and late in breeding season.

The birds are staggering egg laying.

Birds are splintering into small groups for breeding even though no pressure had been put on them. Some sites were abandoned even with no previous control. Was this a learned behaviour from previous programmes / prior years or an innate behaviour/strategy?

Rooks on Hawkes Bay / Waikato boundary. In Miranda / Hunua boundary.

Issues: Not all landowners received awareness mailer. But awareness campaign worked well.

Ground control not good option in Waikato. – Due to small numbers birds.

Two of EW rookeries are in residential areas. Difficult to control but good media interest.

Maybe rooks used to EW doing control work and we need to not do some for a year?

Not sure if control methods suitable for low density populations.

Mostly male birds in Waikato?

Auckland Regional Council

In 15 years 3 rook incursions. First year 1995.

1st one was a pair in Helensville. Applying DRC into nest. Killed female. Male never entered nest. Didn't get male. Rook report 2 months later with Magpies. Shot them.

10 years later. Helensville one nest.

1 sighting in South Auckland.

Rely on public to report. Should push it more publicly with awareness.

Environment Bay of Plenty

New to Rook control. Had sightings around Rotorua for 20 years, solitary birds. Early 90s had DOC officers report them. First rooks Kaitu in 1996 – 4 rooks. Then shortly after in Galitea. About 6 to 10 birds. Poisoned one nest at Galitea. Never too serious, shot one or two. Not until 2006 when change of manager - Greg Corbett. Lochinvar and Rangatike rooks sighted. 2006 got serious when found breeding population at Rangatike 30 to 40 birds. Late finding. So decided no control. Learnt since then. 2006 to 2007 watched birds, built relationship with block owner. Did aerial control in spring 2007 with EcoFX. 70 nests found poisoned 10/12. Found 5 or 6 dead birds under trees. Monitored during summer, birds disappeared. Reports early Autumn 2008 Lochinvar station of 70 to 80 birds. Follow up found birds less than 1km from Lochinvar station. Ground poison those in 2008. 47 dead rooks. Real success. 2009 Birds gone from Lochinvar over in Rangitike. Autumn 2009 hammering grass grub. Poisoned 50 birds in 2 groups. 18 dead under rookery. Spring 2009

surveillance about 6 nests. Storm in October snow damage and nests were destroyed. Some birds re-nested and poisoned 4 nests on Lochinvar 2 on Rangitike station. Believe population currently about 30/50 birds. Rewriting strategy at moment was surveillance now eradication. Birds on edge of Rotorua, unsuccessful in control last spring with helicopter. Strange season. Small population of 7 birds in Rotorua, some in East Taupo. 1 or two in Galatea. Don't get reports in now. Rook awareness in spring. Never seen rooks in natives. See them in poplars, radiata, eucalyptus. After October storm when nests and trees got hammered. Saw some birds come in from South side to North to nest. Tucked away in trees. More nests than the speaker could see from ground were found when control done. Birds liked bread and dripping for 3 or 4 days. Hoping this year they will be back in same areas. Ground baiting tend to do on complaint basis.

Hawke's Bay Regional Council

Manage all Councils Animal control programme excl. AHB.

Look at Aerial & ground poisoning,

Rook management areas – Divided into two zones,

Eradication zone & Controlled zone

Eradication Zone: 27 active rookeries. Control zone: 118 active rookeries.

Make own DRC tubes. Waiting for baits to turn up so made own. Self-sufficient.

Objective is to aerial treat all known rookeries around the bay annually. Have done for 3 years. Up until 4 years ago the rook budget not increased. Start in eradication zone and moved down to controlled zone until budget runs out. Aerial company very efficient. Ground poisoning to reduce number with least amount time spent. To date have poisoned around 2,500 birds. 500 birds on boundary recently.

Ring everyone on their list each year. Prior to season. If active or not. Hawkes Bay Helicopters have contract. Helpful and will ask farmers and provide info at no extra cost. No repeat visits. Treat all nests plus Bait on branches sometimes, where they see bird guano. Last season rookery treated. 59 hours flying, \$80,000. Used to do survey with Robbie chopper. Dangerous. Guy hangs sitting in chair not hanging in harness. Use old plastic guns.

Total 1,788 nests - 997 active 791 inactive nests. Treat everything in rookery. Chicks and eggs treat everything, active or new. 666 eggs, 331 were chicks. High side of eggs. 4.5 nests per rookery, 8.1 active nests per rookery, average inactive nests per rookery 6.3. Active nests in the eradication zone over years downward spiral getting better at it. Control zone 07/08 and 08/09 treated the same.

