STOP THE TOAD
KEEP WA CANE TOAD FREE

Stop the Toad Foundation
Report into the
Gregory's Tree Deflection Fence Trial

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1 EXECUTIVE SUMMARY

This project was not developed as a formal research study, as that would require a significant budget and major inputs of time, but rather it was developed as a part of the Stop the Toad Foundation's (STTF's) adaptive management research[1] model where an active trial can provide useful insight into the practical potential of such a strategy as a part of a dynamic management model for controlling cane toads.

The concept of deflection barriers was developed as a part of an integrated management approach to cane toad control. The sections of deflection fencing are designed to be fitted to existing fence line infrastructure, thereby greatly reducing cost. The aim of deflection fencing is not simply total exclusion, but to direct toad movement, and to be used in conjunction with cane toad trapping and hand collection methods, with the aim of increasing the effectiveness of these control measures.

FrogWatchNT had trailed small deflection fences at Noonamah near Darwin with positive results and the Stop the Toad Foundation (STTF) decided to trial the concept for use in the fight against cane toads near the Western Australian border with a trial fence along Gregory's Tree Road. The project was financially supported by the Department of Environment and Conservation (DEC).

Personnel were employed to manage the fence line and record data on toads and other wildlife located along the fence line. Muyalee Women's Ranger group (a Timber Creek indigenous Community Development and Employment Program (CDEP) group) also assisted with the ongoing management of the fence line. Additional visits by experts were also made and visits were encouraged by NT Parks and Wildlife staff, members of the DEC Cane Toad Team and other community groups.

Traps and toad busting or hand collection techniques were used along the fence line to remove cane toads from the area.

The fence was completed in stages and data collection commenced in early 2007 and is ongoing. The fence has increased the effectiveness of traps and toad busting and has contributed to stopping toads moving through the fence line corridor onto the STTF primary buffer zone on Auvergne Station.

Toads were unable to get past the fence and many were caught in traps and by mustering. During the trial 1316 toads were captured; 855 in traps and 461 by hand collection. 63.6% were captured on the eastern or Timber Creek side of the fence line and 36.4% were captured on the western or WA side of the fence.

The fence was monitored to determine what issues would impact on its effective operation. This included issues with the integrity of the fence line and the impact of the fence line on non-target species.

During the trial period the fence line was maintained with minimal damage, all of which was repairable with a patch and shade cloth needles to sew the patch into the fence.

[1] This model is derived from Action research models and some further details are at http://fosonline.org/resources/Publications/AdapManHTML/Adman_1.html#intro

Late in the trial period (September 2007) about 1.1km of the fence was destroyed by an illegally set wildfire. Although this affected the performance of the fence, its effectiveness had been demonstrated during the previous six months.

2 BACKGROUND

Landscape scale barrier fencing has often been discussed as a possible option in preventing cane toad movement but it has generally been dismissed as too expensive, with the risk of it becoming redundant as soon as the toad front passes the fence. Large scale fences are also considered too difficult to maintain in the weather conditions experienced in the Wet - Dry tropics of northern Australia, although this argument generally refers to the impacts of the large rainfall events that cause significant broad-scale flooding, with the consequent management implications.

Consideration also needs to acknowledge the potential for cane toad deflection fences to impact on the movement of wildlife; however, with an appropriate management and behavioural approach to understanding the requirements of wildlife many of the potential issues with fencing can be successfully overcome.

Deflection or drift fences however have been used for many years in scientific research and surveys to enhance the effectiveness of trapping tools, especially pitfall traps, in native fauna surveys. It was envisaged that such an approach could also assist in cane toad control.

The base hypothesis is that barriers can be effectively created in the region and that they will significantly assist in cane toad control efforts.

Trials conducted near Darwin by Frogwatch NT have shown that cane toads are unable to get over a barrier made from shade cloth at 600mm height. The response behaviours of cane toads to such a barrier are to track (follow) along it. Field trials have demonstrated that the placement of traps along a 'barrier style' fence leads to increased captures of cane toads by up to 5 times previous capture rates.

On the basis of this success the STTF (with support from the WA Department of Environment and Conservation (DEC)) has commenced the first large scale field trial of the concept along the boundary of Gregory National Park near Timber Creek in the Northern Territory. (See picture below)

The field trial was designed by STTF in conjunction with DEC and the Parks and Wildlife section of NRETA in the Northern Territory, giving consideration to objectives and risks to native fauna. Gregory's Tree Road was selected as an appropriate location because of its ease of access in the wet; it's north-south orientation to intercept cane toad movement, and the existence of a boundary fence to which the barrier fence could be attached.

