Marna Banggara

HEALTHY, PROSPEROUS COUNTRY

Predator Control Strategy

2023-2028

Contents

Scope

Ensuring that key native species increase in density and distribution on the Southern Yorke Peninsula (SYP) is a primary goal of the Marna Banggara project. Thriving populations of these species will drive improved ecosystem function and reverse the slow decline in biodiversity and ecosystem complexity which has been observed regionally. Reducing populations of introduced predator species (cats and foxes) is the most effective intervention to enable this population growth and spread to occur.

Successful predator control will help promote healthy populations of extant vulnerable species (including Malleefowl, Hooded Plovers, Bush-stone Curlews, Tammar Wallabies and Mallee Whipbirds) and enable the successful translocation and establishment of endangered and threatened marsupials such as the Brush-tailed Bettong (Yalgi), Southern Brown Bandicoot, Red-tailed Phascogale and Western Quoll. Significantly reduced populations of foxes and feral cats will also improve lamb survival rates and reduce disease risk (toxoplasmosis and sarcocystis) to livestock[1]. Improved ecosystem function is also likely to improve pollination for cropping. Hence, there are environmental and agricultural production benefits across the landscape from improved ecosystem health. The Marna Banggara Predator Control Strategy has been written to further these aims and will be implemented over five years (from September 2023 – June 2028).

Pest animal management requires a strategic approach. Appropriate control methods need to be applied in targeted areas at specific times and at appropriate rates and frequency to achieve desired outcomes. Combining traditional control methods (e.g. baiting and trapping) with the use of the new control methods and technology will increase the efficiency and effectiveness of control. Priorities include significantly increasing the use of the remote sensing field cameras, supporting landholders in implementing effective predator control on private land, the expansion of aerial baiting programs and exploring the possibilities of new and innovative predator control methods. These methods will be deployed in a prioritised zoning approach.

Governance and review

Creating the Marna Banggara Predator Control Strategy

The Predator Control Strategy was developed in consultation with the Marna Banggara project team including predator control project officers, and ecologists. National Parks and Wildlife Service (NPWS) rangers from Dhilba Guuranda-Innes National Park, district and regional managers also contributed. Valuable input was also contributed from the Kangaroo Island Feral Cat Eradication Program project staff and regional management team.

The Marna Banggara project team will oversee the implementation of this Strategy. Additional oversight and support will be provided by a Predator Management Working Group which will be formed in the second half of 2024. The strategy will be reviewed and modified annually by the project team in collaboration with the Predator Management Working Group.

Document management	Version	Date
Strategy approved	1.0	23/08/2023
Strategy review		2024

Background

The Marna Banggara project aims to restore ecological function across 140,000 hectares of the Southern Yorke Peninsula in South Australia, from the Predator Management Fence across the narrow foot of the Peninsula, to Dhilba Guuranda-Innes National Park in the west (see Figure 1).

The project occurs on the traditional lands of the Narungga First Nations people. About half of this area comprises remnant native vegetation and more than 20% of this is protected in national and conservation parks or through Heritage Agreements established under the *Native Vegetation Act (1991)*[2].

Improved ecosystem function can be achieved through the reestablishment (translocations) of absent keystone species. For the Marna Banggara project, initially these species are soil engineers – small to medium-sized marsupial species which beneficially alter the vegetative landscape by improving soil health, water infiltration and seed dispersal through their digging and foraging behaviour[3]. Native predators are planned for future translocations to provide functions of carrion feeders, helping to regulate prey abundance and facilitate nutrient recycling[4]. Currently more than 95% of ground-dwelling native mammal fauna are locally extinct[5]. Translocations will both expand the wild populations of vulnerable fauna (species level benefit) and reverse the slow decline observed in remnant vegetation on the SYP (ecosystem level benefit)[6].

Control of feral predator species (foxes and feral cats) underpins the success of the Marna Banggara project
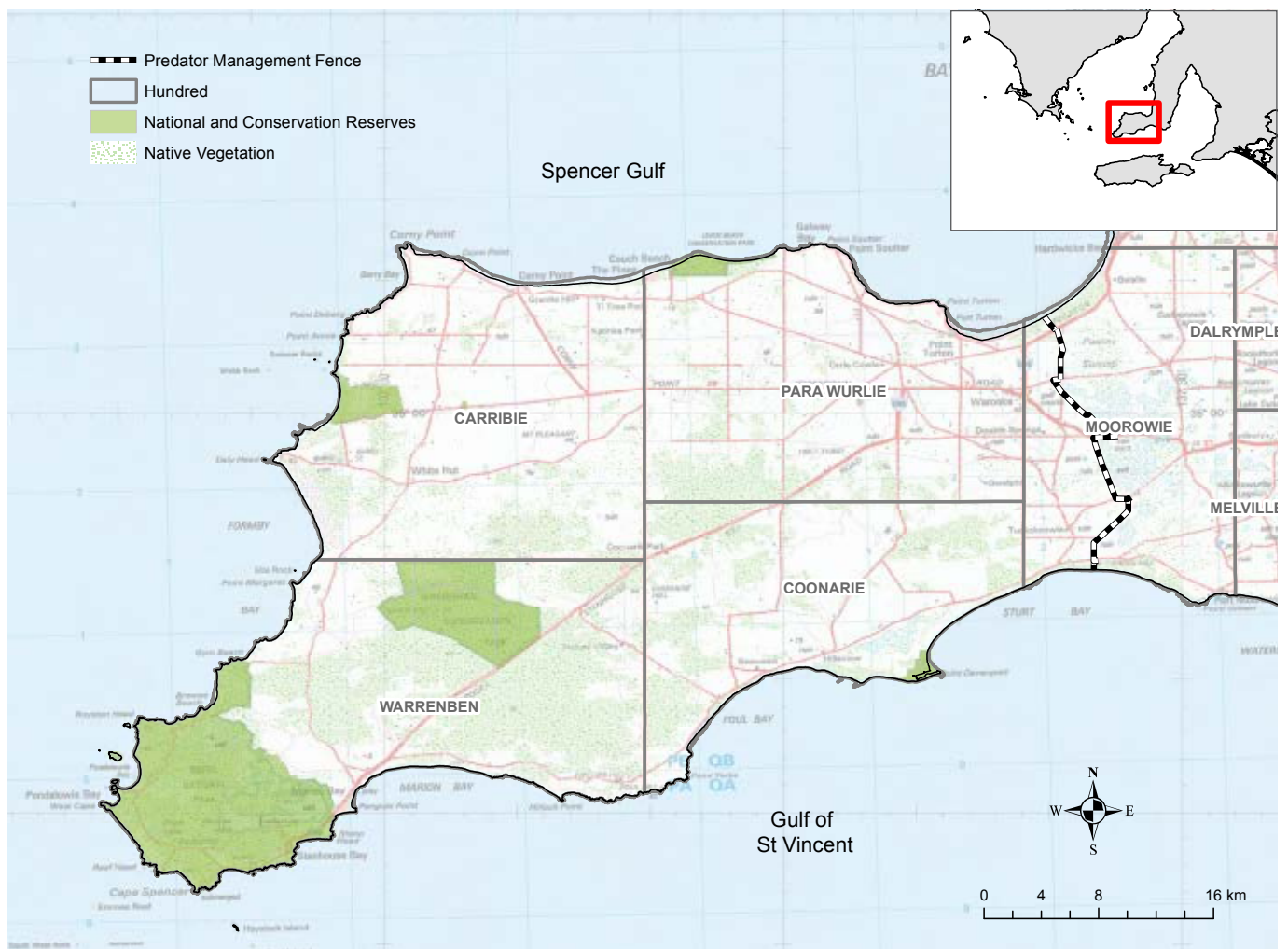

