Progress Report

Fox Control for Turtle Conservation in Ningaloo Marine Park 2006-07 Nesting Season

Department of
Environment and Conservation

List of Appendices

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EXECUTIVE SUMMARY

- Depredation of turtle nests by foxes has been identified as a key threatening process on the Ningaloo coast.
- The Department of Environment and Conservation has implemented a fox control program to reduce the number of feral foxes along the Ningaloo Coast and to increase nesting success where turtle populations have been identified as a priority.
- Since 2002/03, a 1080 baiting program has been implemented each turtle nesting season (October to April). The program involves using dried meat baits injected with 1080 poison (sodium fluoroacetate) to control fox predation on important turtle nesting beaches.
- The aim of the fox control program is to reduce fox depredation of turtle nests at key nesting sites to below 5% of the total number of nests laid. This indicator is used to evaluate the effectiveness of the baiting regime.

Bateman Bay

- Since 2002/03, a 1080 baiting regime has been implemented at Bateman Bay adjacent to Cardabia Station to protect turtle nests and hatchlings from fox predation.
- During the 2006/07 season, baits were laid at 53 stations along the beach and monitored every three weeks. Removed baits were replaced throughout the season.
- A total of 79 baits were removed by predators over the duration of the 2006/07 baiting period.
- Monitoring of turtle nesting activities and depredation of nests was conducted throughout the turtle nesting season. No nests were observed as predated, reducing the level of depredation to below the five percent target, suggesting that the baiting regime in Bateman Bay was effective in the 2005/06 season.

Recommendations:

1. *Bateman Bay to continue to be baited at three-weekly intervals over the entire turtle nesting season (October to April).*
2. *Method of bait distribution to remain unaltered as suspension of baits above ground increases the efficiency of physical rebaiting of stations and reduces predation by ghost crabs.*
3. *Daily beach nest monitoring should continue with suitably qualified personnel (staff or volunteers) to allow for the evaluation of the effectiveness of the baiting program over time.*

Jane's Bay

- Since 2002/03, a 1080 fox baiting regime has been implemented at Jane's Bay, adjacent to Ningaloo Station, as it has been identified as a significant loggerhead turtle rookery.
- Negotiations were made with the owners of Ningaloo Station regarding baiting operations in Jane's Bay. Access was granted to Jane's Bay via the station.
- During the 2006/07 season, baits were laid at 103 stations along the beach and monitored every three weeks. Removed baits were replaced throughout the season.
- A total of 267 baits were removed by predators over the duration of the 2006/07 baiting period.
- Turtle nest monitoring effort increased to 29 days based on recommendations from the 2004/05 season. A remote camp based at Jane's Bay as a component of the Ningaloo Community Turtle Monitoring Program monitored turtle nesting activity daily between 4th January and 3rd February 2006, with additional monitoring conducted by DEC staff during baiting operations.
- A reduction in turtle nest depredation to 2.1%, which is below the 5% target, suggests that the baiting regime in Jane's Bay was effective in the 2005/06 season.
- Nest predation occurred only in the unbaited section in northern Jane's Bay, suggesting that the "wall" of baits laid at 100m intervals is effective in preventing fox predation of turtle nests.

Recommendations:

5. *Jane's Bay to be baited at three-weekly intervals over the entire turtle nesting season (October to April).*
6. *Omitted sections of Janes Bay from the original baiting proposal be re-negotiated and included in future baiting programs.*
7. *Method of bait distribution to remain unaltered.*
8. *Continue to operate the Jane's Bay remote camp as a component of the Ningaloo Community Turtle Monitoring Program over at least four weeks to gain a more accurate understanding of the nesting and depredation levels of the turtle rookery at Jane's Bay.*

Five Mile to Trisel

- Since 2004/05, a 1080 baiting program has been implemented at Five Mile to Trisel beach on the Jurabi Coastal Park as it is a section of a significant green turtle rookery. Considerable fox activity was recorded at Five Mile to Trisel beach during the 2003/2004 turtle nesting season.
- During the 2006/07 season, baits were laid at eight stations along the beach and monitored monthly. Removed baits were replaced throughout the season.
- A total of 25 baits were removed by predators over the duration of the 2006/07 baiting period.

- Monitoring of turtle nesting activities and depredation of nests was conducted throughout the turtle nesting season as a component of the Ningaloo Community Turtle Monitoring Program.
- No nests were observed as predated since the baiting program commenced at Five Mile in the 2004/05 season.
- The level of depredation of turtle nests has remained below the five percent target, suggesting that the baiting regime at Five Mile to Trisel was again effective in the 2005/06 season.