2.1 CONSTRUCTION

Approval for the project was granted by Northern Territory Parks and Wildlife on 26th of August 2006 (see attachment), and construction of the fence line began in December 2006 when the first 50m of shade cloth was attached to the existing fence on December 22nd 2006 by Graeme Sawyer, Ian Morris and Derek Monks.

This provided a 50m barrier with two cane toad traps at the Victoria Highway end (southern) of the mesh section and allowed us to make some preliminary observations about such a barrier.

Traps being installed on the fence line December 22, 2006

The construction of the remainder of the fence line was delayed due to a number of issues relating to available labour in the area and supply of materials and earth moving equipment for work on some sections.

Greg and Sue Kimpton from Timber Creek and the Muyalee Women's ranger programme made a great effort to get the fence completed in very hot and difficult conditions. They installed over 1km of shade cloth on February 7th and completed the majority of the line by the end of the following week.

The main body of the fence was completed on the 19th of February 2007 providing some 2.9 Km of fence with a gap of approximately 600 metres in a seasonal paperbark wetland section approximately 1.2 Kms from the Gregory's Tree Car Park.

Muyalee Rangers closing the gap in the shade cloth near the gate.

Traps were installed at strategic points along the fenced sections and traps were placed at each end of any gaps in the fence (e.g. either end of the paperbark wetland and at existing gates). Traps were placed in pairs, one on each side of the fence at various locations to see where cane toads were moving through the zone and to determine if the majority of toads were moving towards the west.

2.2 CONSTRUCTION METHOD

Construction was assisted by a tractor with a small blade attached creating a scrape along the fence and then the cloth was clipped to the fence to a height of approximately 600mm and the remainder of the shadecloth was anchored in the scrape along the bottom of the fence. The tractor was then used to backfill the scrape burying the bottom of the shade cloth. This made construction relatively fast and not too labour intensive.

The shade cloth used was 50% black shade cloth in rolls 1 metre wide by 50 metres long.

One section in the middle, across a paperbark wetland area with large grass tussocks was not completed until mid April 2007 as heavier earth moving equipment was required to clear the grass tussocks.

A section of the fence, from the Gregory's Tree car park to the edge of the Victoria River, was also delayed, as it required additional approvals and consultation with local traditional owners as well as the heavy earth moving equipment to clear vegetation. It was competed in April 2007.

Whilst the construction delays were unfortunate and probably influenced the effectiveness of our trial, there was enough of the fence constructed to allow observation of the impact on cane toads and generate some very significant findings. The practicalities of construction in such a remote area were also focus for the trial.

2.2.1 GATE OPENINGS

Regularly used gates on the fence line posed a problem in that they had to be modified to maintain a barrier, but still had to be functional. This was achieved for the Auvergne Station access gate by attaching heavy rubber matting to the bottom of the gate that still allowed the gate to be opened freely but restricted toads from getting under the gate (See picture below). Traps were also placed adjacent to the access gate to increase the likelihood of toad captures.

Attaching rubber matting to a gate to maintain barrier continuity

2.3 TRAPS

Traps were used along the fence line with the intention of capturing toads that were blocked by the fence. These traps are of a design approved for use in the northern territory by the NT Government and were fitted with refuge chambers[2] and water troughs to allow cane toads captured in the traps to survive.

Trails by FrogWatchNT at their Ringwood Station research project has shown cane toads can live indefinitely in properly constructed cane toad traps provided they have water. The trap lights attract food every night and the refuge chamber prevents heat stress. Field trials have shown the temperature inside the chamber can be 16 degrees Celsius below the external ground temperature.

Traps were placed, in pairs (see picture below), at intervals along the fence line, one trap on the western (WA) side and the other on the eastern (Timber Creek) side.

The capture data from these traps and the observations from the monitoring effort are providing a better understanding of toad movement. It was anticipated that more toads would be captured on the eastern (Timber Creek) side of the fence than would be taken on the western (WA) side, as the net toad movement will be east to west. Observations have also demonstrated that toads move in all compass directions and are not all moving west with a number of observations made of toads on the western side of the fence moving east to the fence then tracking along until entering a trap.

