# Stop the Toad Foundation
# 2010 Great Toad Muster
# REPORT


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CARING FOR OUR COUNTRY

ABN foundation

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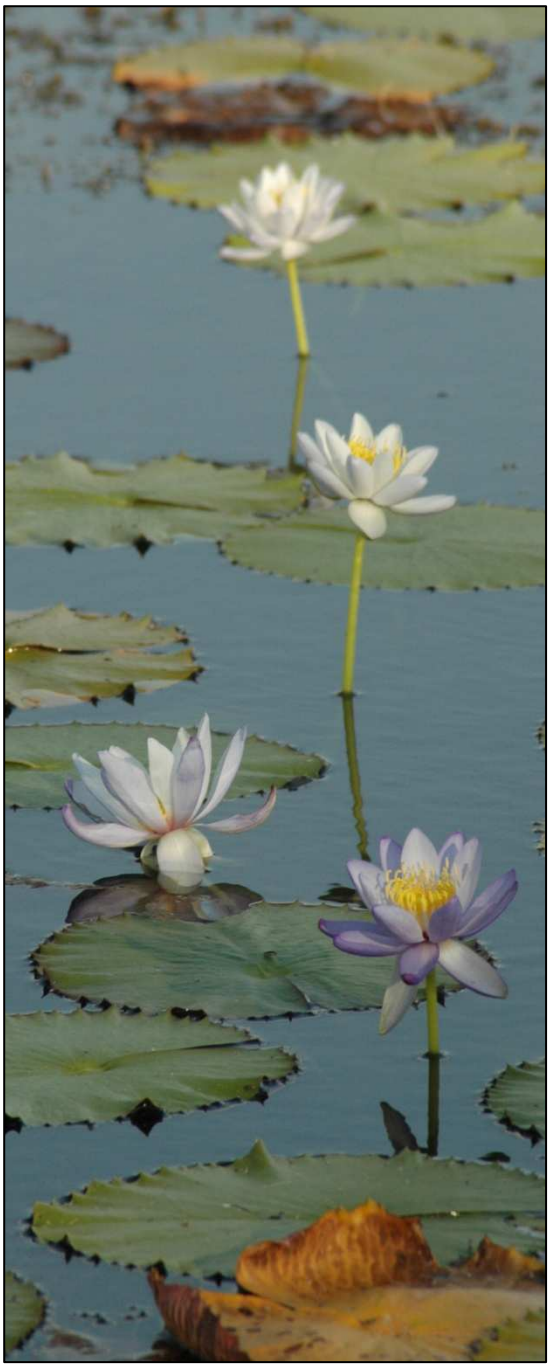

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## THANKS

The Stop The Toad Foundation (STTF) would like to thank the following groups and individuals for their support during the Great Toad Muster and/or throughout the year:

## PRINCIPAL SUPPORTERS

- Australian Federal Government's Caring for our Country grant scheme
- ABN Foundation

## OTHER SUPPORTERS

- The Richardson Foundation
- Department of Environment and Conservation in WA
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- FrogWatch NT
- Northern Habitat
- Conservation Council WA
- Volunteering WA

**PHOTOGRAPHY**

The Foundation would like to thank the following people for allowing their photographs to be used in this publication:
Gary Pike, Brendan McGill, Nicky Jose, Phillipa Burfield, Kim Hands, Lucy Simnett, Chris Done and Ruchira Somaweera.

# CONTENTS



*The fence at Point Spring Nature Reserve is no hindrance for this Water Python.*

# 1 ACKNOWLEDGEMENTS

STTF would like to acknowledge the traditional owners of Point Spring Nature Reserve and Lookout Spring, the Miriuwung and Gajerrong people, who allowed us to work and live on their land.

STTF would sincerely like to thank the manager of Carlton Hill station, Stirling Fearon, for allowing us to set up our main operations on his property for six weeks. Thanks also to Thomas Shephard; manager of Newry cattle station, Charlie Sharpe; manager of Lake Argyle Resort and Caravan Park, management at Keep River National park- especially Adrian McKenzie, Richard Tunnicliffe and Cameron Sharpe 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. The average number of volunteers per night was 30. Special thanks must be made to Reg Geary, Gary Pike, Michael Lohf, Frank Longbottom, Lucy Simnett, Jim Rasmussen, Brendan McGill and Delma Edwards who all played vital roles in the logistics of this year's Muster.

STTF would like to thank the Australian Federal Government. The 2010 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 for their support for the 2010 Muster- the fifth Muster they have supported.

STTF would also like to thank the DEC Cane Toad Team, especially Corrin Everitt, for their assistance and support in the planning of the Muster and the Point Spring Nature Reserve fence project.

Finally, STTF would like to thank the Wyndham Department of Corrective Services for its assistance in pre-making fences that were used during the Muster. The fences are critical to the STTF strategy, and on-ground operations would have been delayed without pre-made fencing being available.

*Yellow Spotted Monitor- one of the native species that is impacted by toads.*

# 2 EXECUTIVE SUMMARY

Stop the Toad Foundation's (STTF) fifth annual Great Toad Muster was held from 11th September until 11th October 2010. The focus in previous years has been to reduce the number of cane toads entering WA. The aim for the 2010 Muster was to protect biologically significant areas surrounding the WA/NT border, as well as trying to reduce the number of cane toads already in The Kimberley and heading towards The Kimberley. This aim was also to align STTF's strategy with the Federal Government's Threat Abatement Plan (TAP) and the Western Australian State Cane Toad Strategy (SCTS).

To achieve the above goals, three base camps were set up near Point Spring Nature Reserve in WA, inside the Keep River National Park and on the edges of the Ramsar listed Lake Argyle. A total of 20,679 cane toads, as well as 18kgs of metamorphs and 10kgs of tadpoles, were removed from these significant areas. This figure may be lower than previous years, but is due to the fact that our focus has changed from trying to remove as many toads as possible to protecting specific areas from toads. We were also working very close to the frontline, so toads had not had the chance to establish large populations in these areas.

The Foundation's temporary fencing strategy was again used at various sites to remove toads. For the first time, however, permanent fencing was also used as a method to remove toads. In liaison with the Department of Environment and Conservation (DEC), STTF attached 2km of toad proof fence to an existing cattle fence inside the Point Spring Nature Reserve. This is the first trial of a cane toad exclusion zone in Western Australia, one of the action items in the State Cane Toad Strategy. The aim is to permanently keep large numbers of toads out of this unique rainforest system while allowing native animals to move freely in and out of the fenced area.

Permanent fencing was also erected at various popular tourism sites and domestic properties around Kununurra during the Muster. Tourism sites included the Lake Argyle Tourist Village, the Kununurra Country Club Resort and the Lakeside Resort. The fences were erected around the pool areas to keep them free of cane toads. Domestic properties were fenced to protect native wildlife, pets and children from cane toads.

As part of the Muster and in conjunction with the University of Monash, the Foundation supported an honours project by Phillipa Burfield. The aims of the project were to get a better understanding of how the fences affect native wildlife, to see how far west toads have moved and to study the physiology of the western frontline toads. The results from Ms Burfield's honours project will form an important contribution towards the future management of cane toads in Western Australia.

In summary, the 2010 Muster was a great success. Thousands of toads were removed from The Kimberley, the first ever cane toad exclusion zone was established in WA and community awareness and involvement with an important environmental issue was again significantly increased.

# 3 INTRODUCTION & BACKGROUND INFORMATION

The STTF cane toad strategy has always been centered around an annual Muster; a volunteer, community based event aimed to stop toads entering WA. Unfortunately, toads crossed over the WA/NT border in February 2009 and our strategy has therefore had to change. It has evolved from trying to keep toads out of an entire state to trying to keep toads out of specific areas. Fortunately this evolution has been partnered with the development of a very successful management tool- cane toad exclusion fencing.

The Foundation developed exclusion fencing in 2007 and trialled it on a broad basis during the 2008 Muster. The fencing strategy was found to be extremely efficient during the 2008 Muster as well as during trials by Frogwatch in the NT, so was used again during the 2009 and 2010 Musters. The ability of exclusion fences to completely eradicate toads from a waterhole has been demonstrated time and time again over the four years that STTF has used them.

Directing the evolution of STTF's cane toad control strategy are two recently released governing documents; The Federal Government's Threat Abatement Plan and The State Government's State Cane Toad Strategy. Both documents acknowledge that there is a need to move away from broad-scale control and eradication to the protection of key biodiversity assets, and that community action is still an important part of minimising the toads' impact.

One of the objectives of the TAP is to 'reduce the impacts of cane toads on populations of priority native species and ecological communities'. Action 2.1.1 under this objective is to 'Implement and monitor emergency management of cane toad impacts using currently available tools and techniques', and lists fencing of small areas as one way to do this.

One of the goals of the SCTS is very similar; to minimise the impact of cane toads. Action 18 under this goal is to 'Evaluate the feasibility of protecting critical habitat for threatened species with fencing and manual cane toad control programs'. Action 26 is to 'Identify areas on the mainland that may be used as refuges for species at risk or in trials of cane toad exclusion zones'.

Using these documents to guide the Foundation, as well as our own successes, the strategy during the 2010 Muster was dramatically different from that in the previous four Musters. In the past, the STTF fencing strategy has been used within areas where toads already existed in relatively large numbers. The Foundation decided to test the theory that the fencing strategy could be used in areas close to or ahead of the frontline to completely exclude toads. In conjunction with DEC, STTF developed the first toad exclusion zone at Point Spring Nature Reserve during the 2010 Muster. DEC is managing the fence to determine if this exclusion zone is successful.

# 4 MUSTER OBECTIVES

Objectives for the 2010 Muster were;

1. To align the STTF strategy with the Federal Government's TAP and State Government's SCTS.
2. To protect key biodiversity sites from the cane toad near the WA/NT border, namely Lake Argyle, Keep River National Park and Point Spring Nature Reserve.
3. To reduce the number of toads already in the Kimberley and those heading towards the Kimberley.
4. To reduce the number of toads heading towards the eastern Kimberley town of Kununurra by creating a 'buffer line' east of Kununurra.
5. In conjunction with DEC, create the first toad exclusion zone within a nature reserve in Western Australia, using toad proof fences.
6. To protect domestic properties and popular tourist sites from cane toads within Kununurra using toad exclusion fences.
7. Demonstrate minimal impact on native wildlife. STTF fences are made with wildlife friendly gates. All staff and volunteers were involved in the monitoring of native wildlife impacts.
8. The attendance and support of large numbers of volunteers. The aim was to have between 25-35 persons per night every night of the Muster.
9. To increase community awareness of the cane toad issue in northern Australia.
10. All strategies are cost effective and do not go over budget for the Muster.
11. The completion of comparative data sets from previous years' activities.
12. Combined stakeholder monitoring of the sites of the Muster 2010 for cane toad activity after the event.

