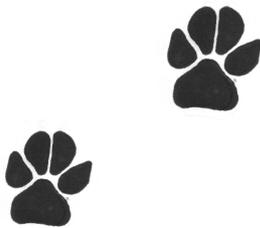




FOX MANAGEMENT PROJECT

TECHNICAL REPORT
FOR
GNARALOO



Prepared by
Animal Pest Management Services
Ph: (08) 97262537
Email: enquiries@animalpest.com.au
November 2009

**GNARALOO FOX MANAGEMENT PROJECT
TECHNICAL REPORT**

CONTENTS

1	OVERVIEW OF OUTCOMES REQUIRED	3
2	FOX CONTROL STRATEGIES	4
3	ASSESSMENT	8
4	RECOMMENDATIONS	9
5	REFERENCES	10

1 Overview of Outcomes Required

This program was undertaken as a result of the need for fox control on Gnaraloo Station due to the high level of predation on marine turtle egg clutches and hatchlings on beaches within the northern sector of the station.

Foxes have been a significant predator to turtle clutch survival rates at Gnaraloo and foxes are currently listed nationally as a key threatening process. Limpus (2008) suggests that it is highly probable that egg loss to foxes and vehicle traffic in recent years has exceeded the sustainable level of loss for the Western Australian Loggerhead Turtle population. Up to 70% of Loggerhead nests at surveyed beaches at Jane's Bay, Ningaloo Station, Western Australia were destroyed by foxes before fox control was implemented (Mau 2003). Limpus (2008a) suggests that much of the egg predation is likely to occur on those Western Australian beaches most likely to produce female hatchlings, adding a further long-term complication to future population dynamics.

During the Gnaraloo turtle breeding season 2008/09, fox control reduced turtle clutch predation from an average of 5 nests predated per night prior to fox control, down to zero predation 5 days after fox control commenced. Fox baiting commenced on 10/12/08 and an immediate reduction in fox numbers occurred (refer Figure 1 immediately below).

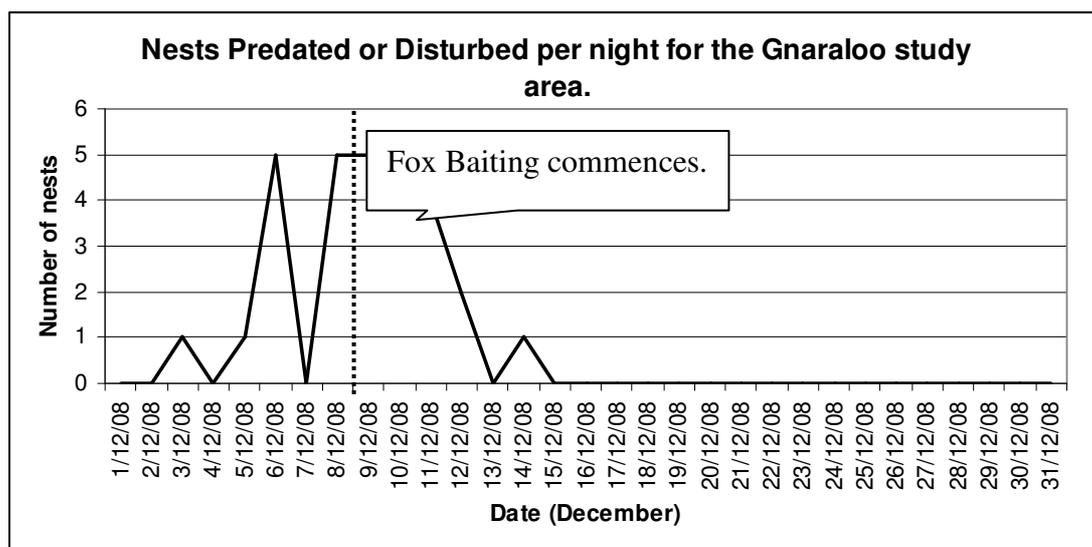


Figure 1: Number of nests predated or disturbed by foxes in December 2008
(Ref. Gnaraloo Station, *Gnaraloo marine turtle research program, Beach Monitoring, Nesting Season 2008/09, Final Report, June 2009*)

Fox control strategies need to focus on managing the impact on fox predation of turtle nests and the most effective control method is baiting with 1080 fox baits. The primary aim is to manage the level of fox predation towards zero.