The total numbers of cane toads caught along the barrier will also improve our understanding of the numbers of cane toads moving through the area and reveal some information about their preferred corridors of movement.

[2] Refuge chambers are made using insulation paper and shade cloth to provide toads with a cool refuge place to stop them dying from desiccation. Water troughs are also placed in the refuge chambers.

Section of fence line under construction, showing graded scrape along east side used to bury the shade cloth and a trap being prepared for deployment

3 PROJECT DETAILS

The project was designed to test the concept of deflection fences in the field and to allow better understanding and knowledge of the potential of such structures to control the movement of cane toads and help concentrate cane toad populations to assist in more rapid control through trapping and hand collection. The project was also designed to provide the opportunity to study any effects of such fences on native animals in the area and the logistics of erecting and maintaining such structures in remote locations.

In addition the project was also conducted to enable a more comprehensive understanding of the management issues and costs associated with erecting, managing and maintaining such a structure in such remote locations.

The fence position was chosen as it is on the eastern boundary of the STTF primary buffer zone[3], an area where ongoing efforts such as the Great Toad Muster (STTF 2006) are contributing to researching the possibility of stopping the westward movement of cane toads. It is also in an area that is accessible throughout the year and can provide significantly useful data about the way cane toads are moving through the specific habitats in that particular area.

Graeme Sawyer (STTF Coordinator) travelled to Timber Creek Feb 22-24, 2007 to help settle Amelia Cann (STTF contract field biologist) into her role and to catch up with people regarding the fence.

Ian Morris (FrogWatchNT) accompanied him and helped with surveys on the fence each night. Several surveys were undertaken and completed along the fence-line as well as some toad trapping work and a number of meetings were initiated and followed – up with participants from the Timber Creek Community. (We spoke to Greg Kimpton, Elaine Watts, Cate Schmidt, Garry Fisher about the progress to date with the project.)

[3] See STTF Report: Field Operations Dry Season 2006 for details about the Buffer Zone

Amelia monitored the fence daily during the period of her employment Feb – March 14th and provided training for the Muyalee Women's Rangers in the monitoring requirements as well.

At various times around these visits, the Muyalee Women's Rangers conducted regular monitoring visits of the fence line.

Graeme Sawyer visited for a follow up surveys March 10-13th, June 21st and 22nd

Graeme Sawyer and Ian Morris visited fence line August 2007

4 RESULTS

A total of 1316 toads were captured, 855 in traps and 461 by hand collection along the fence line corridor during the trial.

Table 1. Number of cane toads taken in each trap over the duration of the project. Each 'set' represents paired traps on either side of the fence.

	Timber Creek Side	WA side	Totals	Location
Set 1	224	117	341	Highway end
Set 2	64	22	86	Gate Break Hwy side
Set 3	75	60	135	Middle Rise
Set 4	97	64	161	Swamp Area
Set 5	48	25	73	Car park River End
Set 6	17	12	29	River End
	525	300	825*	

The trap sets all caught toads and although catches were variable depending on location along the fence, in all cases significantly more toads were caught on the eastern side of the fence than the western (WA) side (paired two-sample t-test on $\log_{10}$ data: t Critical for one-tail test = 2.015, p = 0.0079).
**Note 30 toads were captured but not correctly recorded as to their traps are included in the total but not in the breakdown above*.

Not all traps were in place for the full period of the trial so a full comparison of the trap sets for preferred corridors of movement is not feasible over the full period of the trial. Indications are however that there were toads moving through areas along the entire fence line. Whilst statistically higher captures were towards the highway end, this may be affected by the presence of significant seasonal waterholes found along the highway near that end of the fence line.

Removing some of the early captures when traps were only on the highway end and dividing the trap sets into sectors with 1&2 at the highway third, 3&4 in the middle section and 5&6 at the river end allows a comparison of the corridors and gives the following results.

Table 2 – Trap corridors comparison

Combined trap captures	Feb to May (Wet season) % captures (Total 524)	May to Sept (Dry season) Total (190)
Trap sets 1&2	48.7%	25.3%
Trap sets 3&4	38.9%	46.8%
Trap sets 5&6	12.4%	27.9%

4.1.1 PERCENTAGES FROM EACH SIDE OF FENCE

Of the toads captured in the traps 64.7% were captured on the eastern or Timber Creek side of the fence line and 36.4% were captured on the western or WA side of the fence. This indicates that significant numbers of toads were travelling in an easterly direction when they encountered the fence. It also indicates that toads move in all directions.