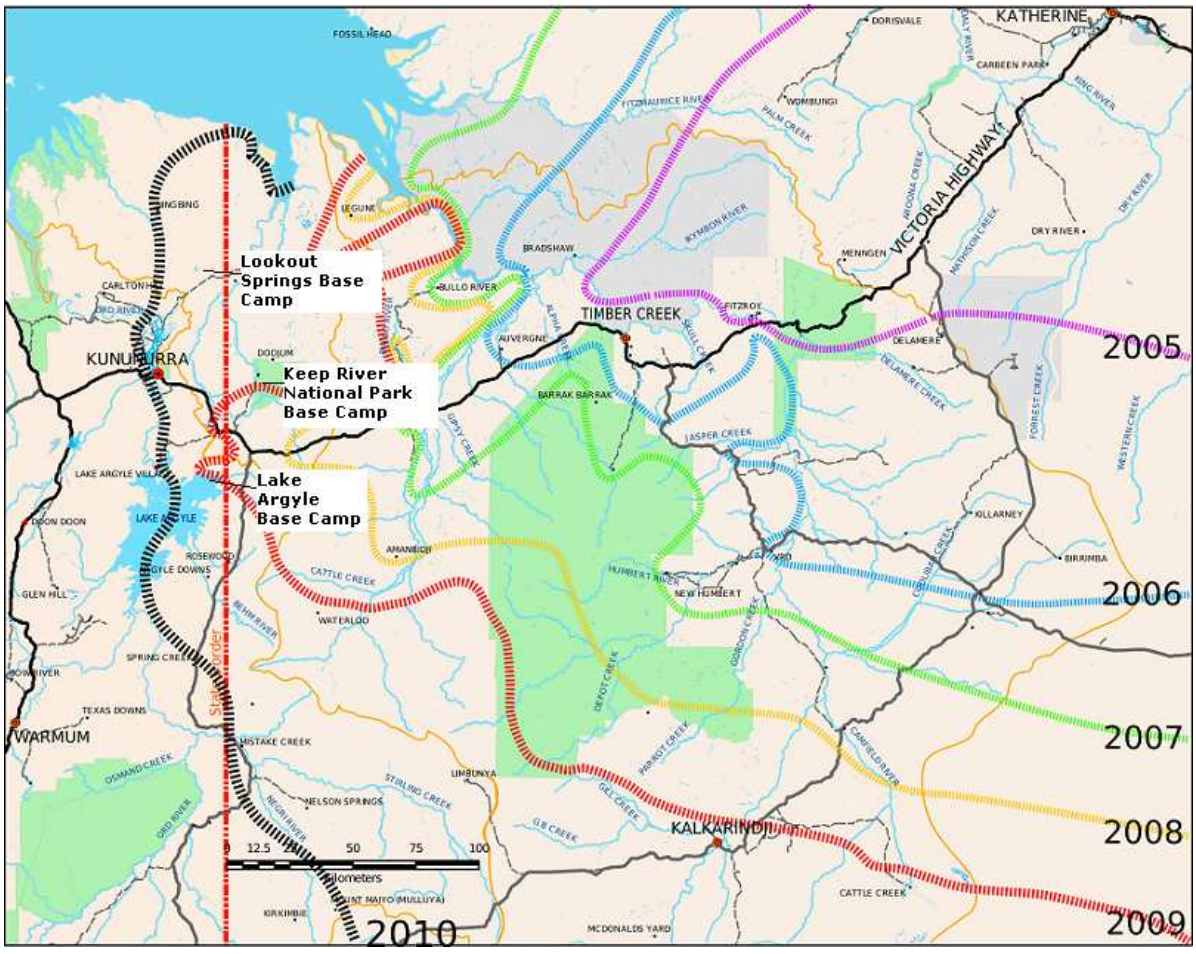
*An adult toad is blocked by the fence.*

# 5 MUSTER LOGISTICS

The 2010 Muster operations were again carried out on a bigger scale than previous years with three field base camps spread out to create a buffer line east of Kununurra. As in 2009, there was also a headquarters in Kununurra, used as a town base for the entire month of the Muster.

The main field base camp was at Lookout Spring on Carlton Hill Station. This site was chosen as it was close to the DEC Point Spring Nature Reserve (one of our main work sites); it provided a previously cleared area and a good supply of fresh water. Lookout Springs base camp took a week to set-up, was operational for the entire length of the Muster and then a further four days to pack down.

The second base camp was at Keep River National Park at the Rangers' quarters. This was the same site as one of the base camps in 2009 and its purpose was to remove as many cane toads from the National Park as possible. The Keep River camp was operational for the four weeks of the Muster. The third base camp was at Matilda Creek on Newry Station, the same site as the main base camp in 2009. The main purpose for this site was to access the shores of Lake Argyle and remove as many toads as possible surrounding the Lake. Matilda base camp was operational for two weeks of the Muster.




*Map of base camp sites in relation to Kununurra – Lookout Springs, Keep River National Park and Lake Argyle. The coloured lines indicate toad movements from 2005-2010.*

*(Map courtesy of DEC and Kimberley Toad Busters)*

# 6 METHODS

STTF removed toads from a total of 25 sites during the Muster. Different toad-busting methods, including the use of fencing (both temporary and permanent), hand collection alone and hand collection from quad bikes, were used depending on the size of the site, the surrounding environment and accessibility to the water body.

## 6.1 Temporary fencing

The concept of exclusion fences was developed by STTF Regional coordinator Graeme Sawyer in 2006. The fence strategy has been largely trialled throughout the NT by STTF and Frogwatch NT over the past 4 years and found to be extremely successful. Our research has shown that by using fences in comparison to just hand catching, the efficiency of toad eradication is trebled.

The potential of the fencing strategy is supported by Dr. Mike Letnic from the University of Western Sydney and Dr. Sean Doody from Monash University. Research from Dr. Letnic in September 2009 supports the eradication impact of fences and he believes it should be possible to keep toads out of certain areas.

The Foundation now owns about 10km of pre-made fences, meaning that for the 2010 Muster, STTF had the majority of fences pre-made from previous years. The Wyndham Corrective Services Camp assisted in making 1.5kms of new fencing for this year's Muster. The materials required to make exclusion fences and the method used to erect the temporary fences can be found in the 2009 Muster Report and on the STTF website www.stopthetoad.org.au.

Temporary fencing was used at 5 sites on Carlton Hill station and Keep River National Park. The fence length varied from 50m to 1km long.

*Temporary fencing is erected around a natural water hole in Keep River National Park.*

## 6.2 Permanent fencing

The concept of permanent fencing is similar to the temporary fencing with the main idea to keep toads out of an area. The main difference is that temporary fences stand alone and can support themselves, whereas permanent fences are made by utilising an existing cattle or boundary fence. Appendix 1 includes instructions of how to 'cane toad proof your backyard', which is how the smaller permanent fences at tourism and domestic sites were erected during the 2010 Muster.

Permanent fencing was used on a much bigger scale in Point Spring Nature Reserve. In conjunction with DEC, STTF used permanent fencing to create the first cane toad exclusion zone in Western Australia, with a size of 5ha.

## 6.21 Point Spring Nature Reserve fencing project

The Point Spring Nature Reserve is located 45kms north-east of Kununurra in the middle of Carlton Hill station. It is a 300ha A-class reserve managed by DEC. The spring provides permanent water all year round which supports remnant rainforest vegetation and associated fauna including various reptile, amphibian, fish and mammal species.

There are numerous cattle fences in the Reserve. One that presented a good opportunity to trial a permanent style cane toad fence was the inner fence line that protects the source of the spring and dependent remnant rainforest vegetation. This fence line is 2kms long and runs around the base of a rocky escarpment creating a 5ha area that was to become the exclusion zone.

A rocky escarpment forms one side of the exclusion zone. It is, however, only 20m high in places. Ideally, fencing would have been placed along the top of this escarpment to help create a complete exclusion zone, but the rocky ground prevented this from happening in the Muster time frame. Hopefully the escarpment will act as a barrier to toads nonetheless.

The fence took twelve days to build and a further four days to modify for native animals. The method for building the fence was generally the same as the smaller permanent fences (see Appendix 1). There were, however, some modifications developed over the course of the project to make the exercise more efficient. This included constructing the panels, each 50m long, at base camp to make them easier to install on site, and the use of a plough, made at camp, to make the digging of the trench much easier.

See Table One below for further details on the construction of the Point Spring fence.

**Table 1- Represents the Point Spring fencing project; Activities undertaken, the number of people and time they each took.**

| Date | Activity | No. working hrs | No. people | No. people hours |
|---|---|---|---|---|
| 13/09/2010 | First 100m partially installed in situ. | 3 | 12 | 36 |
| | | | | |
| 14/09/2010 | Continued fence, one panel made | 5 | 12 | 60 |
| | on the back of trailer. | | | |
| | | | | |
| 15/09/2010 | All day working in camp making fence. | 6 | 16 | 96 |
| | | | | |
| 16/09/2010 | Plough trench, installed fence, | 6 | 12 | 72 |
| | manufacture in camp. | | | |
| | | | | |
| 17/09/2010 | Camp manufacture. | 4 | 8 | 32 |
| | | | | |
| 18/09/2010 | Plough trench and installing. | 3 | 9 | 27 |
| | | | | |
| 19/09/2010 | Manufacture in camp. | 3 | 10 | 30 |
| | | | | |
| 20/09/2010 | Install and manufacture 200m in camp. | 3 | 9 | 27 |
| | | | | |
| 21/09/2010 | Manufacture in camp. | 5 | 12 | 60 |
| | | | | |
| 22/09/2010 | Plough trench 400m, 200m made in camp. | 3 | 9 | 27 |
| | | | | |
| 23/09/2010 | Plough trench 200m, install and | 3 | 13 | 39 |
| | manufacture at camp. | | | |
| | | | | |
| 24/09/2010 | Trench, install and manufacture. | 3 | 8 | 24 |
| | Brush cutter thick vegetation. | | | |
| | | | | |
| 26/09/2010 | Repair wallaby damage. | 3 | 7 | 21 |
| | | | | |
| 27/09/2010 | Modify gates for wallabies. | 3 | 5 | 15 |
| | | | | |
| 28/09/2010 | Modify holes for snakes, bandicoots and blue tongues. | 1 | 4 | 4 |
| | | | | |
| 30/09/2010 | Insert snake ropes. | 2 | 2 | 4 |
| | **TOTAL** | | **TOTAL** | **574** |

Observations throughout the building of the fence during the day and toad busting activities during the night helped STTF to determine which native animals were negotiating the fence successfully and for which animals it needed to be modified. Adjustments were made to account for native snakes, bandicoots, blue-tongue lizards and wallabies. Motion detector cameras were set along the fence to give us more of an insight into the interactions between native animals, toads and the fence as part of Ms Burfield's honours project.

*Motion detector cameras are set up along the fence to capture interactions between native animals, toads and the fence.*

## 6.3 Other methods of toad removal

Nearly all of the work carried out on Lake Argyle was on quad bikes whilst areas closer to the base camp were checked by foot. The edges of the Lake were very muddy due to the Lake level being at its lowest for some years, making it difficult access for a 4WD vehicle, hence the use of quad bikes. Quad bikes also made it easier to spot toads and collect them by hand.

Some sites had very steep banks, were surrounded by rock or thick vegetation such as Freshwater Mangroves (*Barringtonia acutangula*) or Cumbungi Reeds (*Typha domingensis*), 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 water's edge up to 20m away from the water body. Long handled fine mesh nets were used to retrieve toads that were in deeper water.

Tadpoles and eggs were removed with hand-nets. They were scooped out of the water and placed on the edges of the banks to dehydrate. Metamorphs were also collected in nets and by hand. If there were large numbers present, they were sprayed with chlorine-based bleach using battery-powered spray packs.

