

Stop the Toad Foundation 2009 Great Toad Muster REPORT



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CARING
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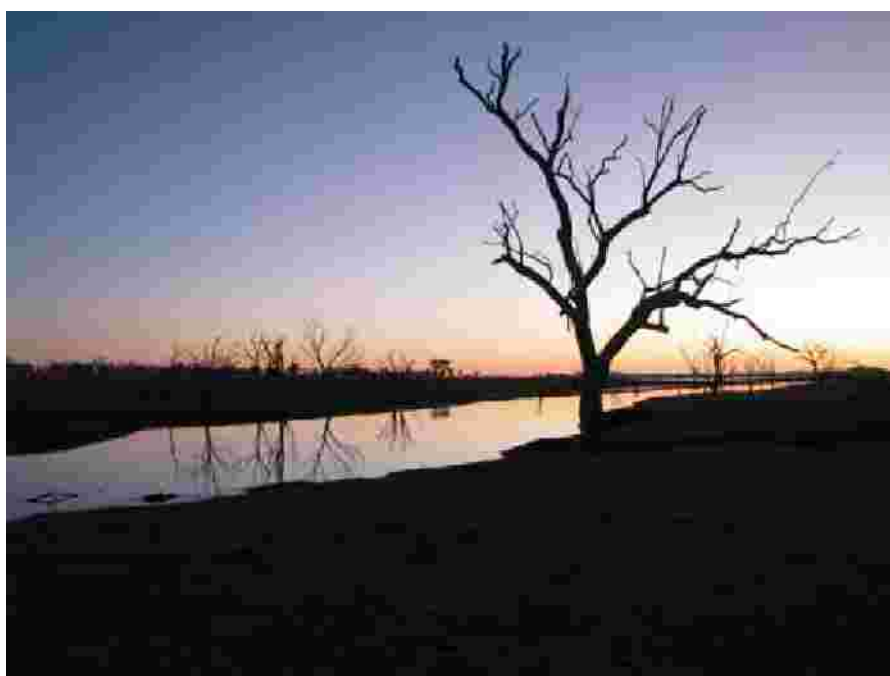
PHOTOGRAPHY

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Matilda creek; a tributary into Lake Argyle.

1 EXECUTIVE SUMMARY

Stop The Toad Foundation's (STTF) fourth annual Great Toad Muster (GTM) was held from 12th September until 12th October 2009. Toad control was carried out on over 40 sites in 5 locations including Newry Cattle Station, Legune Cattle Station, Auvergne Cattle Station (including the Amanbidgi area) Keep River National Park and the shores of Lake Argyle. These areas are along the frontline of toads migrating west from the Northern Territory into Western Australia.

During this four week period, a total of 42,386 cane toads were removed from an overall area of approximately 6000sq kms. Thousands of metamorphs and tadpoles were also removed. Assuming that half the adult cane toads caught and destroyed by STTF volunteers were females, each capable of producing approximately 20,000 eggs per year, we have actually prevented the potential of a further 423,860,000 new toads getting a grip on our landscape.

The Muster supported, on average, 35 volunteers per night for 30 nights, contributing to 1050 days of effort towards cane toad control.

The first National Eradication Week was held in conjunction with the last week of the Muster, from the 3rd October until the 11th October. A total of 4922 toads were removed by community groups from areas across QLD, northern NSW, NT and WA. Volunteers contributed 329 days of effort towards cane toad control. This national endeavour demonstrates that people power is an important part of the fight against the toad.

Toads were removed using different toad-busting methods depending on the size of the site, the surrounding environment and accessibility to the water body. The Foundation's exclusion barrier fencing strategy was again used on a broad scale on man-made and natural water bodies. It was trialled for the first time in a National Park, Keep River National park, and was found to be an extremely efficient method of collecting and removing cane toads from the northern landscape.

Research by STTF and Frogwatch in the Northern Territory has shown that by using fences in comparison to just hand busting, efficiency of toad eradication is trebled (<http://www.stopthetoad.org.au/main/videos.php>). Research by Dr. Mike Letnic from the University of Sydney in September 2009 also supports the eradication impact of fences (Pers. Comm. 9th November).

The fencing strategy has a significant potential to be used across northern Australia as a tool for cane toad control as the fences are cost effective, easy to erect, wildlife friendly and can guarantee to remove all toads in a specific area. They could be used to protect areas of high biodiversity and in World Heritage Listed sites, such as Purnululu National Park in Western Australia. The fences also have broader application to protect property within towns and to restrict the potential of 'hitch-hiker toads' to reach more sensitive environments from transport and trucking facilities.

2 INTRODUCTION & BACKGROUND INFORMATION

The STTF cane toad strategy is centered around an annual Muster; a volunteer, community based event which aims to remove as many toads as possible heading towards W.A. through the combined effort of hand collection, trapping and fencing. The Muster is held at the end of the northern dry season, when water is scarce and cane toads are most vulnerable. This usually occurs in September/October and the Muster runs for approximately one month.

In the four years of its field operations, STTF has removed 175,000 cane toads (and thousands of metamorphs and tadpoles) during their annual Muster with the help of over 340 volunteers, contributing to slowing the westward movement of toads into WA. The Muster has also allowed STTF to trial different methods of cane toad control to determine which are more efficient in completely clearing areas of toads. The Foundation developed exclusion fencing in 2007 and trialled it on a broad basis during the 2008 Muster.

The fencing strategy relies on the toads' need to get access to water to rehydrate every four days (Cohen & Alford 1996, Seebacher & Alford 2002). Where they are denied access to water, the toads must find other sources of moisture. Those that strike out towards other water points die rapidly in the barren land. The point at which they are forced to go searching is usually when they are most critically in need of water and most vulnerable to dehydration. The majority remain at the fence and are easily collected at night. It is common for those that come to the fence after the nightly collection to be found dead or immobile the next morning, indicating how rapidly they dehydrate.

The fencing strategy was found to be extremely efficient during the 2008 Muster as well as during trials by Frogwatch in the NT over the last three years, so was used again during the 2009 Muster.

In previous years, STTF has concentrated efforts on Auvergne Station. The Foundation now has three years of data from the Whirlwind plains of Auvergne. In 2009, STTF changed focus to new locations to account for the toads having moved further west. The joint strategy agreed with Department for the Environment and Conservation (DEC), Kimberley Toad Busters (KTB) and STTF was to work from the western frontline and move east. The aim was also to complement the work of the KTB by covering different areas. STTF worked with the DEC to determine where STTF's fencing strategy would be successful.