Figure 1: Marna Banggara Project Area

and is essential for the survival of native fauna species and long-term viability of populations[7]. Effective predator management in areas with intact remnant vegetation is especially important[8] as predator populations are known to thrive in fragmented or human-modified landscapes[9]. Although eradication in the project area is impractical, reducing and maintaining low predator populations is critical to enable translocations to succeed (particularly beyond NPWS protected areas) and for existing vulnerable populations to survive and expand. Predation must be low enough for extant and translocated species to thrive if ecological function is to be restored. An added benefit of managing fox and feral cat populations to low densities is that native species may develop anti-predator behaviours which enable them to maintain population viability[10].

A range of control programs have been employed on the SYP to reduce the impact of predator species since 2008. NPWS have maintained continuous ground baiting for foxes within Dhilba Guuranda-Innes National Park (DGINP) and Warrenben Conservation Park (WCP) since 2002 (ahead of Tammar Wallaby reintroduction)[11] and have recently begun ground baiting for cats as well as foxes.
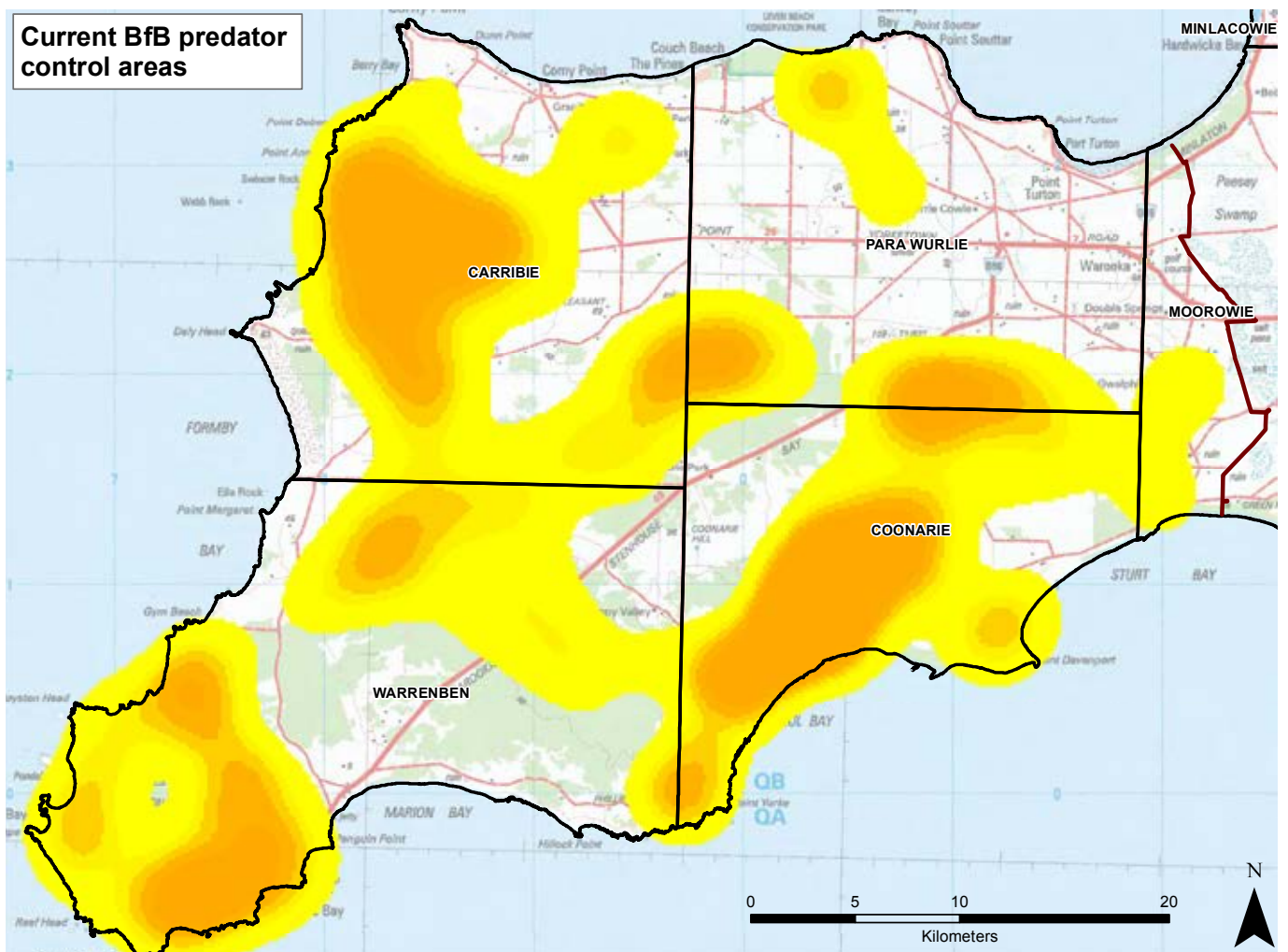
Figure 2: Baiting for Biodiversity bait density distribution
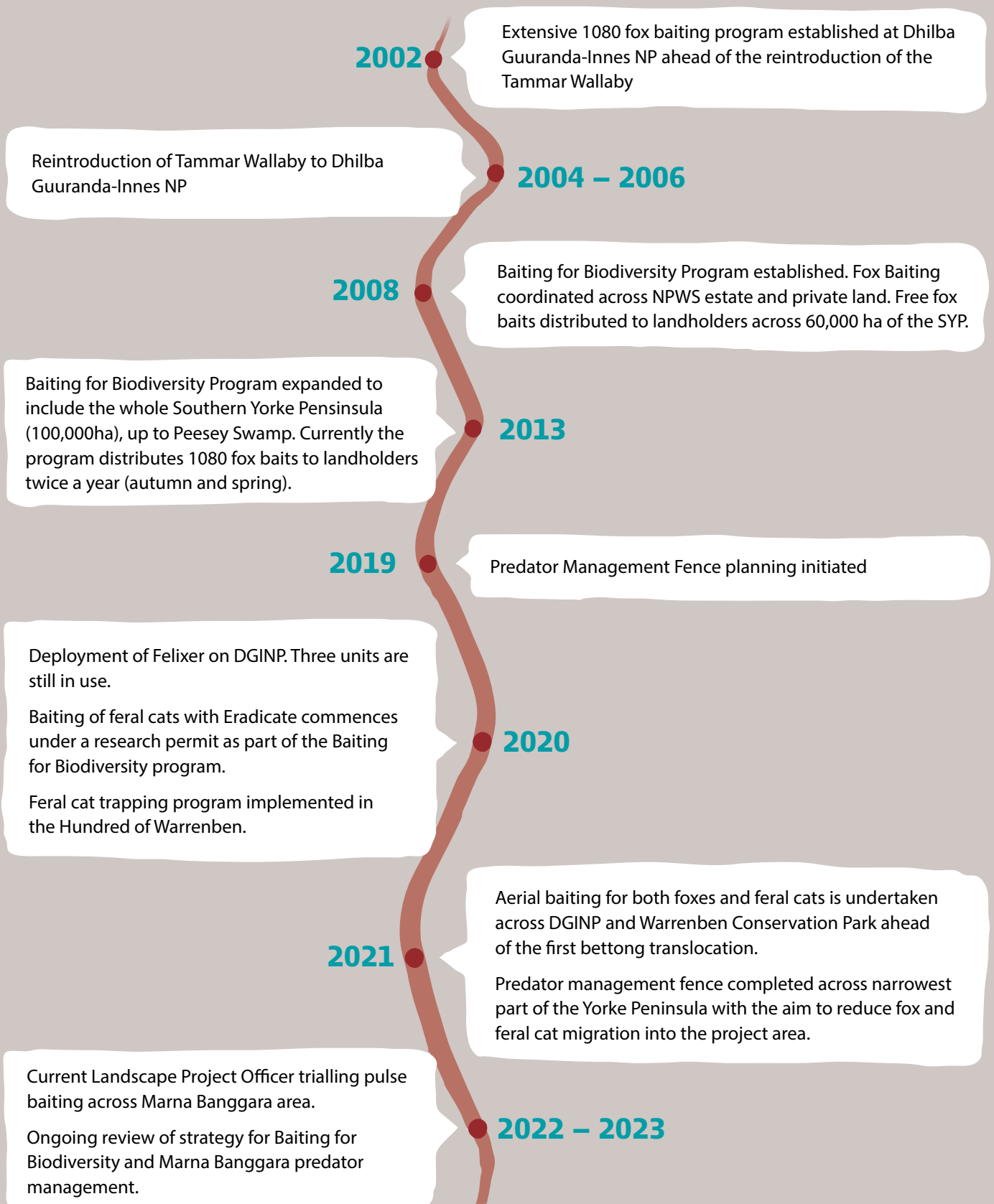
Marna Banggara Timeline of Predator Control

