Far South Coast Deer Monitoring Program 2018/19

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More information

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Acknowledgments

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DOC18/90931 Approved Local Land Services Service Delivery Strategy 2018-21

Foreword

The Far South Coast (FSC) Deer Monitoring Program aims to act as a pathway to building strong foundations for deer management at the local level as part of a long term strategic plan. Prior to this project being undertaken, there was minimal information detailing practical deer control efforts or techniques that were suitable for the unique FSC Local Area environment.

The FSC Deer Monitoring Program 2018/19 was effective in identifying deer populations, impacts on primary assets, effective monitoring and control techniques and landholder views on deer control.

The information gathered from the FSC Deer Monitoring Program 2018/19 will be used by land managers in the development of Local Pest Plans and effective operational deer control plans throughout the South East Region. As highlighted in the recommendation of this report there are particular monitoring and control options that are more suitable for the FSC Local Area than others. The program findings will also help form a baseline to measure the effectiveness of future deer programs along with the implementation of proven control techniques across the South East.

Anthony Marshall

General Manager, South East Local Land Services.

Contents

1. Introduction

1.1. Overview

The South East Regional Strategic Pest Animal Plan 2018 – 2023 (*RSPAMP*) outlines how government, industry and the community can work together and share the responsibility to contain, manage or eradicate pest animals.

Under the *NSW Biosecurity Act 2015*, all community members have a general biosecurity duty to prevent, minimise or eliminate any biosecurity risk.

In view of the South East *RSPAMP* and the *NSW Biosecurity Act 2015* the need for deer (wild/feral deer will be referred to as deer) management has been highlighted as a priority. Deer are an emerging species in the Bega Valley and Eurobodalla with the population increasing dramatically to an extent that they cause a range of serious negative effects on agricultural production, environmental values and social impacts on the community.

1.2. Purpose of the Far South Coast Deer Monitoring Program 2018/19

The purpose of this project throughout 2018/19 was to define the extent of problems which are caused by deer at the local level, establish control options available and provide recommendations on techniques and management strategies.

Prompted by ongoing complaints by landholders in perceived deer affected areas, the Far South Coast (FSC) Biosecurity Team sourced funds from the DPI Special Purpose Pest Levy. Key objectives of the program were established. Fundamentals of vertebrate pest management identify the need to follow a step by step action plan;

Step 1: Understand the problem and assess the impact,

Step 2: Determine clear, measurable objectives,

Step 3: Develop and implement a plan of action,

Step 4: Monitor, evaluate and modify.

Although deer management programs are not new to organisations like Local Land Services, it is the first time a strategic plan was to be undertaken within the Far South Coast to specifically target deer. In view of this, the plan needed to be effective in the preliminary stages as it will build the foundations for future strategic plans.

The program delivered against the key outcomes within the *South East RSPAMP* and the outputs are reflected in table 1.

Table 1.

Far South Coast Deer Monitoring Program 2018/19 Output measures in view of the outcomes in the *RSPAMP.*

Output measure (text)	Relationship to outcomes
Internal Training achieved	Outcome 1
Liaise with local property owners to determine which properties could be utilised for trial locations	Outcome 1
Number of media opportunities resulting in articles in newspapers; radio; television or through social media	Outcome 1 &2
Community participation and workshop events run	Outcome 2
Identify best practice lure techniques	Outcome 3
Maintain records of wild deer reports and control operations	Outcome 3&4
Investigate yarding and large scale trapping techniques	Outcome 1
Monitor wild deer populations for changes	Outcome 3&4
Map deer activity	Outcome 1,2,3&4

2. Monitoring

2.1. Identifying strategic locations

The FSC encompasses the Eurobodalla Shire and the Bega Valley Shire combined. Extending from Batemans Bay in the north and as far south as the Victorian border. The program needed to cover a broad area in order to build an appreciation of the entire FSC. Regular conversations with landholders in the FSC helped establish what could be perceived as problem areas for deer activity.

As a result the following areas were established;