Lot of situations now when going into rookeries in eradication zone, more so, as been treating it hard for a number of years. Come in 60 birds fly out might be 4 nests there, 4 active nests.

Important to keep gel moving. Using 5% dose. 10% dose a lot of DRC in tube. 4.5kgs of DRC is \$21,000 so that's the budget. Keeping mixture warm keeps it pliable.

Difficult to consent to get helicopter in urban setting, but have managed to for last 3 years. Last 2 years in row birds have nested but no eggs. Believe they are male birds. Put poison in nests, but birds don't generally come back after we've visited them. Gum and macrocarpa in urban setting. Napier city council gives full support. Had 2 year consent.

Taranaki Council

Do have odd enquiry for rooks. Pre-1995 didn't do much rook work until implementation of strategy in 1995 which rooks made eradication. Had solitary birds here and there. Much of their work relates to public enquiry, had public awareness on rook identity. Many of the complaints weren't rooks, shags, ducks etc. Good feedback. All the wrong ID. Have had a nest in New Plymouth, soon after Cyclone Bola. Feel that was why the pair turned up. Poisoned it, in middle of New Plymouth. Since then just had enquiry of solitary birds. Recent in Patea, disappeared as quick as it appeared. Unconfirmed birds destroyed, unfounded. Few enquiries after duck season, perhaps that has an impact on birds coming in. Other than that small budget and quite keen to learn more about rooks, habits and actively take part in work. Feed in walnut areas, but elusive.

Horizons

Long history of control. In early days was ground control, no strategy at that time, just on complaints around cropping season. Aerial work started 2001/02. Only in recent years since 2005 have been able to treat all known rookeries in region. Had a big impact. Last year spent \$285,000 this year about \$195,000 next about \$182,000. Big programme. Daniverke Tararua up to Taumarunui, Taihape and Wanganui. The greatest number of birds is Tararua. Migrated from Hawke's Bay in early days. In NZ for long time. Size of rookeries were quite large, 40 to 125 nests. Or 1 to 15. Big area in Eastern area and up towards Taihape and Ngatea country. Treated just under 3,000 nests that year. Biggest year. Today, number of rookeries fewer and smaller rookeries. Central area less number of nests. 2006 good drop off of numbers. Modelled what they do in Canterbury. 2006 dropped a half, then rose slightly in 2008, know they treated more rookeries but may be a surveillance issue. Seeing a general decline. Number of big sites diminished. From 11 to 1. More likely to pick up sightings from teams killing possums than public sighting reports.

Good reduction in last 5 years, down to half first number of nests. Taihape and Manawatu reductions.

In past main focus in Tararua area. The goal was to reduce birds to less than 5,000 in our previous strategy, this was achieved. Rest of region was less than 100 birds and didn't achieve that. Change in strategy this time, going for eradication by 2017. Will be difficult as vast area. 2.2 million hectares region. 1.5 million land area for bird eradication.

New: Suspicions about quality of gel bait they were using – reports it was not uniform, sometimes runny. Few years tested the toxicity of it, tube by tube. Result – it did vary from 4 to 6%. Tested again range from 1.7% to 7.4% in back middle sections. The bottom end of the tube not killing birds. Looking to change that themselves, will be asking for assistance to mix own baits. Want to get it consistent. Expensive programme, if comes down to this it is disappointing.

Such big scale of work, is important to time it right, when chicks are hatching or just after. Impossible to get every rookery. Use aerial pre inspections. Try to maximise to hit in short period of time. 5 days flying in total. 2 choppers, 3 just in case. Hit them and hit them hard, believe makes a difference. Optimistic they will see less nests.

All 161 rookeries will be checked and treated same as last year. Ground baiting a big part of what they do. Getting few enquiries from landowners notifying etc. Quite hard to kill on ground. Mapuru, Danniverke way. Not far from Wellington boundary. Got about 1,000 birds killed with ground control.

Opportunities: NPCA has guidelines for rook control. Think there is room for looking at and changing techniques. Haven't had any new techniques come along.

We rely on contractor and can't check to see if it's done, have to be trusting. Had issues this year with strategy, had a few submissions about people wanting to protect birds, anti us controlling them. Is that a risk in the future? Overuse of current technology? Risk that we lose our support and have explosion of birds.

Wellington Council

21 active rookeries.