The program should also include engaging key stakeholders within the area, and disseminating information on the projects objectives and outcomes to the community and providing a means of reporting fox activity and control undertaken to the operational personnel and technical consultants.

2 Fox Control Strategies

The fox control strategies are aimed at –

- a) Reducing the numbers of foxes within turtle nesting areas,
- b) Minimise recruitment of foxes into these areas, especially during the annual turtle nesting period, to
- c) Minimise the number of turtle nests (egg chambers) and hatchlings predated or disturbed by foxes

Effective fox control strategies can be successful in stopping the predation by foxes on marine turtle rookeries, as has occurred in previous programs conducted by APMS at Cape Lambert (2002-2009), Port Hedland (2008) and Gnoraloo (2008/09) (M Butcher, unpublished reports).

To maximise the effects of the fox control strategies, the following is recommended to be implemented.

2.1 Baiting Area

The area that needs to be controlled for foxes needs to cover (in descending order of priority) the area where foxes present an immediate threat to turtle nests (egg chambers) and hatchlings, the area foxes are likely to be coming from, the areas foxes are likely to be recruited from, and the areas of fox activity across the rest of the station.

At Gnoraloo, foxes are present throughout the station. They occur at highest concentrations within 2km of the beach area, and within 2 km of water sources on the station as a whole.

Most foxes appear to be moving onto the beaches within the first 2 km of the beach.

All water sources are likely to be visited by foxes, although foxes don't always need free water as they will often obtain enough water from their prey. Visitation to water sources is likely to be highest during periods of low prey availability, low rainfall and high temperatures.

Fox control is likely to be more difficult once foxes are regularly preying on turtle nests, as these foxes have a ready source of food available on the beaches and are less likely to take baits except those that are well presented.

The area to be baited can be split into four main areas, based on the priority of each area for fox control:

- a) Turtle beaches – These areas are the highest priority for fox control. This includes the area immediately behind the primary dunes, up to approximately 2 km inland.
- b) Surrounding Hinterland – The area from the valley behind the primary dunes through to approximately 8 km inland and areas north and south of a turtle nesting area.

- c) All beaches north and south of confirmed turtle nesting areas, from Gnaraloo southern boundary to Gnaraloo's northern boundary.
- d) Remaining Station land – the areas of Gnaraloo other than a, b and c, extending inland to Gnaraloo's eastern most boundary on Lake MacLeod.

Bait type and density of baiting may need to be varied in each of the 4 areas that control is to be implemented on.

2.2 Bait Type

The type of baits used during the program may be varied, depending on the area to be baited. The primary bait to be used should be the dried meat bait (DMB) variety, with dried kangaroo baits preferred over dried sausage baits as a result of differences in bait uptake at Gnaraloo (see previous reports of December 2008 and January 2009). All baits should contain 3mg of 1080.

Within turtle beach areas and for all other beaches along the Gnaraloo coastline, baits should be 1080 impregnated into fowl eggs as foxes are likely to be searching for this food source, especially during the annual turtle breeding season. These baits are also likely to better survive the higher moisture levels on the beach. These baits can be used in the area behind the primary dune, although egg bait uptake is likely to be less as the importance of bait placement becomes more critical for this type of bait used in these areas.

From the primary dunes area 2km back inland, DMBs are more likely to be taken by foxes and are less likely to be consumed by non-target species such as ghost crabs and lizards (M Butcher, unpublished data). DMB's should be the highest quality possible during the annual turtle nesting period to increase bait uptake during this critical time. Field produced DMB's are likely to be significantly cheaper than the current cost of factory produced baits.

Baits such as Foxoff can be utilised as an adjunct to DMBs and egg baits to ensure a variety of baits is used to maximise the control effort on foxes. While average fox control programs are likely to achieve an average of 62-88 % control of foxes (Thompson et al 1994, Thomson et al 2000), using differing fox baits may improve control programs by appealing to more foxes and minimising bait shy foxes. This strategy has been used by APMS in a number of areas (including Gnaraloo) and partly accounts for our higher than average success rates during fox baiting programs.