2002 — Extensive 1080 fox baiting program established at Dhilba Guuranda-Innes NP ahead of the reintroduction of the Tammar Wallaby

2004 – 2006 — Reintroduction of Tammar Wallaby to Dhilba Guuranda-Innes NP

2008 — Baiting for Biodiversity Program established. Fox Baiting coordinated across NPWS estate and private land. Free fox baits distributed to landholders across 60,000 ha of the SYP.

2013 — Baiting for Biodiversity Program expanded to include the whole Southern Yorke Pensinsula (100,000ha), up to Peesey Swamp. Currently the program distributes 1080 fox baits to landholders twice a year (autumn and spring).

2019 — Predator Management Fence planning initiated

2020
- Deployment of Felixer on DGINP. Three units are still in use.
- Baiting of feral cats with Eradicate commences under a research permit as part of the Baiting for Biodiversity program.
- Feral cat trapping program implemented in the Hundred of Warrenben.

2021
- Aerial baiting for both foxes and feral cats is undertaken across DGINP and Warrenben Conservation Park ahead of the first bettong translocation.
- Predator management fence completed across narrowest part of the Yorke Peninsula with the aim to reduce fox and feral cat migration into the project area.

2022 – 2023
- Current Landscape Project Officer trialling pulse baiting across Marna Banggara area.
- Ongoing review of strategy for Baiting for Biodiversity and Marna Banggara predator management.

Figure 3: Timeline of Predator Control

Control programs are implemented by Landscape Board staff, pest animal control contractors and NPWS staff. There has been a strong focus on ground baiting for foxes over the last five years, particularly supporting landholders on private and agricultural properties to undertake predator control for production benefits and conservation. For example, the Baiting for Biodiversity (BfB) program distributes approximately 5000 baits to more than 40 landholders every autumn and spring. Landholders are encouraged to coordinate baiting programs to maximise effectiveness.

Currently, monitoring of native species, feral cats and foxes is undertaken using a network of close to 100 remote sensing field cameras across the project area. Thirty field cameras are continually in use with additional cameras utilised for specific monitoring efforts. Nine cellular cameras within DGINP provide real-time notifications and act as an early warning system to guide targeted predator control responses.

