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The 2008 - 2009 Aerial Feral Pig and Feral Goat Shooting Program: A Case Study in Northern New South Wales, Australia

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ABSTRACT: The 2008-2009 Aerial Feral Pig and Feral Goat Shooting Program aimed to reduce feral mammal infestations in the Barnard/Hunter River catchment areas, northern New South Wales (NSW), Australia, over a 2-year period, as well as to provide skills to landholders to manage vertebrate pests. By accomplishing these reductions in pest animal densities, it endeavoured to reduce impacts of feral mammals on soil and water resources and on native flora and fauna, thereby protecting ecosystems and giving benefits to the wider community. The NSW Department of Industries and Energy identified the control area, including the Barnard and Hunter River catchment areas, as having one of the highest populations of feral pigs in northern NSW. The area contains diverse and vulnerable ecosystems of woodlands, remnant rainforest, escarpment, and open grazing areas. Projects were designed to use best practice pest animal management methods, including aerial shooting, followed by a trapping campaign and ground shooting. Stakeholders included NSW National Parks and Wildlife Service, Armidale and Hunter Rural Lands Protection Boards, and up to 336 private landowners. Aerial shooting was undertaken in July, because winter is the most opportune season for this method. In 2008, a total of 913 feral pigs, 650 feral goats, 18 deer, and 4 wild dogs were destroyed. In 2009, 1,338 feral pigs, 900 feral goats, and 336 deer were destroyed, all of which were primary target animals. Trapping and poisoning were used to control feral pigs and an extensive ground-shooting program was put in place to control feral goats and the emerging deer problem. Monitoring of residual populations, through New England Livestock Health and Pest Authority property inspections, and assessment of damage caused by feral animals were undertaken at the conclusion of both projects. Ground trapping continues over a 4-month period, and ground shooting is ongoing and opportunistic.

KEY WORDS: aerial shooting, Australia, *Capra hircus*, deer, exotic species, feral dogs, feral goats, feral pigs, New South Wales, *Sus scrofa*

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INTRODUCTION

The New South Wales (NSW) Department of Industries and Energy identified the centre of the control area in the New England area in NSW, Australia, as having one of the highest populations of feral pigs in Northern NSW. The Barnard / Hunter River catchment areas, at the centre of this area, have diverse and vulnerable ecosystems of woodlands, remnant rainforest, escarpments, and open and valuable grazing areas.

In 2008-2009, the New England / Mid Coast Livestock Health and Pest Authorities (LHPA) received A\$88,864 from the Commonwealth Envirofund Grant and A\$162,000 from the Hunter Central Rivers Catchment Management Authority to undertake an aerial feral pig and feral goat shooting program. The project aims included:

- Reduction of vertebrate pest infestations in the Barnard / Hunter River catchment areas over a 2-year period. The project would contain and further reduce residual populations of feral pigs and goats.
- Provision of skills to landholders to manage vertebrate pests on their land.
- Benefits to the wider community, namely reduced pest animal density, reduced impacts of feral animals on the environment (soil and water resources), reduced pest impacts on native flora and fauna, and protection of ecosystems.

HISTORY

Feral Pigs

The first recorded introduction of feral pigs (*Sus scrofa*) into Australia occurred when Captain James Cook landed in Botany Bay with the First Fleet in 1778. Pigs were brought to Australia as a food source not only for the settlers but also for the convicts. The husbandry practice of allowing pigs to free range resulted in pigs escaping into the bush, and thus the phenomenon of wild pig mobs began (Choquenot et al. 2006).

By the mid 1800s, sightings of large mobs of wild pigs were reported throughout the Hunter and Barnard river valleys. Settlers established blackberry bushes as a food source, and these quickly spread in the ideal climatic conditions throughout both of these valleys. It was not long before there were blackberry bushes covering 20 to 50 acres, which not only supplied a food source for the wild pigs but also provided a safe and secure harbour. By the end of 1800s, feral pigs reached such high numbers that they were considered a pest in parts of New South Wales (Clarke et al. 2000). There are now estimated to be between 3.5 million and 23.5 million feral pigs in Australia, with a range across approximately 38% of the country's mainland (Hone 1990).

Feral Goats

Feral goats (*Capra hircus*) were first introduced into this area in 1987, when the Australian Goat Breeders Association purchased the property "Barry Station".

They purchased 28,000 captured feral goats and trucked them to this property. These goats had no regard for fences, and within 12 months, 20% of these goats could be found anywhere up to 10 km from Barry Station. This venture did not succeed, and the property was sold in 1993. The goats that could be mustered were sold, while the balance ended up as a pest species in the area.