Recommendations:

9. *Five Mile to Trisel beach to continue to be baited monthly over the entire turtle nesting season (October to April).*

Bundera and Boat Harbour

- Baiting on Bundera Coastal Protection Area and at Boat Harbour within Cape Range National Park commenced in the 2005/06 season due its location within a significant loggerhead turtle rookery and high evidence of fox activity in the 2004/05 season.
- During the 2006/07 season, three bait stations were laid at each site and monitored monthly. Removed baits were replaced throughout the season.
- A total of five and three baits were removed by predators at Bundera and Boat Harbour respectively.
- Monitoring of turtle nesting activities and depredation of nests was conducted at Bungelup, an adjacent site within Cape Range National Park, over 38 days. Volunteers conducted monitoring, based at a remote camp at Bungelup, as a component of the Ningaloo Community Turtle Monitoring Program.
- A reduction in turtle nest depredation to 0%, which is below the 5% target, suggests that the baiting regime in Bateman Bay was effective in the 2005/06 season.
- No nests were observed as predated. The level of depredation was therefore below the five percent target, suggesting that the baiting regime in Bundera and Boat Harbour was effective in the 2005/06 season.

Recommendations:

10. *Bundera and Boat Harbour to continue to be baited monthly over the entire nesting season (October to April).*
11. *Continue to operate the Bungelup remote camp as a component of the Ningaloo Community Turtle Monitoring Program over at least four weeks to gain a more accurate understanding of the nesting and depredation levels of the turtle rookery at Bungelup*

VLF Towers

- 1080 baiting for fox control commenced in 2001 around the Harold E. Holt Naval Communication Station VLF towers and along the tip of the North West Cape on Department of Defence land.
- During the 2006/07 baiting season, 62 baits were laid around the VLF towers and along the North West Cape and monitored five times throughout the 2006/07 financial year. Removed baits were replaced throughout the season.
- A total of 144 baits were removed by predators over the duration of the 2006/07 baiting period.
- Monitoring was conducted throughout the turtle nesting season as a component of the Ningaloo Community Turtle Monitoring Program.
- No nests were observed as predated in the adjacent Lighthouse Bay section of the Ningaloo Community Turtle Monitoring Program suggesting that the baiting regime at the VLF towers was effective in the 2005/06 season.

Recommendations:

12. *VLF towers to continue to be baited every two months throughout the year to control fox numbers on the North West Cape.*

Additional Recommendation

13. *Monitoring for fox predation activity on hatchlings at all baited location should be implemented in March and April to improve the accuracy of evaluating the effectiveness of 1080 baiting by including the peak hatchling emergence phase.*

INTRODUCTION

Ningaloo Marine Park has been identified as having significant beaches for turtle nesting (Prince, 1990). Three species of marine turtle that consistently nest along the Ningaloo coast are the loggerhead (*Caretta caretta*), green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. Marine turtles face many threats to their survival throughout their lifetime. One such threat along the Ningaloo coast is predation of eggs and hatchlings by introduced foxes.

Fox predation of turtle nests has been identified as a key threat to the recovery of turtle populations (Environment Australia, 2003). Studies of eastern Australian turtle populations indicate that small long term increases in annual mortality from introduced sources above natural mortality levels will cause population declines. Increases in turtle mortality of more than a few percent are considered unsustainable (Limpus, 2002). Five per cent has been identified as a sustainable fox predation level for the Ningaloo Region (pers comm., Limpus 2002).

The threat of foxes to turtle nests along the Ningaloo coast has been recognised since the 1970's (Kinnear, 1995). In the early 1990's, Peter Mack recognised the threat of foxes to nesting turtles in Bateman Bay, near Coral Bay. He implemented an extensive trapping and nest protection regime including the use of some poison baits to protect turtle nests and hatchlings. In 2002/03 the Department of Environment and Conservation (DEC; formerly the Department of Conservation and Land Management, CALM) implemented a program which continued the systematic use of 1080 poison baits to control foxes in Bateman Bay and other locations along Ningaloo Marine Park.

The use of dried meat baits injected with 1080 (sodium fluoroacetate) poison to control foxes has been identified as a Key Management Strategy under the Ningaloo Marine Park Management Plan, which guides management actions between 2005 and 2015 (CALM, 2005). Since 2002/03, a 1080 baiting program has been implemented each turtle nesting season (October to April) to attempt to reduce the level of fox depredation of turtle nests and hatchlings. The program is regularly reviewed to determine the most efficient and effective management regime with the long term survival of marine turtles as the outcome. Authorised 1080 DEC personnel implement the approved baiting prescriptions and regularly monitor bait uptake throughout the baiting period.

Based upon results from aerial surveys and the Ningaloo Community Turtle Monitoring Program (NCMTP), the DEC 1080 baiting program expanded beyond Bateman Bay in 2003/04 to include Jane's Bay, and expanded further in 2004/05 to include Whaleback Beach and the Five Mile to Trisel sub-section of Jurabi Coastal Park. Baiting at Jane's Bay and the Five Mile to Trisel beach proved to be successful and has continued through to the 2005/06 season. Baiting at Whaleback Beach however proved not to be worthwhile due to the low numbers of turtle nests recorded and therefore ceased after the 2004/05 season.

Prior to 2003/04 there had been limited fox control near the turtle nesting beach in Jane's Bay. The adjacent station owners had tried trapping foxes with little success. The 2005/06 season is the third season of fox baiting conducted by DEC at Janes' Bay. As per the

previous seasons, negotiations with the Ningaloo Station pastoralists were necessary to gain access across the pastoral lease. The negotiations resulted in access to Jane's Bay to bait with the following concessions to the baiting regime:

- baits to be removed before visitors arrived around the Easter School Holidays;
- baiting will be conducted only south of the Janes Bay access track, removing the first 28 bait stations, leaving 3.6 km of beach unbaited from the original baiting proposal; and
- bait stations 29, 30 and 31 will not be installed due to proximity of constructed stock watering holes.