Successful rook season in 2009. 2008 had 239 nests. 2007 breeding before had chance to bait them. Only baited 130 but were a lot more nests present. Last year had 150 nests. Big reduction. Control programme prepared early and contractor and crew, all signed off before programme started on 1 September. Media is pushed hard for rook control. Info in local paper. Advertising for 1 month on radio, Kapiti Coast and Wairarapa went well.

Aerial surveillance touched on all historical sites in region we check every year. 115 site checks last season. Big thing is to keep surveillance going. Believes money should be kept in surveillance as this is very important. Worked well as have used same aerial company for 10 years. If company see rooks they give him a call. Important to have good rapport with company.

Been going through a two phase feeding regime. Luxury as have so few rookeries so works well for them. Additionally, try to get early start to beat nesting birds. In past have waited for chicks to hatch, until 3 years ago. Decided to target eggs to break breeding cycle. One of things interesting, baiting eggs go back and a lot of nests have dead birds sitting on eggs and died there.

Bait quality: not given much thought. Always assumed from visual states of nests that bait OK. But now has concerns.

Otago

They have 120 rooks. Last season didn't get opportunity to paste nests as no eggs were laid. Similar to Waikato situation, forming nests then abandoning prior to laying. Didn't find any successful rookeries last year. 1 or more rookeries around place but don't know location. Awareness campaign really successful.

Canterbury

Have 7 birds scattered over 4 districts in whole region. Bird number so low, they are unsure what is happening now. No known successfully fledged chicks last year. Some birds built nests but failed to incubate eggs. Couple of birds seen in prior years have disappeared. Suspect they may have reared chicks, just a possibility or maybe they died. Had massive drop-off from under 5,000 birds in early 90's to just over 100 by 1995. Interested to know what they did over that time to get them down.

Group Discussion / Ideas – Common things

- Questions around baits – lethal does, quality and consistency, bait types, ERMA, MOH Process, equipment used, bait feeders (mechanics)
- How to measure performance of contractors, how to measure staff performance.
 - o EW Staff don't get to learn about habits of birds, or control success. Wonder what introduction of competition in Waikato regions would achieve. May change prices?
- General improvements with new technologies methods to explore.
- Opportunities for co-operation across regional boundaries
- Potential research stuff (do sex ratios affect work)
- Dispersal behaviour
- Toxicology interest on birds. 1.3 enough to kill.
- Pre control – advantages / disadvantages

Aerial Contractors

Due to highly specialised work for contractors / helicopter companies difficult to make competitive as only small window control time.

Need for industry wide training. NPCA looking at gearing up project manager.

Baits: Lethal dose, quality consistency and potential other baits to use, equipment.

Lethal dose: 5% is targeted mix. Is 5% sufficient? General we don't need science trials to investigate this. Maybe look into in future.

At moment bread only for ground application. Get label changed?

Guidelines booklet for NPCA industry guidelines required. Bill to action.

Equipment used: Bait feeder – Landcare paper on this. Gap between holder and spinner. Looking at cut-off mechanism so shuts off and opens up. MOH may be concerned with what kids would eat if it looked like food. Perhaps use attractant then go to bread bait. Perhaps ask Dick to provide info. For NPCA guide too. T-head and caulking gun Alan moving from, as more difficult to use. Need to have tubes warmed up. Too runny then disappears. Vaselline freezing over in nests in one case so not killing birds. Some average 5 some 10 nests per tube of DRC. Temperature range for application of DRC in nests? Needs to be put in guideline.

Bait Options

Is there another way of getting bait into nest, 5 years ago talked about using solid baits. Potentially DRC on bread in nest. Something more stable? 'Bird be gone' is another product. ACP & Connovations. Approach companies.

Monitoring outcomes of control

Is counting number of nests found: treated a suitable method of measuring outcomes or is there another way.

EW count number of nests treated and ask contractors to break down into eggs and chicks. The real outcome is how many birds we have the following year. The other way is how many complaints you get about crop damage. Male birds are involved with nest building process. A lot of males out there and not so many females, must be a lot of nests being built but not laid in. Maybe counting nests isn't so valid?

Identify and trial new methods for locating rookeries

Public awareness campaign was good for EW but not other areas with larger populations. Rural newspaper are crying out for material. EW difficulty once roosting site is found the birds disperse. EW needs to refine the campaign. This is where relationship with landowner is so important. Some people don't even realise rooks are a pest. Big issue is a reduced number of rooks means people can't see the problem with them. Historical photos and statistics may be powerful to teach people. Local newspapers need to cover story. Targeted programme, RD1?