3 MUSTER OBJECTIVES

Objectives for the 2009 Muster were;

1. The reduction and complete removal of cane toads from key refuge areas near the frontline of their advance towards Western Australia.
2. The completion of comparative data sets from previous years activities.
3. Demonstrate the success of the new exclusion fencing as a tool for cane toad control; to cover a larger amount of land with a smaller number of people.
4. Demonstrate the acceptance of exclusion fencing by the broader community as a best practice management tool against cane toads in northern Australia.
5. Demonstrate minimal impact on native wildlife. STTF fences are made with wildlife friendly gates. All staff and volunteers will be involved in the monitoring of native wildlife impacts.
6. Engagement of community and individuals across northern Australia for a National Eradication Week (NEW).
7. During the NEW, demonstrate that people power can reduce the numbers of cane toads in Australia, at the same time that a biological solution is being sought.
8. The attendance and support of large numbers of volunteers. We aimed to have between 25-30 persons per night every night of the Muster and the NEW.
9. All strategies are cost effective and do not go over budget for the Muster.
10. Combined stakeholder monitoring of the sites of the Muster 2009 for cane toad activity after the event.



An adult female cane toad cannot fit through the wildlife gates, but native frogs can.

4 MUSTER LOGISTICS

The 2009 Muster operations were carried out on a bigger scale than previous years; the total area covered was significantly greater and there were three field base camps compared to just the one in previous years. This year also included a headquarters in Kununurra, used as a town base for the entire month of the Muster.

The main field base camp was at Matilda Creek on Newry Station. This site was chosen as it was central to all control areas for the Muster and it provided a previously cleared area and a good supply of water. Newry base camp took a week to set up, was operational for the entire length of the Muster and then took a further week to pack down.

The second base camp was on Legune Station near the old homestead driveway. Legune base camp was operational for the first three weeks of the Muster. The site was chosen as it was also close to all control sites and relatively easy to access from the main station road. The final base camp was at Keep River National Park at the Rangers quarters. This third base camp was operational for the last two weeks of the Muster.

STTF would sincerely like to thank the managers of Newry station Jo and Catherine Atkins for allowing us to set up our main operations on their property for six weeks. Thanks also to Cameron and Belinda Rasheed; managers of Legune cattle station, Stuart and Natalie McKechnie; managers of Auvergne cattle station, the members of Amanbidji community and management at Keep River National park- especially Cameron Sharpe and Andrew Coats who were all happy to either host a base camp or allow us to work on their property.

STTF relies heavily on the support of volunteers to run a successful Muster. Heartfelt thanks must be made to all those who volunteered their time and efforts at this year's Muster. One hundred and twenty volunteers from all over Australia and overseas attended this year's Muster. The average number of volunteers per night was 35. Special thanks must be made to Megan Donald, Michael Lohf, Frank Longbottom, Mitch Farrell, Brendan McGill, Lucy Simnett and Jim Rasmussen, who all played vital roles in the logistics of this year's Muster.

STTF would like to thank the Federal Australian Government. The 2009 Muster is largely funded by their Caring for our Country grants scheme. STTF also relies on the generous donations from corporate and private donors. The Foundation is extremely grateful to the ABN Foundation and Lotteries West for their support for the 2009 Muster.

STTF would also like to thank Dave Woods from the DEC Cane Toad Team. Without his extensive knowledge of cane toads and their location, the Muster planning would not have been possible.

Finally, STTF would like to thank the Wyndham Department of Corrective Services for their assistance in pre-making several kilometres of fence that was used during the Muster. The fences are critical to the STTF strategy and on-ground operations would have been delayed without them being pre-made.



Map of base camp sites in relation to Kununurra - Newry base camp, Keep River National Park and Legune cattle station. Some control areas are also listed including Lake Argyle, Auvergne cattle station and sites along the Amanbidji driveway (Police Hole, Dashedong Dam & Hurricane Bore).

5 METHODS

STTF removed toads from a total of 40 sites during the Muster. Different toad-busting methods, including the use of fencing, hand collection alone and sniping (using low calibre air rifles), were used depending on the size of the site, the surrounding environment and accessibility to the water body.

5.1 Fencing

The concept of exclusion fences was developed by STTF coordinator Graeme Sawyer in 2006. The fence strategy has been largely trialled throughout the

Northern Territory for the past 3 years and found to be extremely successful (<http://www.stopthetoad.org.au/main/publications.php>).

In September 2009, Mike Letnic from the University of Sydney investigated whether toads are dependent on accessing standing water in a semi-arid landscape in the upper Victoria River catchment. To test this hypothesis he used the same style fences as STTF. In summary, his field-studies confirmed that toads are extremely vulnerable to dry-season control programs that restrict their access to water. He agreed that permanent toad-proof fencing of artificial waters is likely to result in dramatic decreases in cane toad populations in areas situated far from natural water sources such as permanent waterholes (Pers. Comm. 9th November, 2009).

In previous years, STTF has made fences on site (<http://www.stopthetoad.org.au/publications/Muster2008Report.pdf>) which was relatively time consuming. In 2009, STTF had the majority of fences pre-made, making them very quick and easy to erect in the field.

Fences were pre-made in 50m panels by a team from the Wyndham Corrective Services Work camp and STTF volunteers. The equipment required to make the fences includes:

- Fencing wire – soft 1.2mm (in 1300metre rolls)
- Wire strainers
- Wire ‘spinning jenny’
- Jambro Fencing Fastener Pliers – cartridge filled
- Jambro fasteners
- Side cutters, small bolt cutters and fencing pliers
- 50 metre x 1 metre high density shade cloth rolls
- 25mm x 25mm gutter guard in 50metre x 1 metre rolls
- Tin snips, large scissors
- Steel droppers
- 1.8 metre steel star pickets
- Picket drivers
- Gympie hammers



Volunteers making fences at Newry base camp.

The method for making the fences is as follows;

Wire is run out and strained over a 50 metre length between two anchor points (strainer posts) in two lengths providing a top and bottom wire. The bottom wire is raised above ground level approximately 40 cm and top wire is at 90cm to full 1 metre above ground level.

Shade cloth is rolled out along full length of strained wire supports then fastened to top wire along full length using Jambro fasteners placed at 1 metre intervals (note the shade cloth should be tied off at commencement end so that some tension can be applied as it is fastened). The same process is repeated along bottom wire allowing a 40 cm skirt to hang loose from this wire. (When fence is completed and in situ it will resemble an L shape when viewed along its axis).

Steel droppers are then placed at 5 metre intervals on the opposite side to where the skirt will sit on the ground and attached using the supplied dropper pins (tapping the droppers partly into the ground will help stand the fence up prior to adding the wildlife gates).

The gutter guard is then cut into sections of 3 metres length by 20cm depth (this allows up to 250 metres of wildlife gate to be manufactured from a single 50 metre roll).

Depending upon supply of gutter guard, a 3 metre long section is placed into every section of the fence between droppers. STTF determined that in most cases every 2nd section of fence (15 metres total over 50 metres) only required a wildlife gate to provide effective access allowing ingress and egress for a range of wildlife and reducing impacts on non target species significantly. It is however recommended that impacts on wildlife should be monitored and extra section of wildlife gate be placed into the fence panels if deemed necessary. This can be attached using Jambro fasteners every 5-7 cm or alternatively using light tie wire to stitch the gate to the shade cloth. The scissors are used to cut out the section of shade cloth 'behind' the wildlife gate thus opening the gate.