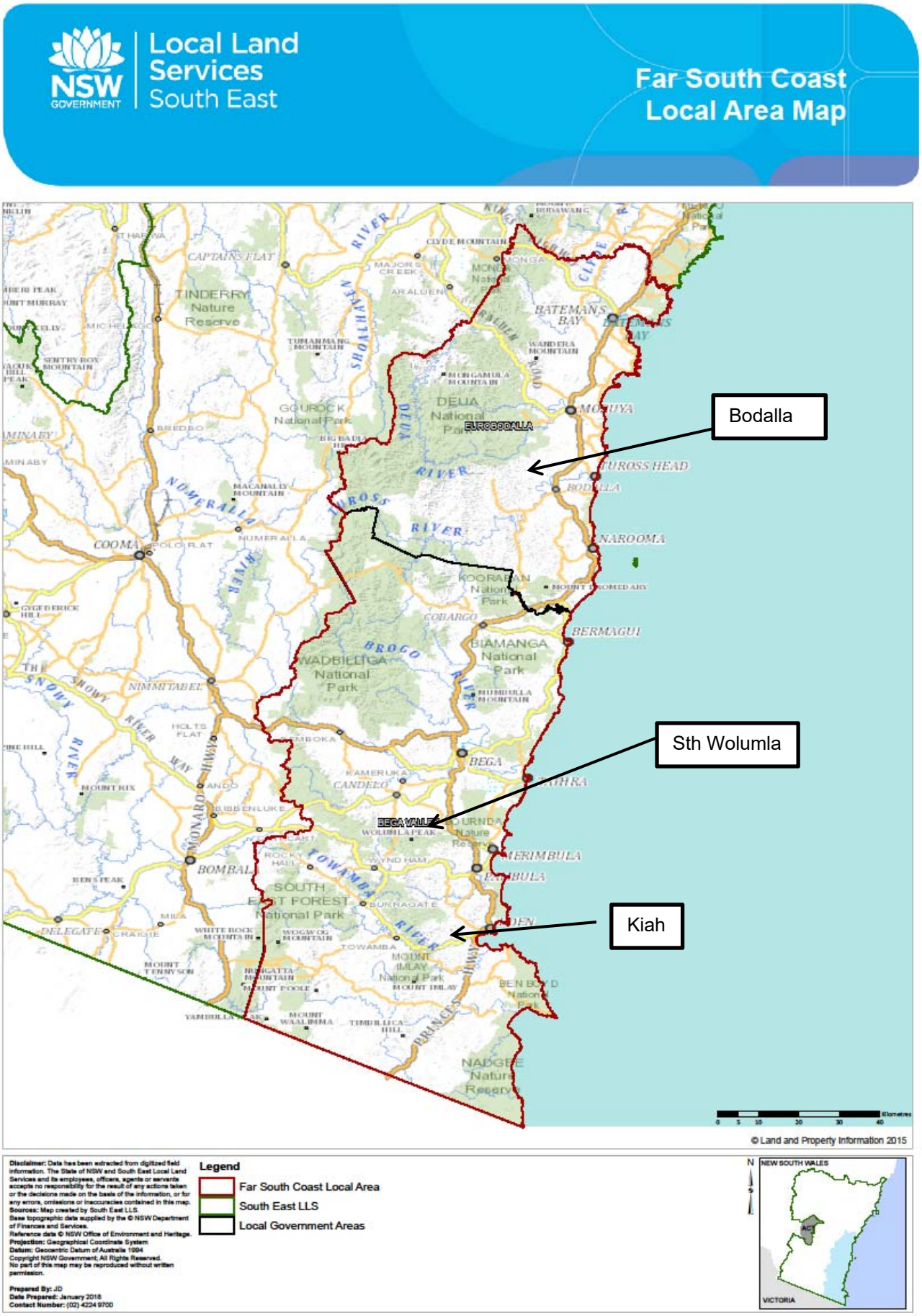
1. Kiah,
2. South Wolumla
3. Bodalla

1. Kiah presented an opportunity as there has been a long history of deer farming in the area. With the abolishment of the deer farms and new landholders taking on properties, the legacy of these deer (now wild) present a suspected impact on the entire Kiah and Towamba area. Additionally, Kiah presented a number of complexities including the fact that this particular location is recognised as a gateway for deer potentially moving from as far south as the Victorian border, through extensive areas of public lands on to improved pasture on private land.

2. South Wolumla was identified as a known location for deer and after discussions with landholders followed by a reconnaissance with camera traps the FSC Team positively identified three species of deer in this defined area.

3. Bodalla falls within the boundaries of the FSC and an area where the impacts of deer on agriculture were significant. This was brought to our attention by the South East LLS Ag Team on completion of drought workshops in the area.

Figure 1. Map of Far South Coast Local Land Services area.



2.2. Landholders Engagement and Participation

Deer are a priority pest species within the *RSPAMP.* As LLS aims to be effective in its role in supporting land managers in deer management, community participation was fundamental for the program success.

Initial consultation took place in the form of phone conversations, on farm visits and face to face meetings. It was identified early that the landholders/managers with the highest impact of deer were also the people whose grazing properties bordered bushland.

A challenge for LLS staff when engaging with landholders was to inspire confidence. This was achieved in the following ways:

1. Detailing the objectives of the Plan and align them against world's best practice for vertebrate pest management,
2. Providing confidence in the Landholder/ manager that LLS staff are working to a highly professional level, for example, adopting best practice WHS and animal welfare standards when shooting and trapping deer,
3. Articulating that, although this is a 12 month program, intentions are for this to be part of a more strategic, long term plan for effective pest management with solid landholder support being crucial to progress,
4. Establishing two way, open communications between the landholders and LLS,
5. Encouraging and enabling landholders to participate in the program.

2.3. Monitoring in defined locations

The use of Camera Traps is nothing new to LLS, for example, the Pest Animal Controllers within the FSC Team deploy these tools in the field for wild dog monitoring consistently. More comprehensive information on camera traps and Multimedia Messaging Service (MMS) capabilities is detailed in section 4.2. Lures, Techniques and Procedures.

Kiah presented many opportunities for monitoring as we discovered on initial reconnaissance that deer were using the Kiah river flats as a thoroughfare to access most properties. Camera traps were deployed on participating properties. The river sand along the flats provided sign of deer activity. Fresh deer scats provided evidence of their recent movement patterns and helped establish where to set up camera traps.

Figure 2. Deer sign along river bank Kiah.

Figure 3. Trail camera image alongTowamba River flats.

Engaging with Landholders in **South Wolumla** enabled the FSC Team to begin monitoring with camera traps along the interface of public and private lands. Even though South Wolumla is less than a 50km drive from Kiah, the Team was quickly made aware of the diversity in deer species within this section of the FSC.

Deer identified were:

Figure 4. Fallow deer

Figure 5. Rusa deer

Figure 6. Sambar deer

Bodalla created its own complexities with the bordering property historically being used as a Fallow deer farm. The monitoring program was on a dairy farm where the land holders allow shooters / hunters in an attempt to keep the deer numbers down. As with Kiah, the majority of deer observed were Fallow with the odd Sambar being sighted. However, it was observed early on that significant behavioral differences were present in Bodalla compared to Kiah. For example, the Bodalla Fallow rarely pushed out beyond 5 – 15 metres from the interface of bush to cleared land.

Figure 7.Use of Thermal Imagery to detect deer activity in low light

Camera traps were invaluable in providing the team with preliminary information in regard to presence versus absence of species, peak deer activity and behavioral movements based on their biology,

for example, activity during mating season (*the rut*),

activity during times of drought and behavior

when in velvet.

Figure 8. Fallow deer during 'The Rut'

Despite success with the trail cameras, the *Team* felt the need to establish a better appreciation of population density and distribution in larger mobs. Therefore, in the early stages of the program, the FSC Team conducted an Aerial Survey using a Helicopter in the Kiah area.

The Towamba River served as an ideal location to conduct the Survey as the area running along the Towamba River comprised a mixture of private land which provides high nutrient pasture and public land offering shelter

Including, NSW National Parks and Wildlife, Forestry

Corporation of NSW, Aboriginal Land, Crown Land

and Bega Valley Shire Council.

More Information, See Aerial Survey Results in **ANNEX A**

Figure 9…… Wild deer on private land parallel to Towamba River (left) and adjacent to public land (far right)

3. Impacts

For the purpose of this report, investigations examined the negative impacts of deer within the Far South Coast.

A wide range of negative social, economic and environmental impacts have been associated with deer. Agricultural impacts were recognised early in the project from landholders voicing their concerns about a wide range of issues including pasture loss from grazing, orchards being decimated, ringbarking of trees and shrubs as well as the high labour and cost of erecting deer proof fences.

Figure 10. Liver Fluke in a sambar deer

on a cattle property

Figure 11. Grazing exclusion cages

A rudimentary investigation was undertaken to quantify the impact of pasture consumption by deer on a property in Kiah. Two pasture cages were placed on the paddock which was only grazed by deer. At the end of the 6 week period of the investigation, the residual pasture in the grazed area was 433 kg Dry Matter/Hectare (DM/Ha), as compared with an average of 1133 kg DM/Ha in the ungrazed section (pasture cages). This equates to approximately 700 kg DM/Ha being grazed by the deer in the 6 week period.

This will be continued into spring to study the impacts as pastures start to grow.

You could make some assumptions on the value of this based on the costs of alternative feed which are still very high given the ongoing drought impacts (at the time of printing this document). Dairy Australia's hay and grain reports put grain and hay at approximately $400 - $450 per tonne currently so you could assume 0.7 tonne x $400

= $280 per Ha as an estimated cost in lost value of feed in a 6 week period. If cattle were utilising 60% of the pasture on offer that would bring it back to $168/ha.

4. Techniques and management strategies

4.1. Capacity building

The FSC Team appreciated the need to develop high levels of skill in order to achieve best practice pest control. Although already established as 'Professional Shooters', the FSC Team utilised all other available assets for skills enhancement and capacity building.