## 6.4 Recording data

Once back at base-camp, cane toads were euthanized with carbon dioxide (C02). This was achieved by placing up to 20 captured toads in an airtight heavy duty plastic survey bag and flooding the bag with concentrated CO2. The bag was then sealed and rolled to ensure that the CO2 reached all toads. The bags were left overnight for a minimum time of 6 hours.

The following morning toads were removed from the bag and data were then recorded on the total number collected. Males, females and juveniles were recorded for all study sites. Some of the toads were dissected to determine what they had been eating and to gain an indication of possible impacts on invertebrate fauna.

*Volunteers count and sort toads into male, female and juvenile toads.*

Tadpoles and metamorph numbers were harder to accurately record than adult toads due to their very high numbers in some sites and their small size. Once they were collected in bags, they were weighed. Rather than count all tadpoles and metamorphs, numbers were extrapolated from subsamples. Weighed subsamples determined that 100 tadpoles or metamorphs weighed 3 grams, therefore 1kg was equivalent to 33,333 tadpoles or metamorphs. Eggs were counted in egg strings. One long string was one breeding event.

*Tadpoles and metamorph toads are collected with hand-nets by volunteers.*

# 7 RESULTS

## 7.1 Lookout Spring Base Camp (located on Carlton Hill Station)

Carlton Hill Station is located 40kms north of Kununurra, west of the NT/WA border. It is largely made up of the black soil plains of Weaber Plains, with some alluvial flats. The Ord River borders the south-west section of Carlton Hill and provides a permanent water supply to the property through the Ord Irrigation Scheme. This water supply feeds a series of man-made dams and turkey nests that are scattered across the 3675 sq km property, providing plenty of opportunities for toads to re-hydrate in the late dry season.

There are also a number of natural springs found on Carlton Hill station including Lookout Spring and Point Spring that provide toads with a water source throughout the year. Lookout Spring, an area once used as a stockmen's camp, was the site of the main base camp for the 2010 Muster. Base camp was set up over a period of a week by ten people on the western side of the springs. The camp supported an average of 30 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 15 people.

A total of 3201 cane toads were removed from 14 sites across Carlton Hill station using a combination of collection methods; hand collection, temporary fencing and permanent fencing (See Appendix 2, Table 1 for full details including GPS coordinates). This number of toads captured was the lowest of all three base camps, even though it was the largest in terms of operations and the number of people it supported, indicating that toads were relatively new to the area in comparison with the other two base camps where toads have been established for two years now. Almost 95% of toads found on Carlton Hill were adults (50.6% males and 43.8% females); also indicating toads have been on the Station for less than a year because they have not had the chance to breed.

## Site description and strategy deployed

**Lookout Spring Soak**
A small soak located directly behind base camp was nominally named the Lookout Spring Soak. It provided the perfect habitat for toads with shallow pools of water and muddy fringe areas. It was also the perfect training site for new volunteers as it was close to camp and easy to access. The Lookout Spring soak was hand busted 16 out of 30 nights. 130 toads were removed, 100% of these being adults. 65% of these adult toads were large females.

**Lookout Spring Billabong**
Lookout Spring Billabong is a large spring fed water body with a north-south orientation. At the time of the Muster, the main part of the water system next to camp ran for roughly 1km. There were a series of smaller pools of water 1-2kms north and south of this main billabong that were discovered during

reconnaissance trips. These sites were busted after the main billabong was cleared of toads (starting on 6th October).
The Lookout Spring Billabong system was relatively hard to bust in some areas due to its high banks and fringing freshwater mangroves, however, most toads were found along the edges of the billabong on higher ground. 165 toads were removed from the system, again 100% of them being adults. Just over 61% of these toads were adult male. This could indicate that, in comparison with the Lookout Spring Soak, adult males prefer the larger bodies of water and female toads the smaller, muddier ones. Further investigation, however, would be required to confirm this.

Numerous days were spent removing tadpoles and metamorphs from Lookout Spring Billabong, indicating that breeding had occurred at this site prior to the Muster. In total, over 10kgs of tadpoles and almost 2kgs of metamorphs were collected from this billabong. Nine strings of eggs were also found later in the Muster after a few rain events occurred throughout the beginning of the Muster (See Appendix 2, Table 4 for full details).

**Point Spring Nature Reserve- inner fenced section**
The Point Spring Nature Reserve was conveniently located in between the main base camp site at Lookout Spring and most of the other study sites, meaning that we were able to easily check the area on the way to/from other sites. The area was consistently busted throughout the Muster, with a focus on the fence line of the 5ha inner fenced section. The aim was to clear the inside of the fenced section of toads before the fence was completed. This was almost impossible to achieve due to the very thick vegetation, deep muddy ground and rocky terrain within the fenced section, making it a hard site to bust. It was, however, cleared of as many toads as possible before and after the fence was finished.

A total of 148 adult toads were removed from this site, almost exactly 50% male and 50% female. There were no juveniles found. Before the fence was completed, 56 toads were removed from the inside. After the fence was completed, a further 59 toads were removed from the inside. 33 toads were removed from the outside of the fence, trying to gain access to the water inside. In summary, it is more than likely there are toads still on the inside of the fenced area, but hopefully the fence will keep further numbers of toads from entering this unique rainforest ecosystem. Continual toad control and management by DEC will also ensure that toads on the inside are removed.

*Volunteer Gary Pike helps build the Point Spring toad fence.*

**Point Spring Nature Reserve Billabong**
Located 260m inside the entry gate to Point Spring Nature Reserve, is a small billabong fed by Point Spring. At the time of the Muster it was 100m in circumference and had very muddy shallow edges, a preferred toad habitat. In total, 84 toads were hand collected across nine nights. Almost 80% of these were adult male toads and only 3.6% juvenile.

**Brolga Dam**
A small man made dam south of Yard Creek was nominally named Brolga Dam due to the amount of Brolgas (*Grus rubicunda*) seen at the Dam in the first reconnaissance visit. Brolga Dam presented an ideal site to use the temporary fencing strategy, but is accessed by cattle on Carlton Hill Station, so was just hand busted. At the start of the Muster, the Dam was 100m in circumference. Half way during the Muster, it dried up completely, although toads were found deep in cracks within the black soil where the Dam had been for a few days post this event. 178 toads were removed by hand over 13 nights. Hooks made out of fencing wire were used to retrieve toads out of black soil cracks when they were too hard to reach by hand.

**Yard Creek**
Yard Creek, a tributary of Border Creek which feeds into the Keep River, is one of the creek systems that runs through the eastern side of Carlton Hill Station. Some areas along the Creek have relatively steep banks and are surrounded by freshwater mangroves (*Barringtonia acutangula*). A 3km stretch of the Creek was chosen as a study site during the Muster as it contained numerous water holes and other parts of the Creek had dried up. Different teams of 4-6 people were usually required to complete the hand busting at Yard Creek as it was such a large distance to cover. Over 13 nights, 1296 toads were removed from this site, 95% adult toads and only 5% juvenile toads. Just under 100 metamorph toads were also collected at this site.

**Metamorph Dam**
Metamorph Dam is a man made dam located along the Gap Road, the road that runs north towards the coast from Yard Creek. It was nominally named Metamorph Dam because the first time we visited the site, we found thousands of metamorphs surronding the edge of the dam. Of all the study sites at this year's Muster, Metamorph Dam had the greatest number of metamorphs present, suggesting that it represented the perfect environment for metamorph toads at that time of year. A lot of effort was put into collecting these metamorphs throughout the Muster; almost 16kgs (equal to 524,880 metamorphs) were removed! One egg string was also found. (See Appendix 2, Table 4)

The fencing strategy would have worked very well at Metamorph Dam but cattle needed to access it, so it was only hand busted. The total amount of toads removed was 267, with 60% being adult males, across 8 nights.

**Gap Road Springs**
There were numerous natural springs along Gap Road that ranged in size from 30cm² to 3m². These springs presented perfect habitat for toads as they created

a permanent muddy and moist surrounding area, ideal for toads to rehydrate, whilst having plenty of refuge spots nearby. Springs such as these are very hard to manage as they provide permanent water for toads and these particular ones were numerous (it is highly likely we didn't find them all). Due to time restraints and logistics, we cleared as many sites as possible using hand collection. 92 toads were removed from 12 different springs.

**T1**

Located on the south-east of Carlton Hill Station near the Sorby Hills Range, is a group of man-made dams called Sorbys. For our recording purposes, one of the turkey nest and over-flow systems that was chosen as a study site was named T1 (Turkey nest number 1). This man made system was ideal for the fencing strategy to be used as it was fenced off from cattle (water was trough fed) and it was one of the only water sources in the area. There were patches of Cumbungi Reeds in the turkey nest but the overflow was clear. The turkey nest was fenced using 150m of temporary fencing in 45 minutes with 12 people. The overflow was fenced using 250m of temporary fence in 1 hour with 12 people. Both fences were taken down in 30 minutes by 6 people.

As this site is at least 20kms east of where toads have already been found and one of the only water sources in the immediate area, it was assumed that toads would be found here in large numbers. There was, however, a total of only 10 toads found at this site. The surrounding troughs and tanks were inspected for leaks in case toads were rehydrating from them, but none were found. This result is unusual in comparison with previous similar study areas, but could be due to a number of reasons, including other water sources in the area.

**T2**

A further 2kms south of T1 was a man-made quarry, 100m in circumference, surrounded by very rocky ground, but no vegetation. It was named T2 for our recording purposes. T2 was fenced using 100m of temporary fencing in 1hour with 12 people. A 20m gap was left at the southern end to allow cattle, dependent on the water hole, access to drink. This design, trialled at the 2009 Muster, again worked well and meant that cattle did not walk all over the fence. Over 5 nights, 75 toads were collected from off the fence, over 60% of them were adult males. Even though this site was only 2kms from T1, it was interesting to note that seven times more toads were found here, indicating that the habitat was preferred by toads. The fence took 20 minutes to take down with 4 people.

*Volunteers erect the temporary fence at T2- a gap is left at one end for the cattle to access water.*

**Milligan's Lagoon**
Milligan's Lagoon is located on the WA/NT border and depending on the time of year, spans across the south-eastern corner of Carlton Hill Station and the north-west corner of Keep River National Park. It is a large water body, part of the Keep River system. At the time of the Muster, it was 1km in length and supported numerous wildlife including Barramundi, Freshwater Crocodiles, various snake and bird species.

Due to its large size, numerous teams of 4-6 people were used simultaneously to hand collect toads at different parts of Milligan's. The Lagoon was visited for three nights and 380 toads were removed, almost all adult toads. There was no evidence that any breeding had occurred at the time of the Muster, although 9 juvenile toads were found at this site.

**Jabiru**
As part of Ms Burfield's honours project and the STTF 2010 Muster strategy, we wanted to determine the location of the western frontline of toads. During numerous reconnaissance trips and with the assistance of Carlton Hill Station, we found three additional water bodies to include in our study sites. The first of these was a natural sandy creek line, 2kms west of the Lookout Spring base camp. It was nominally named Jabiru as the first time we visited it, there was a Jabiru, or Black-necked Stork, found there. At the time of the Muster, the remaining water body was 50m long and 3m wide.

This site was visited for four nights and 165 toads were hand removed. Interestingly, almost 30% of these toads were juvenile, representing the highest percentage in all the study sites of this area. Sites closer to the frontline usually have no to small numbers of juvenile toads, indicating that this site was probably not as close to the frontline as first thought.