Pre-made fences are easily rolled out in the field.



Once the fence is completed it can be unfastened from the strainers and rolled up tightly ready for deployment into a field situation.

Once the fences are made, they are easy to erect. The panels are simply unrolled in the direction that will orientate the bottom 'skirt', on the panel to the outside of the fence. From here, the fence is stood up and the support droppers are driven into the ground to the depth where the bottom wire and the wild life gates are at ground level. Minor tension is required as the supports are progressively erected (note that the fences work most effectively if there is some looseness to the shade cloth that makes it impossible for a heavy animal like a cane toad to climb and support its body weight).

The bottom skirt is then laid flat across the ground and weighed down with dirt, rocks, sticks or in some cases pegged down with small tent pegs to prevent toads gaining easy access under the fence. As each panel is erected, the next roll is secured to the last dropper and rolled out for erection. Where water bodies have sharp corners, steel fence posts (star pickets) are used at corners or the end of a line where it is required to maintain an opening for stock to access the water. Where a continuous curve will surround the area to be fenced, the standard 'fence droppers' are secure enough to hold the system erect.



Once the fence is rolled out, the droppers (already attached) are banged into the ground.

Once fences were erect, teams of volunteers were able to walk around the fences and collect toads off the fence. More volunteers were required if it was the first night toad busting in an area, but once the bulk of the numbers were removed, 2-4 people could easily bust a large area. Most of the toad-busting in fenced areas

occurred after dusk, but toads were also able to be removed during early daylight hours as they would stay on the fence all night and not return to their refuge site.



Volunteers do the final check that the fence is ready for toad control.

5.2 Other methods of toad removal

Some sites had very steep banks, were surrounded by rock or thick vegetation such as Freshwater Mangroves (*Barringtonia acutangula*) or Cumbungi reeds (*Typha* species), making access to the water very difficult. For these sites, hand collection was used. Teams of 2-4 people would walk in a skirmish line around the water body ensuring they were spaced out from the waters edge up to 20m away from the water body. Long handled fine mesh nets were used to retrieve toads that were in deeper water.

In some creek beds, large numbers of toads were located in damp burrows in the banks of the creeks. These were encouraged out with flexible hooks fashioned from heavy fence wire. The record number captured from one burrow was 35 adult toads and these activities accelerated the clean out of the population on these areas, but also importantly highlighted the need for appropriate vigilance when checking refuge areas.

In some cases, toads were too hard to remove by hand, net or hook as they were sitting in the middle of the water body or under the roots of a Freshwater Mangrove. They were usually the last remaining toads at a water body once all others had been removed. As a 'mop-up' tool, sniping was used to remove these hard to reach toads. Graeme Sawyer, STTF Regional Coordinator, holds an air-rifle

licence, has approval to use the firearm from the property owner and is a qualified firearms range master and was our sniper during the 2009 Muster.

Tadpoles were removed with hand-nets and a large hand haul net manufactured on-site from a 15 metre section of shade cloth and weighted using cast net leads – similar in design to a hand haul prawn net but without the sock pocket. They were scooped out of the water and placed on the edges of the banks to dehydrate. The hand haul net was found to be extremely efficient at clearing an area of tadpoles in comparison to the hand nets. Metamorphs were sprayed with chlorine-based bleach using electric spray packs.

5.3 Recording data

Once back at base-camp, cane toads were euthanized with carbon dioxide (CO₂). This process is undertaken by placing up to 40 captured toads in an airtight heavy duty plastic survey bag and flooding the bag with concentrated CO₂. The bag is then sealed and rolled to ensure that the CO₂ reaches all toads. The bags are left overnight.

It is generally acknowledged that an indicator of stress is the release of toxin by cane toads through the parotoid glands. This exhibits as a cream coloured slime and can totally coat the toad if stress is evident. Using this euthanasia method is effective, relatively stress free and results in 100% mortality overnight. The following morning toads are removed from the bag and data is then recorded on the total number collected.

Males, females and sub-adults were only recorded separately for the Lake Argyle toads as requested by DEC and because the STTF strategy is based around complete eradication, not individual toads. Some of the Lake Argyle toads were dissected to determine what they had been eating and gain an indication of possible impacts on invertebrate fauna.



Volunteers sort toads into males, females and juveniles.

6 RESULTS

6.1 Auvergne Station (including sites on the Amanbidgi driveway)

Auvergne Station is located 170kms east of Kununurra in the Northern Territory. It is largely made up of black soil plains which provide plenty of refuge sites for toads in the cracks of the soil late in the dry season. The one permanent river on Auvergne, The West Baines River, is tidal and relatively deep, and not favoured by toads. Instead, the toads rely on man-made dams that are scattered across the 4142 sq km property.

The fencing strategy was the main strategy used to remove toads from Auvergne, as well as hand collection and sniping. A total of 26,932 cane toads were removed from 13 sites across Auvergne station, including sites on the Amanbidgi driveway. (See Appendix 1, Table 1 for full details). There was a mixture of adult female, adult male and juvenile toads found on Auvergne, indicating toads have been there for the past few years and have had time to breed up their numbers.

Site description and strategy deployed

Marks Dam system

Marks Dam is located on the most western side of the Whirlwind plains on Auvergne station, north of the Victorian highway and east of Snake creek. It consists of a small man made dam or turkey nest and two overflow areas, all of which had water in. In total, 800m of fencing was used to fence all three areas over a 4 hour period with 16 people. Over a 9 day period, 7,819 toads were removed from the Marks Dam system using a combination of the fencing strategy and sniping. The 750 metres of fencing was rolled up and removed using 10 personnel in a three hour period.

Mahoneys

Mahoneys turkey nest is located 3kms south-west of Marks Dam, on the same access road. It is a small turkey-nest surrounded by heavy vegetation, making access to the water relatively difficult. Six volunteers spent 1.5hrs clearing a space with mattocks 1.5m back from the waters edge to enable a 100m fence to fit around the turkey nest. Over an eight day period, 1632 toads were removed from Mahoneys using the fences and sniping. The fence was taken down in 20 mins with 4 people.

Snake Creek bridge area

Snake Creek is part of the West Baines River System and crosses the Victorian Highway 5kms east of the West Baines crossing. It is one of the only creeks in the area that still had pools of water remaining during the Muster period, allowing toads to refuge nearby. The pools were not fenced owing to their difficult access and surrounding rocky areas. Snake creek bridge area was hand-busted for cane toads over a three night period and 728 cane toads were removed.