This was achieved in the following ways:

1. Ongoing internal training for application of firearms with the use of Thermal Scopes and Suppressors,
2. Conduct training with the NPWS Specialist Ground Shooting Team to achieve consolidation of skills,
3. External opportunities for example with the Victorian Police – Special Operations Group (SOG) where a two day engagement enabled the FSC Team to identify the benefits of specialist firearms including, for example, suppressors, thermal and night vision and semi-automatic firearms,
4. The NSW Department of Primary Industries (DPI) held a week long 'Deer Masterclass' in April 2019. This provided the FSC Team with an opportunity to learn and consolidate skills, and
5. Internal collaborations with other regions for research and development.

4.2. Lures, techniques and procedures

With the use of MMS trail cameras; we could confirm deer were present on a daily basis. In view of this, the FSC Team began to introduce various lures to encourage the deer to remain in location and to identify which lures work best.

Lures used were; Lucerne hay, horse feed mix, corn, rolled barley, molasses and a combination of these. We established that the rolled barley worked best, possibly due to it being something different than what they are used to and its high protein quality (introducing small amounts first). Mineral blocks were also trialed, however these appeared to be least effective for deer specifically in the FSC.

Figure 12. Deer habitually feeding on barley viewed by monitoring cameras

Camera Traps were invaluable to the success of the program for monitoring deer activity, behaviour and biology. Camera traps were also used for control when employed as part of a trapping program. Camera types varied based on the particular requirement. For example, for monitoring deer behaviour on private land in times where feed is scarce on public lands, data collection of images could take place on a weekly or monthly basis. However, when requiring information immediately as part of a trapping program, best quality cameras with MMS were required.

Types of cameras deployed by South East Local Land Services include;

RECONYX HYPERFIRE 2:

High quality trail camera with High definition picture and video quality. Although a very good camera, this model does not have a cellular capability. Prices are around $500.00 per unit. Cellular models made by RECONYX are priced at around $1500, therefore may impact a projects budget.

PRO'S COICE BRAVO X 3G:

Good quality trail camera with High definition picture quality. A good camera with cellular capability. Image quality good for what we needed but not as defined as RECONYX. The unit works by taking the image under Passive Infra Red (PIR) then sending one image through the cellular network to a mobile phone device or email. Sometimes the time taken for an image to be received to a mobile device can take up to an hour. This model prices are around $500.00 per unit

JAGER PRO, M.I.N.E. or I.C.E.

The camera's remote control technology allows users to send messages back to the camera to receive images on demand. Ideal camera for a trapping program as the M.I.N.E. camera can be used to initiate a trap gate.

Image quality is good (not as good as RECONYX). This unit works on the principle of capturing images under PIR and sending immediately to your mobile device. Other benefits include the option to buy an extendable booster antenna for in areas of low signal strength. Unit price for the M.I.N.E. Approx. $1300 (providing the ability to drop a trap gate) and the I.C.E. is approx. $600

ENELOOP PRO BATTERIES:

It is also worth mentioning the benefits of quality rechargeable batteries. Eneloop has a range of batteries that meet capability requirements and the Eneloop Pro (capacity up to 2550 mAh) is most suited for this program.

WHS was a considerable factor in the planning of control options, particularly when the only control option for deer involved firearms.

Internal procedures were adopted and amended to suit the specific tasks within the scope of the program.

The following procedures included:

- Landholders signed consent for ground shooting of deer and other pest animals,
- Adoption of a shooting roster in order to manage staff and address fatigue management,
- Notifications to neighbouring properties assessed on a case by case basis,
- Establishing a Shoot Plan to address risks for example, No Shoot Zones, Fall of shot areas and a bullet trace arch of fire,
- Additional notifications to key agencies, for example, Local Police.

4.3. Deer Control: Trapping and Ground Shooting

The South East *RSPAMP* describes the presence of six species of deer within the South East Region, however suspected and known populations of deer in the Far South Coast Area include the following:

- Fallow,
- Rusa,
- Red,
- Sambar, and
- Hogg.

Within the defined locations outlined in this program, three species of deer were reported (in order of priority): Fallow, Rusa and Sambar.

Best practice pest control supports an integrated, cross tenure approach using a range of control measures. Effective control is considered difficult and limited. Control options available for deer include:

- Exclusion Fencing,
- Aerial Shooting,
- Ground Shooting,
- Trapping followed up with shooting.

The Far South Coast is covered by a mixture of private and public land including NSW National Parks, NSW Forestry Corporation, Crown Land and Aboriginal Land. The area is characterised by rolling farmlands, small towns and villages, scattered between beaches, lakes, estuaries and rivers.

This program aimed to achieve results by focussing on private lands where pasture palatability is higher. The FSC Area made it difficult to utilise all control options available.

Aerial shooting was the first control option ruled out due to many complexities surrounding each defined area within this plan, for example;

- The power lines along the Towamba River made it too dangerous for a campaign,
- The administrative burden of attempting to achieve multiple landholder support in a peri urban environment would exceed the resources of the FSC Team,
- Smaller holdings in the area provided very limited tactical advantage for aerial shooting,
- Vegetation pushing along the interface is considered too thick and a helicopter pilot could not negotiate manoeuvrability around tall old growth forests.

Exclusion Fencing has been beneficial elsewhere in the South East and could be deployed in key areas of the Far South Coast. Points for consideration include:

- The additional high costs of erecting exclusion fencing,
- The fundamental need for maintenance to ensure its effectiveness, especially in known wombat habitat areas,
- Erecting an exclusion fence in flood prone areas, for example on river flats would require further examination by South East LLS due to the high repair costs post flood and environmental considerations (fencing material scattered throughout the area).

Ground Shooting was used as part of this plan by identifying the efficacy as a control option. The FSC Team appreciate that, although labour intensive, ground shooting could be the most suitable control option when incorporating the following mechanisms:

- Thermal imagery scopes on firearms and thermal monocular for a spotter,
- Use of suppressors to muffle and dampen sound distribution,
- Night operations targeted around minimal light periods (no moon phase),
- Operators trained to meet the requirements of accuracy, precision and efficiency,
- Used in conjunction with a Trapping Program,
- All WHS considerations addressed.