The 1080 baiting program along the Ningaloo Marine Park coast expanded further in 2005/06 to include baiting stations on Bundera Coastal Protection Area and at Boat Harbour within Cape Range National Park. These sites were included as results from the 2004/05 NCMTP revealed a high presence of foxes in the Bundera Division (including Bundera and Boat Harbour) which is a significant rookery for loggerhead turtles in Western Australia.

Bait stations were also laid along Yardie Creek in Cape Range National Park for the protection of a population of threatened black-flanked rock wallabies (*Petrogale lateralis*). Bait use and predation was recorded, however no measure on the effect of the rock wallabies was established. Methodology and bait uptake will be documented in this report, however no in depth analysis will be explored.

1080 baiting was also conducted around the Harold E. Holt Naval Communication Station VLF towers and along the tip of the North West Cape on Department of Defence Land in 2005/06. Baiting has been conducted by DEC staff at this location since 2001. In 2005/06, baits were tethered to ground pegs and monitored monthly between October 2005 and January 2006. Baiting on this Department of Defence land presents an opportunity to reduce the number of foxes on the northern tip of the North West Cape throughout the year. This in turn benefits turtles nesting on the adjacent Mildura and Lighthouse Bay sections of the Ningaloo coast.

The monitoring of bait uptake and nest depredation in 2002/03, 2003/04 and 2004/05 seasons indicated that 1080 was an effective fox control tool to protect turtle rookeries in Ningaloo Marine Park.

AIM AND OBJECTIVE

The main aim of the fox control program is to reduce fox depredation of turtle nests at key nesting sites to below 5% of the total number of nests laid.

The objectives of the fox control program are:

1. to control fox numbers through an effective 1080 dried meat bait baiting regime;
2. to regularly monitor the number of nests laid for each turtle species over a specific section of beach;
3. to regularly monitor the level of depredation on turtle nests;
4. to regularly monitor the bait uptake;
5. to annually review the effectiveness of the program; and
6. to make recommendations for improvement in future years.

METHODS

Based on turtle monitoring results, five locations in the Ningaloo Marine Park were targeted for a 1080 baiting regime over the summer of 2006/07.

1. Bateman Bay (Appendix 1)
Location: Between Mauds Landing S23°06'20.1" E113°47'32.5", and 'The Lagoon', S23°05'55.7" E113°44'36.6"
Number of bait stations: 53
Baiting spacing: 100 metres
Periodicity of baiting: Every three weeks between October and April
Baiting method: Baits tethered with wire to stakes. Baits suspended above ground and concealed by adjacent vegetation. These baits hang above ground to prevent predation by ghost crabs, as was found to be a significant issue when baits were buried in previous years (Parker *et al*, 2003).

2. Jane's Bay (Appendix 2)
Location: Between S22°43'10.2" E113°42'58.2" and S22°47'30.1" E113°46'24.3"
Number of bait stations: 104
Baiting spacing: 100 metres
Periodicity of baiting: Every three weeks between October and April
Baiting method: Baits tethered with wire to stakes. Baits suspended above ground and concealed by adjacent vegetation.

3. Five Mile Beach (Appendix 3)
Location: Between S21.8465067, E114.0375441 and S21.8411423, E114.0462023
Number of bait stations: 8
Baiting spacing: 100 metres
Periodicity of baiting: Once every month between October and April
Baiting method: Baits tethered with wire to stakes. Baits suspended above ground and are concealed by adjacent vegetation.

4. Bundera/Boat Harbour/Yardie Creek (Appendices 4, 5 & 6)
Location: Bundera: Between S22.45730, E113.74339 and S22.45866 and E113.74283
Boat Harbour: Between S22.36187, E113.78863 and S22.36097, E113.78985
Yardie Creek: Between S22.32747, E113.81771 and S22.32887, E113.82205
Number of bait stations: Bundera: 3
Boat Harbour: 3
Yardie Creek: 6
Baiting spacing: 100 metres
Periodicity of baiting: Once every month between October and April
Baiting method: Baits tethered with wire to stakes and buried. Bait stations are demarcated by marker pickets.

5. VLF Towers (Appendix 7)
Location: Around the perimeter of the VLF towers at the Harold E. Holt Naval Communication Station then extending in a transect along the coast between -21.812405S, 114.187576E and -21.787846S, 114.165855E.
Number of bait stations: 62
Baiting spacing: 200 metres
Periodicity of baiting: Once every two months throughout the financial year (July to June)
Baiting method: Baits tethered with wire to stakes and buried. Bait stations are demarcated by marker pickets.

The locations of the baiting sites are shown in **Figure 1**.