Duckhole Bore

Duckhole Bore is 4.2kms east of the Snake Creek bridge crossing, 2kms south of the Victorian Highway. It consists of a small turkey nest and larger dam. It was decided not to fence these areas as there was a huge herd of cattle using the water at the time. The ground around the area was also fairly clear which meant it was an easy site to hand bust. Over a six day period, 3125 toads were removed by hand collection alone.

Blue Mud water hole

Towards the end of the northern dry season, the West Baines River System is made up of a series of water holes, rather than a flowing creek system, creating perfect habitat for cane toads. Blue Mud water hole is one of these water holes, located 15kms south of the Victorian Highway. Blue Mud water hole was fenced in 1 hour by eight people using 250m of fencing. A 25m gap was left at the southern end to allow cattle, dependent on the water hole, access to drink. This design worked well and meant that the cattle didn't try to walk over the fence. It was noted that cane toads were much easier to eradicate when there was a fence in place compared to the area that had no fence. Over a six day period, 2146 toads were removed from this water hole.

Dead Cow and Two Puddles water holes

Two other water holes also on the southern part of the West Baines River were named Dead Cow (owing to the fact that there was a dead cow in it) and Two Puddles (in relation to the two bodies of water found close together). Dead Cow was a very small water hole and was fenced in 20 minutes by six people, using only 100m of fence. Two Puddles was not fenced due to limited fencing equipment at the time. Over four days, 1124 toads were removed from Dead Cow. Over two days, 413 toads were removed from Two Puddles.

Two Bob Billabong

Two Bob Billabong is another water hole on the south of the Victorian Highway part of the West Baines River system. It is heavily vegetated with freshwater mangroves and has very steep banks, so was the fencing strategy was not applicable at this site. Over 5 days, 1039 toads were removed from this water hole.

West Baines Dam

The West Baines Dam is a large dam system found just south of the Victorian Highway, 2kms after the West Baines crosses the highway. This system was one of the largest areas fenced throughout the 2009 Muster, with a total of 1.5kms erected around the dam. West Baines was fenced over a three day period in a total of five hours using 14 people. A gap was left at the southern end to allow access to the surrounding cattle. The results for this site were separated into three areas; toads found outside the fence, toads found inside the fence and toads found in the unfenced area to allow them to be compared. Over five days, the fenced area allowed 1770 toads to be caught and removed from the dam compared to the non-fenced area where 1262 toads were removed by hand. The fence was removed in 1 ½ hrs by 16 people.

Police Hole

The Amanbidji community driveway is located 64.5kms east of the Duncan Road turnoff and is also part of Auvergne station. Police Hole is located 22kms along the Amanbidji driveway, south of the Victoria Highway. It consists of one turkey nest and two overflow dams. The two dams were fenced using 500m of fencing in 1½ hrs with 16 people. The turkey nest was highly vegetated and required a brush cutter to clear an area around the waters edge to make space for a fence. This was done in 2 hrs by one person, with four others assisting with rakes. The turkey nest was fenced in 1 hr with 150m fence by six people. Out of the three sites, toads favoured the turkey nest over the two dams, highlighting their dependence on refuge sites nearby water. In total, 2663 toads were removed from all three sites over a six day period. The fences around Police Hole were taken down in 1 hr by 16 people.

On a trip to Police Hole, it was noted that there was water in one of the creek crossings. An old Toyota land cruiser has been left on one side of this creek, so it became known as 'Cruiser Crossing'. A team of eight volunteers removed 321 toads from this site during one night's toad busting.

Dashalong Dam

A further 8kms down the Amanbidji driveway is a leaking water tank and an overflow dam that is named Dashalong Dam. The dam was fenced using 450m of fencing in 1hr with 16 people. Unfortunately, the leaking water tank was impossible to fence due to the extremely thick surrounding vegetation. A path was cleared around the water tank using a brush cutter to allow for easier access to the tank. This was done by one person in 2 hrs, with four others assisting with rakes. Again, the toads in this area preferred the habitat around the tank in comparison to the dam, which was generally clear around the edges of the water and most toads were collected from around the water tank. In total, 1854 toads were removed from this area. The fence around the dam took 30 mins to take down with 16 people.

Hurricane Bore

Another 7kms down the Amanbidji driveway is Hurricane Bore. Hurricane Bore consists of one very small turkey nest with no surrounding vegetation. One hundred metres of fence was erected around this turkey nest in 25 mins by eight people. A total of 1036 toads were removed from this site over four days. The fence was removed in 15 mins by six people.

6.2 Legune Station

Legune cattle station is situated 100kms NE of Kununurra on the border of WA/NT. Legune has one large dam that is used to flood the station up to twice a year. This presents challenges for controlling toads using the STTF fencing strategy as it relies on the landscape becoming dry towards the end of the northern dry season. There are, however, numerous dams that are suitable for fencing to occur that are located away from other sources of water.

Legune station was the location for one of the Satellite base camps during the Muster. A team of eight people were stationed on Legune for a period of three weeks. They were supported by a camper trailer and small generator. Base camp was set up near the old homestead driveway.

A total of 7,423 toads were removed from Legune station over a period of three weeks (See Appendix 1, Table 2 for full details). A combination of fencing and hand collection were used to remove these toads from a total of eight sites. The majority of the toads (6,482) were removed from one site, Weaners dam, located NE of the Legune homestead, indicating that this is an important refuge site for toads at this time of year and possibly a site toads use when gaining access to land from the Victoria River. Toads have only been found on Legune station for the past 18 months, hence the low number found during the Muster.

Site description and strategy deployed

Gravel Pit

The Gravel Pit is located on the main Legune driveway, just after Lindeman's gate. It is a small water hole about 200m in circumference. Owing to its proximity to base camp, Gravel Pit was an easy site to bust. Over two nights, 85 toads were removed by seven people in a period of an hour. Toads were collected by hand owing to the site being unsuitable for fencing.

Sneaky Dam

Sneaky Dam is a small dam located 2kms past the Stud Paddock gate near the Legune homestead. It was an easy site to hand bust as the edges were clear of vegetation. There was no water in the surrounding area, the closest place being at Dead Turtle dam approx 4 kms away. It was only checked for toads on two evenings; 65 toads were removed by hand collection on the first night and three on the next.

Weaners

Weaners is a large system of dams located 9kms east of the Legune homestead. The Weaners system comprises of one medium sized turkey nest and four large overflow dams. At the time of the Muster, only three of these overflows had water in, all of which were ideal sites to fence. The turkey nest was a harder site to fence owing to its steep banks and relatively thick cane grass around the edge. In total, the Weaners system took six people, seven hours (over three days) to fence using 800m of material.

Weaners was busted for eight days by six people. A total of 6,482 toads were removed from this system. It was noted that, in general, there were mainly adult male toads found in the first few days of toad busting. Once these adults had been removed from the system, there were predominantly juvenile toads found. The fences around the Weaners system were taken down in 3 hr by six people.