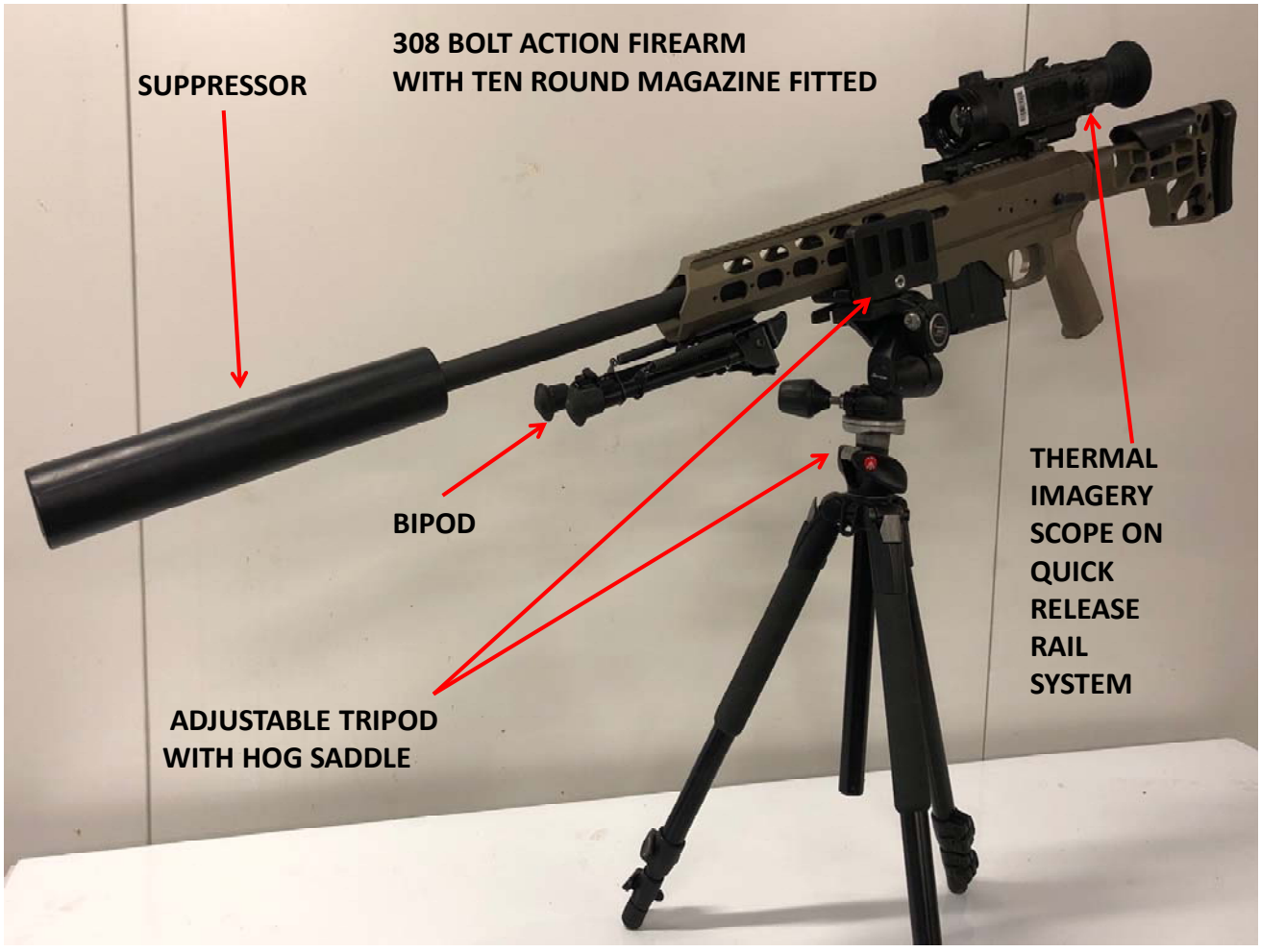


Figure 13. Firearm system used by the FSC Team for deer control.

More information: See Small Scale Trapping Debrief in **ANNEX B**

Trapping operations were trialed throughout the program. Small Scale Trapping on Peri-Urban properties was validated early in the program with the primary consideration being effectiveness.

The FSC Team quantified effectiveness as follows in order of priority:

- Adhere to animal ethics by addressing animal welfare when deer were trapped and euthanised,
- The ability for deer to enter the trap and remain in the trap when the gate is initiated,
- Material infrastructure durability in order to achieve multiple trapping programs, and
- The trap construction to be straightforward and effortless allowing landholders to employ this method. Enabling all landholders and managers to share the responsibility of pest management and meeting their general biosecurity duty.

Figure 14. Small scale trapping.

Large scale trapping was developed late in the program as an extension to this plan. Early results suggested its effectiveness where high numbers of deer are present. The purpose of large scale trapping by the FSC Team was to test and adjust best practice procedures for the aim of being able to educate land managers on the methodology of control.

Figure 15. deer distribution where numbers are high.