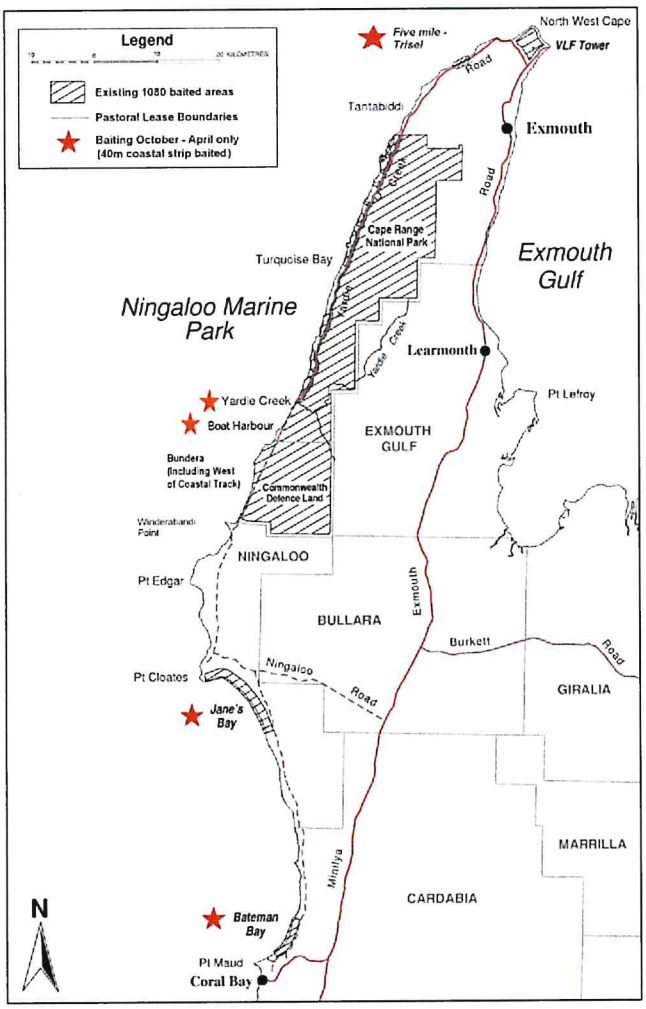

Figure 1: Map of baiting locations in Ningaloo Marine Park.

Prior to the start of the baiting program, a risk assessment was conducted by suitably qualified DEC personnel. Adjacent landowners and local councils were notified of the baiting regime, given a copy of the baiting prescription and notified of the frequency of rebaiting

activities. Signage was installed at appropriate locations. Pamphlets and other written materials were distributed to notify the wider community of baiting activities.
Positions of bait stations were selected to maximise effectiveness of baiting and efficiency of baiting operations. Baiting was not conducted 200m either side of popular public recreation areas or public access tracks. A GPS co-ordinate was recorded for each bait station. Bait stations were revisited and monitored at regular intervals by qualified DEC personnel. Monitoring involved relocating bait stations, recording the status of the bait and replacing the baits where necessary. Baits required replacing if they had been taken, were deteriorating from environmental conditions, or if a significant rainfall event had occurred. At the end of the season all baits were removed and destroyed by soaking them in water and then burying in a one metre deep hole at a designated site within Cape Range National Park.

Monitoring of turtle nesting activity and any fox predation was conducted by DEC staff whilst monitoring baits and volunteers through the NCTMP. All monitoring was carried out in accordance with the NCTMP methodology (Richards and Mau, 2005).

1. Bateman Bay:
   Monitored over 50 days between December 1st 2005 and February 28th 2006 by volunteers as a component of the NCTMP.

2. Jane's Bay:
   Monitored for 26 days between 4th January and 3rd February 2006 by volunteers based at a remote camp established at Jane's Bay (a component of the NCTMP). An additional three days of monitoring occurred during baiting operations by DEC staff.

3. Five Mile to Trisel:
   Monitored almost daily for a total of 94 days between 24th November 2005 and 28th February 2006.by volunteers as a component of the NCTMP

4. Bundera and Boat Harbour:
   Monitored almost daily for a total of 38 days between 20th December and 3rd February 2006 by volunteers based at a remote camp established at Bungelup (a component of the NCTMP). The monitoring area covered 5 km of southern Cape Range National Park adjacent to the camp[1].

5. VLF Towers
   The Lighthouse Bay section of coastline, adjacent to the VLF baiting site, was monitored almost daily for a total of 85 days between 28th November 2005 and 28th February 2006 by volunteers as a component of the NCTMP.

[1] This monitored area is north of the Boat Harbour and Bundera baiting sites, however the monitoring data is useful as it is within the same loggerhead rookery which was found to have a high level of fox activity in the 2004/05 turtle nesting season. Although predation levels may not reflect the influence of baiting at the Bungelup monitoring site, the numbers of nests and predation levels in the adjacent area are still of interest and will be presented in this report.

RESULTS

Bateman Bay

A high number of baits were removed by predators in the 2005/06 season (Table 1). A notably higher number of baits were used for replacement in the 2005/06 season than in previous years. A number of heavy rainfall events throughout the season required baits to be replaced which contributed to the high number of replacement baits.

Table 1: 1080 bait use across five baiting seasons at Bateman Bay.

BAITS USED	2002/03*	2003/04	2004/05	2005/06	2006/07
Total no. baits used at season start	53	53	53	53	53
Total no. baits used for replacement	66	58	73	153	138
Total no. baits removed throughout season	0	40	36	103	112
Total no. baits removed by predators	119	71	90	103	79
Total no. baits used	119	111	126	206	191

*Data is not definitive from the 2002/03 season due to sampling gaps for that year.