There was a resident Saltwater crocodile (*Crocodylus porosus*) present in the Weaners system during this year's Muster. Team leaders of the Legune base camp

were reptile experts from the Perth Zoo, so made sure there was a 'crocodile spotter' at all times during busting sessions, which included night spotlighting and day inspections for slide marks and scats.

Homestead and Walk-in Turkey nests

There are two turkey nests with large overflows located very close to the Legune homestead that were named Homestead and Walk-in by DEC. Both of these turkey nests were dry during the Muster, but their overflows had water in them. The Homestead overflow is slightly larger than the Walk-in overflow. These sites were not fenced due to the fact that there is plenty of other ground water in close vicinity, so the fencing strategy would not be fully effective.

Very low numbers of toads were collected from these areas. Hand collection was used on one night to collect 20 toads from the Homestead overflow and eight toads from Walk-in overflow.

Busted Dam

Busted Dam is located 5km south of the homestead. It is a very large dam about 500m in circumference. The south-western wall of the dam is not functional, hence the name given to the dam. It was not fenced due to its size and limited fencing equipment, as well as the fact that one side is broken.

Hand collection was used at Busted Dam for two nights to remove a total of 26 toads.

Alligator Turkey nest

Alligator Turkey nest is a small to medium, relatively deep turkey nest surrounded by lots of vegetation and overhanging trees. It is located near Alligator water hole, 15km south of the Legune Homestead. It was not fenced due to the thick, surrounding vegetation. 366 toads were removed over three nights from the turkey nest using hand collection. In comparison, only one toad was noted at Alligator water hole close by, indicating that man made water bodies are an important water source for toads.

Dead Turtle pool

This natural water body was named Dead Turtle by DEC because they found dead turtles close by. It is located 5 kms east Sneaky Dam near the Legune Homestead. At the time of the Muster, Dead turtle was a 200m round deep pool with shallow edges. This pool was ideal for the fencing strategy. 200m of fence was erected in 2 hrs by seven people. A total of 368 toads were removed from Dead turtle pool over two nights. The fences were taken down in 45mins by four people.

6.3 Newry cattle station

Newry is a 2500 sq km cattle station located directly east of the WA/NT border and the Keep River National Park. It extends both north and south of the Victoria Highway. Newry is very similar to Auvergne station, being mainly dominated by

black soil plains, offering the toads plenty of refuge sites late in the dry season. Newry has one permanent river in the north of the property, Keep River, as well as smaller, less permanent creek systems and natural springs throughout the property. Toads rely on these systems, as well as numerous man made turkey nests scattered throughout the property, for hydration late in the dry season.

Together with DEC and KTB it was decided that STTF would work on areas south of the highway for the duration of the Muster. After reconnaissance trips to these sites prior to the Muster, it was determined that the STTF fencing strategy would not be the best control method to use on Newry station due to sites being either too heavily vegetated or being large, rocky creek systems. Instead, hand collection was used for all sites on Newry station.

A total of 6,487 toads were removed from Newry (see Appendix 1, Table 3 for full details). A mixture of adult males, adult females and juveniles were found, but interestingly the mix was often dominated by large females. The low number of toads found on Newry was due to two factors; toads have only been on the property for 18 months and KTB have been working on toad eradication for the duration of 2009.

Newry station was the site of the main base camp for the 2009 Muster. Base camp was set up over a period of a week by eight people on Matilda creek, 1km from the shores of Lake Argyle. Base camp generally supported an average of 35 people a night for the four weeks of the Muster. It was a large operation, requiring a 4.5KVA generator, two fridges, three freezers, three showers and four toilets. It was dismantled in four days by 20 people.

Site description and strategy deployed

Matilda Creek

Matilda creek is one of the tributary creeks flowing into the NE corner of Lake Argyle. It is of very high importance in terms of toad control as it one of the main routes that toads use to reach Lake Argyle from the Northern Territory. For this reason and for the convenience that base camp provided, STTF spent nearly every night of the Muster busting Matilda creek; 20 nights out of 29.

Over the duration of the Muster, STTF covered the last 18kms of Matilda creek that drains into Lake Argyle, starting at Matilda bore and ending up at Lake Argyle. This was done by foot and on quad bikes, generally in pairs on each side of the water. Toads were generally found in the shallow, muddy areas of the creek in comparison with the deeper sections. In total, 959 toads were collected from Matilda Creek.

Numerous days were spent removing tadpoles and metamorphs from along Matilda creek, indicating that breeding had occurred at this site prior to the Muster.

Dingo Springs

Dingo Springs is a natural spring that crosses the Victorian Highway west of the Duncan Road turn off. The area was checked on four different nights; 32 toads were found on the east of the Duncan Road in the shallow, muddy part of the spring. In comparison, 22 toads were found near the deeper sections of the spring where there was flowing water, indicating that toads prefer shallow, still water.

One of the largest toads over the four weeks of the Muster was found at Dingo springs. The toad was a large adult female weighing 522g and measured 162mm. This animal was dissected for inspection of eggs and stomach contents. Her egg mass weighed 75g and her stomach contents included leaves, maggots, lavender beetles and small stones. There were stomach cysts present on the outside of her stomach but as a general observation this toad appeared robust and healthy.



The largest toad collected on the Muster- an adult female weighing 522g!

Glenarra Bore

Glenarra Bore is located east of the Duncan Road, 6kms south of the Victorian Highway. It has been busted on a regular basis by KTB, so was only busted on three occasions. A total of 43 toads were removed from this man made water hole.

Glenarra Creek

North east of Glenarra Bore is Glenarra creek, a natural water system reduced to small pools of water at the time of the Muster. The most SW part of the creek was checked for toads on five different occasions and 157 toads were hand collected from this area.

Matilda Creek Bore

Continuing SE past Glenarra Bore, is Matilda Creek Bore. The bore has a number of leaks as well as the nearby trough which is utilised by toads. Also near the bore is the western end of Matilda creek. All three areas were checked for toads over four nights and 103 were removed.

Mud Spring Bore

Mud Spring Bore turnoff is opposite the Newry homestead driveway. It is a natural spring-fed creek that flows north for a few kilometres and is surrounded by thick vegetation. At the start of the spring, there is a water tank which toads use as a refuge site. A total of 79 toads were removed over five nights hand busting.

Boundary Bore

Named for its location near the southern boundary of Newry, this site consists of two troughs and a water tank with a dry creek bed nearby. It was only checked for toads on one occasion. 42 toads were hand collected on this one night, found mostly in the nearby dry creek beds, but also around the troughs.

Ballinger Bore

Ballinger Bore is located 4kms east of the Newry homestead driveway and 4kms south off the Victorian Highway. The bore has a leaking pipe and a natural soak area NW of the tank. Toads were hard to remove by hand from under the tank as they were hard to reach. To solve this problem, a temporary wire mesh gate was erected around the bottom edge of the tank to deny toads' access to a refuge site (see picture). This seemed to work extremely well and allowed us to completely eradicate toads from this site. In nine days, 548 toads were hand collected from Ballinger. On the ninth night, zero toads were found at this site, three days after the wire gate had been erected.