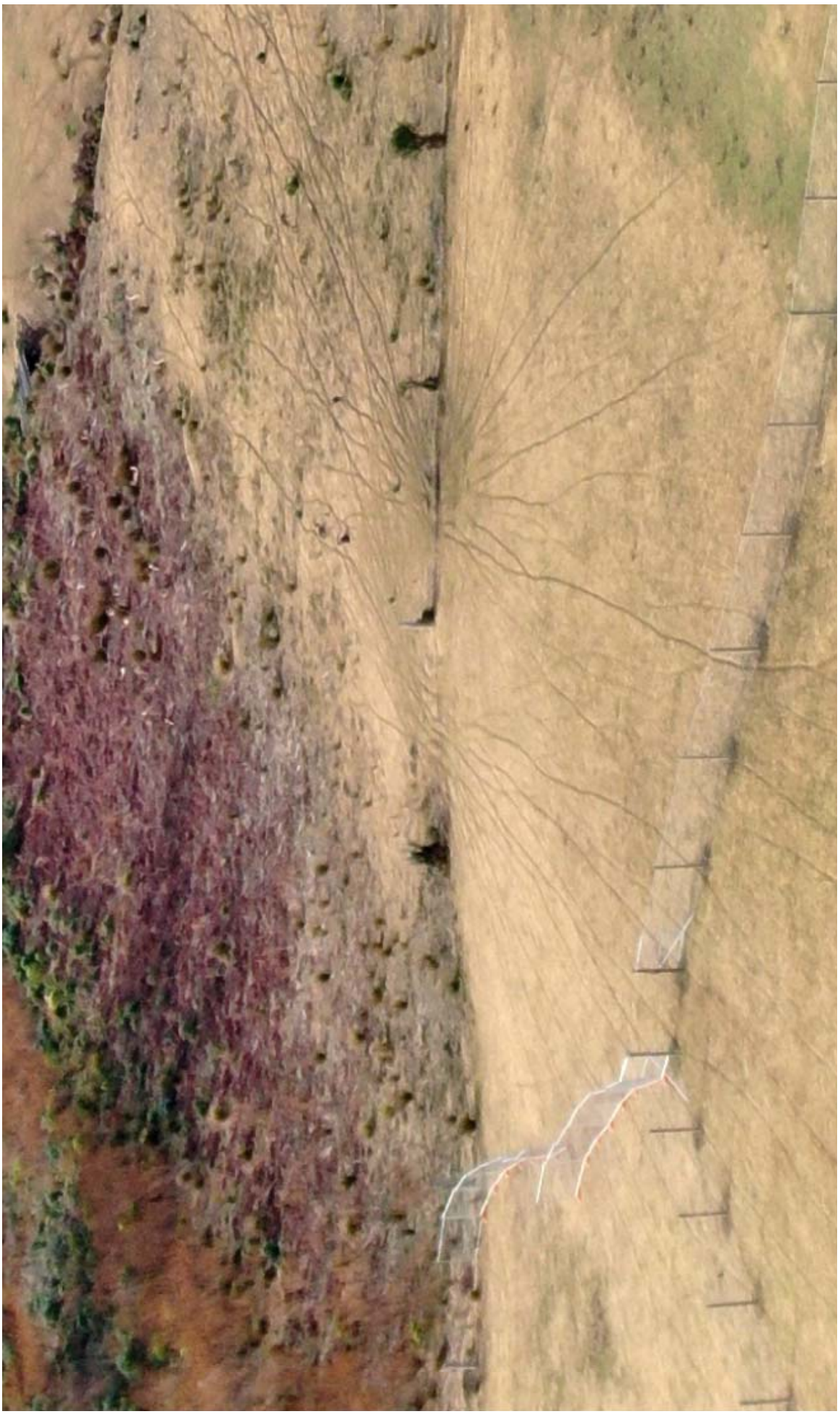


Figure 16. Large Scale Trap location

5. Reporting

Reporting is fundamental for effective and efficient data management in accordance with a good system for monitoring, evaluating, reporting and improvement (MERI). Data collection within this plan aims to support the *South East RSPAMP* evaluation.

At a broad level, activities under the FSC Deer Monitoring Program 2018/19that work towards a MERI goal include:

- Surveillance and mapping of deer distribution and relative abundance to refine state-level maps,
- Identifying priority assets, sites and particular deer species for intervention,
- Informing customers and stakeholders about the distribution, impacts and management options for deer,
- Informing stakeholders about their pest animal management obligations under the *NSW biosecurity Act 2015* and options for discharging these obligations,
- Coordinating and providing advice at a regional level and
- Setting up collaborative partnerships.

5.1. Feral Scan

FeralScan (www.feralscan.org.au) is a community website and Smartphone App that allows people to map sightings of pest animals and record the problems they are causing in their local area. FeralScan contains over 40,000 records of pest animals mapped by landholders and communities across Australia. FeralScan can be used by farmers, community groups, pest controllers, local government, catchment groups and individuals managing pest animals and their impacts.

FeralScan is administered through the Centre for Invasive Species Solutions with the FSC Team reaching out to the administrators to develop an advanced method for reporting deer activity into the App.

Prior to mapping deer presence, damage and control in the application the FSC Team needed to acknowledge the following fundamentals:

- The information needed to be captured in a manner that it could be reported against the MERI Framework,
- The locations needed to be exact, referencing a specific geospatial location.
- The data needs to be retained confidentially by key personnel in South East LLS,
    - This was considered an important element as privacy was a major factor to landholders and the FSC Team, for example, when reporting deer activity in high distribution areas.
    - This was achieved by the FSC Team working in collaboration with the Feral Scan administrators to create a closed group to facilitate our program.

Figure 17. Far South Coast Closed Group in DeerScan

5.2. Community Workshops and internal communications

Community engagement and communications were a priority principle in the early stages of planning for the program. At the time of writing, deer are considered a pest animal under the South East *RSPAMP* and *NSW Biosecurity Act 2015* but also a game animal under the *NSW Game and Feral Animal Control Act 2002.*

Community workshops were held throughout the course of the program to articulate the position LLS holds for effective deer control management and the measures needed to achieve this.

South East LLS held an internal Biosecurity Workshop in February 2019 for all biosecurity staff. The FSC Team used this platform to deliver a presentation to the group about the FSC Deer Monitoring Program 2018/19. As a result of this workshop and other conversations with key personnel in the organisation, the FSC Team drew upon further funding within the scope of this program to establish the large scale deer trap in Kiah.

The final community workshop the FSC Team delivered to the community was held in Kiah which involved a range of customers and stakeholders for example:

- Bega Valley Shire Council,
- FSC Landcare Association,
- Atlas of Life and
- Community landholders and land managers.

The primary purpose of maintaining an open dialogue was to advise the community of the program and its progress. Other key factors were to reach out for their thoughts and further possible guidance in order to achieve best possible outcomes for the program's effectiveness. It is with the community, customer and stakeholder engagement that this document would be used to guide future strategic programs in the FSC.

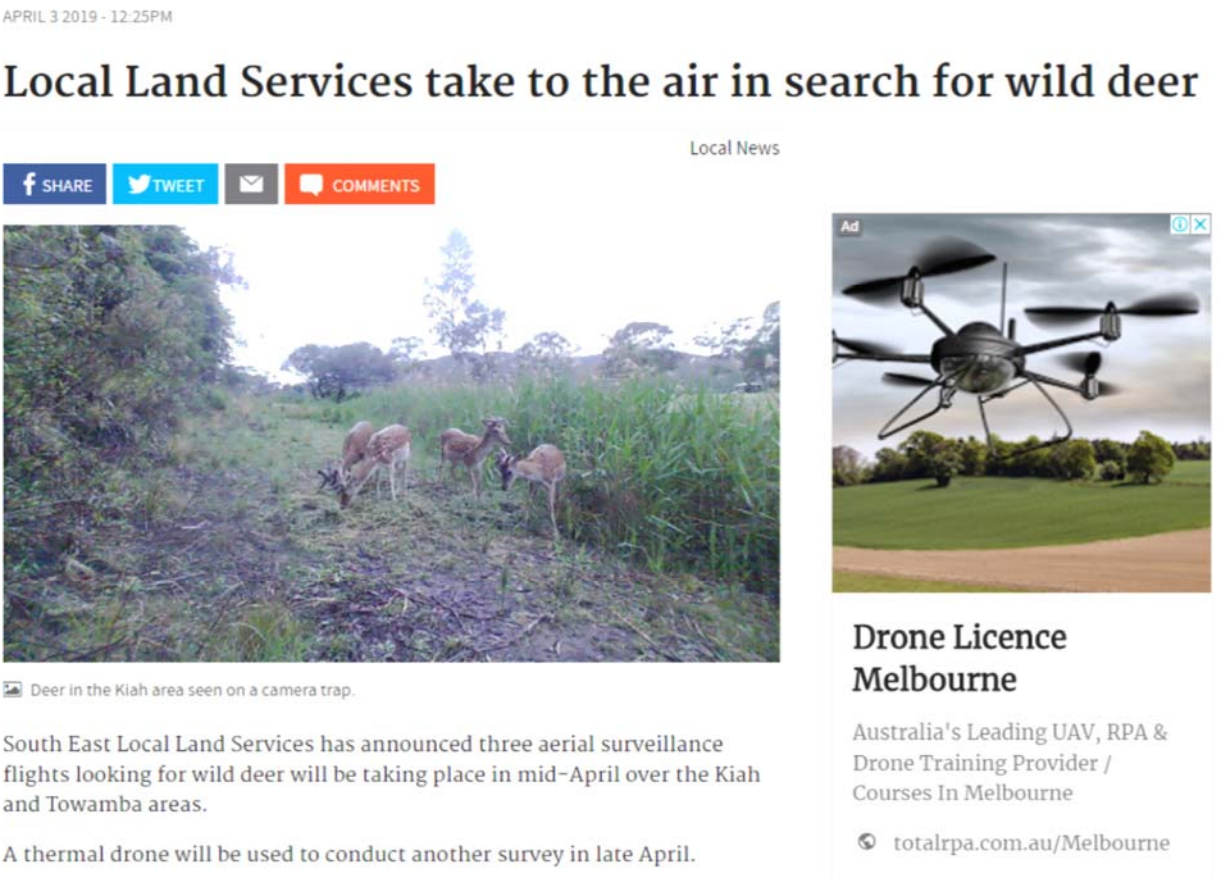
Figure 18. Kiah Community Workshop June 19.