Predator numbers have been measured using the Relative Abundance Index (RAI) which uses observations from camera traps across the project area to estimate and track predator activity. A RAI of less than 3 was established prior to the first Brush-tailed Bettong (Yalgi) translocation in DGINP. Whether this is an acceptably low level for successful translocations will require ongoing review. Using the RAI alongside other measures of ecological function will enable successes to be measured through the life of the Marna Banggara project.
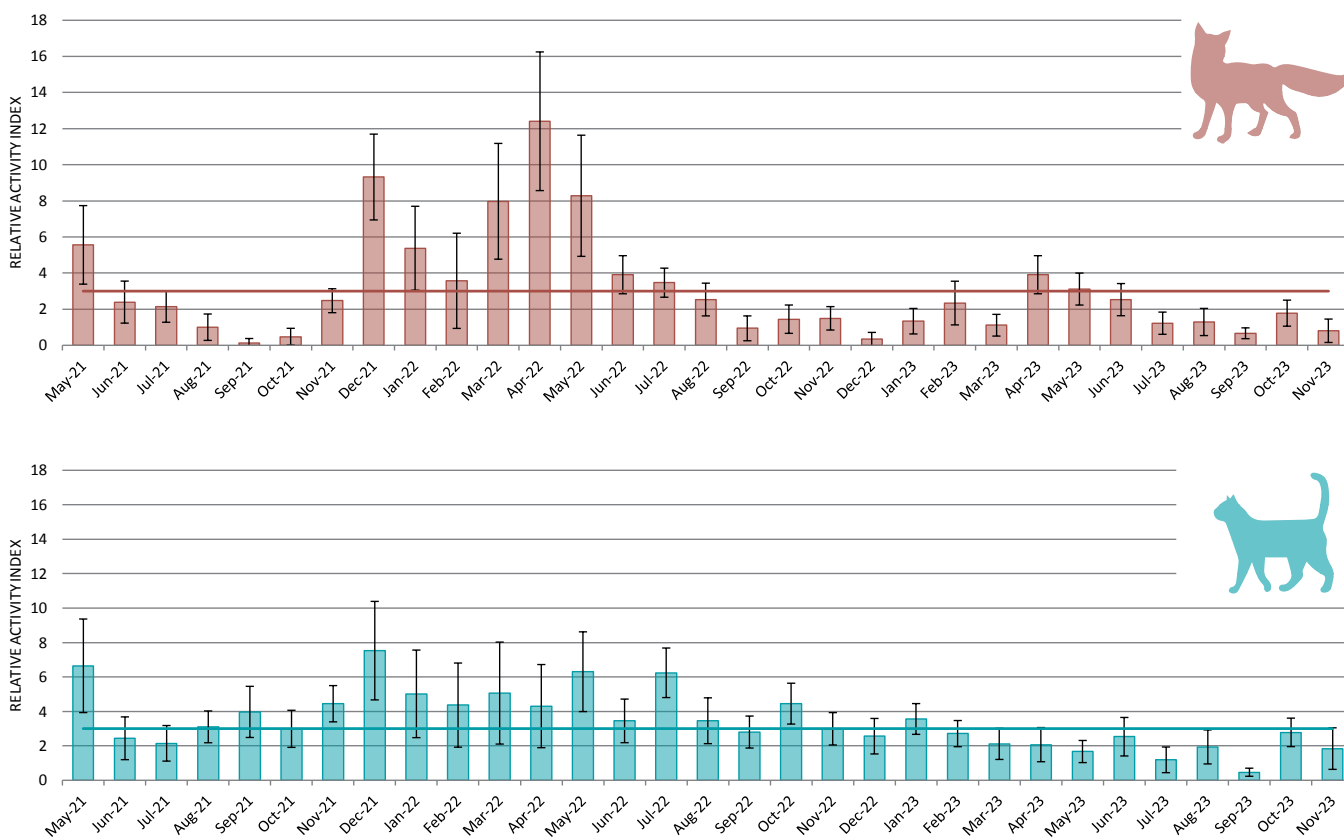
Figure 4: Fox and cat RAI 2021 - 2023

Methodology

Marna Banggara covers an expansive area within a working agricultural landscape which incorporates protected areas, farms and small towns. To achieve a sustained reduction in fox and feral cat densities in the project area, strategies need to be developed that specifically target cats and foxes to achieve population knock-down and then address fecundity and immigration to maintain acceptably low levels of abundance.

Learnings from literature and case studies from other predator control projects on Kangaroo Island, across Victoria[12] and in the SA arid zone demonstrate that a network of control measures at appropriate densities and frequency across the project area are critical.

To succeed in this context, the following methodology will be used:

- Available resources will be directed to a series of prioritised zones. Control work needs to achieve low levels of feral predators in a progression from one end of the project area to the other. Broad scale knock-down methods and targeted "mop-up" will be deployed strategically using this zoned approach. Broad scale baiting, including aerial baiting for both foxes and cats, will be the key control technique for the "knock-down" phase. Specifically, aerial baiting is the most economic method for effectively covering the entire home-ranges of both species within a management zone. Other control techniques will be critical for treating areas where broad scale baiting is not possible (i.e. near populated areas, waterways, and where landholders do not wish to broad scale bait). These "mop-up" techniques will help ensure that pest animals from surrounding areas do not rapidly recolonise treated zones.

- A significantly expanded camera network will be deployed and machine learning will be used to analyse images (as appropriate). Real-time camera data regarding fox and cat presence and movement patterns needs to drive strategic decisions about which control strategies to deploy and when. This network will provide critical information about whether aerial baiting is achieving the desired population knock-down and inform how managers prevent populations from other zones spreading west.

- Control of fox and feral cat populations requires different approaches. Concurrent control methods need to be deployed to achieve low levels of both predators for populations of native species to expand.

- Landholder engagement is crucial to access and implement predator control programs on private lands which cover most of the project area. Engagement needs to focus on the same zones as other operational activities, prioritising high value remnant vegetation. This will ensure the greatest possible degree of coordination in predator control activities and thereby the greatest impact. Without a coordinated, zoned approach, pest animals will simply migrate back into controlled areas from untreated areas. Community support for feral cat and fox control is at very high levels on the SYP however, consistent messaging needs to focus on:

  - Using toxic baits to control feral pests is justified in terms of conservation benefit relative to risks.