Monitoring of turtle nesting and predation occurred daily at Bateman Bay between December 2005 and February 2006 season. No nests were observed as predated over the 2005/06 turtle monitoring season (Table 2).

Table 2: Observed turtle nests and predation at Bateman Bay.

NESTING ACTIVITY	2002/03	2003/04	2004/05	2005/06	2006/07
No. of nests observed laid	95	108	60	42	
No. of nests observed predated by fox	11	3	5	0	
Predation level as a percentage of observed nests	11.6%	2.8%	8.3%	0%	

Results from the 2005/06 baiting and monitoring programs indicate that 1080 baiting has been effective in Bateman Bay, with fox depredation of turtle nests reduced to below the 5% target (Figure 2).

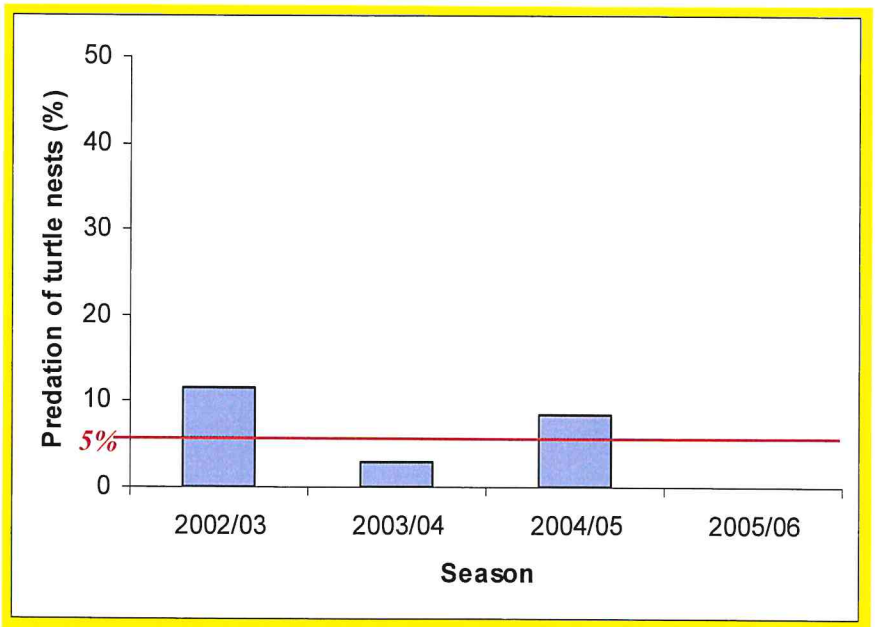

Figure 2: Observed level of depredation of turtle nests in Bateman Bay.

Jane's Bay

The number of baits used and removed by predators in the 2005/06 season was similar to that of the 2004/05 season (Table 3). Considerably more baits were taken by predators in the 2003/04 season.

Table 3: 1080 bait use across four baiting seasons at Jane's Bay.

BAITS USED	2003/04	2004/05	2005/06	2006/07
Total no. baits used at season start	103	106	104	103
Total no. baits used for replacement	281	224	229	251
Total no. baits removed throughout season	47	78	72	87
Total no. baits removed by predators	337	252	260	267
Total no. baits used	384	330	332	354

Three turtle nests were observed as predated in the 2005/06 season, which accounts for 2.1% of all nests observed laid (Table 4). This level of depredation is considerably lower than in previous years and for the first time since baiting commenced in Jane's Bay, depredation of turtle nests has been reduced to less than the 5% target (Figure 4).

Table 4: Observed turtle nests and predation at Jane's Bay.

NESTING ACTIVITY	2002/03	2003/04	2004/05	2005/06	2006/07
No. of times monitoring conducted	13	26	13	29	
No. of nests observed laid	74	130	73	143	
No. of nests observed predated by fox	48	106	19	3	
Depredation level as a percentage of observed nests	65.0%	81.5%	26.0%	2.1%	