Deer

Both Rusa deer (*Cervus timorensis*) and fallow deer (*Dama dama*) were first introduced into Australia in the mid 1800s and were contained in the Royal National Park, adjoining Sydney Town, providing value as something the aristocracy could view as a reminder of England. In the mid 1970s, there was a demand worldwide for venison, and hundreds of properties within New South Wales imported Rusa and fallow deer with a goal of supplying a growing market. A lack of organisation and product promotion within this new industry resulted in the failure of this venture, leaving countless landowners with a product they could not sell. For many, this occurred at the start of the last drought, and landowners were not prepared to outlay more expenses on feed for an animal that was virtually worthless, so gates were left open and the breeding population was released into rough and inaccessible country, where they flourished. For the past 20 years their numbers have increased, and now 'feral' deer are being sighted regularly on highly improved open country used for farming and by the cattle and sheep industry. Not only do deer eat valuable pasture and have the ability to carry and spread exotic diseases, but in the rutting season they will knock cattle around.

PROJECT DESCRIPTION

The purpose of both projects was to reduce vertebrate pest infestations in the Barnard River and Hunter River Valleys over a 2-year period. These projects aimed to contain and further reduce residual populations of feral pigs and feral goats (and, opportunistically, deer as well) in the control area, and to protect ecosystems and water resources from the destructive impacts of vertebrate pests, through coordinated integrated programs that were strategically implemented by the New England and Mid Coast Livestock Health and Pest Authority rangers.

The project used best practice pest animal management methods, including strategic helicopter shooting followed up with a trapping campaign, and ground shooting over a wide area. The aerial shooting campaign was undertaken over a 1-month period. Winter is the most opportune season to conduct aerial shooting, as vegetative cover is reduced, feral animals are active, and shooters are most likely to successfully find and destroy these pest animals. Ground trapping was undertaken over a 4-month period with ground shooting, both on-going and opportunistic, over the 18-month project duration. A wide range of stakeholders involved in the project participated in public meetings. Field days were organised to build community knowledge in feral animal control.

THREATENED SPECIES

Pigs are a declared pest species. Feral pigs act as predators on young livestock; are vectors for spread of pathogens (e.g., worms, foot-and-mouth disease) and weeds (e.g., blackberries); compete with and displace ground dwelling birds and marsupials; foul waterways and degrade soil resources in pristine mountain streams, tea tree swamps, and flow lines running from the ranges; and damage fences. Reducing the overall population of pest animals has resulted in an enhancement of water quality, reduced weed infestations, and has lessened the impact of these feral animals on rare and endangered species of flora and fauna.

Reducing the population of feral pigs was expected to reduce the likelihood of pigs destroying neighbouring property including fences, water courses, and rain forest areas. Likewise, reducing the number of feral goats would enable rare and endangered native flora to recover. Goats compete with domestic stock and native marsupials for limited pasture and feed. The success of the projects was anticipated to considerably enrich the recovery of sensitive ecosystems found in both the Barnard and Hunter catchment areas. Several species of threatened fauna and flora occur in this area, including birds, bats, sugar gliders (*Petaurus breviceps*), and the rare and endangered *Sphagnum* moss (*Sphagnum* spp). Recovery plans are progressively being prepared for species listed under the Threatened Species Conservation Act of 1995. Removal of feral animals from this area, via this project, would allow landholders and Crown land managers to better manage natural habitats, which Authority staff, landholders, and government agencies and departments were striving to protect.

PROJECT BACKGROUND

The concept of an aerial shooting program originated in late 2006. Despite extensive efforts by local landholders and various Government employees, whose responsibilities included controlling invasive species on public and private lands in the Hunter and Barnard Valleys, many stakeholders felt they were still fighting a losing battle in controlling, let alone in eradicating, the feral pig population. Rangers Brian Ferris and Craig Crooks, of the New England and Mid Coast LHPAs, respectively, each applied for funding to address the feral pig populations and, to a lesser extent, the feral goat problem.

Community Consultation

Many public meetings were held. A defined area was marked out on a map detailing the main populations of both feral pig and feral goat populations in both LHPA areas. All landholders that were inside the marked 'shoot' area were contacted to ascertain if the landholder would be interested in participating in an aerial shoot, if funding was made available. Most landholders replied, and when landholders agreed to participate in the program, they signed an 'approval to shoot' for their property. The majority of landholders contacted agreed to be involved, but some landholders were skeptical. This

posed a problem, because to have a successful program all landholders needed to be involved. To overcome this problem, both rangers spoke to those well-respected landholders in the area, who agreed to try using a little “peer pressure”, which was successful. Some of the landholders did not want feral goats shot on their holdings, as they used them for blackberry and brier control, and this request was honored.