5.3. Media Releases

Media opportunities provided the FSC Team with an enabling tool to bring public and private landholders together to appreciate the significance of the program and the issues that deer present.

By being able to achieve the objectives outlined in this plan the FSC Team are now in a position to act in the capacity of subject matter expert when advising the broader community on the subject of deer using media outlets, for example, radio, newspaper and television.

The use of media provided the FSC Team with the opportunity to provide factual information without the concern of misinformation or deception. We also were able to adequately answer questions regarding some perceptions.



APRIL 3 2019 - 12:25PM

Local Land Services take to the air in search for wild deer

Local News

SHARE TWEET COMMENTS

Deer in the Kiah area seen on a camera trap.

South East Local Land Services has announced three aerial surveillance flights looking for wild deer will be taking place in mid-April over the Kiah and Towamba areas.

A thermal drone will be used to conduct another survey in late April.

Figure 19. Fairfax Media article released by South East LLS

6. Results and recommendations

The long term strategic aim is to empower the community to undertake effective vertebrate pest management. The *Far South Coast Deer Monitoring Program 2018/19* aspires to meet the above statement by reporting on objectives within this program for continuous improvement in conjunction with recommendations for the delivery of future plans.

Monitoring during this reporting period established success from key activities; including:

- The **Helicopter Survey** throughout Kiah, Towamba and Burragate served as a cost effective and valuable tool which provided the FSC Team with preliminary data in identifying high numbers in particular areas and distribution of deer throughout the valley. see Aerial Survey Results in **ANNEX A**.
    - **Aerial Survey Results: Helicopter**
    - **Total Survey Area = 28Km²**
    - **Total deer observed on 1 run = 350 deer**
    - **Therefore: deer density = 12.5 deer per Km²**

    - **Deer density, <u>Kiah only</u>: Survey area = 10Km²**
    - **Total deer observed on 1 run = 220 deer**
    - **Therefore: deer density = 22 deer per Km²**
- **Camera traps** used in key locations and particular types for capability requirements,
- The **specialist skills** of biosecurity staff within the FSC Team provided opportunities to establish suitable monitoring locations for best results. It is also worth mentioning the subject matter experience and local knowledge of personnel in the community, and
- **Small and Large Scale Trapping** programs.

Figure 20. Deer sign along river flats

Identifying the presence of deer is not a difficult task. Designing and implementing an effective control program is much more difficult. It is with the combination of trade craft in the field, technology in the form of advanced camera traps, electronic initiated trap gates in both small and large scale trapping programs, followed up with specialist firearms and accessories that makes deer control complex. However, it is the recommendation of the FSC Team that all elements are employed if deer control is to be effective as part of a strategic plan.

Measuring and reviewing the **impact** of deer should be considered when adopting a program to show solid justification for the investment. Pasture growth measurements, post mortems and testing for biosecurity should be adopted. Community engagement is also supported by the FSC Team for determining additional impacts, for example, public perception, social, ecological and /or cultural impacts.

Capacity building enabled the FSC Team to advance their skills to a higher standard to enable a significantly improved program. Ongoing training allowed for better team dynamics when operating in a tactical environment. Developing better knowledge of technology and world's best practice provided the FSC Team with accomplishments in deer control while adhering to strict guidelines in animal welfare and WHS.

Reporting key milestones and aligning them with the objectives for evaluation ensured consistency within the scope of the program. With the Helicopter surveys taking place three times over a 10 day period the FSC Team achieved a median distribution of deer numbers based on the balance of probabilities. During this reporting period deer numbers between Kiah and Towamba during a 30 minute flight varied from 150 through to 300 deer. Weather was a consideration when counting deer as the morning fog did affect visibility. Some assumptions could be made around the accurate number of deer in location at a specific time but the FSC Team acknowledges that it is difficult to achieve an estimate of the population.

The FSC Team fully supports the use of helicopters for future surveys, in particular where there is an environment that resembles the Kiah and Towamba Valley with public land pushing down on the interface of private improved pasture along river flats.

Feral Scan served as a valuable tool enabling the FSC Team to collect and enter data to support this plan and the overarching strategic plan of the *RSPAMP.* With the added benefit of this application already being deployed this meant resources were not exhausted and tech support was available through DPI administrators.

Incorporating the benefit of Feral Scan in **community workshops, internal communications and media releases** aided in delivering the message that biosecurity is a shared responsibility.

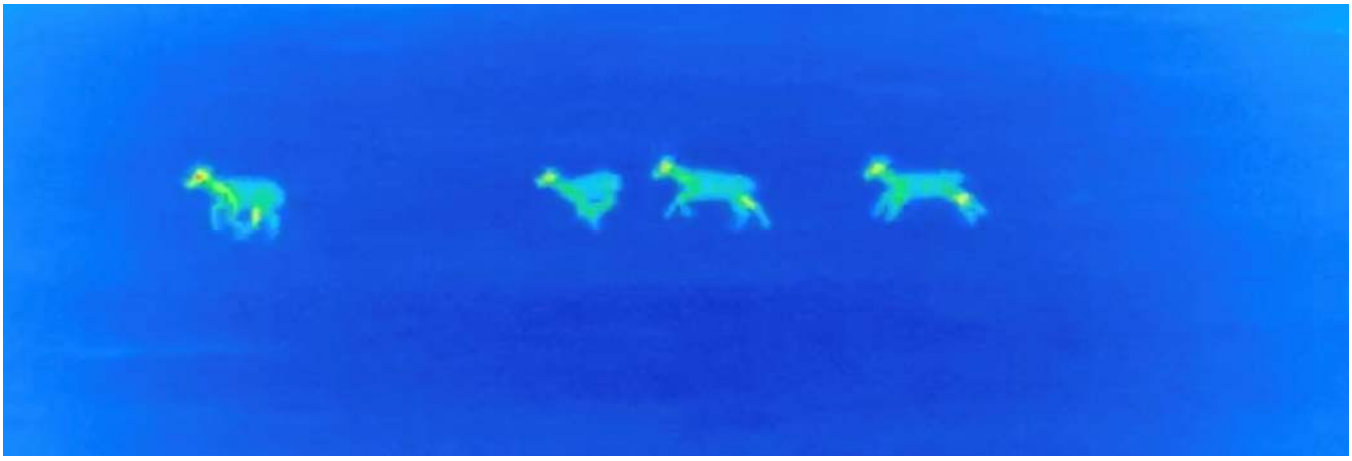
With the FSC Team combining **ground shooting with small scale trapping** during this reporting period, the final number of deer successfully shot and destroyed came to 82.