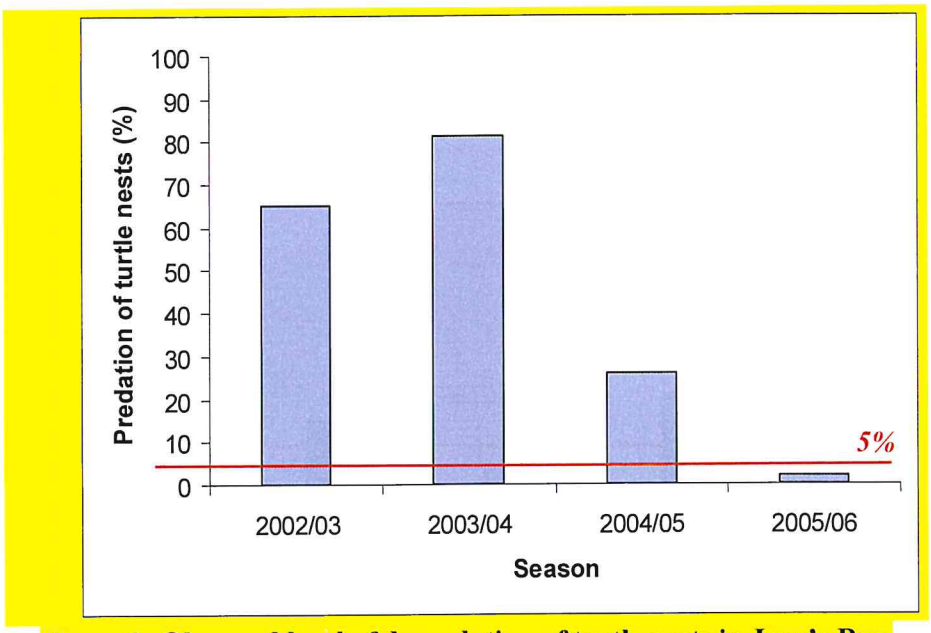

Figure 3: Observed level of depredation of turtle nests in Jane's Bay.

Of the three predated nests, two were located on the beach adjacent to northern Jane's Bay (Appendix 2). This area was not 1080 baited, however was nominated in the original 1080 baiting proposal which could not be negotiated with adjacent landholders. The location of the third predated nest is unknown as an incorrect GPS reading was recorded.

Five Mile

Due to the size of the Five Mile to Trisel sub-section only eight baiting stations were required, with nine baits removed by predators over the 2005/06 season (Table 5). All baits were replaced on 24th January 2006 due to high rainfall which would have reduced the effectiveness of the baits had they not been replaced.

Table 5: 1080 bait use across two baiting seasons at Five Mile to Trisel beach.

BAITS USED	2005/06	2006/07
Total no. baits used at season start	8	8
Total no. baits used for replacement	11	24
Total no. baits removed throughout season	10	7
Total no. baits removed by predators	9	25
Total no. baits used	19	32

For the two seasons in which 1080 baiting was introduced, no fox depredation of turtle nests was observed (Table 6). A considerably higher number of turtle nests were observed laid in the 2005/06 season.

Table 6: Observed turtle nests and predation at Five Mile to Trisel beach.

NESTING ACTIVITY	2003/04	2004/05	2005/06	2006/07
No. of nests observed laid	216	146	530	
No. of nests observed predated by fox	6	0	0	
Predation level as a percentage of observed nests	2.8%	0%	0%	

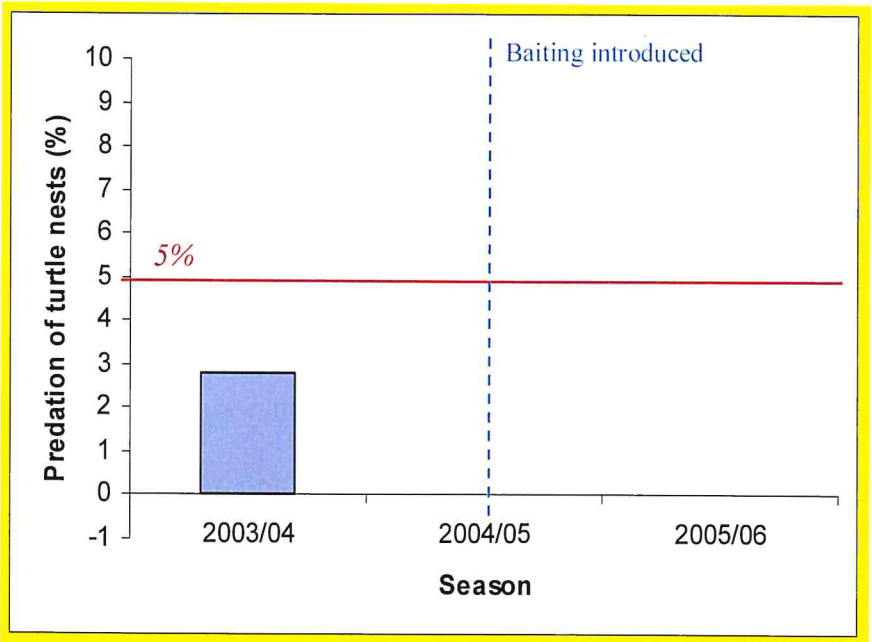

Figure 4: Observed level of depredation of turtle nests at Five Mile to Trisel beach.

Bundera/Boat Harbour/Yardie Creek

Low numbers of baits were used at the Bundera and Boat Harbour sites over the 2005/06 season due largely to the low number of baiting stations (Table 7). Yardie Creek used a larger number of replacement baits due to the harsh and exposed environment drying out the baits.

Table 7: 1080 bait use at Bundera, Boat Harbour and Yardie Creek over two baiting seasons.

BAITS USED	2005/06			2006/07		
	Bundera	Boat Harbour	Yardie Creek	Bundera	Boat Harbour	Yardie Creek
Total no. baits used at season start	3	3	6	3	3	6
Total no. baits used for replacement	4	2	10	9	6	23
Total no. baits removed throughout season	2	1	12	7	6	18
Total no. baits removed by predators	5	4	4	5	3	11
Total no. baits used	7	5	16	12	9	29

Over the five week monitoring of the adjacent Bungelup site, no nests were observed as predated (Table 8). Fox depredation was therefore less than 5 % suggesting that the baiting program has been effective.