Sonic boom Used in UK for starlings. In trees then at night press button.

Shooting Rooks Big 'no no' due to dispersal. Is shooting an option for low densities? There was some agreement that in low population situations there isn't much to lose by trying to shoot birds. Helicopter does create some dispersal.

Modifying current baits (consistency & durability)

Keep in dark place. But in freezer.

Someone to look overseas into bird control methods. What options are available?

Tracking birds.

Would this kind of research help? Looking at dispersal? How long tracking? Good to know outside of breeding season where they're feeding. Is there a way of attacking roosting sites. Knowing this may provide other opportunities for control?

Surfactants

Not sure if feasible option in New Zealand. Potential method?. Target specific. Removes oils from feathers and die of hypothermia. Do at night time. A lot of effort. How will the humane lobby feel?

Research – In General

Sex ratio issues. All assume large populations of male birds. Is that so, or are they females learning to avoid control? Genetic testing, only need a few samples to determine a lot about the populations.

Conclusion

Need to do workshop every 5 years. Propose one of each council has a catch-up 2 or 3 times a year. Work closely on boundaries. Thoughts on that. Some councils already liaise on annual basis. After rook season get together. Irrespective whether have a few or lot of rooks in region.

Action Points

- ⇒ The Regions would like to investigate a DRC label change to allow the application of DRC to materials other than bread for the purposes of ground baiting. **Brett Bailey** from Environment Waikato will compile a list of the substances supplied by each Region. **Bill Martyn** from Horizons will investigate the potential of NPCA Project Managing this label change. It was suggested that in the past more than bread was used for this purpose and there may be some old guidelines available to support a label change. **Brett Bailey** will investigate and compile information to forward to Bill.
- ⇒ Some discussion was held around the use of bird feeders for ground baiting. Some attendees thought there was some research conducted by Dick Porter about this. Some discussion was also held about using Judas Birds and/or radio tracking to learn more about rook movements. **Ben Paris** of Environment Waikato will follow

these subjects up with Dick Porter and will distribute to the group for further discussion.

- ⇒ Horizons are looking into a project to investigate the sex ratios of rook populations. It is early days but DNA sampling is a method that may be used. **Eric Dodd** will keep everyone informed as there may be opportunities for other Regions to get involved.
- ⇒ The group would like to consider whether there are other substances that could be used in which to suspend DRC apart from Vaseline. **Dave Hodges** of Environment Waikato will investigate
- ⇒ The group agreed that it would be valuable to have an annual workshop about rooks. It was suggested that it may be appropriate to hold this workshop immediately prior to, but at the same venue as, the NPCA conference each year as it would be timely following the conclusion of each seasons control, and would more likely to be attended by other regions if it took place in conjunction with a national conference. **Bill Martyn** would look into this possibility.

Appendix 2 - NPCA Rook Workshop November 2010

Summary of key points

- Rook control has been highly successful in all areas of NZ in decreasing rook numbers, to the point where elimination from some regions (e.g. Canterbury) is a real possibility
- Councils should consider the political and operational costs and benefits of (i) managing rooks through a national consortium; and (ii) total eradication of rooks from NZ
- This workshop and similar exercises over the last few years have tended to identify the same issues and key information gaps/needs. Councils therefore need to prioritise issues/needs and develop a plan to progress action on them
- Councils hold large amounts of unpublished data on rooks. The answers to some of the key information gaps can probably be supplied by analysis of these data
- There is a need to update the current NPCA guidelines on rooks and rook management

Key issues/information gaps/needs

Finding rooks

- Optimising searching for new infestations/rookeries
- Estimates of efficiency of current searching methods – how many rooks/rookeries are missed?

Rook Biology

- Origin of rooks – e.g., where do South Island rooks come from, where do new infestations come from (new invaders or missed rookeries?)
- Fragmentation of rookeries and dispersal of rooks – e.g. how far and where do rooks go when rookeries fragment? What causes increase in rookeries as rook numbers decline? How can fragmentation be minimised?
- How long do rooks live in the wild?
- Has rook biology and behaviour changed in response to control? e.g., has clutch size changed, has juvenile survival changed, has nesting behaviour changed?
- Has control consistently changed the sex ratio at rookeries to strongly male biased through greater mortality of females from nest poisoning? What are the implications of this change for rook management?

- What is the relationship between breeding rookeries and winter roosts?