On the night of Thursday the 1st of August and morning of Friday the 2nd August 2019 The FSC Team initiated the **large scale trap** where an additional 15 deer were trapped, shot and post mortems conducted for biosecurity by the District Vet. An additional 3 deer were shot from outside the trap. All 18 carcasses were recovered with the gut contents going to the local Food Organics Garden Organics (FOGO) compost recycling unit. The carcasses were handed over to the Sydney Zoo to be used for feeding their big cats and other carnivores. The carcass recovery process did consume additional time in the field however was of little cost to South East LLS.

7. Summary

The FSC Team delivered the FSC Deer Monitoring Program 2018/19 through careful planning and a good understanding of the principles of best practice pest animal management. This plan was developed in consultation with key stakeholders and customers. This plan will form foundations for the development of local pest plans and operational deer control plans throughout the South East Region.

As highlighted throughout this report it was important to target the delivery of this plan around operations and tactics as a means to weigh against the overarching strategic pathway of the South East *RSPAMP* and the *NSW Biosecurity Act 2015*. The practical application of this program articulated in this report will form a baseline to measure against long term strategic programs.



More information

Far South Coast Biosecurity Team,

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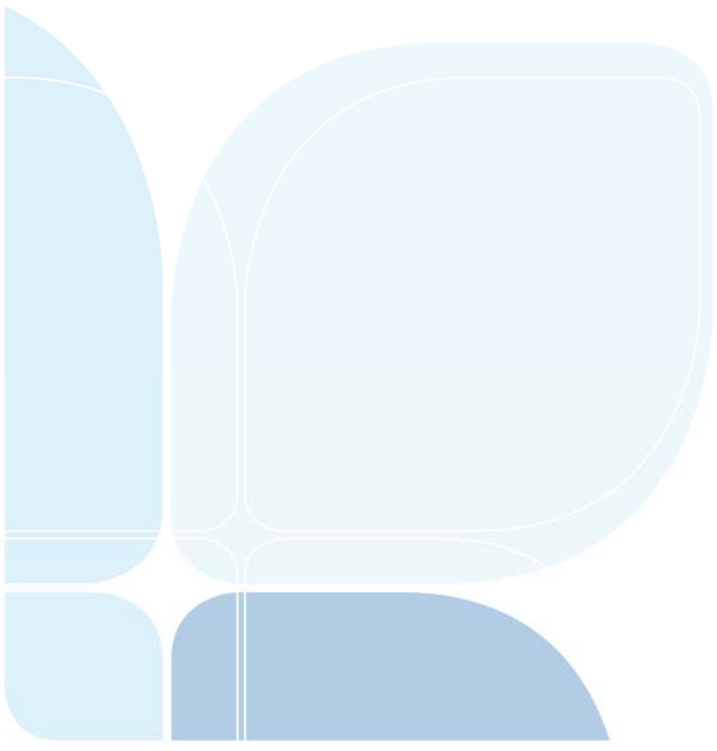

ANNEXURE A

Far South Coast Deer Monitoring Program 2018/19

SOUTH EAST LOCAL LAND SERVICES

Aerial Survey Results

Far South Coast Deer Plan - Biosecurity Team
South East Local Land Services, Bega

1. Situation Overview

This document relates to Aerial Surveys conducted from the mouth of Towamba River running along the river through Kiah, Towamba and in to Burragate as part of the *FSC Deer Monitoring Program 2018/19* from 21 December 2018 through 24 April 2019 and includes results from a Drone Aerial Survey 12 and 13 May 2019.

Kiah is a well-known location for deer. They utilise the river system that runs through Burragate, Towamba, Kiah and ending at the mouth in Twofold Bay, Eden. The FSC team saw this as an opportunity to visually record deer along the river flats on improved pastures.

The aim of the aerial survey was to develop an appreciation of the deer population within this area and to identify specific areas affected and identify species.

2. Procedure

Fig 1.Robinson R44

A Robinson R44 Helicopter was utilised for the survey departing Merimbula Airport at first light with the intentions of observing deer whilst still out feeding on the river flats (prior to being deterred by traffic and the normal day to day routine of landholders).

A Thermal Monocular was also utilized to enhance deer detection capabilities. This device proved to be very useful as several deer that could not be seen with the naked eye were spotted using the Thermal Monocular. Deer observed where counted and their coordinates saved onto a GPS device for further analysis.

Fig 2. Image seen from the Thermal monocular.

In addition to the helicopter survey, the drone company Ninox Robotics where contracted to conduct a beyond visual line of sight (BVLOS) infrared survey with the Ninox Spylite remotely piloted aircraft system (RPAS). The area of survey was the same as the area indicated above.

Once completed, detailed video analysis was undertaken by Ninox. Deer seen where reported using an online interactive map (see attachment 2).

3. Results

The Helicopter survey maps and locations of deer can be seen in the attachments 1, maps 1 through 4. It should be noted that foggy conditions inhibited two of the helicopter surveys and they had to be postponed before the whole of the survey area could be assessed. The last Survey was conducted in the last hour of daylight.

Survey 1: (December 2018) deer where observed at 25 locations, with a total number of 132 deer observed.

Survey 2: (12th April 2019) deer where observed at 28 Locations, with a total number of 300 deer observed.

Survey 3: (16th April 2019) deer where observed at 9 locations with a total number of 139 deer observed.

Survey 4: (24th April 2019) deer were observed at 13 locations, with a total number of 147 deer observed.

The drone survey was completed on the 12th and 13th May 2019, they resulted in the following numbers of deer sightings/observations

- Approximately 350 deer with a confidence level of possible or above were observed,
- Deer were spotted in numerous groups, with larger groups of up to 50 animals,
- Larger deer numbers were observed in the central areas.

4. Conclusions

Utilising two survey methods gave us the opportunity to compare these against each other. The helicopter survey was approximately $18,740 cheaper than the drone survey. The helicopter survey gave us the opportunity to not only count deer but also to observe damage that deer were doing to the river vegetation (*Fig.3*).

The other major benefit of the helicopter was that identifying and counting the deer was very close to 100% accurate.

In comparison the drone survey results (see attachment 2), gave a percentage of confidence level of deer identification. The drone survey indicated 350 deer with a confidence level of possible (45%-60%) or above. This kind of uncertainty could be misleading.

The terrain along the Towamba River also dictated where drone operations could occur. Minimal sites could be found despite many hours spent looking for suitable locations. This may have affected the accuracy of the drone survey.

Helicopter surveys in this area will be conducted as part of future strategic monitoring instead of drone surveys. The drone survey is too cost prohibitive and provides inadequate accuracy compare to the helicopter.