  - Project activities are guided by animal welfare legislation and humane control is paramount to the project.

1. Zones

Establishing predator management zones within the Marna Banggara project area will enable predator populations to be strategically reduced based on available resources. Areas where the project has successfully reduced predator abundance will be maintained and progressively extended over the next five years. Ultimately, feral predator abundance will be significantly reduced and maintained at low levels up to the predator management fence which will allow native animals to expand their populations and range under reduced predation pressure.

Given the scale of the project, each zone will need to be sub-divided into smaller management units to enable feasible sized areas to be managed within allocated time frames. This will allow for very low level predator numbers to be targeted, controlled and maintained. Allocation of resources and staffing should be linked to management units within zones. Learnings from similar projects show that where staff members are responsible for manageable zones or management units, both predator control and staff satisfaction is improved.

Working towards an RAI of <3 for feral predator species in a given zone/management unit will give a reasonable measure of success. Adjustments to this RAI may be necessary during the life of this strategy. Ultimately, the project team will need to use their knowledge of on-ground conditions to decide whether feral predator species are at low enough levels to move management activities from one zone to another or adjust the target RAI.

Figure 5: Proposed predator management zones

Zone 1	**2023-2025**	A priority for Marna Banggara will be to continue to work with the NPWS in protected areas and expand work with landholders to reduce predator numbers in the area between DGINP and WCP. Working with landholders with high quality native vegetation in this area should be the initial focus. Within this zone, smaller management units should be established. Continue to implement BfB throughout project area to maintain landholder support and maintain benefits to agricultural production.
Zone 2	**2025-2027**	Continuing working to east and south of WCP with a focus on Heritage Agreements/translocation sites to reduce predator abundance and limit immigration into Zone 1. Maintain low predator levels in Zone 1 through ongoing monitoring and follow-up control. Continue more extensive engagement with farmers to expand predator control on farming properties. Continue to implement BfB throughout project area to maintain landholder support and maintain benefits to agricultural production.
Zone 3	**2027-2028**	Maintain low predator levels in Zone 1 and 2 through ongoing monitoring and follow-up control. Continue to work with farmers to reduce predator numbers and implement measures to restrict immigration through the Predator Management Fence. Continue to implement BfB throughout project area to maintain landholder support and maintain benefits to agricultural production.

2. Camera Monitoring Network

Robust information on relative abundance, activity, and habitat use preferences of feral predator species within each predator management zone of Marna Banggara should inform how control strategies are executed. A comprehensive remote sensing field camera network is the most practical way to gather data on predator populations and activity collecting data on species of interest can also be undertaken utilising the same cameras). When used in conjunction with a zoned approach, camera data is both a powerful way to direct control work and assess effectiveness of methods.

Capturing data using cellular cameras which remotely upload images in real-time is also critical given the large size of the project area. Utilising machine learning to analyse and classify images will significantly reduce staff time, allowing a much larger quantity of data to be gathered and analysed, and for more resources to be allocated to control efforts. A camera spacing of no more than two kilometres with a focus on the best habitat for foxes and cats will deliver high quality information.
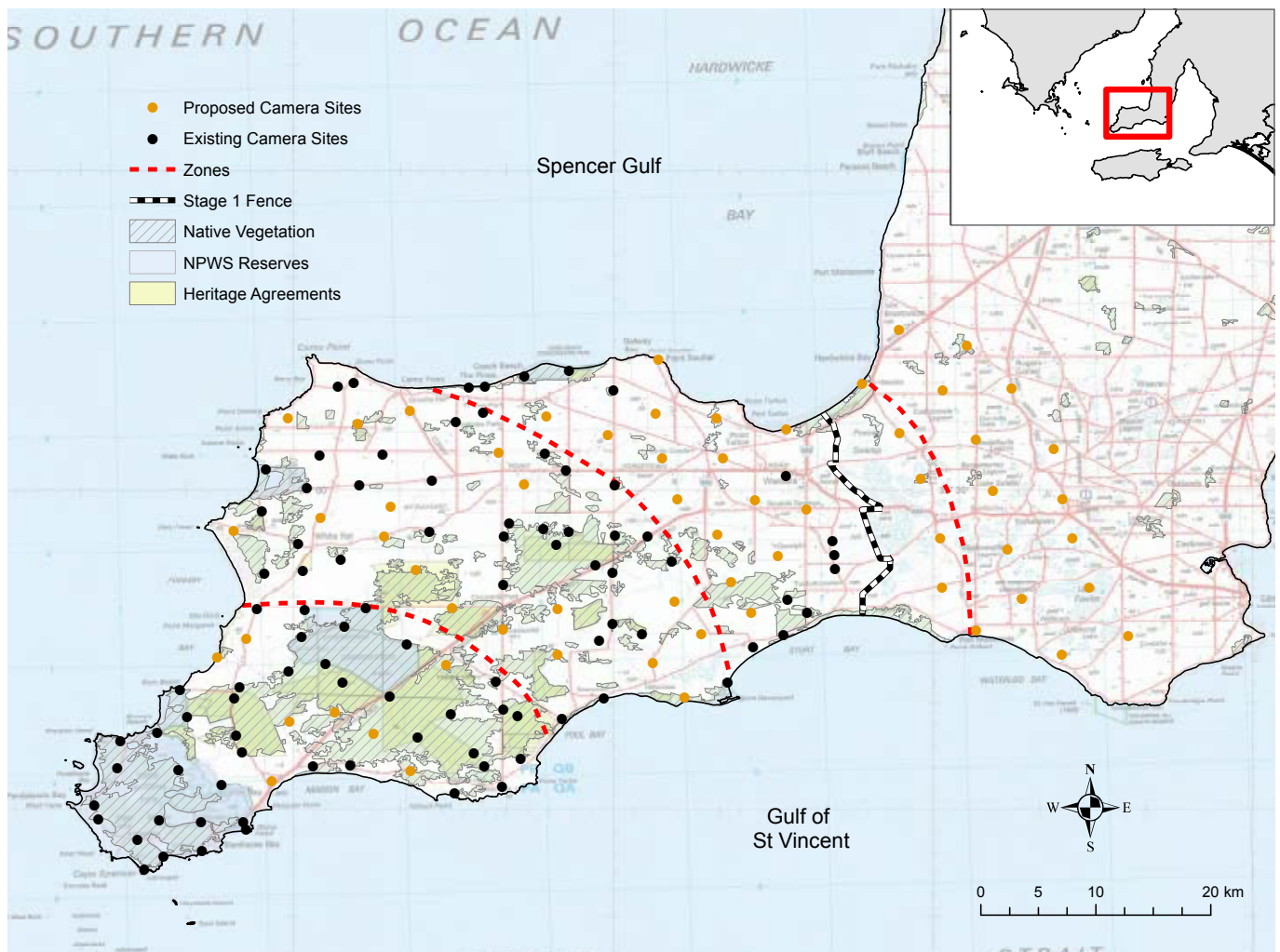