Table 8: Observed turtle nests and predation at Bungelup.

NESTING ACTIVITY	2004/05	2005/06	2006/07
No. of nests observed laid	453	694	
No. of nests observed predated by fox	1	0	
Predation level as a percentage of observed nests	0.2%	0%	

VLF Towers

144 baits were removed by predators over the 2006/07 baiting season (Table 9).

Table 9: 1080 bait use at VLF over previous two baiting seasons (July-June).

BAITS USED	2005/06	2006/07
Total no. baits used for replacement	126	251
Total no. baits removed throughout season	98	147
Total no. baits removed by predators	28	144
Total no. baits used	126	251

Two nests were observed predated by foxes in the adjacent Lighthouse Bay section of the NCTMP in the 2006/07 season (Table 10).

Table 10: Observed turtle nests and predation at Lighthouse Bay over turtle nesting season 2006/07.

NESTING ACTIVITY	2002/03	2003/04	2004/05	2005/06	2006/07
No. of nests observed laid	181	120	135	572	518
No. of nests observed predated by fox	0	0	0	0	2
Predation level as a percentage of observed nests	0%	0%	0%	0%	0.39%

Whilst there has been an increase in fox predation of nests from previous years, the level of depredation is below the 5% target, suggesting that the baiting program has been effective (Figure 5).

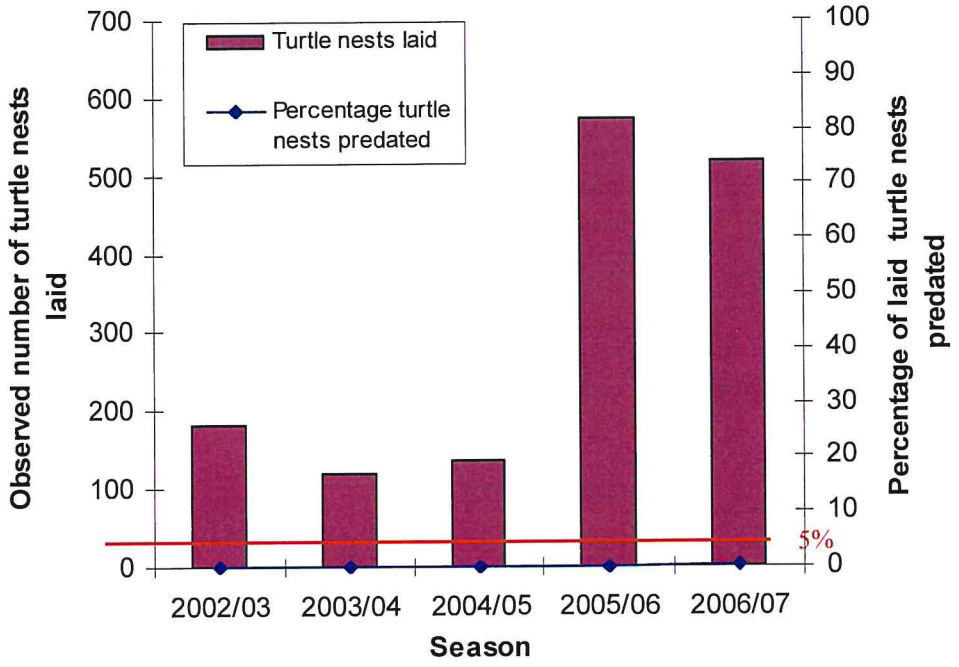

Figure 5: Observed number of turtle nests and predation levels at Lighthouse Bay for seasons 2002/03 - 2006/07.

DISCUSSION AND CONCLUSION

In the 2005/06 season, all locations recorded a turtle nest depredation level of less than five per cent, therefore achieving the aim of the program. Based on available data, if baiting continues at its current level the level of fox predation is no longer a threat to the nesting turtle populations at the Ningaloo coast.

For all baiting locations, depredation levels were consistently or considerably lower than for previous years, and all sites for which there is pre-baiting monitoring data, depredation of nests was lower after the baiting program was implemented. Bait uptake levels were also reasonably consistent with previous years, suggesting that foxes are consuming the baits, rather than just a low level of fox activity in the area.

It is particularly interesting to note that whilst observed predation levels at Jane's Bay were particularly low, the only predation recorded was in the unbaited section of coast. This suggests that the method of creating a "wall" of baits laid at 100m intervals along the coastline adjacent to nesting beaches is an effective method of preventing fox predation on turtle nests.

It must however be noted that the observed number of nests predated is an indicator only of predation activity. A study in 2003/04 of fox depredation on turtle nests found high numbers of depredation at Five Mile Beach (McKinna-Jones, 2005). Fox predation was first observed in early January 2004 with evidence of predation continuing through to at least the last week of March. It was found that the greatest predation activity on turtle nests occurred in March, when most nests were undergoing the emergence phase. Therefore, whilst 1080 baiting is likely to be reducing fox depredation of turtle nests, it must be considered that predation may have occurred after the turtle monitoring period. However, the decreasing trend of depredation after the 1080 baiting program was implemented suggests that 1080 baiting is having a positive effect on Ningaloo turtle populations. Monitoring in March and April in addition to data obtained on baiting days would best assist in further assessing the effectiveness of baiting in reducing fox depredation of turtle nests.