Landholder and Government Legal Obligations

Landowners and land managers have a legal obligation to undertake pest control. The NSW Rural Lands Protection Act of 1998, as amended, (Sections 155-156) requires that “An occupier of any private land on whom a general destruction obligation in relation to a pest is imposed by a pest control order must eradicate any pest on the land by any lawful method (or, if the order specifies a method to be used, by the method specified)”. In contrast, “An occupier of any public land on whom a general destruction obligation in relation to a pest is imposed by a pest control order must (to the extent necessary to minimise the risk of the pest causing damage on any land) eradicate any pest on the land by any lawful method (or, if the order specifies a method to be used, by the method specified)” (Rural Lands Protection Act 1998).

Past Aerial Control Efforts

Previous aerial control exercises carried out in this area had revealed feral pig and feral goat populations to be widespread and not limited to one land type or land use. Because both the Barnard River and Hunter River catchment areas were environmentally diverse, consisting of woodlands, remnant rainforest, escarpment country, and open grazing areas, the use of helicopters as shooting platforms had proven in previous programs to be the most successful and cost-efficient method of controlling these pest animals.

Aircraft Choice

A Hughes 500 D helicopter was chosen to carry out the control program. The decision to use this type of machine was based on previous experience of carrying out aerial shooting programs in this area over the past 15 years. This type of aircraft has the maneuverability to fly in rough and unpredictable terrain, and it has the stability in all weather conditions to provide an optimum shooting platform. The helicopter company that was chosen was Precision Helicopters (Barraba, NSW). An added bonus of this decision was that company’s pilot, Mark Hodgson, had extensive local knowledge and had been the pilot for numerous shooting programs in this area. In 2000, in 20 hours flying time, he was involved in a total of 1,599 feral pigs being shot on a 68,000 acre property situated in the planned control area. Mr. Hodgson’s skill, experience, and knowledge proved invaluable throughout the whole program.

FAAST Shooters

The use of firearms by skilled marksmen to humanely destroy animals from helicopters is an integral part of pest

animal management in NSW, Australia, and worldwide. Aerial shooting is also an essential component of operations, which involve the humane destruction of feral animals or livestock for exotic disease mitigation. In NSW, the Feral Animal Aerial Shooting Team (FAAST) is the group that undertakes the majority of aerial shooting on both public and private land. Due to the dangerous and controversial nature of aerial shooting, FAAST ensures that all its graduates are of the highest possible standards through thorough training in helicopter safety, firearms safety and humane destruction. Active FAAST shooters must also complete a number of ongoing competency standards to remain FAAST accreditation (Moriarty 2003).

Funding

After landowner agreements were obtained and operational cost estimates were made, the cost of the program for the two geographic areas was estimated to total A\$88,864 (A\$45,228 for the New England LHPA, and \$43, 636 for the Mid Coast LHPA). Because it was easier for each ranger to deal with his own geographic areas, and because the total amount needed was above the grant application maximum of A\$50,000, the grant applications were submitted separately. Once funding was secured, the cooperating landholders were advised in writing that the funding applications had been successful.

METHODS

2008 and 2009 Projects

The 2008 project involved public land managers (National Parks and Wildlife Service NSW, State Forests NSW, New England LHPA and Mid Coast LHPA) and up to 93 private land managers, encompassing a total area of 890,000 acres (1,171 square miles). The 2009 project involved all the above as well as a further 182 private land managers and the Hunter-Central Rivers Catchment Management Authority, for a total of 2,670,000 acres (3,513 square miles). The magnitude and scope of these projects were anticipated to effectively address the pest infestations, and to deliver good natural resource management outcomes to the broader community. Following aerial shooting, it was intended that monitoring of residual populations would continue through LHPA property inspections by Authority rangers, and by landholder reports of feral animal activity. We expected an obvious, visible reduction in damage caused by feral animals.

The majority of properties were hunted on both years. During 2009, there were areas where in 2008 little or no animal activity had been found, so these areas were not flown again. Property owners/managers were invited to act as navigators while shooting was taking place on their land, but if they were not comfortable doing this, then a respected landholder who knew the country acted as the navigator for a large area. This process saved a lot of time. Each day we estimated the area that could be covered, and where there was only a light infestation of target species, our estimates proved very accurate. A problem occurred only when the landholder wasn’t honest about the population level of target pests.

Search and Rescue Recording

A Search and Rescue Recording (SAR) watch was kept for the entire operation. A report was given each time the helicopter lifted off, to ascertain that radio contact was available. A radio call was then made on the half-hour to the helicopter, and recorded as per FAAST, LHPA, and NSW National Parks and Wildlife Service policies. The only issue that the operation had with SARs was that some radio calls were delayed. This was overcome in one of three ways: the helicopter had to climb to an altitude so that the pilot could make radio contact with the ground base; a mobile ground unit was deployed to a high vantage point where radio contact could be accessed; or the SAR report was given by a satellite phone to a pre-arranged landline (Crooks and Garland 2009).