**Limestone**
A further 8.8kms west of Jabiru was a turkey nest and overflow system called Limestone. This system also included a water trough for cattle, located in the middle of a large open paddock. The water trough leaked into the surrounding paddock and many toads were found spread throughout this paddock area. The turkey nest was relatively small with a 30m circumference. The overflow dam was large in comparison, but at the time of the Muster, completely dry. Limestone was hand busted by the same team that checked 8 Mile over four nights. 177 toads were found, over 50% being adult females. No signs of breeding were found at this site.

**8 Mile**
The most western study site on the 2010 Muster was a turkey nest and overflow system called 8 Mile. It was a further 9.5km west of Limestone and then 7km north. The turkey nest is only 30m in circumference but very hard to access due to thick Cumbungi Reeds. Toads were often found hiding deep amongst these reeds and to collect them, volunteers had to wade into the turkey nest, often waist high in water. The overflow was 20m in circumference and completely clear of vegetation. Across four nights, 34 toads were collected from this site. It is interesting to note that all of these toads were found around and in the turkey nest and no toads were found around the overflow. Six metamorphs were found

around the overflow during a day time reconnaissance trip, indicating that breeding has occurred at this site. It is possible that toads were using the turkey nest as a refuge site, but breeding in the overflow.

## 7.2 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. 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 the site of a base camp during the 2009 Muster. It was again chosen for a base camp site during the 2010 Muster due to its importance and to collect a second year of data. Parks and Wildlife NT management were very keen to use the fencing strategy again as a management tool to remove toads after its success is 2009.

The Rangers' station which includes a kitchen and bathroom was used as the headquarters for this base camp. A team of eight people, including two team leaders, was stationed at the Park for the entire four weeks of the Muster. Due to the support of Parks and Wildlife NT, the cost for this base camp was kept to a minimum and the logistics were very straight forward. This is a great example of how Government can support community groups with the access to volunteer numbers and time to carry out on-ground action.

As part of the Muster activities, STTF staff and volunteers created permanent toad proof fences around the Rangers' houses to protect their families and pets from toads. This also prevented toads from being able to rely on the garden reticulation; another water source at the end of the northern dry season. Toads collected from around the Rangers' houses were included in the Cockatoo Lagoon toad numbers.

A total of 7294 toads were removed across nine sites on KRNP using a combination of fencing and hand collection strategies (See Appendix 2, Table 2 for full details). 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. Last year only 400 toads were removed from KRNP, demonstrating the rate at which toad numbers have increased in just one year.

Metamorphs and tadpoles were sighted in the park (at Cockatoo Lagoon and Garrandalng Campground), but due to the lack of resources (no nets or spray-packs) the focus was not on recording their numbers.

## 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 access. 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 the 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. The fence at Cockatoo Lagoon took five people 18.5 hours to erect. As the lagoon was fenced during the 2009 Muster, the same fence being conveniently used again this year.

Cockatoo Lagoon was hand busted for 18 nights and 5,164 toads were removed. In STTF's experience, toad numbers are usually cleared at a site after 7-10 days of constant toad busting. The fact that toads were still found after 17 days around the Lagoon, indicates that toads were able to rehydrate from other sources and not rely solely on the Lagoon. In this case, it was most likely the Rangers' garden reticulation. The toad proof fences that were erected around the Rangers' houses near the end of the Muster will prevent this from happening in the future.

Over 70% of the toads collected in the KRNP were found at Cockatoo Lagoon highlighting the importance of this site as a water source for toads late in the dry season. Fences at Cockatoo Lagoon were taken down in 15 hours by three people.

**Gurrandalng Campground**

Gurrandalng is one of two campgrounds designated for tourists in KRNP. It is 10kms north of the Rangers' station. There is a causeway over a creek line that crosses the road 1km before the campground. At the time of the Muster, there was a small water hole (5m x 2.5m) east of this causeway. It took two people two hours to erect just under 50m of temporary fencing around this waterhole. Droppers were bent into 'feet' for the area of the fence that extended over a concrete slab that formed part of the causeway. In total, 90 toads (almost all adults), were removed from this site in five nights, mostly adults. The fence was removed in one hour by two people.

**Wilson's Lagoon**

Wilson's Lagoon is located 40kms north of the Rangers station. It is a small remnant pool of Wilson's Creek and at the time of the Muster, it was 50cms deep. This site was an extremely easy site to fence as the edges of the Lagoon were all clear of vegetation. It took four people 2.5 hours to erect 150m of temporary fencing around the Lagoon. Over eight nights, 230 toads were removed from this site. Interestingly, almost double the number of juvenile

toads was found compared with the number of adult female toads. The fence was taken down in 1.5 hours by three people.

**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 400m 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 from this site in 2009. In 2010, 315 toads were removed, almost all adult toads. It was busted for seven nights.

**Little Policemans Waterhole North**
Located 39kms north of Little Policemans Waterhole was another water hole, which was nominally named Little Policemans Waterhole North during the Muster. At the time of the Muster the water hole was approximately 50m long and 50m wide. This water hole had pockets of freshwater mangrove scattered around the edges, but was in general easy to access. This site was hand busted for seven nights, usually by the same group of volunteers who busted Little Policemans Waterhole. 271 toads were removed and similar to Little Policemans Waterhole, were mostly adult toads.

**Ernie's Lagoon**
Located 39km north-east of the Ranger Station, Ernie's Lagoon is part of the Keep River drainage system. At the time of the Muster, it was a series of pools about 3m wide, spanning a 400m stretch. It was 2km off the main track in KRNP, so was accessed by quad bike. Toads were mostly found along the edges of the actual water body, but often had to be retrieved from the roots of the surrounding freshwater mangroves. Due to the difficulty in accessing this site and transporting toads out on quad bikes with limited space, it was only visited three times. 646 toads were removed by hand, which included a mixture of adults and juveniles.

**Pig Trap Wetland**
Pig Trap Wetland is a large spring-fed wetland area 29kms north-east of the Rangers Station, named after the pig trap that is located there to catch feral pigs. At the time of the Muster, the Wetland covered an area 450m wide and 200m long. It provides the perfect habitat for toads due to the large amount of moist ground and plenty of refuge sites. Large amount of wildlife were spotted at this site including numerous water bird species, wallabies and various snake species. Pig Trap Wetland was hand busted for five nights and required all volunteers at the KRNP base camp to cover the large area. 429 toads were removed with only two juveniles being recorded.

**Doogum Bore**
In the north-east of the park is a local Indigenous community called Doogum. Water is supplied to the community via a bore, named Doogum Bore. The bore is located 32kms north-east of the Ranger's Station. At the bore site was a deep lagoon which is spring fed. It was approximately 150m long and 8m wide. There were more pools upstream, but the full extent was not recorded due to difficulty in accessing the site due to dense grass and Pandanus. This site was visited only twice due to the distance it took to get there. 59 toads were removed from the

site, mostly adults. The majority of these toads were collected from burnt open areas around the bore.

**Blue Lilly Lagoon**
Blue Lilly Lagoon is located 36kms north-east of the Rangers Station. It is a deep lagoon located on a dry creek bed. The area of the Lagoon that was easily accessible was 250m long and 10m wide. To the east, the Lagoon was inaccessible due to cliff edges; however the Lagoon was estimated to be a third longer again. In addition, the northern edge was Pandanus lined making this side also difficult to bust. It was also only visited twice at the same time as Doogum Bore as these sites were relatively close together. A total of 60 toads were removed with over 60% of these juvenile.

## 7.3 Lake Argyle Base Camp (located on Newry Station)

The third base camp was at the same site of the 2009 Muster main base camp; next to Matilda Creek, 1km from the shores of Lake Argyle. Base camp was set up over a period of two days by four people. It was a smaller operation than the main base camp and supported between 6-8 people for two weeks of the Muster. It was dismantled in one day by five people.

The main aim for this camp was to remove as many toads as possible from around the Ramsar listed Lake Argyle in the two week timeframe. A total of 10,184 toads were removed from Matilda Creek and the shores of Lake Argyle (See Appendix 2, Table 3 for full details). Even though this camp was the smallest of all three base camps and only operational for 2 out of the 4 weeks of the Muster, volunteers removed the largest number of toads of all three base camps. This is most likely due to the fact that toads have been in the area for nearly two years and have had a chance to breed.

## 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 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 concentrated their efforts not only around the shores of Lake Argyle, but also on removing toads from Matilda Creek.

Toad collection 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, 4153 toads were collected from Matilda Creek, a mixture of adult females (45.5%), adult males (28.8%) and juveniles (25.7%).

**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, making it the largest man made

water structure in the southern hemisphere (http://www.kununurratourism.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. It also supports large populations of freshwater crocodiles, which have been shown to be very sensitive to bufo toxins. From this water system, they can 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 (Bungle Bungles).

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. In total, STTF covered 37kms of the shores on the Lake; 17kms on the northern side of Matilda Creek and 20kms on the southern side.

Over the nine nights of control work, 6031 toads were collected around the shores of the Lake. This was five times the number found in the same areas during the 2009 Muster, showing how toad numbers can quickly increase.

## 7.4 Native wildlife; observations and impacts

An important by-product of the Muster is the opportunity to observe native fauna not only during the day, but at night. Of particular interest is which native species occurs in our study areas, evidence of any dead animals which may be caused by toads and the interactions between native fauna with toads and the fences. From these observations over the past 5 years, it has become very clear that cane toads are decreasing the biodiversity of reptile and amphibian species as they move further west. A couple of very obvious examples that support the expected impacts of toads occurred during this year's Muster.

Firstly, there were numerous King Brown snakes (*Pseudechis australis*) found near the main base camp at Lookout Spring and in Point Spring Nature Reserve. In previous years at base camps further east, there has been only one King Brown seen. Another example is from Keep River National Park. During the 2009 Muster there was a Merten's Water Monitor (*Varanus mertensi*) seen daily in and around Cockatoo Lagoon. This year, at the start of the Muster, a dead Merten's Water Monitor was found near the edge of the Lagoon. It may not be due to the presence of toads, but it is highly likely that it is. Merten's numbers usually decline when there are juvenile toads present in large numbers in an area (Doody, Green, Rhind, Castellano, Sims & Robinson 2009 and Griffiths & McKay 2007). This would have happened between last year's Muster and this year's, corresponding to the presence of the dead Merten's Water Monitor.

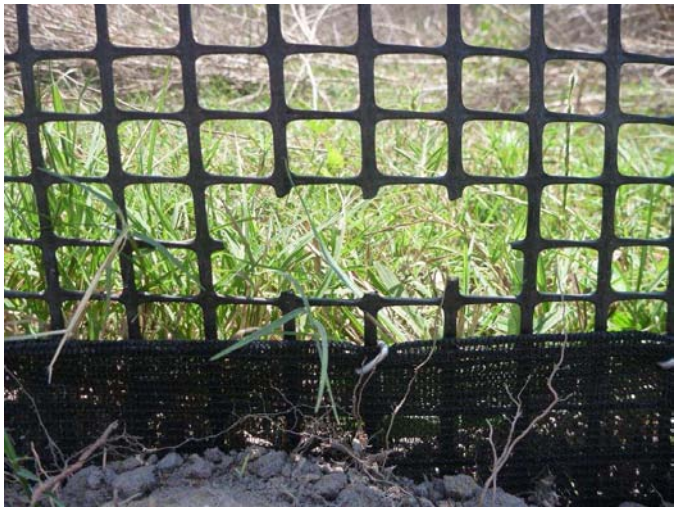
A complete list of fauna observed on all sites at the Muster can be found in Appendix 3, Table 1 and 2.