Figure 6: Current and proposed camera locations

3. Landholder Engagement

A 2023 community, First Nations, stakeholder and project staff consultation process clearly identified expanding predator control as a priority for Marna Banggara. Currently, staff are working directly on community engagement, focused on increasing participation, up-skilling and building community capacity. Staff also connect with the wider community in a variety of capacities including through the provision of baits and in the process of seeking permission to conduct feral animal control on private land. Successful ongoing engagement with landholders and the general public will require adequate and consistent resourcing.

Landholder relationships in each zone need to be cultivated strategically. Without participation from key landholders the Marna Banggara project will not be able to operate effectively across the landscape as 80% of the project area is privately owned and not formally managed for conservation. Although general support should be provided to engage landholders across the project area, the zoned approach also needs to apply to landholder engagement. This will ensure that the greatest possible coordination between predator control on public and private lands occurs, maximising the impact of this control. Small and measurable successes on private land are anticipated to increase the community's engagement with the project. Additionally, providing a range of effective control activities will enable landholders to choose the methods most appropriate to their context. Consequently, the Marna Banggara team will need to continue to up-skill and support landholders through:

- Direct contact with landholders in priority areas to encourage and support timely feral animal control through the community trapping and baiting program as well as to facilitate participation in biodiversity monitoring;

- Workshops and capacity building opportunities;

- The provision of expert advice and support;

- Facilitating the development of community networks (ideally utilising local 'champions') to support predator control activities and increase information sharing;

- Support the use of new technologies such as Feralscan and;

- Provide up-to-date information about the progress of the project including clear information about where predator control activities are focused. Information sharing needs to use a variety of platforms including local print media.

4. Targeted feral cat and fox control

A major consideration for the Marna Banggara Project is ensuring that species-appropriate tools are utilised and the deployment of these tools also takes into account the complex relationship between fox and cat populations and prey populations[13]. Targeting feral cats and foxes with different control methods will be required for different cat/fox life cycles and behaviours, densities and under different environmental conditions[14]. Progressively expanding cat control efforts within the zoned approach is also a priority for the next five years. (Achieving a reduction in fox numbers may simply mean cat numbers increase thereby reducing the conservation gains obtained through fox control[15].)

Specifically, for fox control to be effective, research suggests that a minimum 65% reduction in fox population across 50% of the project area is required[16]. Aerial baiting will be the most cost effective way to knock down the fox population to this level where feasible. Seasonal broad scale baiting for foxes can maintain low fox densities where annual programs result in re-invasion within four months[17]. Other methodologies can be used strategically to maintain low population density, addressing immigration and reproduction once this high level of knock-down is achieved.

Feral cat populations are more challenging to control as cats are live prey experts and are less likely to take baits than foxes. Baiting trials have revealed variable rates of bait uptake: cats are less likely to encounter baits; baits are less likely to be palatable to cats; non-target species will consume baits, and prey availability and weather are key factors[18,19]. However, toxic baiting is the only broad scale method currently available to land managers to knock-down cat populations. As such, both Eradicat and Curiosity should be used to control cat populations in a strategic and targeted way which takes into account seasonal conditions and available prey[20]. In practice, this may mean cat baiting efforts are increased in dry years when other prey species (such as rabbits) are at low numbers and the likelihood of cats taking baits is increased.

More experience using cat baits at a landscape scale should then inform best-practice protocols and a better understanding of factors that influence successful baiting programs[21]. Thorough risk assessment and monitoring to quantify potential non-target impacts will also be needed to ensure meaningful reductions in cat populations are occurring. Similarly to fox baiting, strategically timed, broad scale aerial cat baiting can then be followed up by other methodologies.

5. Control Tools

A. New Technology

There have been significant improvements in the technology available to manage feral animals over recent years. The following is not an exhaustive list but outlines some of the major options for consideration on the SYP.

Celium Trap Alert	Celium Trap Alert is a wireless trap monitoring system which remotely notifies staff when a trap has been triggered. It is a priority for Marna Banggara to transition to using the Trap Alert system to better utilise staff time and resources. In one instance on Kangaroo Island, changing to the use of the Trap Alert system resulted in approximately a 75% saving in staff time.
Felixer feral cat grooming trap	A Felixer is a camera based device which is triggered to discharge 1080 poison in a gel form onto passing cats. The cat then grooms itself and ingests the poison. Currently three Felixers are deployed within DGINP. Felixers may be particularly useful on properties where baiting is not possible as they will not fire on non-target species[22]. Recent upgrades to the Felixer technology allow the machine to also fire on foxes.
Toxic Trojans	A Toxic Trojan is a toxic implant which is harmlessly implanted in a translocated animal. Consuming the 'Trojan' animal is toxic to the predator and either trains the predator species to avoid targeting the reintroduced species or kills them. While this technology is still being developed, it could be trialled in the future[23].
FoxNet	FoxNet, a fox population modelling tool, digitally simulates fox populations across landscapes based on control efforts and monitoring and can be customised to specifically reflect the target area. Tools such as FoxNet should also be considered as a technological tool to more accurately focus on-ground fox control activities. CatNet (a comparable modelling tool for cats) is in development and should be considered in the future.
Drone cat and fox tracking	Drones using thermal cameras can be used at night to locate foxes and cats as they range. Locating them using this technology can enable more effective spotlighting and shooting.
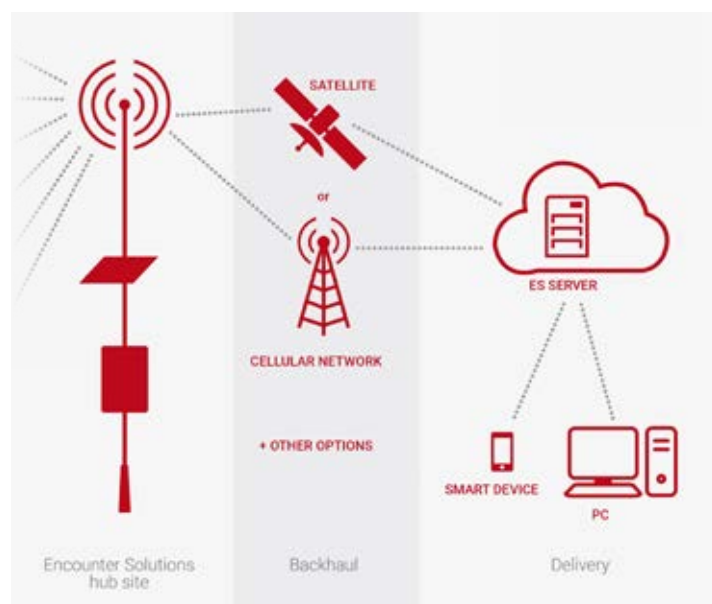
B. Aerial Baiting