Volunteer erects temporary wire mesh around Ballinger tank.

Keep River, Quart Pot Creek and Saddle creek

There are numerous creeks on Newry that cross the Victorian Highway. During journeys to other busting sites, these were all checked for water at the highway. At the time of the Muster, the Keep River and Quart Pot creek had small to medium sized pools of water near the highway crossing. Saddle creek had no water, but there was a leaking tap at the nearby resting area.

The Keep River was only checked on one night and 12 toads were found. Saddle creek rest area was also only checked on one night during a dinner break and four toads were found. Quart Pot Creek crossing had a surprisingly large amount of toads, most likely due to the fact that the water is the only available water for 4-5kms in the surrounding area during the late dry season. A total of 1595 toads were collected in seven nights at Quart Pot crossing.

Lansdown

There were four sites, including Lansdown, on the SE side of Newry that were busted by STTF during the Muster. The turnoff for all four sites is 22kms east of the Newry homestead driveway to the south of the Victorian Highway. Lansdown is a small turkey nest surrounded by thick vegetation. Over a period of four nights, 322 toads were removed through hand collection.

Fish creek soak and Fish creek bore

Located east of Lansdown is Fish creek soak and Fish creek bore. Fish creek soak was a river bed with small pools of water still remaining at the time of the Muster. The river bed was very muddy and provided plenty of refuge sites for toads in the surrounding areas. There was also a dead cow in the river bed which attracted large amounts of toads. Over nine nights, 1121 toads were removed from Fish Creek soak.

A further 800m past Fish creek soak is Fish creek bore. This bore has a leak, so attracts plenty of toads at the end of the dry season. Over ten nights, 1139 toads were removed using hand collection from the bore area. It is interesting to note that on one night eight of these toads were found freshly killed and eviscerated. It has been speculated that a raptorial species such as an owl may have contributed to this event.

In total, 2260 toads were collected from this area on Newry, indicating that it is an important refuge site late in the dry season for toads.

Blackfellows

Blackfellows is the most eastern site on Newry that STTF worked on during the 2009 Muster. It is a small turkey nest surrounded by thick vegetation and muddy edges, making it impossible to fence. Toads were in low numbers at this site; 308 were removed in four nights.

6.4 Lake Argyle

Lake Argyle is situated 50kms south of Kununurra. In June 1972, the Ord River was dammed to create this 1000 sq km lake, apparently making it the largest man made water structure in the southern hemisphere

(<http://www.kununurra tourism.com/en/What+to+See+and+Do+in+Kununurra/Lake+Argyle+-+Ord+Valley/default.htm>).

Lake Argyle is of great concern in terms of toad control as it obviously provides an enormous amount of permanent water for toads to use. Once toads have established themselves in this water system, they will be able to move freely north and south along the Ord River, one of the main rivers in the East Kimberley and one that will allow them to move easily from Lake Argyle to World Heritage-listed Purnululu National Park (Bungles Bungles).

Toads were first found on the edges of Lake Argyle near Matilda creek in February 2009 by DEC staff. STTF included Lake Argyle as a study site for the Muster in order to determine how far the toads had moved in seven months (from February to September). There are numerous tributaries that flow into Lake Argyle from the Northern Territory, including Matilda Creek. STTF focused their study site north and south of Matilda creek, as well as doing numerous reconnaissance trips as far south as Hicks creek, the next tributary creek south of Matilda creek.

Nearly all of the work carried out on Lake Argyle was on quad bikes, besides closer areas to base camp which were checked by foot. The edges of the Lake were very muddy and narrow in some areas, making it difficult access for a normal sized 4WD vehicle, hence the use of quad bikes. Due to its importance, Lake Argyle was busted as often as possible during the Muster (14 nights out of 29). In total, STTF covered 45.7kms of the shores on the Lake; 25.7kms on the northern side of Matilda creek and 20kms (up to Hicks creek) on the southern side.

Over the 14 nights of control work, 1143 toads were hand collected around the shores of the Lake (See Appendix 1, Table 4 for full details). It was interesting to note that most of these toads were found in the muddy, shallow tributaries flowing into the lake, rather than on the actual edge of Lake Argyle itself.

Toads collected were sexed, weighed and measured (See Appendix 1, Table 5 for full details). Out of the toads collected from the lake, the general trend was 75% adult females, 23% adult males and 2% juveniles. Many of these toads were dissected and assessed for eggs and stomach contents. Nearly all females had eggs. A summary of the stomach contents for 74 of the Lake Argyle toads can be found in Figure 1 below. Further details can be found in Appendix 1, Table 6.

It is likely that should toads become established in large numbers on the shores of Lake Argyle that there will be direct competition for food resources between cane toads and freshwater crocodiles. It has been shown that invertebrate fauna makes up a significant component of freshwater crocodile diet and almost 100% of the diet of hatchling and juvenile crocodiles rely on this resource for survival. Of toads sampled from Lake Argyle stomach content analysis determined a relatively high proportion of invertebrate fauna being taken as food by toads.

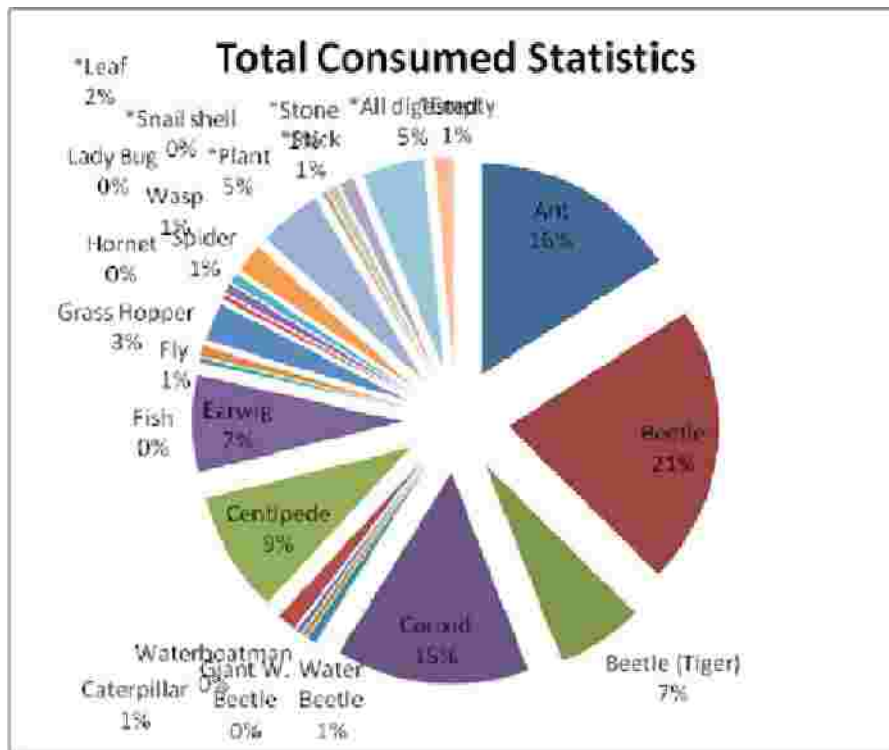


Figure 1. Stomach contents found in toads on Lake Argyle.