Another important part of the native fauna observations, is to see how they react to the fences. STTF fences are specifically designed to allow access to water by all animals except adult and juvenile cane toads. The fences 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. The fence at Point Spring Nature Reserve had several modifications made to it during the course of the Muster. These included wallaby 'gates' which allowed wallabies to jump in between two of the fence wires, access points for bandicoots and blue-tongued lizards (larger holes were cut out of the 25mm mesh) and snake 'ropes', coils of rope wrapped around plastic piping that bridge the fence to assist snakes over the fence.

*Snake 'ropes' are placed on the Point Spring fence to assist snakes over the fence.*

Observations during the 2010 Muster consistently demonstrated that these modifications 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 were seen jumping over the fences. The images from the cameras set up at Point Spring Nature Reserve and Keep River National Park will also give a good indication of the interaction with wildlife and the fence.

*Larger holes are cut out of the wildlife gates to allow access for Bandicoots and Blue-tongued Lizards.*



A complete list of fauna observations and their interactions with the two main fences - Point Spring Nature Reserve fence and the Cockatoo Lagoon fence at Keep River National Park - can be found in Appendix 3, Table 3 and 4. The results from the motion detector cameras will also be able to determine how the fences affect native wildlife. Below are some photos captured from the cameras.


*A bandicoot is seen along the fence line at Point Spring Nature Reserve.*


*A cane toad is captured on the outside of Point Spring toad fence.*

# 8 CONCLUSIONS

Over the past five years of Muster activity the STTF has removed 195,000 adult and juvenile cane toads and millions of metamorphs and tadpoles from its areas of operation. The Foundation's activities have also hugely increased the public awareness of the cane toad issue in northern Australia and encouraged many people to participate in their control.

As cane toads have advanced further west, the tools and methods the Foundation has to control toads have also developed. When the Muster began in 2006, toads were collected by hand only. Exclusion fences were developed at the 2007 Muster and trialled on a broad basis during the 2008 Muster. These temporary fences were a breakthrough in toad control and tripled the efforts achieved by hand collection alone. During the 2009 Muster, the temporary fences were used in a National Park in the NT for the first time. Their success at toad eradication was clear as evidenced by Parks and Wildlife NT management welcoming STTF back to use fences during the 2010 Muster.

2010 was the first year that toads arrived in large numbers in Western Australia. It was also the first time that STTF used the exclusion fence design to create a permanent fence to protect a nature reserve from cane toads. This project was done in conjunction with DEC and is the first trial of a cane toad exclusion zone in Western Australia, one of the action items in the Western Australian State Cane Toad Strategy. The success of this project will be determined in the future through monitoring and management by DEC.

Although it has not been possible to stop cane toads from moving further west into The Kimberley (and south into NSW), STTF have shown is is possible to reduce their numbers significantly at given times of the year and even stop them from entering specific areas. The Muster also demonstrates the fact that there is strong community support across Australia to protect the nation's biodiversity from this invasive species.

STTF will continue to work with DEC to determine if there are any other sites in Western Australia where toad exclusion zones can be created with the use of permanent exclusion fencing, as per Action 18 and 26 of the State Cane Toad Strategy. These actions will also support the objectives stated in the Federal Government's Threat Abatement Plan for cane toads.

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# 10 APPENDIX 1 – How to make your property toad proof

If you already have a fence surrounding your property, it is easy to make it toad proof to protect your pets and native wildlife. Smaller fences can also be used within your property to keep toads out of specific areas such as swimming pools and BBQ areas.

You will need the following tools;

- Jambro Fencing Fastener guns – cartridge filled
- Jambro fasteners (c clips)
- 50 metre x 1 metre high density shade cloth rolls
- 25mm x 25mm gutter guard in 50 metre x 1 metre rolls
- Tin snips
- Sewing/Fabrication scissors
- 6mm thick black rubber strips
- Wooden clothes pegs

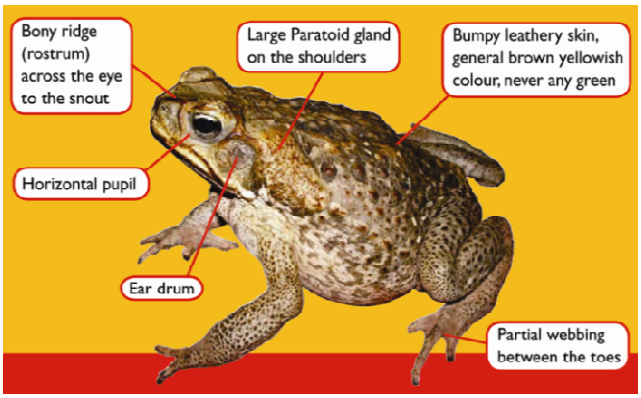
Then simply follow these 10 steps;

1. Firstly, make sure your existing fence line is clear of vegetation and has a suitable fire break on either side.
2. Roll out shade cloth rolls along the outside of the fence line (outside your property).
3. Attach shade cloth using Jambro gun and c clips to pre-existing fence line. Make sure you use the wire strand that stands the closest to knee height or about 50cms. If there is another strand of wire that runs along the ground, attach shade cloth to this wire as well. Note: the shade cloth should be tied off at commencement end so that some tension can be applied as it is fastened.
4. The remaining 50cms of shade cloth needs to lie flat along the ground facing away from the fence. (When fence is completed and in situ it will resemble an L shape when viewed along its axis).
5. Most native wildlife such as goannas, snakes and frogs can move over the shade cloth fence, but if you are concerned about their movements, it is recommended that 'wildlife gates' be inserted into the fence. These should be made out of gutter guard or something similar with a 25mm x 25mm mesh size (this size blocks adult toads, but not native frogs). Cut the gutter guard in 20cm strips x 1m using tin snips.
6. Depending upon supply of gutter guard, a 1 metre long section is placed every 25m along the fence at ground level. It is, however, recommended that impacts on wildlife should be monitored and extra sections of wildlife gate be placed into the fence panels if deemed necessary. This can be attached using Jambro fasteners and c clips every 5-7 cm or alternatively using light tie wire to attach the gate to the shade cloth.
7. The scissors are used to cut out the section of shade cloth 'behind' the wildlife gate thus opening the gate. Cut only the two sides and bottom on the shade cloth. Roll up the shade cloth and peg it to the top of the gate. If smaller toads are found on your property, you can roll down the shade cloth to block them from entering your property.
8. The bottom skirt is then 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.
9. For any access points to your property such as entry/exit gates, 6mm thick black rubber strips can be attached to the bottom of your gates. The black rubber should be flexible enough to move with the gate, but strong enough to seal any gaps in the bottom of the fence.
10. Monitor your fence for any required maintenance and upkeep.

## Monitoring your fence for toads and other wildlife

It is important that you monitor your fence (daily if possible) for toads and other wildlife. This will help you determine a) how many toads you have surrounding your property, b) if the fence is working to keep toads out and c) if the fence is affecting native wildlife in any way. If you aren't sure what a toad looks like, please see diagram below. Make sure you don't confuse it with any native species such as the Giant Frog (*Cyclorana australis*) pictured next to the cane toad. If you find any other animals impacted by the fence you may need to insert more wildlife gates or consider other designs of toad control.

An adult cane toad




A Giant Frog

## Removing and disposing of toads

Toads come out at night time, so a walk around your fence (and inside the fence) an hour after dark will ensure you encounter local toads. It is recommended, but not required, to wear gloves when picking up toads. The glands behind their head are where their toxin is released from if the animal is stressed. Just by picking toads up, they will generally not release their poison, but be sure to wash your hands after touching toads to be safe. Collect toads in a heavy duty plastic bag and place them in the freezer or de-capitate them. They can then be buried.

# 11 APPENDIX 2 – Breakdown of results

## Table 1- Lookout Spring base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| Lookout Springs Soak S15°21'09.1'', E128°50'34.5'' | 11/09/2010 | 18 | 50 | 0 | 68 |
| | 12/09/2010 | 8 | 3 | 0 | 11 |
| | 13/09/2010 | 5 | 9 | 0 | 14 |
| | 14/09/2010 | 0 | 2 | 0 | 2 |
| | 15/09/2010 | 1 | 0 | 0 | 1 |
| | 16/09/2010 | 0 | 3 | 0 | 3 |
| | 19/09/2010 | 0 | 0 | 0 | 0 |
| | 20/09/2010 | 0 | 2 | 0 | 2 |
| | 24/09/2010 | 2 | 3 | 0 | 5 |
| | 26/09/2010 | 0 | 2 | 0 | 2 |
| | 27/09/2010 | 0 | 1 | 0 | 1 |
| | 29/09/2010 | 3 | 4 | 0 | 7 |
| | 30/09/2010 | 2 | 0 | 0 | 2 |
| | 1/10/2010 | 1 | 1 | 0 | 2 |
| | 8/10/2010 | 2 | 3 | 0 | 5 |
| | 9/10/2010 | 4 | 1 | 0 | 5 |
| | | **46** | **84** | **0** | **130** |
| | | | | | |
| Lookout Springs Billabong S15°21'13.6'', E128°50'41.9'' | 11/09/2010 | 7 | 4 | 0 | 11 |
| | 12/09/2010 | 13 | 6 | 0 | 19 |
| | 13/09/2010 | 12 | 3 | 0 | 15 |
| | 14/09/2010 | 7 | 5 | 0 | 12 |
| | 15/09/2010 | 0 | 1 | 0 | 1 |
| | 16/09/2010 | 2 | 4 | 0 | 6 |
| | 19/09/2010 | 0 | 0 | 0 | 0 |
| | 20/09/2010 | 0 | 0 | 0 | 0 |
| Lookout Springs Billabong S15°21'41.0'', E128°50'32.9'' | 6/10/2010 | 36 | 17 | 0 | 53 |
| | 7/10/2010 | 9 | 6 | 0 | 15 |
| | 8/10/2010 | 7 | 8 | 0 | 15 |
| | 9/10/2010 | 8 | 10 | 0 | 18 |
| | | **101** | **64** | **0** | **165** |

## Table 1 continued - Lookout Spring base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| Point Spring Nature Reserve | 11/09/2010 | 9 | 15 | 0 | 24 |
| S15°24'30'', E128°53'10.0'' | 12/09/2010 | 9 | 1 | 0 | 10 |
| | 13/09/2010 | 0 | 4 | 0 | 4 |
| | 14/09/2010 | 0 | 1 | 0 | 1 |
| All toads removed from | 15/09/2010 | 1 | 2 | 0 | 3 |
| inside fence prior to 26/09/10 | 18/09/2010 | 0 | 1 | 0 | 1 |
| | 19/09/2010 | 0 | 2 | 0 | 2 |
| | 22/09/2010 | 1 | 0 | 0 | 1 |
| | 23/09/2010 | 3 | 1 | 0 | 4 |
| | 24/09/2010 | 4 | 2 | 0 | 6 |
| FENCE COMPLETE-Outside | 26/09/2010 | 5 | 4 | 0 | 9 |
| Outside | 27/09/2010 | 2 | 2 | 0 | 4 |
| Inside | 28/09/2010 | 15 | 27 | 0 | 42 |
| Inside | 29/09/2010 | 9 | 8 | 0 | 17 |
| All toads removed from | 30/09/2010 | 5 | 0 | 0 | 5 |
| outside fence after 30/09/10 | 1/10/2010 | 6 | 0 | 0 | 6 |
| | 4/10/2010 | 0 | 1 | 0 | 1 |
| | 6/10/2010 | 3 | 1 | 0 | 4 |
| | 7/10/2010 | 0 | 1 | 0 | 1 |
| | 8/10/2010 | 0 | 2 | 0 | 2 |
| | 9/10/2010 | 0 | 1 | 0 | 1 |
| | | **72** | **76** | **0** | **148** |
| | | | | | |
| Point Springs Nature Reserve | 15/09/2010 | 16 | 0 | 1 | 17 |
| Billabong | 16/09/2010 | 19 | 2 | 0 | 21 |
| S15°24'29.9'', E128°53'44.8'' | 17/09/2010 | 8 | 3 | 0 | 11 |
| | 19/09/2010 | 2 | 0 | 1 | 3 |
| | 27/09/2010 | 0 | 1 | 0 | 1 |
| | 6/10/2010 | 16 | 5 | 1 | 22 |
| | 7/10/2010 | 2 | 0 | 0 | 2 |
| | 8/10/2010 | 2 | 2 | 0 | 4 |
| | 9/10/2010 | 2 | 1 | 0 | 3 |
| | | **67** | **14** | **3** | **84** |