Where it is logistically possible, aerial baiting remains a very cost effective way to bait for both foxes and feral cats, achieving initial knock-down over large areas. The 2021-2022 aerial baiting program resulted in measurable reductions in fox pressures and should be continued and expanded. Aerial baiting over private land, particularly Heritage Agreements should continue to be investigated. Ideally the 2023-2024 aerial baiting program could be extended to cover areas with significant native vegetation, especially those where future translocations are proposed and across the Predator Management Zone of focus. Buffer zones, permissions, off-target fauna species, community perceptions and seasonality will need to be considered.

C. Ground Baiting

Ground baiting must be linked to the zoned approach to enable the intensity of activity needed to effectively control predator populations. Due to the density of vegetation on the SYP and the need to control pest animals ranging beyond road networks, ground baiting should be viewed as supplementary to aerial baiting and used to prevent populations moving into cleared zones. If ground baiting is deployed along the edges of areas where predator populations are known to be reduced is will be a very effective way of maintaining these low populations.

Canid pest ejectors have been used as a part of the project to reduce impacts of baiting on non- target species. This method provides options where there are concerns regarding off-target impacts and their use as a part of ground baiting operations should continue where it is appropriate.

D. Predator Management Fence

The completion of the Predator Management Fence across the narrow neck of the Southern Yorke Peninsula in 2021 was a major milestone for the Marna Banggara Project. However, in the short term predator control resources should be directed towards priority areas for translocations and populations of extant vulnerable species. Using the zoned approach will reduce feral predator numbers over the next five years enabling the fence to be patrolled as the "edge of the front" once feral predators in the Marna Banggara project area are sufficiently controlled.

Using cameras which can detect cats and which then trigger a high frequency noise aimed to repel them (which is inaudible to humans and other species) is currently being trialled on the Dudley Peninsula on Kangaroo Island. If the cat still breaches the fence a variety of other control measures can then be remotely triggered including pre-positioned traps, bait stations and ultimately attendance on-ground by shooters. Similar approaches are being deployed on the Dog Fence where surprising and frightening stimuli (e.g. noises and lights) are triggered when cameras detect a dog approaching the fence. Learning from these projects should be applied, melding approaches to best suit conditions on the Southern Yorke Peninsula.

E. Trapping

Trapping has been used as a part of predator management efforts so far, with a focus on removing feral cats. Going forward, trapping efforts should be expanded through increased landholder engagement consistent with the use of predator management zones. Use of the Trap Alert system should also be implemented as soon as possible. Trap locations should also be determined using information from cameras which enable staff and landholders to better anticipate feral cat movement. Best practice cage trapping protocols should be developed for use by project staff as well as participating landholders.

F. Shooting

A Marna Banggara Ground Shoot Operation Plan has been developed so contractors and Landscape Board staff can cull trapped animals and undertake spotlighting and shooting to control predator species. The usefulness of shooting will be maximised where it is coordinated with translocations and where a focused program of trapping and baiting have been undertaken in a given predator management zone, targeting remaining predators.

Like other tools of control, the usefulness of shooting will also be enhanced by using camera data to direct shooting to areas of predator activity. Drones could also be used to improve the effectiveness of spotlighting. The success of shooting can also give an indication of baiting and trapping effectiveness, augmenting data gathered through the camera network.

G. Detector Dogs

Detector dogs, used by skilled contractors can be used to help locate foxes, fox dens and feral cats. This can be useful in a number of ways. Detector dogs can be used in conjunction with shooting to effectively locate feral cats and foxes. Similarly, detector dogs can be used to guide the location of camera traps or ground baits. Detector dogs can also be used to locate fox dens which can then be destroyed through fumigation. If reduced fox numbers can be maintained in a given zone, the destruction of dens will contribute to an eventual decline in fox numbers. Detector dogs may also be a useful tool to sweep through areas ahead of translocations to ensure these sites are predator free at critical times. A further use of detector dogs may be to determine native animal distribution where this is not adequately established through camera data. The use of spotlighting and tracking dogs could be six times more efficient than other methods such as trapping (depending on context)[24].

Ideally, a local detector dog contractor could be engaged to conduct this work which would ensure availability at critical times and familiarity with local conditions.

H. Pest Animal Contractors

Specialist pest animal removal contractors are used as part of the current fox and feral cat management program. Strategically utilising their services to manage specific problem animals and conduct sweeps to remove animals from identified areas will contribute to management efforts over the next five years. Engaging contractors at strategic times (i.e. ahead of translocations, as part of response plans post translocations or during peak activity periods) should be incorporated into annual planning. An added benefit could be up-skilling staff through their expertise and knowledge during periods of contract work.

6. Monitoring and Evaluation

Feral cat and fox numbers have been monitored for many years across the Southern Yorke Peninsula. In 2014 a landscape-scale grid of motion sensor cameras was installed which used a nontoxic meat lure to attract predators. Initially, monitoring was undertaken to collect data on goannas but proved to be an effective method to collect data on introduced predators as well. In 2019, the program resumed with introduced predators as the primary focus. It will continue annually as a part of the Marna Banggara project. An additional 30 cameras were added to this network in 2020. Currently, ongoing assessments of RAI for foxes and cats can be made using the latest camera imagery.