2.3 Bait Placement

Baits should be placed in the following areas –

- along all vehicle tracks where fox tracks are evident (as required, all year)
- around all water points and sources used by foxes or stock (bi-monthly, being every two months rather than twice per month)
- along turtle beaches – egg baits preferred (October, January and March)
- along all beaches north and south of any turtle beaches (October, January and March)

- on the main access track from 6 Mile gate to Cape Farquhar (bi-monthly from October – April)

Baiting densities should not exceed 5 baits/km² or 1 bait per 200m. Increasing the baiting rate will not improve bait uptake or control achieved (Thomson et al 2000).

2.4 Timing of Fox Baiting

As turtle nesting commenced prior to the 1st December in 2008, fox control should be undertaken before this occurs. Baits should be available to foxes through November to at least the end of April to cover the main nesting and hatching times and ensure as many foxes as possible are likely to come across and consume baits.

Fox control is best undertaken before predation of nesting occurs to protect all nests. Bait take is likely to be higher when food for foxes is lower and foxes are not moving direct to the beaches where that readily available food is located.

The baiting program should also be undertaken in May, prior to the fox's peak breeding season to reduce the total number of foxes that occur on the station.

Water points and sources throughout the station, and especially those on or near the coast, should be baited at least during the annual turtle season and dry summer months and these areas may be baited up to bi-monthly.

LOCATION	DATE	BAIT TYPE	COMMENTS
Turtle beaches, including the area behind primary dunes up to ~2 km inland	October, January and March	Egg baits	Baiting above high water mark
Surrounding Hinterland, up to 8 km inland	October, January and March	DMB, Foxoff	Bait at 5 baits/km ²
Other beaches	October, January and March	Egg baits	Baiting above high water mark
Vehicle tracks	During routine station activities	DMB	Where fox tracks found
Remaining Station land including water points and sources	Bi-monthly or a minimum of October, January, March, May/June	DMB, Foxoff	Bait around all water points

2.5 Bait Usage

1080 fox baits must only be used by personnel who have been trained and approved for 1080 possession and use. 1080 baits must only be used and stored during the approved period set down on a 1080 Authorisation voucher.

2.6 Other Control Methods

Alternative control methods should be adopted where the following occurs –

- Foxes are active even after baiting (bait aversion suspected)
- Foxes are present in areas that are too high risk to bait (e.g. 3 Mile and the Homestead)
- Opportunistically

The following methods can be utilised in addition to the baiting strategies outlined above. It should be remembered that properly placed baits of the right type and quality will generally control most foxes, so long as adequate time is allowed for foxes to find and consume baits, and no rainfall has occurred that will break down or leach 1080 from the bait material. As such, sufficient time should be allowed to ensure the baiting program has an opportunity to work, with bait programs requiring up to 44 days to be fully effective in semi-arid areas (Thomson et al 2000 b). Some foxes may however show an aversion to any bait and other methods can be used to control these problematic foxes.

Shooting –

Shooting can be an effective addition to baiting, provided it is undertaken by skilled marksman using the property equipment. Shooting should not be attempted where the chance of killing the fox is not extremely high. High powered small calibre firearms that are correctly sighted in are preferred.

Shooting can be either opportunistic (when a fox is seen) or by targeted spotlighting programs using a vehicle mounted 100w spotlight. Shooting is an alternative to baiting in high risk areas such as near the homestead and 3 mile areas.

Trapping –

Trapping using cage traps is an alternative to baiting when in high risk areas such as at 3 mile and around the homestead. The use of foot-hold traps improves capture rates, but may result in trap shy animals where traps are set by inexperienced personnel. Trapping can be a highly successful means of removing foxes that show an aversion to baits.

2.7 Evidence of Foxes

Determining whether there are foxes along vehicle tracks and beaches is based on the presence or absence of fox tracks and diggings into nests. The generally windy conditions experienced at Gnaraloo (throughout the summer months in particular which coincides with the annual turtle breeding season) would result in fox tracks being obscured relatively quickly.

It was noted during the baiting program conducted in December 2008 and was more apparent during the January 2009 fox baiting program that feral cat tracks increased along the beach while fox tracks significantly decreased. Large cat tracks were confused with fox tracks by the turtle monitoring personnel 2008/09 as reported fox tracks were checked by APMS staff and found to be those of large feral cats. Two very large feral cats (larger than a full grown

fox) were known to exist in the area from tracks seen during fox baiting and one was sighted during spotlight monitoring in December 2008.