## Table 1 continued - Lookout Spring base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| Brolga Dam S 15°23'02.2'', E 128°56'55.3'' | 14/09/2010 | 44 | 18 | 0 | 62 |
| | 15/09/2010 | 19 | 12 | 0 | 31 |
| | 16/09/2010 | 34 | 8 | 0 | 42 |
| | 17/09/2010 | 3 | 1 | 0 | 4 |
| | 19/10/2010 | 2 | 1 | 0 | 3 |
| | 20/10/2010 | 2 | 6 | 0 | 8 |
| | 21/10/2010 | 3 | 1 | 0 | 4 |
| | 22/10/2010 | 0 | 0 | 0 | 0 |
| | 24/10/2010 | 0 | 1 | 0 | 1 |
| | 26/10/2010 | 4 | 2 | 0 | 6 |
| | 27/10/2010 | 0 | 3 | 1 | 4 |
| | 30/10/2010 | 3 | 3 | 0 | 6 |
| | 1/10/2010 | 4 | 3 | 0 | 7 |
| | | **118** | **59** | **1** | **178** |
| | | | | | |
| Yard Creek S15°23'01.2'', E128°57'05.1'' | 14/09/2010 | 175 | 162 | 3 | 340 |
| | 15/09/2010 | 148 | 141 | 14 | 303 |
| | 16/09/2010 | 99 | 115 | 3 | 217 |
| | 17/09/2010 | 39 | 47 | 0 | 86 |
| | 19/10/2010 | 37 | 36 | 3 | 76 |
| | 20/10/2010 | 14 | 23 | 3 | 40 |
| | 21/10/2010 | 15 | 22 | 12 | 49 |
| | 22/10/2010 | 18 | 14 | 0 | 32 |
| | 24/10/2010 | 15 | 21 | 2 | 38 |
| | 26/10/2010 | 12 | 29 | 6 | 47 |
| | 27/10/2010 | 17 | 22 | 2 | 41 |
| | 30/10/2010 | 5 | 5 | 5 | 15 |
| | 1/10/2010 | 2 | 5 | 5 | 12 |
| | | **596** | **642** | **58** | **1296** |
| | | | | | |
| Metamorph Dam S15°17'48.0'', E128°57'25.4'' | 19/09/2010 | 52 | 32 | 0 | 84 |
| | 20/09/2010 | 34 | 19 | 4 | 57 |
| | 21/09/2010 | 16 | 9 | 0 | 25 |
| | 22/09/2010 | 13 | 10 | 4 | 27 |
| | 26/09/2010 | 13 | 11 | 7 | 31 |
| | 27/09/2010 | 6 | 4 | 2 | 12 |
| | 30/09/2010 | 15 | 1 | 2 | 18 |
| | 1/10/2010 | 7 | 5 | 1 | 13 |
| | | **156** | **91** | **20** | **267** |

## Table 1 continued - Lookout Spring base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| Gap Road Springs S15°16'25.0'', E128°57'00.7'' | 19/09/2010 | 18 | 13 | 0 | 31 |
| | 20/09/2010 | 3 | 2 | 2 | 7 |
| | 21/09/2010 | 1 | 2 | 6 | 9 |
| | 22/09/2010 | 5 | 2 | 1 | 8 |
| | 26/09/2010 | 7 | 4 | 5 | 16 |
| | 27/09/2010 | 4 | 6 | 0 | 10 |
| | 30/09/2010 | 6 | 1 | 2 | 9 |
| | 1/10/2010 | 2 | 0 | 0 | 2 |
| | | **46** | **30** | **16** | **92** |
| | | | | | |
| T1 S15°26'30.8'', E128°57'46.4'' | 23/09/2010 | 3 | 3 | 0 | 6 |
| | 24/09/2010 | 0 | 4 | 0 | 4 |
| | 26/09/2010 | 0 | 0 | 0 | 0 |
| | 27/09/2010 | 0 | 0 | 0 | 0 |
| | 30/09/2010 | 0 | 0 | 0 | 0 |
| | | **3** | **7** | **0** | **10** |
| | | | | | |
| T2 S15°27'29.2'', E128°57'55.9'' | 23/09/2010 | 8 | 3 | 0 | 11 |
| | 24/09/2010 | 14 | 9 | 0 | 23 |
| | 26/09/2010 | 14 | 7 | 0 | 21 |
| | 27/09/2010 | 9 | 6 | 0 | 15 |
| | 30/09/2010 | 2 | 1 | 2 | 5 |
| | | **47** | **26** | **2** | **75** |
| | | | | | |
| Milligan's Lagoon S15°37'31.0'', E129°00'24.3'' | 3/10/2010 | 111 | 93 | 6 | 210 |
| | 4/10/2010 | 68 | 60 | 3 | 131 |
| | 5/10/2010 | 23 | 16 | 0 | 39 |
| | | **202** | **169** | **9** | **380** |

## Table 1 continued - Lookout Spring base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| Jabiru S15°23'16.7'', E128°49'22.8'' | 6/10/2010 | 39 | 13 | 8 | 60 |
| | 7/10/2010 | 13 | 6 | 0 | 19 |
| | 8/10/2010 | 20 | 14 | 40 | 74 |
| | 9/10/2010 | 7 | 4 | 1 | 12 |
| | | **79** | **37** | **49** | **165** |
| | | | | | |
| Limestone S15°22'58.3'', E128°44'03.4'' | 6/10/2010 | 28 | 21 | 0 | 49 |
| | 7/10/2010 | 18 | 29 | 0 | 47 |
| | 8/10/2010 | 16 | 17 | 0 | 33 |
| | 9/10/2010 | 13 | 27 | 8 | 48 |
| | | **75** | **94** | **8** | **177** |
| | | | | | |
| 8 Mile S15°19'01.2'', E128°38'38.3'' | 6/10/2010 | 6 | 1 | 0 | 7 |
| | 7/10/2010 | 4 | 3 | 0 | 7 |
| | 8/10/2010 | 4 | 6 | 0 | 10 |
| | 9/10/2010 | 5 | 4 | 1 | 10 |
| | | **19** | **14** | **1** | **34** |
| | | | | | |
| **TOTAL** | | **1627** | **1407** | **167** | **3201** |
| | % total | 50.82786629 | 43.9550141 | 5.21711965 | |
| | | | | **TOTAL** | **3201** |

## Table 2- Keep River National Park base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| Cockatoo Lagoon | 14/09/2010 | 685 | 370 | 273 | 1328 |
| S15° 58'09.1'', E129°02'26.8'' | 15/09/2010 | 366 | 235 | 161 | 762 |
| | 16/09/2010 | 559 | 366 | 164 | 1089 |
| | 17/09/2010 | 211 | 228 | 147 | 586 |
| | 18/09/2010 | 264 | 323 | 131 | 718 |
| | 19/09/2010 | 57 | 92 | 29 | 178 |
| | 20/09/2010 | 5 | 5 | 2 | 12 |
| | 21/09/2010 | 22 | 38 | 17 | 77 |
| | 22/09/2010 | 15 | 17 | 27 | 59 |
| | 23/09/2010 | 25 | 31 | 39 | 95 |
| | 27/09/2010 | 20 | 35 | 86 | 141 |
| | 28/09/2010 | 10 | 18 | 17 | 45 |
| | 29/09/2010 | 18 | 23 | 6 | 47 |
| | 30/09/2010 | 0 | 3 | 3 | 6 |
| | 1/10/2010 | 2 | 1 | 2 | 5 |
| | 3/10/2010 | 1 | 4 | 2 | 7 |
| | 4/10/2010 | 2 | 3 | 1 | 6 |
| | 5/10/2010 | 1 | 1 | 1 | 3 |
| | **TOTAL** | **2263** | **1793** | **1108** | **5164** |
| | | | | | |
| Gurrandalng Campground | 29/09/2010 | 18 | 11 | 1 | 30 |
| S15°52'42.4'', E129°03'25.9'' | 30/09/2010 | 7 | 8 | 2 | 17 |
| | 1/10/2010 | 9 | 17 | 0 | 26 |
| | 3/10/2010 | 14 | | | 14 |
| | 6/10/2010 | 2 | 1 | 0 | 3 |
| | **TOTAL** | **50** | **37** | **3** | **90** |
| | | | | | |
| Wilsons Lagoon | 18/09/2010 | 45 | | | 45 |
| S15°47'39.1'', E129°06'28.6'' | 19/09/2010 | 26 | 12 | 5 | 43 |
| | 20/09/2010 | 16 | 3 | 4 | 23 |
| | 22/09/2010 | 8 | 2 | 3 | 13 |
| | 23/09/2010 | 7 | 9 | 21 | 37 |
| | 29/09/2010 | 5 | 7 | 26 | 38 |
| | 3/10/2010 | 2 | 2 | 14 | 18 |
| | 6/10/2010 | 7 | 5 | 1 | 13 |
| | **TOTAL** | **116** | **40** | **74** | **230** |

## Table 2 continued - Keep River National Park base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| Little Policemans Waterhole | 18/09/2010 | 52 | 28 | 2 | 82 |
| S15°46'43.7'', E129°06'21.4'' | 19/09/2010 | 29 | 23 | 0 | 52 |
| | 20/09/2010 | 22 | 17 | 0 | 39 |
| | 22/09/2010 | 15 | 9 | 0 | 24 |
| | 23/09/2010 | 13 | 10 | 0 | 23 |
| | 29/09/2010 | 25 | 17 | 0 | 42 |
| | 6/10/2010 | 27 | 21 | 5 | 53 |
| | **TOTAL** | **183** | **125** | **7** | **315** |
| | | | | | |
| Little Policemans Waterhole | 19/09/2010 | 67 | 34 | 0 | 101 |
| North | 20/09/2010 | 24 | 13 | 0 | 37 |
| S15°46'14.2'', E129°06'18.4'' | 22/09/2010 | 10 | 5 | 1 | 16 |
| | 23/09/2010 | 18 | 14 | 0 | 32 |
| | 29/09/2010 | 20 | 6 | 0 | 26 |
| | 30/09/2010 | 7 | 6 | 0 | 13 |
| | 6/10/2010 | 31 | 13 | 2 | 46 |
| | **TOTAL** | **177** | **91** | **3** | **271** |
| | | | | | |
| Ernie's Lagoon | 1/10/2010 | 161 | 109 | 81 | 351 |
| S15°45'23.5'', E129°07'51.3'' | 3/10/2010 | 67 | 71 | 36 | 174 |
| | 6/10/2010 | 69 | 44 | 38 | 151 |
| | **TOTAL** | **297** | **224** | **155** | **676** |
| | | | | | |
| Pig trap wetland | 21/09/2010 | 50 | 45 | 0 | 95 |
| S15°43'11.4'', E129°06'54.9'' | 28/09/2010 | 100 | 87 | 1 | 188 |
| | 30/09/2010 | 42 | 40 | 0 | 82 |
| | 1/10/2010 | 22 | 16 | 1 | 39 |
| | 3/10/2010 | 16 | 9 | 0 | 25 |
| | **TOTAL** | **230** | **197** | **2** | **429** |