4.2 RESULTS WORK PERIOD - FEB – MARCH (MAIN WET SEASON)

Table 3. Trap catches in Feb-March 2007

Set #	Timber creek Side	WA Side	
1	92	44	Highway end
2	18	14	Gate Break Hwy side
3	45	34	Gate Break River Side
4	31	16	Swamp break
5	23	3	Car park River End
Totals	209	111	

During this period (February – March, 2007) nearly double the number of toads were taken on the (eastern) Timber Creek side compared to the (western) WA side of the fence. This data was consistent with predictions although it was expected that capture rates would increase following the completion of the fence and after all the gaps are closed. Again, although catches were variable depending on location along the fence, statistical testing showed that significantly more toads were caught on the eastern side of the fence than the western (WA) side (paired two-sample t-test on $\log_{10}$ data: t Critical for one-tail test = 2.132, p = 0.0301.

The Muyalee Rangers collected a further 109 toads from the traps along the fenceline up to March 23.

5 NATIVE SPECIES RECORDED ALONG THE FENCELINE

The following list shows vertebrate species recorded along the fenceline during the trial.

Class	Scientific name	Common Name
Mammals	*Pseudomys nanus* *Pseudomys delicaultus* *Bos indicus* *Macropus agilis* *Felis catis*	Western Chestnut Mouse Delicate mouse Scrub Bull Agile Wallaby Feral Cat
Reptiles	*Brachyurophis roperi* *Ctenophorus gilberti* *Ctenotus alacer* *Ctenotus spaldingii* *Denisonia maculata* *Diporiphora magna* *Gehyra variegata* *Strophurus cilliaris*	Half girdled Snake Gilbert's Dragon Lively Ctenotus Straight-browed Ctenotus Little spotted snake Yellow-sided Two-lined Dragon Variegated Dtella Spiny-tailed Gecko

	Pygopus nigriceps *Brachyurophis roperi* *Liasis Childreni* *Liasis olivaceus* *Varanus panoptes*	Hooded scaly foot Northern Shovel-nosed Snake Children's Python Olive Python Juvenile Goanna Prickly Gecko
Amphibians	*Cyclorana australis* *Cyclorana longipes* *Cyclorana cultripes* *Litoria inermis* *Litoria tornieri* *Notaden melanoscaphus* *Limnodynastes depressus* *Uperoleia lithomoda* *Litoria caerulea* *Litoria rubella* *Litoria Nasuta* *Litoria rothii* *Limnodynastes ornatus* *Limnodynastes convexiusculus*	Giant frog Long-footed frog Knife-footed frog Peter's frog Tornier's frog Northern Spadefoot toad Flat-headed frog Stonemason toadlet Green tree frog Red tree Frog Rocket frog Roth's tree frog Ornate burrowing frog Marbled Frog

A spiny tailed gecko "patrolling" the fenceline.

5.1 IMPACTS ON NATIVE WILDLIFE

Although no attempt was made to quantify the influence of the fence on the abundance and distribution of native fauna, when fauna were observed, they were identified to species, where possible, and observations made of behaviour. There did not appear to be any preferential predation on native fauna by raptors or other predators along the fenceline, and there were no obvious impacts other than the

inability of some species to pass through the fence line. However, we have no evidence that these animals needed to cross the line for any specific purpose other than normal foraging/movement behaviour.

A range of small reptiles were observed beside and on the fence, and most of the reptile species seem to be able to climb over the shade cloth whenever they choose.

A further adaptation under review is the strategic placement of wildlife access 'gates' in the fenceline, similar to those employed during the Great Toad Muster 2007. These consist of coarse mesh openings at ground level that still prevent sub-adult and adult cane toad passage, but allow small native fauna to pass through. If the use of special openings for native wildlife is deemed necessary, research would be useful to determine the size of openings that different species can pass through.

6 DISCUSSION

The fencing trial indicated that cane toads cannot cross a barrier of this nature and that the cane toads are "held" in the area by such barriers making them easier to control. The fencing amplifies the effectiveness of other control measures such as traps and hand collection suggesting that integrated control strategies will be the most effective against cane toads

6.1 TRAPS

The traps along the fence line caught significant numbers of cane toads

As predicted the fenceline appears to increase the effectiveness of cane toad traps. Reports from field trials from DEC[4] show some 2012 toads captured from 70 traps, with trap captures estimated at approximately 0.1 toads per trap per night. The fence trial captures of 829 toads from just 12 traps provides a capture rate of approximately 0.5 toads per trap per night. A significant improvement.