Expanding the current network of cameras will enable more detailed monitoring and evaluation to occur. When cameras are deployed both across the landscape and with greater density in priority zones and management units, data can be collected to determine predator activity and response to management actions.

Detector dogs that are trained to a specific native animal scent may also be useful in the future to monitor presence and absence of feral predators and key native species.

Ideally, measuring the effectiveness of predator control is done by measuring the impact on target native animal populations. However, these populations take time to establish and external conditions (such as weather) can have a significant impact. In the short term, measuring predator populations to assess whether management

has been effective is a practical alternative. Reducing and maintaining predator populations at an RAI of <3 will give an adequate indication of success for the duration of this strategy. Data from cameras, trapping, bait uptake, shooting, Feralscan and detector dog activity can all inform an understanding of current predator populations. A Before-After-Control- Impact project design may aid in analysing the effectiveness of management efforts. Analysing predator numbers from treated zones can also be compared to those outside the Predator Management Fence to provide data on the effectiveness of control programs. Longer-term, predator management will be considered to be successful if populations of vulnerable native fauna are breeding successfully, populations are growing and the range of these populations is increasing.

Investigations into genetic sampling[25] and camera grids[26] to determine fox and feral cat density as potential research projects should also be undertaken over the next five years.

Although cropping is a more significant industry than livestock in the Marna Banggara area, it would be useful to collect data regarding the presence of predator species with toxoplasmosis and sarcocystis and make this information available to the community / farmers. Evaluating the positive effect of predator management on primary production could include estimates of lamb mortality reduction and/or a reduction in carcass rejection due to cysts.

7. Priorities

1 Increase operational capacity to reduce predator populations and maintain them at a level which enables key, identified native species to expand their population and range. Survival data of native fauna will inform whether control efforts are effective.

2 Apply a zoned approach to predator species control which aims to knock-down and then manage feral cat and fox numbers progressively through the project area. Eventually, predator numbers can be primarily managed along the Predator Management Fence to maintain low density throughout the project area.

3 Continue and expand all control activities including establishing a bi-annual aerial baiting program for foxes and feral cats which includes baiting over Heritage Agreements and/or other private land.

4 Increase camera numbers in both permanent and seasonal monitoring arrays. Employ machine learning software to analyse camera images and utilise cellular 3G/4G wireless cameras. Utilise camera data to drive management actions.

5 Ensure consistency and regularity in communications with landholders, community groups, project partners and stakeholders regarding predator control. Up-skill landholders to enable them to effectively reduce predator populations on private land with a focus on creating connected blocks of habitat for target species while working concurrently with staff in a specific zone.

6 Trial new methods including but not limited to detector dogs, sound and light deterrents, wireless trap alert monitoring, use of Feralscan and modified cat traps.

7 Investigate whether an Indigenous Ranger Group (or similar) could ease staff shortfalls and deliver working on country outcomes. Collaborating with Aboriginal Land Trust/Indigenous Protected Area staff will be necessary.

8 Utilise proven Citizen Science methodologies to support monitoring and evaluation efforts.

8. Animal Welfare, Permits & Approvals

All aspects of this Predator Management Strategy will comply with relevant legislation which includes:

- *Animal Welfare Act 1985*
- *Animal Welfare Regulations 2012*
- *Controlled Substances Act 1984*
- *National Parks and Wildlife Act 1972*
- *National Parks and Wildlife Regulations 2019*
- *Controlled Substances Act 1984*
- *Controlled Substances (Pesticides) Regulations 2003*
- *Landscape South Australia Act 2019*
- *Landscape South Australia Regulations 2020*
- *Wilderness Protection Act 2012*

Aspects of the Predator Management Strategy that require specific permits and approvals for specific predator control activities and monitoring will be completed as required and include but are not limited to;

- Animal Ethics Committee approvals (e.g. cat baiting, camera monitoring)
- Animal welfare research and teaching licence
- Minor use permits linked to research (e.g. 1080 cat bait)
- Scientific research permits

The Model code of practice for the humane control of feral cats and Model code of practice for the humane control of foxes will be implemented as a part of control programs.

9. Indicative spreadsheet of management activities over time

		Zone 1	Zone 2	Zone 3
Year 1	Summer	🥜	🥜	🥜
	Autumn	🥜 🐕 🪤 🔫	🥜	🥜
	Winter	🐱 🥜 ✈️ 🐕 🪤 🔫	🥜	🥜
	Spring	🥜	🥜	🥜
Year 2	Summer		🥜	🥜
	Autumn	🥜 🪤 🔫	🥜	🥜
	Winter	🥜 ✈️ 🪤 🔫	🥜	🥜
	Spring	🥜 🐕 🪤 🔫 💨	🥜	🥜
Year 3	Summer	🥜	🥜	🥜
	Autumn	🐱 🥜	🥜	🥜
	Winter	🐱 🥜 ✈️	🥜 ✈️ 🐕 🪤 🔫	🥜
	Spring	🥜 🐕	🥜 🐕 🪤 🔫 💨	🥜
Year 4	Summer	🥜	🥜	🥜 🔲
	Autumn	🥜	🥜 🐕 🪤	🥜 🔲
	Winter	🥜 ✈️	🥜 ✈️ 🐕 🪤	🥜 🔲
	Spring	🥜	🥜 🐕 🪤 🔫 💨	🥜 🔲
Year 5	Summer	🥜	🥜	🥜 🔲
	Autumn	🥜	🥜 🐕 🪤	🥜 🔲
	Winter	🐱 🥜 ✈️	🥜 ✈️ 🐕 🪤 🔫	🥜 💨 ✈️ 🪤 🔫 🔲
	Spring	🥜	🥜 🐕 🪤 🔫 💨	🥜 🐕 🪤 💨 🔫 🔲

Legend:

🐱 Translocation
🥜 Ground bait (*intensive program*)
🥜 Ground bait (*maintenance program*)
✈️ Aerial bait
🐕 Detector dogs
🪤 Trapping
🔫 Shooting
💨 Den fumigation
🔲 Fence AI deterrent

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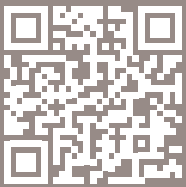
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