## Table 2 continued - Keep River National Park base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| Doogum Bore | 4/10/2010 | 21 | 19 | 4 | 44 |
| S15°42'53.4'', E129°10'20.4'' | 5/10/2010 | 5 | 10 | 0 | 15 |
| | **TOTAL** | **26** | **29** | **4** | **59** |
| | | | | | |
| Blue Lilly Lagoon | 4/10/2010 | 10 | 12 | 34 | 56 |
| S15°40'03.9'', E129°10'05.5'' | 5/10/2010 | 1 | 0 | 3 | 4 |
| | **TOTAL** | **11** | **12** | **37** | **60** |
| **TOTAL** | | 3353 | 2548 | 1393 | **7294** |

## Table 3- Lake Argyle base camp

| Site name & GPS coordinates | Date | No. males | No. females | No. juveniles | TOTAL |
|---|---|---|---|---|---|
| | | | | | |
| Lake Argyle North | 16/09/2010 | 84 | 134 | 25 | 243 |
| S16°10', E128°55' | 17/09/2010 | 159 | 269 | 143 | 571 |
| | 18/09/2010 | 105 | 230 | 91 | 426 |
| | 26/09/2010 | 29 | 93 | 49 | 171 |
| | 27/09/2010 | 389 | 547 | 391 | 1327 |
| | | | | | |
| | | **766** | **1273** | **699** | **2738** |
| | | | | | |
| Lake Argyle South | 17/09/2010 | 80 | 129 | 22 | 231 |
| S16°14', E128°55' | 18/09/2010 | 152 | 242 | 77 | 471 |
| | 19/09/2010 | 213 | 349 | 95 | 657 |
| | 20/09/2010 | 171 | 339 | 195 | 705 |
| | 21/09/2010 | 204 | 464 | 189 | 857 |
| | 22/09/2010 | 114 | 175 | 83 | 372 |
| | | | | | |
| | | **934** | **1698** | **661** | **3293** |
| | | | | | |
| Matilda Creek | 16/09/2010 | 62 | 63 | 32 | 157 |
| S16°0'05'', E128°59'32'' | 22/09/2010 | 84 | 129 | 137 | 350 |
| | 23/09/2010 | 196 | 248 | 170 | 614 |
| | 24/09/2010 | 189 | 266 | 125 | 580 |
| | 28/09/2010 | 374 | 729 | 277 | 1380 |
| | 29/09/2010 | 243 | 361 | 291 | 895 |
| | 30/09/2010 | 47 | 96 | 34 | 177 |
| | | | | | |
| | | **1195** | **1892** | **1066** | **4153** |
| **TOTAL** | | **2895** | **4863** | **2426** | **10184** |

## Table 4- Metamorphs and tadpoles collected across all sites

| Site name & GPS coordinates | Date | Metamorphs (kgs) | Tadpoles (kgs) | Notes |
|---|---|---|---|---|
| | | | | |
| Lookout Springs Billabong S15°21'13.6'', E128°50'41.9'' | 11/09/2010 | | 0.06 | |
| | 13/09/2010 | | 0.078 | |
| | 14/09/2010 | 0.06 | 0.138 | |
| | 15/09/2010 | 0.015 | 0.6 | 1hr Rain at night |
| | 16/09/2010 | | 0.039 | |
| | 17/09/2010 | | 0.018 | |
| | 26/09/2010 | | 0.04 | |
| | 27/09/2010 | | 0.017 | Short rain shower |
| | 28/09/2010 | | 0.04 | |
| | 29/09/2010 | | 0.231 | |
| | 30/09/2010 | | 0.04 | Big storm at night |
| Lookout Springs Billabong Jims waterhole | 1/10/2010 | | 1.75 | |
| | 3/10/2010 | 0.3 | 0.2 | |
| | 4/10/2010 | 0.05 | 0.53 | Rain during night |
| | 5/10/2010 | 0.12 | 0.37 | 9 x egg strings found |
| | 6/10/2010 | 1.16 | 2 | |
| | 7/10/2010 | 0.21 | 2.7 | |
| | 8/10/2010 | 0.03 | 1.5 | |
| | | **1.945** | **10.351** | |
| | | | | |
| Yard Creek S15°23'01.2'', E128°57'05.1'' | 30/09/2010 | 0.03 | | Big storm at night |
| | 1/10/2010 | 0.003 | | |
| | | **0.033** | **0** | |
| | | | | |
| Metamorph Dam S15°17'48.0'', E128°57'25.4'' | 20/09/2010 | 0.321 | | |
| | 21/09/2010 | 0.427 | | |
| | 22/09/2010 | 8 | | |
| | 27/09/2010 | 4 | | Short rain shower |
| | 29/09/2010 | 2 | | |
| | 30/09/2010 | 1 | | 1 x egg string found |
| | | **15.748** | **0** | Big storm at night |

## Table 4 continued - Metamorphs and tadpoles collected across all sites

| Site name & GPS coordinates | Date | Metamorphs (kgs) | Tadpoles (kgs) | Notes |
|---|---|---|---|---|
| 8 Mile S15°19'01.2'', E128°38'38.3'' | 6/10/2010 | 0.002 | | |
| | | **0.002** | **0** | |
| | | | | |
| **TOTAL** | | **17.728** | **10.351** | **10 x egg strings** |
| Equivalent in actual numbers | (1kg=33,333) | 590927.424 | 345029.883 | 350000 |
| | 1 egg event= | | | |
| | 35,000 eggs | | | |

# 12 APPENDIX 3 – Native fauna observations and impacts

## Table 1- Complete list of reptile, amphibian and mammals observed during the 2010 Muster

| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| **REPTILES** | |
| Gilberts Dragon | *Gemmatophora gilberti* |
| Two Lined Dragon | *Diporiphora bilineata* |
| Dragon sp (no common name) | *Diporiphora magna* |
| Frill-necked Lizard | *Chlamydosaurus kingii* |
| Merten's Water Monitor | *Varanus mertensi* |
| Mitchell's Water Monitor | *Varanus mitchelli* |
| Yellow spotted Monitor | *Varanus panoptes* |
| Sand Monitor | *Varanus gouldii* |
| Estuarine Crocodile | *Crocodylus porosus* |
| Freshwater Crocodile | *Crocodylus johnstoni* |
| Olive Python | *Liasis olivaceus* |
| Black-headed Python | *Aspidites melanocephalus* |
| Water Python | *Liasis fuscus* |
| Childrens Python | *Antaresia maculosus* |
| Keelback Snake | *Tropidonophis mairii* |
| Common tree snake | *Dendrelaphis punctulatus* |
| Northern death adder | *Acanthophis praelongus* |
| King Brown Snake | *Pseudechis australis* |
| Greater Black Whipsnake | *Demansia papuensis* |
| Orange naped snake | *Furina Ornata* |
| Eastern brown snake | *Psuedonaja textilis* |
| Brown tree snake | *Boiga irregularis* |
| Northern shovel nose snake | *Brachyurophis roperi* |
| Northern long neck turtle | *Chelodina rugosa* |
| Northwest red faced turtle | *Emydura australis* |
| Northern red faced turtle | *Emydura victoria* |
| Gecko sp (no common name) | *Gehyra australis* |
| Gecko sp (no common name) | *Gehyra nana* |
| Bynoe's gecko | *Heteronotia binoei* |
| Northern spiny-tailed gecko | *Strophurus ciliaris* |
| Burton’s legless lizard | *Lialis burtonis* |
| Fence skink | *Cryptoblepharus plagiocephalus* |
| Skink sp (no common name) | *Cryptoblepharus megastictus* |
| Northern Blue tongue | *Tiliqua scincoides* |

## Table 1 continued–Complete list of Reptile, Amphibian and Mammals observed during the Muster 2010

| COMMON NAME | SCIENTIFIC NAME |
|---|---|
| **AMPHIBIANS** | |
| Green Tree Frog | *Litoria caerulea* |
| Peter's Frog | *Litoria inermis* |
| Rockhole Frog | *Litoria meiriana* |
| Striped Rocket Frog | *Litoria nasuta* |
| Roth's Tree Frog | *Litoria rothi* |
| Black shined Rocket Frog | *Litoria tornieri* |
| Rock Frog | *Litoria coplandi* |
| Ornate burrowing Frog | *Platyplectrum ornatum* |
| Long footed Frog | *Cyclorana longipes* |
| Flat-headed Frog | *Limnodynastes depressus* |
| Giant Burrowing Frog | *Cyclorana australis* |
| Desert Frog | *Crinia deserticola* |
| Desert Tree Frog | *Litoria rubella* |
| Northern Dwarf Tree Frog | *Litoria bicolor* |
| Wailing Frog | *Cyclorana vagitus* |
| Ornate Burrowing Frog | *Opisthodon ornatus* |
| **MAMMALS** | |
| Agile wallaby | *Macropus agilis* |
| Northern Nail-Tail Wallaby | *Onychogalea unguifera* |
| Dingo | *Canis lupis dingo* |
| Black Flying Fox | *Pteropus alecto* |
| Orange Leaf-nosed Bat | *Rhinonicteris aurantius* |
| Northern Cave Bat | *Vespadelus caurinus* |