Fig 3. Deer sign along Towamba River

*******Attachments removed due to privacy concerns*******

ANNEXURE B

Far South Coast Deer Monitoring Program 2018/19

SOUTH EAST LOCAL LAND SERVICES

Small Scale Trapping Debrief

Far South Coast Deer Plan - Biosecurity Team
South East Local Land Services, Bega

1. Situation Overview

This document relates to the Trapping Program conducted in the Kiah area as part of the *FSC Deer Monitoring Program 2018/19* during the period early November through 12 December 2018

The aim of the small scale trapping program was to identify the potential success of this tool as an additional control technique for deer management on a high agricultural value area due to the impacts by deer.

Additionally, the FSC Team appreciated that if successful, this application could be used by the landholder to meet their General Biosecurity Duty for future deer control.

Within the scope of the *FSC Deer Monitoring Program 2018/19* project outputs it was identified that 6 measures needed to be delivered on to achieve successful small scale trapping:

1. *Internal Training achieved* (develop operational skill in Thermal Imagery Sights, deer behaviour, trap techniques),
2. *Liaise with local property owners to determine which properties could be utilised for trial locations*. In this case, requiring a simple conversation with a landholder who wants the pest species addressed for pasture improvement,
3. *Identifying best practice lure techniques.* Following a trial of various lures in a set location with cameras to capture what is more palatable than others. Environmental conditions taken into consideration, for example fresh pasture in the area made Lucerne hay less desirable than rolled barley,
4. *Maintain records of wild deer reports and control operations.* Within this project we are reporting information into the Deer Scan – Closed Group Application,
5. *Monitor wild deer populations for changes.* Behavioural changes (particularly in fallow deer) brought on by introducing foreign items into their area along with ongoing successful trapping, environmental changes as a result of pasture availability and drought, and flightiness from rifle fire, and
6. *Map deer activity,* as per point 4.

2. Method

The Kiah and Towamba Valley was strategically targeted for deer monitoring as part of this plan due to the perceived high populations of deer. This information was reported back to South East LLS from concerned landholders in the community. A small holding within the Kiah area was used for this small scale trapping program. This location was considered ideal as the property had river frontage and deer used

the river as a form of thoroughfare. Additionally, deer sign was present in that specific location and we had full support of the landholder.

The preliminary stages of the program established a suitable location for trapping. This was achieved by a reconnaissance looking for sign of deer and fresh scat.

Location 1 was ideal for the following reasons;

- There was recent sign of deer presence and they were using that specific location as a thoroughfare to other areas by following the river,
- Overhead canopy offered shelter and a natural rest area,
- Mobile phone reception was adequate to use MMS camera traps and the option of using the MMS drop down gate,
- The landholder was supportive of deer control,
- It was not visible from other properties or from the general public which lowered the risk of sabotage

Figure 1. Location.

With the use of the MMS camera, we could confirm deer were present on a regular daily basis. In view of this, the FSC Team began to introduce various lures to encourage the deer to remain in location and to identify which lures work best.

Lures used were; Lucerne hay, rolled barley, molasses and a combination of these. We established that the rolled barley worked best, possibly due to it being something different than what they are used to and its high protein quality (introducing small amounts first).

Figure 2. Deer free feeding.

Stage by stage we introduced the trap panels allowing the deer to access the lures and continue to use the area as a passageway.

Figure 3. Introducing trap infrastructure.

During this period data was entered into feralscan. The FSC Team were able to create a closed group in order to record deer numbers and control methods without the concern of information being compromised by personnel outside of the Team.

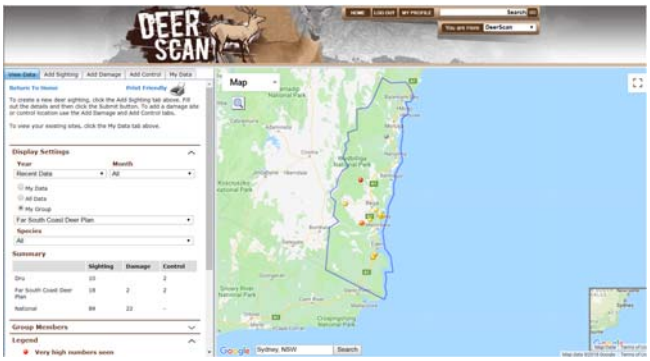

Figure 4. Closed group in DEER SCAN

The FSC Team continued to discuss options for setting up the trap for its final stages and it was agreed that we should aim to initiate the trap and follow up shooting under minimal light (no moon phase). The time frame available to us was 10-13th December 2018.

Figure 5. Final stages of trapping program

By this time it was observed that the deer appeared to be very comfortable within their new surrounds and we were confident that we could successfully trap deer. There were some concerns around the behavioural changes of the deer once they were trapped. Particularly regards to animal welfare and infrastructure damage. To mitigate this we needed to be clandestine to minimise the impact of our presence (use of Thermal Imagery Sights was/ is paramount), apply efficiency in shooting the deer once trapped and provide enough structural support to the gate and trap to ensure its effectiveness.

Figure 6. Day time final preparations.

On the night of the 12th December the trap, the gate and lures were in place ready for the gate to be actioned. We discussed with the landholder the possibility of initiating the trap that night and received a consent form from the landholder and delivered our Shoot Plan as part of our SOP's. In addition we provided the landholder with a Radio Frequency Transmitter to initiate the gate on our call to a receiver.

MMS Images came through as deer appeared and when we identified there to be two deer in the trap the gate was initiated.

Two members of the FSC Team moved in to location, established a staging area to conduct equipment preparations (approx. 200m from the trap location) and moved by foot toward the trap location. With the use of thermal scopes, thermal sights and a silenced 308 firearm we were able to achieve ground shooting within the property prior to getting to the trap.

On approach to the shoot location (30m from the trap location) we noticed two deer in the trap and a third outside the trap. The outside deer was engaged first. There was no significant change in the behaviour of the two in the trap from the rifle fire.

Figure 7. Deer Trapped

The two deer inside the trap were shot swiftly and humanely with minimum stress observed and nil damage to infrastructure.

Figure 8. Carcass recovery.

On completion we were able to shoot and destroy 5 deer within the timeframe of no more than 20 minutes. Carcasses were retrieved from the location at the landholders request and the trap was re-set to monitor other deer in the area.

Figure 9. Resetting trap

Figure 10. Recurrence of deer in the area of operations.

Points for Consideration

- Neighbours that were approx. 200m away in line of site did not hear the sound of the suppressed rifle fire during the early morning activity,
- On approach to each deer located, they did not appear to be ‘spooked’ by the previous rifle fire. We believe this to be because of the suppressor effect and the additional use of thermal imagery on a very dark night,
- The deer in the trap did not see us when we were establishing a shooting platform and remained calm They did become a little more active as soon as they picked up on our scent as a result of the shooting platform being upwind,
- It is paramount for the activity to be conducted under the cover of darkness, preferably in low light, for example, no moon periods with the use of thermal imagery sights and scopes, and suppressors. Minimum two man team fully trained to achieve the objective safely and efficiently.
- It is important to note that the deer appeared comfortable in the environment with the traps. We believe this to be a result of the methodical introduction of the trap and lures over a period of a month.

More information

South East Local Land Services – Bega Office