6.2 POSSIBLE IMPACTS OF THE FENCE PROJECT

Detailed records of toad densities across the region are not available but it is interesting to note some results from the STTF Great Toad Muster 2007 (STTF 2007).

During the muster most of the cane toads captured were found on man-made water points (turkey nest dams). The Turkey nest dam complex closest to the fence line (Gregory's bore) had far fewer toads (238) than the next closest turkey nest dam complex Hollywood (2913), and Nesmit (2519). This major difference may be due to the fence line blocking toads that would otherwise have congregated at Gregory's.

More detailed studies of toads in the area will need to be conducted to verify these sorts of impacts. With appropriate funding this could be achieved in 2008-09.

[4] REVIEW OF DEPARTMENT OF ENVIRONMENT AND CONSERVATION CANE TOAD FIELD OPERATIONS 2005/06

6.3 MOVEMENT DIRECTION

Research (Schwarskopf 2002) has demonstrated cane toads move in all directions and does not support the notion that all the cane toads in the area are all heading west as has been hypothesised by others.

The fact that numbers of toads have been caught on the western side of the fence, right through the trial period, indicates that they are almost certainly spreading in all directions as per previous research findings. However, overall 63.2% of the captured toads were caught on the eastern side of the fence and 36.8% were captured on the Western Side, with statistically significantly more toads on the eastern side.

This indicates a net movement of toads towards the west, which would be expected since toads are invading westwards.

6.4 FENCE MAINTENANCE

There were some holes made in the fence but STTF are unsure what made them, as tracks were not evident. Some of the holes look similar to ones that hunting kookaburras make in fly wire screens when they 'spear' geckos from the screens. The transparent nature of the shade cloth may lead to these types of issues as animals can see through the fence.

Holes in shade cloth

These holes were easily repaired with a patch kit. Any such fences will require maintenance to repair such damage. It is unlikely that toads crossed through the holes in great numbers, especially holes that are above ground level like those in the picture above.

In most areas wallabies jumped the shade cloth without difficulty although it may improve their access if the barbs on the wire are covered in places where game trails cross the fence line.

Part of the fenceline was destroyed by an intentionally lit fire inside the breaks around the property, which compromised the integrity of the fence, but only for a

limited section and late in the trial. The barrier fence was along an established pastoral boundary fence, with a graded road along one side, however, maintenance of a graded firebreak on both sides of the fence would be desirable to avoid repeated instances of fire damage. It would also be appropriate to apply some interpretive signage to the project to assist with community education aims.

The ability to grade the ground against the fence, both to prevent damage from fire, but also to assist with initial installation should be considered when selecting locations for future fence deployments.

7 APPENDIX MONITORING SURVEY REPORTS

The following reports were progress reports during the trial

7.1 FEBRUARY REPORTS

The monitoring project commenced on 24 January 2007th immediately after the majority of the shadecloth was attached and the installation of the majority of the traps. At that point there was a gap of several hundred metres in the swampy section about 2/3rds of the way along the fence and a gap at the river end of the fence for about 350 metres.

Work continued to close these two gaps as soon as was practicable.

In the first 6 days of monitoring the traps captured 171 toads and a further 85 toads had been hand collected along the fenceline by STTF staff, volunteers and the Muyalee Women's Rangers.

STTF have been unable to determine results of any *ad hoc* collections along the trial fence line by DEC staff or Kimberley Toadbusters (KTB). STTF are aware that KTB has collected toads in the area since the project began and are endeavouring to source their data and involve them in the ongoing monitoring of the project.

During this period 70% of the trapped toads were caught on the eastern or Timber Creek side of the fence.

When the hand collection numbers are added, 80% of the toads caught were on the eastern side of the fence line during this period.

Monitoring has not shown any adverse impacts on native wildlife to date, which is in line with expectations.

7.2 JUNE 21 SURVEY REPORT

G.Sawyer spent 21/6/07 doing a night survey along the fence line.
It was surprisingly cool for the time of year with strong winds and occasional squally rain showers. Cane toads were quite active along the entire fence line whilst they did not appear to be active in numbers in other locations.