Rook control

General

- Rook control is highly dependent on the public for (i) access to land; and (ii) information about locations of rooks. How can public participation be enhanced?
- What can be done to better locate winter roosts and how can rooks be controlled at winter roosts?
- DRC 1339 is only registered toxin for aerial control – need for an additional toxic agent (VTA)
- How can aerial control and ground control be best used together?
- How can kill in the first visit to a rookery be maximised (to avoid possible fragmentation and behavioural changes)?
- What is the best strategy for nest that have eggs and/or small chicks?

Aerial control

- DRC1339
 - The optimum concentration of DRC 1339 (i.e. greatest efficacy and least risk to non-targets) is not known!
 - lack of quality control since each council makes its own formulation (e.g., toxicity changes along length of bait tubes)
 - Issue about source of original toxin – need for quality control on toxin itself (material produced by different manufacturers differs)
 - Information needed on how fast DRC 1339 toxicity declines once it has been laid , especially effects of sunlight (since it is broken down by UV)
 - How does way in which bait is spread around nest affect efficacy – e.g., issue of T-nozzle on disperser vs single nozzle

Ground control

- Need for registration of a much wider set of bait types (e.g., maize, walnuts, etc)
- How to better manage non-target risks – e.g., other bird species
- Remote methods for monitoring rooks on bait lines (e.g., cameras)
- Need for consistent best practice for ground control

Measuring success

- Best measure of successful rook control may be number of complaints about rook damage
- Kill rates of rooks are usually computed using an index based on active nests x clutch size. Different councils use different methods (e.g., clutch size 3.5 or 4.5). While consistent application of the method will show trends, inaccuracies in assumptions may cause problems when index is used as basis for decisions based on rook numbers. Also clutch size may have changed at low density!

Appendix 3 – Workshop: Priorities for research to improve rook management

31 May 2011

Landcare Research Seminar Room, Riddett Rd, Massey University campus

Phil Cowan (Landcare Research): facilitator

0930 Introductions & agreement on outcomes for workshop and project

0945 Brief overview of recent research identification exercises

1030 Morning tea

1100 Facilitated discussion on research priorities

1230 Lunch

1315 Facilitated discussion on research priorities

1430 Mechanisms for getting research done

1500 Afternoon tea

1515 Funding for research and research reporting

1600 Close of meeting (latest time)

Appendix 4 - Research review notes

1. Justifying control

- Need to engage farmers
- Need to better publicise rook impacts and potential national problem is absence of control
- Difficulty of control results in low farmer support
- Need to demonstrate success

2. Finding rooks

- Rooks at low density – less detectable. Use variety of information sources – media releases, letter drops, landowner reports
- Sustained control of rooks – no information about probability of detection of rookeries
- Some systematic searching by air but hard to spot – possible changes in behaviour re roosting making detection more difficult

3. Rook biology

- Where do rooks come from – e.g., do Bay of Plenty rooks come from Hawke's Bay?
- Where do rooks congregate in the landscape – can this be predicted?
- Fragmentation of rookeries – where do the rooks go
- Timing of breeding – can annual variation be predicted?
- Aging and sexing birds – how can this be done? Can the information be used to measure success of rook control through changing age and sex ratios?
- Modelling of current DRC 1339 nest baiting – will it produce suspected age and sex changes?
- At what age do rooks stop breeding?
- Can analysis of existing data (e.g., numbers of nests built but not used) be used as measure of control success?
- Need coordination of information and analysis of existing data

4. Rook behaviour

- Do carcasses at the nest act as a deterrent or scare off surviving rooks?

- Suspect control has driven rooks to nest in less visible sites at lower levels in trees and hedges
- Increasing reports of urban rooks – issues about access to control
- Difficulty of ground baiting and bait acceptance
- Only one bait type currently registered for use
- What factors increase the success of ground baiting?

6. Ground control

- Need to discuss new baits with ACVM
- What are options for manufactured bait (see D Porter report – what is used for crow control?)
- Issue of varying responses of MOH to applications for poisoning

7. DRC 1339

- What is optimum concentration? (B Simmons, ACP, reviewed data on toxicity)
- Is vaseline the best matrix? What are the ideal product specifications?
- Are bait stations an option for rooks?
- DRC 1339 degradation by sunlight
- How can non-target risks be reduced (seagulls, magpies, ducks)

8. Measuring success

- Usefulness of regional maps based on climate/habitat matching as per Cowan et al. (2010)
- Assess usefulness of age and sex ratio changes + modelling as measure of success of nest baiting strategy



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