3 Assessment

As the key outcome required is to minimise the impact of foxes on marine turtle nests (egg chambers) and hatchlings, the assessment as to the effectiveness or otherwise of the fox program is based the number of egg chambers and hatchlings disturbed or predated by foxes.

The presence or absence of foxes per se is not an indicator of the effectiveness of the turtle disturbance / predation reduction outcome required.

However, minimising the number of foxes present on Gnaraloo is likely to reduce the amount of disturbance and/or predation by foxes of turtle nests. This is particularly important at the beginning of the annual nesting season where the foxes are more readily able to detect the presence of the turtle nests for the first few days after laying. This was shown from the Gnaraloo beach monitoring program report 2008/09 where foxes were apparently evident after the 2008/09 baiting program but did not predate nests.

To be effective, Gnaraloo turtle monitoring personnel need to be well versed in detecting the difference in feral cat, wild dog and fox tracks, even when tracks are wind-blown overnight.

The current method adopted in recording the presence of foxes and predation levels used in the 2008/09 Gnaraloo beach monitoring program is sufficient to measure the effectiveness of the fox predation reduction program.

Quality assurance of the control program and fox monitoring should be conducted at the commencement and during the turtle season. This will ensure the program is being undertaken as efficiently and effectively as possible and that foxes are successfully targeted.

4 Recommendations

4.1 Area Baited

The area to be baited should at least include turtle beaches, areas immediately behind the primary dunes and the surrounding hinterland, all water points / sources and all beaches possible from Gnaraloo southern to the northern boundary (subject to adequate risk assessment for domestic dogs).

4.2 Bait Type

Bait types should primarily consist of 1080 dried meat baits and egg baits, placed in accordance with the recommendations contained in this technical report.

4.3 Bait Timing

Baits should be available to foxes from late October and continue through to at least May.

4.4 Other Fox Control Methods

Alternatives to 1080 baiting should be used where the risks of bait use are too high and opportunistically where foxes are seen. These alternative strategies may include trapping and expert shooting conducted by experienced personnel.

4.5 Evidence of Foxes

Gnaraloo turtle personnel involved in recording fox evidence (tracks) should be trained and be able to determine the difference between fox, wild dog and feral cat tracks.

4.6 Quality Assurance

Quality assurance auditing and additional advice should be provided at the commencement of each season and at least once during the season to ensure effective, efficient fox control is undertaken and fox recording is accurate.

5 References

Gnaraloo Station, *Gnaraloo marine turtle research program, Beach Monitoring, Nesting Season 2008/09, Final Report*, June 2009.

Limpus, C.J. (2008a). *A biological review of Australian Marine Turtles. 1. Loggerhead Turtle Caretta caretta (Linnaeus)*. [Online]. Queensland Environment Protection Agency. Available from: http://www.epa.qld.gov.au/publications/p02785aa.pdf/A_Biological_Review_Of_Australian_Marine_Turtles_1_Loggerhead_Turtle_emCaretta_Caretta/em_Linnaeus.pdf.

Mau, R (2003). *Conservation and Management: The Nesting Turtles of Ningaloo*. In: Carter, R., ed. *Ningaloo Marine Turtle Conference*. Exmouth: World Wildlife Fund.

Personal communications with Karen Hattingh, Environmental Advisor for Gnaraloo Station & Project Manager / Co-ordinator of the *Gnaraloo Turtle Conservation Program*, March – April 2010.

Thomson, P. C., Algar, D. (2000) *The uptake of dried meat baits by foxes and investigations of baiting rates in Western Australia*. *Wildlife Research*, **27**, 451–456.

Thomson, P.C., Marlow, N. J., Rose, K., Kok, N.E (2000). *The effectiveness of a large-scale baiting campaign and an evaluation of a buffer zone strategy for fox control*. *Wildlife Research*, **27**, 465–472.

Thompson, J.A., Fleming, P. J. (1994) *Evaluation of the Efficacy of 1080 Poisoning of Red Foxes using Visitation to Non-toxic Baits as an Index of Fox Abundance* *Wildlife Research*, **21**, 27-39.