Ideally, STTF would have liked to continue work on Lake Argyle as toads were found throughout the 45.7kms, indicating that they could be even further spread than this. Due to limitations such as long distances from base camp, the amount of fuel that a quad bike can hold and access past Hicks creek, this was not possible. STTF recommends that control work is continued on Lake Argyle by KTB and DEC.

6.5 Keep River National Park

Keep River National Park (KRNP) is located on the NT side of the WA/NT border, 40kms east of Kununurra. This 700 sq km park is located between two distinct geological areas; the escarpment country of the Victoria River District and the sandstone ranges that characterise the Kimberley, creating diverse habitats for a large variety of wildlife. The Keep River flows through the middle of the National Park creating permanent water holes all year round. Mound springs in the northern section of the park also provide year-round water. The Keep River area is dominated by eucalypt open savanna woodland, with an understory of native grasses. Small isolated pockets of vine forest occur in protected gullies and tussock grasslands occur in the lower Keep River. Fourteen threatened species occur in the Keep River area, resulting in it being given International significance status (http://www.nt.gov.au/nreta/environment/conservation/pdf/28_keepriver.pdf).

KRNP was chosen for the site of a third satellite base camp during the Muster due to its importance and to test the STTF fencing strategy in a National Park. Parks and Wildlife NT Management wanted to test the efficiency of the fencing as a management tool for feral animals in one of their showcase parks. Prior to the Muster, toads had been found in very low numbers. The first toad was sighted in the KRNP on the 29th January 2009.

The Rangers station was used as a base for the Muster. A team of eight people, including two team leaders were stationed at the park for two weeks. Due to its close distance from Newry base camp, volunteers were able to rely on the main base camp for supplies and for toad disposal.

A total of 400 toads were removed across four sites on KRNP using a combination of fencing and hand collection strategies (See Appendix 1, Table 7 for full details). This low number indicates that toads have not been in the park long enough to establish high numbers and the potential for them to be controlled remains. The sites were chosen in conjunction with the Parks and Wildlife Rangers as sites that had remaining water at the end of the northern dry season - an important part of the STTF strategy.

Site description and strategy deployed

Cockatoo Lagoon

Cockatoo Lagoon is a permanent water hole situated directly opposite the Rangers station, making it a very easy site to get to. It is home to numerous birds, reptiles, amphibians and mammals. At the time of the Muster, Cockatoo lagoon was about 1km in circumference. It provided an ideal site to fence as it is the only available water at the end of northern dry season (the closest water being about 4kms away). The edge of the water was generally easy to get access to, besides a section on the eastern side which has Freshwater Mangroves (*Barringtonia acutangula*). A section on the SW corner of the lagoon was very rocky and presented challenges for fencing. To overcome these two obstacles, the fence was wound through the mangroves and small 'feet' were built with droppers to support the fence along the rocky areas (see photo below).

The fence at Cockatoo Lagoon took eight people 14 hrs to erect. A total of 1km of fencing was required. Over half of the toads collected in the KRNP were found at Cockatoo Lagoon (207 out of 400), highlighting the importance of this site as a water source for toads late in the dry season. Cockatoo Lagoon was hand busted for twelve consecutive nights. By the eleventh night, there were no toads found at the lagoon (see table 1 below). This strategy supports the idea that to completely eradicate an area of toads, consecutive nights of toad busting are required. Fences at Cockatoo Lagoon were taken down in 5 hrs by seven people.

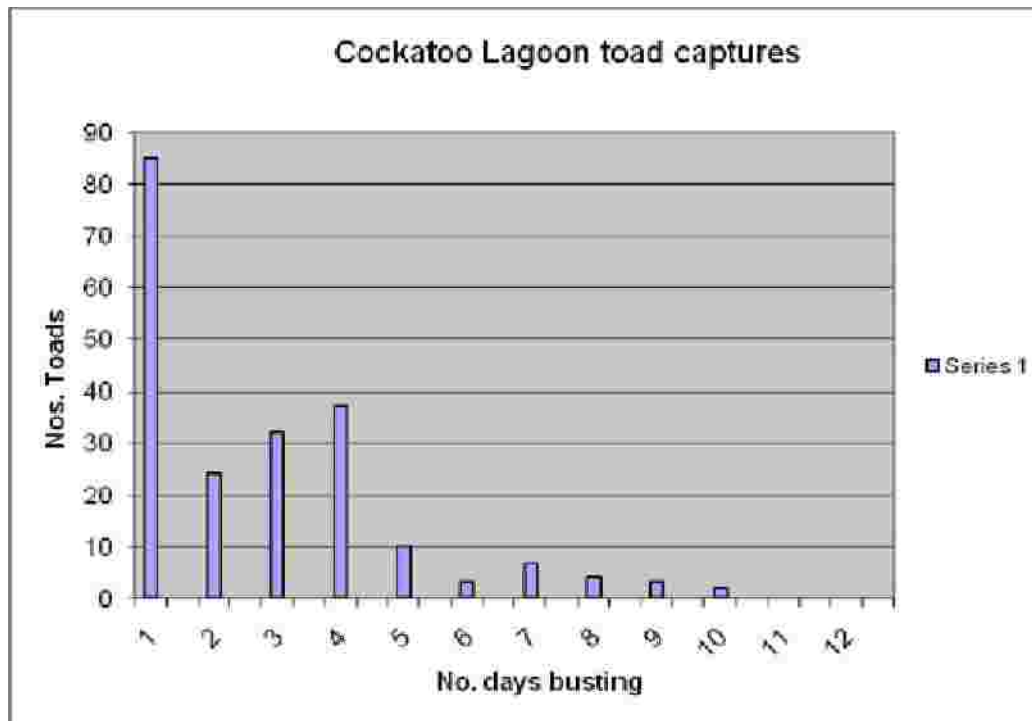


Figure 2. Cockatoo Lagoon toad numbers. By the eleventh night, there were no toads found at the lagoon.

Keep River Gorge

Keep River Gorge is located 17kms NE of the Rangers station. At the time of the Muster, there were at least four waterholes that were part of the Keep River Gorge channel and could be accessed via the Jinumum walk trail. Two of the water holes were very small. They were surrounded by rock, thick vegetation and had steep sides, making them impossible to fence. The other two water holes were 150m in length, but also had steep sides and were densely vegetated. STTF trialled the use of three fences; one at either end of the water holes and one across the river channel in between the water holes. Toads were found on the fences, but not many. Just as many were found at the top of the steep banks and along the walking track.