All recommendations from 2004/05 1080 Baiting Progress Report (Parker *et al*, 2005) were implemented in the 2005/06 season. These recommendations are summarised below with comments on their effectiveness in the 2005/06 season and suggestions for future baiting operations.

- *Bateman Bay, Jane's Bay and Five Mile continue to be baited at regular intervals covering the entire turtle nesting season.*

  The 2005/06 season of baiting at all of the abovementioned locations resulted in reductions in depredation levels to below the five percent aim of the program. The regularity of baiting at all locations slackened, particularly around March 2006 as limited staff availability made keeping on schedule difficult. However, the baiting intervals are achievable and should be maintained more vigilantly in the future baiting seasons. It is recommended that baiting at Bateman Bay and Jane's Bay occur at three-weekly intervals and Five Mile at monthly intervals.

- *Method of bait distribution changed by placing 1080 dried meat baits onto long pieces of 12 gauge fencing wire suspended above ground to increase efficiency of rebaiting of stations and prevent uptake of baits by ghost crabs.*

  This method of bait distribution was incorporated in the 2005/06 season at Bateman Bay, Jane's Bay and Five Mile. It was found to be effective, with no reported evidence of ghost crabs taking baits. Also, field operations were more efficient, as baits could be pre-wired and simply exchanged with old wire when baits required replacing. In addition, having the baits tied to a peg or small stake made finding the bait station simple (more so than loose buried baits). One consideration however is that whilst the bait is suspended above ground, it is likely to be more visible to other animals, such as birds of prey. It is therefore important that unburied baits are well hidden within vegetation to avoid non-target species. It is therefore recommended that the method of suspending baits above ground at beach locations be continued in future baiting regimes.

- *Continue to monitor beaches for turtle nests daily at Bateman Bay with suitably qualified personnel.*

  The NCTMP co-ordinated volunteers to monitor beaches adjacent to Bateman Bay daily over the 2005/06 turtle nesting season. Whilst there were a small number of volunteers involved, therefore requiring a large time commitment, the monitoring continued almost daily for the season providing useful information on nesting activity and depredation levels. It is again recommended that daily turtle monitoring occur in Coral Bay over the entire turtle nesting season in the future.

- *Omitted sections of Jane's Bay beach from the original baiting proposal should be re-negotiated and included in future baiting programs.*

  Negotiations with adjacent landholders to Jane's Bay to extend the baited area further north of the Jane's Bay access track in the 2005/06 season were unsuccessful. However, data from the 2005/06 season reveals that the few depredation events that occurred in Jane's Bay were in this northern unbaited section of coast. This argument could be used in future to re-negotiate extending the baiting area, which is again recommended.

- *Implement a daily turtle nesting and depredation monitoring program over at least four weeks to gain a more accurate understanding of the nesting and depredation levels of the Jane's Bay turtle rookery.*

  A 26 day monitoring program was implemented as a component of the NCTMP over the 2005/06 season. A remote camp was established at Jane's Bay and volunteers monitored the beaches daily. This monitoring provided much information on nesting and depredation levels which was useful in making confident assessments of the levels of fox predation and effects of the 1080 baiting program. In the past, low monitoring effort made assessing nest depredation difficult with any level of confidence. It is recommended that a similar monitoring program be implemented in future.

In addition recommendations were also made in the Ningaloo Turtle Program Annual Report 2004-2005 (Richards *et al*, 2005). Several of these recommendations were covered above, with one additional recommendation below.

- *Implement a fox baiting program in the Bundera Coastal Park and Bungelup section in Cape Range National Park, with monitoring of fox predation.*

  Based on high levels of fox activity in the 2004/05 season, bait stations were established at Bundera and Boat Harbour, the adjacent coastal strip to the Bungelup section. It is difficult to draw conclusions on the effectiveness of baiting at these locations given no monitoring data is available directly adjacent to these baiting stations. The nearby Bungelup section however recorded no depredation of nests in the 2005/06 season, slightly less than in the previous season. Given the importance of this site as a loggerhead rookery, it is recommended that baiting continue at Bundera and Boat Harbour. It is also recommended that some monitoring occur to determine the effectiveness of the baiting regime.

The Cape Range Draft Management Plan 2005 also made recommendations on fox control for the protection of turtle nests and black-flanked rock wallabies. Whilst strategies to reduce impacts on the Yardie Creek rock wallaby population have already been implemented by DEC, such as regulating the number of boat trips along the creek, and prohibiting visitors from the southern side of the creek, 1080 ground baiting for foxes provides additional protection for the population. Additional aerial baiting of the Cape Range National Park four times per year aims to significantly reduce fox numbers throughout the area, protecting the greater Cape Range population of rock wallabies. It is recommended that 1080 ground baiting of Yardie Creek continue for the protection of the threatened black-flanked rock wallaby.

Recommendations from the 2005/06 season are presented in the 'Executive Summary' in the beginning of this report.

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