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Raptor Journal 2024, 18: 59–62. 10.2478/srj-2024-0006

Using birds of prey to manage pest bird flocks under lethal and non-lethal conditions – A review

Využitie dravých vtákov pri regulácii kŕdľov vtáčích škodcov v smrtiacich a nesmrtiacich podmienkach - prehľad

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Abstract: Raptors have been successfully used to disperse and often control flocks of pest birds. However, the question that has not been resolved is, "If the raptor kills a small number of the target flock, does this improve the efficiency of control?" This mini-review examines the few research reports that have been published that can shed light on this question.

Abstrakt: Dravce sa úspešne využívajú na plašenie a taktiež ako biologická kontrola kŕdľov vtáčích škodcov. Nebola však vyriešená otázka: "Ak dravec usmrtí malý počet jedincov cieľového kŕdľa, zvýši sa tým účinnosť kontroly?" Predložený krátky prehľad skúma niekoľko publikovaných výskumných správ, ktoré môžu túto otázku objasniť.

Key words: raptors, owls, pest birds, biological control, sustainable agriculture and forestry

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There have been several reviews into techniques available for the management of flocks of birds that cause damage to agriculture and infrastructure, threaten human and animal safety and health or upset cultural and sporting events (Bomford & Sinclair 2002, Anonymous 2004, Braysher 2017, Avery & Feare 2020, Enos et al. 2021, Klug et al. 2023). Techniques that combine different methods and take an ecosystem approach (integrated pest management) usually produce the best results (Garcia et al. 2020, Anonymous 2024).

Using birds of prey to disperse pest birds without killing those target birds is considered a humane method of reducing the deleterious impacts of the pest population – certainly when compared with such methods as poisoning, shooting, trapping and subsequent translocation (Blokpoel 1976). We have been flying trained raptors to successfully disperse flocks of pest birds in Australia (Coles et al. 2019, Wallis et al. 2019). However, the relevant government approval agency and the University's animal ethics committee specify that we must use captive-bred or rehabilitated raptors trained not to kill the target birds. We are keen to investigate whether allowing raptors to prey on the pest birds will increase the success rate of their dispersal to another location by increasing the threat level.

This review thus addresses this question: if the raptor kills (or hunts and therefore has the potential to kill) a few individuals of the target population, does this increase the efficacy of the control method?

There have been few comparisons between lethal and non-lethal use of raptors that allow for meaningful comparison. Baxter & Allan (2006) found peregrine falcons (*Falco peregrinus*) significantly reduced the number of gulls (black-headed gulls *Larus ridibundus*, herring gulls *L. argentatus* and great black-backed gulls *L. marinus*) at rubbish tips in England. In about one third of their trials, the falcons were able to hunt and capture their prey. However, their data analysis did not discriminate between the prey reduction for lethal versus non-lethal trials. The authors surmised the falcons were successful "whether hunting, being flown to simulate hunting or more importantly, perceived as potentially present" in deterring the gulls from using the tips (Baxter & Allan 2006 p. 1165). However, the experimental design did not allow any conclusion to be drawn on the relative reduction in gull numbers for three

conditions: falcons that did not hunt, simulated hunting and falcons that preyed on the gulls.

In another study of landfill rubbish tips in the UK, Cook et al. (2008) found that when lethal methods were used (falcons preying on gulls or the gulls being shot), the gulls no longer habituated to the raptors (which occurred when the birds did not hunt their prey). They found lethal techniques (shooting, falconry) which reinforce visual and audio cues with the occasional death of target birds, have the opposite effect on habituation and more gulls were deterred as the trial progressed. This is the most striking evidence that lethal takes and/or shooting do indeed have a positive effect on reducing numbers of gulls compared with non-lethal use of raptors.

There seem to be other anecdotal suggestions that if raptors can kill their prey, the control of pest flocks becomes easier, but hard evidence is lacking. In some cases, it seems authors intuitively think this should be the case without any experimental evidence. Thus Erickson et al. (1990 p. 314) stated "The raptor species used preferably should be a natural predator of the pest bird species as the occasional kills it makes will help reinforce the perception of danger" and cite Grubb (1977) in support. However, Grubb (1977) did not mention lethal versus non-lethal control using raptors, referring to differential habituation only in distinguishing between different aerial stimuli, such as various shapes of model raptors.