In total, 135 toads were removed by hand from these sites over seven nights. This number is quite high for the small size of this water hole, indicating that it is another important area for toads to rely on at the end of the dry season.

Little Policemans Waterhole

Located just south of the Jarnem camping ground is Little Policemans Waterhole (not to be confused with Policemans Hole and Policeman Waterhole). At the time of the Muster, there was a large billabong approximately 200m long and 40m wide, with a feeder creek on the west side. It was unable to be fenced due to the very dense surrounding vegetation. Only eight toads were removed by hand from this

site, all from open areas. It was busted for three nights, but the eight toads were all found on the first night and only one was male.

Mound spring

Located 6km south of Little Policemans Waterhole and 1.5kms west of Keep River Gorge is one of the mound springs found in KRNP. The Mound springs are of significant conservation value in KRNP as they provide permanent water to wildlife in the park.

At the most northern extent the site consisted of two small pools approximately 5 m x 2m. This is where the toads were found. At the most southern extent 1.2 kms away was a pandanus thicket assumed to be the spring where a running creek was observed. Between the spring and the two small pools were large paperbark swamp areas surrounded by thick grassy vegetation. A total of 50 toads were removed by hand in five consecutive nights at this site.

6.6 Native wildlife impacts

STTF fences are specifically designed to allow access to water by all animals besides cane toads. They have a 25mm square mesh inserted along the bottom of the fence that allows entry for native animals, such as frogs and snakes, but does not allow access to cane toads owing to their larger size.

Consistent observations during the 2009 GTM demonstrated that these 25mm 'wildlife gates' were used very successfully by native animals to access the water inside the fence. Frogs and snakes were seen moving through the gates, whilst larger animals such as wallabies and a water-monitor were seen jumping or climbing over the fences. Very few negative impacts on native fauna were observed by STTF staff and volunteers during the 2009 Muster.

A complete list of fauna observations and their interactions with the fences can be found in Table 1, Appendix 2. A complete list of fauna observed on all sites at the Muster can be found in Table 2 and 3, Appendix 2.



A Roth's tree frog prepares to use the native wildlife gate.

6.7 NATIONAL CANE TOAD ERADICATION WEEK

As part of STTF's cane toad control program, the Foundation coordinated a National Cane Toad Eradication Week (NEW) in conjunction with the last week of the Muster; from the 3rd October to 11th October. The aim of NEW was to show the impacts of people power on toad populations across Australia and unite the nation for the first time in the fight against cane toads.

During the NEW, toads were removed from northern NSW, Queensland, the NT, and WA using temporary fencing, trapping and hand collection. A total of 9124 toads were removed by 82 people, contributing to 574 days of community volunteer toad control.

In general, the feedback from community groups was very positive. Some community groups in QLD and northern NSW commented the timing of NEW was not ideal for their toad busting activities- as toads were not yet active in these areas. STTF will continue to hold a NEW in following years, but extend the period of toad collection to account for all community groups wanting to be involved in a national effort as well as considering climatic differences across northern Australia.

7 CONCLUSIONS

Over the past four years of Muster activity the STTF has removed 175,000 adult and juvenile cane toads and thousands of metamorphs and tadpoles from its areas of operation.

The success of STTF's fencing strategy as a toad control methodology has again been proven. The variety of habitats that it has been applied to has shown that it can be applied across a range of situations and this should be further investigated. It should become a tool of management for agencies such as DEC and NT Parks and Wildlife to protect areas of high biodiversity prior to cane toads impacting on National parks and other conservation areas. Furthermore it is a tool of control that should be adopted by all groups undertaking cane toad removal work.

Fencing presents a further opportunity for indigenous communities looking for to develop employment opportunities for community members prior to the significant changes expected from the planned roll up of Community development Employment programs (CDEP) by mid 2012. It is an activity that can be immediately supported through indigenous ranger programs currently funded by Caring for our Country resources.

It is obvious that cane toad control is an issue of national significance and that it is an activity that has strong community support given the numbers of volunteers who have participated in this year's muster. Given the limited funding that is available to STTF to undertake this annual event and the fact that many potential volunteers were 'turned away' from the activity in 2009 owing to funding constraints it is imperative that further government and philanthropic support is sought for 2010.



A volunteer out toad busting.

8 RECOMMENDATIONS

Toads have moved into Western Australia and established themselves in Lake Argyle. STTF recommends that a concerted control effort by KTB and DEC is continued to protect this RAMSAR listed site.

It is more than likely that toads will continue moving westward into Western Australia. Since the Ord River flows into Lake Argyle from Purnululu National Park (Bungle Bungles), STTF propose that a major effort be made to prevent the movement of cane toads up (south) the Ord valley to Purnululu. As Australia's newest World Heritage area, and one of the most naturally and culturally significant, it would be a tragedy of international proportions if cane toads were allowed to invade this heritage and environmentally significant area. This happened a decade ago with World Heritage-listed Kakadu National Park in the NT and should not be repeated.

Recent advances in cane toad control techniques, primarily fencing and research, are showing that our ability to manage the impact of cane toads is more significant than Governments and research groups, focussing on biological and genetic control measures, previously thought. This is especially valid for the fencing techniques that have been developed over the past three years that have provided the ability to eradicate toads from isolated water points. This fact has been demonstrated through several trials and is also now validated by specific research by Dr Mike Letnic from Sydney University in the Victoria River District area (Pers. Comm. 9th November). In summary, the nature of the terrain between the Lake Argyle area where cane toads now are, and the Purnululu area, coupled with the water structures, dynamics of the area and cane toad dependence on water all conspire to make control feasible.

STTF also recommend that the fencing method be adopted by management of National Parks and other high priority biodiversity sites across Australia as one of the key tools in cane toad control. The strategy was welcomed by the Keep River National Park in the Northern Territory this year and should be at least trialled in others across Australia.

In the future, STTF will continue working with DEC and KTB to control toad numbers entering WA and populations that establish in WA. With a strategic approach in mind, areas that are determined fencing sites could be left to be fenced later in the dry season and do not need to be hand busted during the year. With integrated coordination across agencies and groups, the existing resource base should allow a significantly greater area to be cleared of toads.

9 REFERENCES

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STTF and Frogwatch NT Fencing video

<http://www.stophthetoad.org.au/main/videos.php>

STTF 2008 Muster report

<http://www.stophthetoad.org.au/publications/Muster2008Report.pdf>

STTF publications

<http://www.stophthetoad.org.au/main/publications.php>

Western Australia Tourism – Kununurra visitor centre

<http://www.kununurra tourism.com/en/What+to+See+and+Do+in+Kununurra/Lake+Argyle+-+Ord+Valley/default.htm>