As a comparison, driving from the fenceline to Timber Creek, about 15 kms and back again twice during the evening, resulted in observations of 3, 2 and 2 cane toads on the highway. 116 toads were collected from along the fence line, the majority from the eastern Side. It is suggested that the difference in numbers in the fence location

is due to the fence blocking toad movement and causing toads to congregate in the area.

Although many of the traps needed servicing there were 32 toads in the traps. 34 toads were hand collected in the section from the car park near the Victoria River to the traps near the swampy section; 38 toads from the swampy section to the gate and 12 toads from the gate to the highway.

It was interesting to note that a number of toads were on the western (WA) side of the fenceline. 13 of the 32 toads in traps were on the western side of the fence. A number of toads were hand collected (9) from the western side of the fence as well and several others being seen but not able to be collected on the western side.

The numbers of toads reinforces the toad movement model revealed by research conducted by Schwarkopf and Alford, that toads in fact move in all directions. (Schwarkopf 2002)

No native wildlife was seen along the fenceline during the night. This was probably due to the weather.

Some damage had occurred to the shadecloth fence that was evidenced by holes to a diameter of 10 cm. These areas were repaired on 22 June 2007. Unfortunately the weather had erased any tracks that would indicate what had made the holes in the fence.

8 RECOMMENDATIONS

STTF recommends agencies and volunteer groups begin planning broad scale use of the deflection fencing strategy, as per the 2007 Draft Strategy document, and work with the Federal and Western Australian governments and other agencies to create large scale projects to the west of the current cane toad frontline in an attempt to stop the movement of cane toads towards WA.

If large areas can be denied as movement corridors for cane toads it is anticipated that significant corridors can be denied to the existing cane toad frontline. Removing these corridors with a combination of suitable fencing and traps makes the amount of work remaining for hand collection much more achievable. It also opens up the possibility of applying the model to large identified movement corridors further east of the toad frontline that are currently acting as 'feeder' areas for toad movement and population growth.

As the preliminary indications were supportive of the project hypotheses the STTF incorporated observable outcomes into planning to use the deflection fence technique on strategic targets such as major refuge waterholes in the dry season to deny toads access to water. The full report on this is included in the 2007 muster report (STTF 2007). The results were very positive.

It is further recommended that the Gregory's Tree Road trial be supported for a further 2 years with resource and personnel support from DEC. STTF is currently negotiating a fence management strategy with an indigenous land management group and this approach combined with a cooperative management support role from DEC and other volunteer groups will increase the trials effectiveness.

9 PERMIT APPROVAL

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Your Ref
Our Ref

Graeme Sawyer

Dear Graeme

Re: Cane Toad Fencing on Eastern Boundary of Gregory National Park

I wish to advise you that the construction of a Cane Toad Fencing trial to be conducted along the Auvergne and park boundary fenceline in accordance with the proposal you submitted to the park is approved. The following conditions will apply to the construction;

- That it is monitored regularly during its lifespan and initially daily for the first two months.
- That all native animals caught or injured are reported to local rangers as soon as possible
- That should Parks and Wildlife find any adverse impact on the local native environment that the fence is removed immediately.
- That traditional owners for the area are consulted during the operation and before any activities off the fence occur, including the monitoring program. Parks and Wildlife will assist this process.

With these safeguards in place we believe that the trial may contribute significantly to finding ways to reduce the impact of cane toads on the environment and fully support the initiative of the Stop the Toad Foundation. Please contact the ranger in charge for Gregory National Park, Cate Schmidt, prior to starting work on 8975 0888.

Yours sincerely

Garry Fischer
Chief District Ranger - VRD

25 AUGUST 2006

Rubber matting attached to gates can be effective as a barrier to toads

Firebreaks should be on both sides of the fence.

Traps are placed in pairs on the east and west sides of the fence

Fences can be surveyed easily from a vehicle

Cane toads cannot climb effectively and track along the fence line

10 REFERENCES

Schwarzkopf, L. & Alford, R.A. (2002). Nomadic Movement in Tropical Toads. *Oikos* **96**, 492-506.

STTF 2006 Stop the Toad Foundation Report into field Operations 2006 , http://www.stopthetoad.org.au/publications/sttf_field_operations_report_v3l_2006.pdf

STTF 2007 Stop the Toad Foundation Report into field operations Great Toad Muster) 2007.