Inglis (1980) also believes that shooting pest birds and seeing dead or dying birds are aversive stimuli that could disperse pest birds from a site. His argument is based on the literature on avoidance conditioning. However, certain elements in its practice are required:

- The warning stimulus (in this case, birds seeing others taken by a raptor) must retain its potency for long periods (a single kill episode will likely be ineffective).
- It must occur spatially and temporally with the pest bird visits to the site.
- A scaring device (such as the playing of alarm calls) could be used simultaneously with the aversion stimulus (e.g., hazing by falcons) so the pest birds associate the device stimulus with killing.
- Novel scarers are preferable to ones used previously.

Inglis's (1980) suggestions are based on theory, and his paper does not produce hard evidence that killing some pest birds as aversion stimuli increases the efficacy of pest dispersal. Furthermore, in his discussion, the aversion stimulus of dead conspecifics is by way of shooting and not by raptor take.

Rock doves (*Columba livia*) have been successfully deterred from structures with a combination of falconry and shooting (Ryzhov & Mursejev 2010, Heck & Schwartze 2020, Klug et al. 2023). However, the design of the operations means we cannot distinguish between the effectiveness of falcons killing the doves alone from the effects that shooting have in both reducing dove numbers and potentially acting as a deterrent to the target species.

Bomford & Sinclair (2002) reviewed the research on bird pests in Australia and listed the circumstances when scaring devices could be effective, including their reinforcement with real danger, such as shooting. Raptor takes of target birds could also be considered such a reinforcement stimulus.

Lethal takes by raptors

Several studies have shown that falconry can reduce pest bird numbers when the raptor is encouraged to prey on the target species. In a study on grape damage in New Zealand, Kross et al. (2011) found New Zealand falcons (*Falco novaeseelandiae*) translocated to wine-growing regions preyed on birds that fed on and damaged grapes. The researchers noted that not only did direct predation reduce numbers of the pest flocks but that the high predation risk changed the birds' behaviour to become more "antipredator". Such behaviours included avoiding the sites, increased vigilance relative to the time spent actually foraging for grapes and also relocation by the frugivorous birds to less favourable sites in which to forage that had lower predation risk.

Sometimes, increased predation is insufficient to reduce the target species' population growth (Bendjoudi et al. 2013), but agricultural damage may still be reduced. Klug et al. (2023) have suggested this might be through creating what Laundré et al. (2001) call a "landscape of fear".

In the same review, Klug et al. (2023) report that the use of falcons preying on starlings (*Sturnus vulgaris*) and monk parakeets (*Myiopsitta monachus*) successfully reduced the pest numbers. However, in these studies, no comparison was made between allowing falcons to prey on the birds and using falcons only to scare them away.

Clearly, research needs to be undertaken to resolve whether lethal takes of pest birds reduce the impact they cause, and we encourage researchers to pay more attention to this understudied but essential issue.

Public perceptions

The use of raptors to control pest birds has been cited as an example of compassionate conservation in which no

harm comes to animals and cruelty is avoided (Wallach et al. 2018). However, this movement has been criticized by ecologists as misguided and likely to result in poor biodiversity conservation outcomes (Callen et al. 2020). These authors claim that using the principles enunciated by proponents of compassionate conservation, a number of conservation techniques would be unacceptable. These include biocontrol of pests using, for example, killing of pest birds by raptors. Other techniques Callen et al. (2020) consider would be forbidden include captive breeding of endangered species, predator exclusion fencing, contraception, translocation and disease control. However, these techniques are nowadays considered standard practices to enhance biodiversity conservation, especially of threatened species.

Lethal control of pests is one tool that can be used with others as part of an integrated pest management operation. Even the example Wallach et al. (2018) cite of using Maremma guardian dogs to prevent foxes from preying on little penguins (*Eudyptula minor*) in Warrnambool, Australia (King et al. 2015) involves destruction of fox dens and using poison baits as part of the fox control program.

Lethal takes by raptors are likely to distress some in the community. Witnessing a predatory bird seize and consume prey can be off-putting (Bird-control 2022, Pigeon Control Resource Centre undated) and, therefore, likely to prove unpopular with the general public. This needs to be weighed against any increase in efficacy in dispersing the birds and the resultant reduction in damage and economic loss. Perry & Perry (2008) offer practical ways of addressing this conflict. One such technique that would appeal to both animal rights activists and conservation biologists is to apply the precautionary principle regarding the arrival of invasive species through greater border protection and quarantine. The authors also urge wildlife managers to consult with ethicists to understand better how activists will perceive some of their policy decisions.

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Recieved: 5.9.2024
Accepted: 11.9.2024