Safety Briefing

An on-site briefing occurred first thing in the morning before the helicopter left the site. This was done to remind all the ground crew and to inform any new navigators or shooters about all aspects of the Safe Operational Procedures (SOP) required in recording, flying, and shooting. When this was completed, the pilot took the navigator and shooter to the helicopter and carried out a safety briefing on all aspects of the helicopter, explaining each of their roles. If a new navigator/shooter arrived during the day, he was given the same review by the Site Supervisor.

Hazards

Power Lines

Throughout the area of aerial control, there were numerous single-wire power lines. These power lines mostly span from one ridge to another, and they have neither marker balls attached nor any other form of notification. It is the responsibility of all personnel on the helicopter to be aware of this type of hazard, but especially so for the navigator, who has the local knowledge of where these power lines are located.

Fatigue

Fatigue was one of the most important issues throughout the whole program. Fatigue resulted from the low temperatures and of long periods of time in the helicopter for the pilot, navigator, and shooter. This issue was overcome by regular breaks for the air staff, and on every occasion when the helicopter landed, hot drinks and light snacks were provided for the air staff. Full meals were also provided throughout the program to keep energy levels high. All persons who flew were equipped with warm clothing, a flight suit, and a helmet. Shooters and navigators were replaced every 2 hours, where possible (Crooks and Garland 2009).

Weather

Some mornings during the project were foggy and overcast, resulting in a few hours being lost. Frost was another issue, and relatively late starts were normal, allowing time for the frost to melt off the helicopter.

Engine Failure

Engine failure is the one thing that everybody dreads. If the engine stops when flying at high altitudes and in steep and rough terrain, everyone is in real trouble. Thankfully, this did not occur during either of our shooting programs. However, it did occur during 1998 while rangers were carrying out aerial feral pig shooting. Fortunately, in that incident there were no fatalities, and all the crew walked away with only minor injuries.

RESULTS

The 2008 Project

To assess the population of feral pigs and feral goats in the project area in 2008, two parallel flight paths (transects) were GPS recorded and flown, with a ranger on either side of the helicopter to count all feral pigs and goats that were sighted. On the pre-program flight, a total of 126 feral pigs and 197 feral goats were sighted. During project aerial shooting, target animals removed from the project area totalled 913 feral pigs, 650 feral goats, 18 fallow deer, and 4 wild dogs. These animals were taken over a total of 76 hours of flying, which included time spent conducting transect flights. At the completion of the 2008 program, the same transect lines were again flown, and the total number of animals sighted was 18 feral pigs and 56 goats, providing an estimated 86% reduction in feral pigs and a 72% reduction in feral goats.

The 2009 Project

During project aerial shooting, target animals removed from the project area totalled 1,338 feral pigs, 900 feral goats, 336 fallow and Rusa deer, and 21 foxes. These animals were taken over a total of 120 hours of flying. The new area included in 2009 had a much higher population of deer than the area covered in 2008. In 2009, there were no transects flown, because we knew where the majority of the feral pigs and goats would be found from our experience during the 2008 program.

While in 2008 the behaviour of pigs and goats did not change in response to aerial hunting activities, but in 2009 more time was spent hunting out pigs from blackthorn thickets and blackberry bushes where they had gone to ground.

Sizes of Mobs

When during flights we sighted feral pigs, often there were single boars. At times, we would happen across groups of up to 5 sows and either half-grown pigs or, towards the end of the 2009 program, sows with small piglets. The largest mob of pigs totaled 23 animals.

Feral goat mobs were usually between 8 and 25. However, on one occasion in 2008, there were about 70 goats out in the open on Glenrock Station, all of which were shot.

OUTCOMES

In 2008, using the available funding we were able to carry out the aerial shooting program, covering the complete target area. Also, there was funding left over,

which was used to construct a total of 20 feral pig traps for landholders to assist in the control of feral pigs. With the funding received in 2009, we were able to finance two wild dog trapping schools to better enable land managers to control wild dogs, subsidise the Annual Aerial Wild Dog baiting program in the Hunter Region, and set up a Wild Dog Steering Committee for this region, in addition to carrying out the planned program of feral mammal shooting.

CONCLUSION

The 2008 - 2009 Aerial Feral Pig and Feral Goat Shooting Program was successful at many levels. The involvement and support from all stakeholders including interagency and departmental co-operation, and the numbers of feral animals removed, alone marked these 2 projects as successful. It is, however, salutary that projects such as these also highlight battles that are yet to be fought in regard to new and emerging feral animal problems. Both fallow deer and red deer (*Cervus elaphus*) were encountered throughout the program on various properties. Rusa deer were seen on one property, and red deer were also seen in a portion of forest that had been logged. However, neither the Rusa nor red deer were shot, as the respective property owners did not want those animals taken.

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