## Table 2- Bird list for Carlton Hill Station (CH) and Keep River National Park (KRNP) (X indicates species was present)

| Bird name | CH | KRNP | Bird name | CH | KRNP |
|---|---|---|---|---|---|
| Emu | X | | Galah | X | X |
| Brown Quail | X | | Little Corella | X | X |
| Plumed Whistling Duck | | X | Sulphur-crested Cockatoo | X | |
| Magpie Goose | | X | Rainbow Lorikeet | X | X |
| Rajah Shelduck | X | | Varied Lorikeet | X | |
| Pacific Black Duck | | X | Red-winged Parrot | X | X |
| Darter | | X | Cockatiel | X | |
| Pied Cormorant | | X | Northern Rosella | X | |
| Little Black Cormorant | X | | Pheasant Coucal | X | X |
| Little Pied Cormorant | | X | Australian Owlet-nightjar | | X |
| Black-necked Stork | X | X | Barking Owl | X | |
| Australian Pelican | | X | Southern Boobook | X | |
| White-necked Heron | X | X | Tawny Frogmouth | X | X |
| White-faced Heron | X | X | Spotted Nightjar | X | |
| Little Egret | X | X | Blue-winged Kookaburra | X | X |
| Intermediate Egret | X | X | Sacred Kingfisher | | X |
| Nankeen Night Heron | | X | Rainbow Bee-eater | X | X |
| Striated Heron | X | | Dollarbird | | X |
| Glossy Ibis | | X | Red-backed Fairywren | X | |
| Straw-necked Ibis | | X | Striated Pardalote | | X |
| Australian White Ibis | | X | Weebill | X | |
| Royal Spoonbill | | X | Little Friarbird | X | X |
| Black Kite | X | X | Silver-crowned Friarbird | X | X |
| Whistling Kite | X | X | White-throated Gerygone | | X |
| Black-breasted Buzzard | X | X | Blue-faced Honeyeater | X | X |
| Collared Sparrowhawk | X | X | Yellow-throated Miner | X | |
| Brown Goshawk | X | X | White-gaped Honeyeater | X | X |
| Wedge-tailed Eagle | X | | White-lined Honeyeater | X | |
| Brown Falcon | X | X | Yellow-tinted Honeyeater | | X |
| Brolga | X | X | White-throated Honeyeater | X | X |
| Purple Swamphen | X | X | Bar-breasted Honeyeater | X | |
| Bustard | X | | Rufous-throated Honeyeater | | X |
| Sharp-tailed Sandpiper | X | | Banded Honeyeater | X | |
| Black-tailed Godwit | X | | Dusky Honeyeater | | X |
| Black-winged Stilt | X | | Brown Honeyeater | X | X |
| Black-fronted Dotterel | X | X | Grey-fronted Honeyeater | | X |
| Bush Stone-curlew | | X | Black-chinned Honeyeater | | X |
| Masked Lapwing | X | X | Jacky Winter | | X |
| Australian Pratincole | X | X | Grey-crowned Babbler | | X |
| Diamond Dove | X | X | Rufous Whistler | X | X |

## Table 2 continued - Bird list for Carlton Hill Station (CH) and Keep River National Park (KRNP) (X indicates species was present)

| Bird name | CH | KRNP | Bird name | CH | KRNP |
|---|---|---|---|---|---|
| Peaceful Dove | X | X | Grey Shrike Thrush | X | X |
| Bar-shouldered Dove | X | X | Restless Flycatcher | X | X |
| Crested Pigeon | X | X | Willie Wagtail | X | X |
| Spinifex Pigeon | | X | Northern Fantail | X | X |
| White-quilled Rock-Pigeon | | X | Black-faced Cuckoo-Shrike | X | X |
| Red-tailed Black Cockatoo | X | X | White-bellied Cuckoo-Shrike | X | X |
| White-winged Triller | X | X | Great Bowerbird | X | X |
| Olive-backed Oriole | | X | Richard's Pipit | X | |
| White-breasted Woodswallow | | X | Double-barred finch | X | X |
| Black-faced Woodswallow | | X | Masked finch | | X |
| Grey Butcherbird | X | | Long-Tailed finch | | X |
| Pied Butcherbird | X | | Crimson finch | X | |
| Magpie-Lark | X | X | Gouldian finch | | X |
| Magpie | X | | Mistletoebird | X | |
| Torresian Crow | X | X | Tree Martin | | X |
| Azure Kingfisher | X | | Koel | X | |
| Channel-billed Cuckoo | X | | | | |

## Table 3- Fauna interactions with the fences at Point Spring Nature Reserve

| | | |
|---|---|---|
| 12/09/2010 | No fence as yet | 1 x small Keelback snake spotted near water in the centre of the reserve near the 5 cane toads that were removed. |
| | | 1 x 6ft King Brown snake and 1 x Whip snake in western part of reserve. Feral cat seen on track near reserve. |
| | | |
| 13/09/2010 | First 100m installed | 1 x Whip snake on outside of fenced area, 6 x Whip snakes in |
| | | central part of reserve in good health. |
| | | |
| 14/09/2010 | 20% complete | 1 x Olive python, 1 x water python, 2 x black Whip snakes, 2 x |
| | | Keelback snakes found inside reserve. Remains of a fruit bat |
| | | found within reserve. |
| | | |
| 15/09/2010 | 20% complete | Numerous insects such as grasshoppers seen resting on the |
| | | fence. |
| | | |
| 16/09/2010 | 30% complete | 1 x common tree snake seen on top of fence. |
| | | |
| 19/09/2010 | 50% complete | 1 x Green Tree frog seen sitting on top of fence. |
| | | |
| 22/09/2010 | 75% complete | 1 x Large water python on top fence. |
| | | |
| 23/09/2010 | 90% complete | Agile Wallabies seen jumping over fence, some more cautious |
| | | than others. |
| | | |
| 24/09/2010 | 100% complete | 1 x gecko seen on top of fence. |
| | | |
| 26/09/2010 | 100% complete | Repaired Wallaby damage to some areas of fence. |
| | | |
| 27/09/2010 | 100% complete | Modify cattle fence to create 'gates' for wallabies. |
| | | 1 x Olive python trying unsuccessfully to get through fence. |
| | | |
| 28/09/2010 | 100% complete | 1 x Northern Blue Tongue seen walking along outside of fence. 2 x Green Tree Frogs seen climbing fence. |
| | | Modify fence to create access points for Blue Tongues, snakes |
| | | and Bandicoots. |
| | | |
| 29/09/2010 | 100% complete | 2 x native frogs seen climbing through wildlife gates. |

## Table 3 continued - Fauna interactions with the fences at Point Spring Nature Reserve

| DATE | FENCE PROGRESS | FAUNA OBSERVATIONS |
|---|---|---|
| 30/09/2010 | 100% complete | Insert snake ropes |
| | | |
| 1/10/2010 | 100% complete | 2 x pythons- 1 inside and 1 outside fence, 3 whip snakes- 1 outside and 2 inside fence, 2 x bandicoots- 1 outside and |
| | | 1 inside fence. |
| | | |
| 6/10/2010 | 100% complete | Green Tree Frog seen climbing over fence. |
| | | |
| 7/10/2010 | 100% complete | Bandicoot seen inside the fenced area. |
| | | |
| 8/10/2010 | 100% complete | Bandicoot seen inside the fenced area. |
| | | |

## Table 4- Fauna interactions with the fences at Cockatoo Lagoon

| DATE | FENCE PROGRESS | FAUNA OBSERVATIONS |
|---|---|---|
| | | |
| 14/09/2010 | 30% complete | Many species of native frogs, including Peter's Frogs found |
| | | around the Lagoon. |
| | | |
| 15/09/2010 | 50% complete | Spinifex Pigeons walking up to fence, but not flying over. |
| | | They seemed unsure about the fence. |
| | | |
| 16/09/2010 | 80% complete | Cormorant was spotted hunting on the lagoon. It captured |
| | | something (hard to determine what) and looked unwell; may |
| | | have been a cane toad. |
| | | An unwell looking Western Brown Snake was spotted at the |
| | | waters edge. |
| | | |
| 17/09/2010 | 90% complete | Agile wallabies spotting hopping over fence. |
| | | |
| | | |
| 20/09/2010 | 100% complete | Site not busted due to presence of water buffalo. |
| | | |
| 22/09/2010 | 100% complete | Agile Wallabies on inside of fence. |
| | | |
| 23/09/2010 | 100% complete | Merten's Water Monitor seen on inside of fence. |
| | | |
| 27/09/2010 | 100% complete | 1 x adult and 2 x juvenile Olive Pythons seen outside of fence. |
| | | 1 x Whip Snake spotted passing through wildlife gates 4-5 times. |
| | | 6 x dead Peter's Frogs found on outside of fence. |
| | | 1 x dead Green Tree Frog found outside of fence. |
| | | |
| 28/09/2010 | 100% complete | 3 x pythons on the inside of the fence, numerous native frogs |
| | | on inside and outside of fence. 12 x wallabies around outside |
| | | of fence. |
| | | |
| 29/09/2010 | 100% complete | Cool night, not much native animal activity. |
| | | |
| 3/10/2010 | 100% complete | 1 x Dead Tawny Frogmouth found 2m from fence on the |
| | | outside. Hard to tell if a cane toad was eaten. |
| | | |
| 4/10/2010 | 50% fence removed | |
| | | |
| 5/10/2010 | Fence removed | |

## 13 APPENDIX 4 – A volunteer's memories

# 2010 Great Toad Muster
# One Volunteer's Experience

In 2009 I attended my first toad muster. I had just retired after 40 years in the State Public Service and was looking for something 'worthwhile' to do with some of my new-found spare time. I really had no idea what I was letting myself in for so I only committed to stay for two weeks. As the time got closer, I was getting anxious to get going so at the last minute, I volunteered to drive up to Kununurra with the set-up crew to help build the main base camp.

My passenger on that trip was a fellow volunteer who I met for the first time on the morning of our departure when I picked him up outside his house. I was initially very wary of being stuck in a car for four days with a complete stranger whom I had never met and only spoken to a couple of times on the phone. By the time we had reached Midland however, we were the best of mates and remain so today. That was a great start to what turned out to be the adventure of a lifetime.

The road trip to Kununurra and the experiences I had on the 2009 Muster proved to be a turning point in my life. The physical work involved in setting up that camp and the extreme heat nearly killed me and I swore to all who would listen that I would never do another camp set-up. Despite that, I found myself twelve months later signing up for the full 'tour of duty' – one week of set-up, four weeks of camp and another week of pack-up. By that time, I had gotten more involved with the Stop the Toad Foundation and had been 'promoted' to the honorary rank of camp leader, joining the likes of such toad muster legends as Michael 'Lofty' Lohf, Frank Longbottom, Reg Geary, Brendan McGill, Jim Rasmussen and Lucy Simnett. As the new kid on the block, I was very intimidated by the task ahead but quite chuffed to be asked to join such an illustrious crew.

Toad musters are deliberately timed to take place in the hottest, driest part of the Kimberley dry season – the lead-up to the wet. This ensures that the toads are concentrated around the few remaining water sources and are easier to catch. However, for vollies finding themselves dropped into this environment from the southern Australian winter, the change can be excruciating – the temperature in that part of the world averages around the 40C mark and the humidity is in the 90s. Add to that the isolation, spartan accommodation, sanitation, red dust, swarming insects, ticks, snakes, lizards, crocodiles, spiders, and an endless variety of creepy crawlies and you have a recipe for camp life that is everyone's private nightmare. Despite that, most volunteers come away from a Muster with a warm and fuzzy glow (probably a rash) and great memories of their own once-in-a-lifetime experience.

So why do we do it? People join the toad musters for a variety of reasons. Many, like me, are retirees and/or baby boomers looking for something different to do and wanting to make a positive contribution to preserving the environment

we grew up in as kids but are not sure of how best to go about it. Others want a change from their day jobs and head bush for the quintessential Australian experience. Whatever their reasons, everybody who attended the 2010 Muster was prepared to give something of themselves and work with others to achieve a common goal. Despite all the physical hardships, we all came away with a tremendous sense of satisfaction that we had made a contribution and had achieved something worthwhile. We were also mindful that we had been given the privilege of living and working in one of the world's most unique wilderness environments.

For me, it is all of the above and more - and it is the people you meet and work with that makes the whole experience so unique and special. No matter what their normal station in life, everybody who joins a muster is on an equal footing and each person brings their own unique set of life skills and experience with them. You are all in the same boat together for the time that you are there and you can't easily escape – so you make the most of it.

There is nothing like standing next to someone while you empty the week's toilet waste and bags of dead toads into a pit, both gagging, laughing and crying at the same time so as not to be physically sick. It is a unique and unforgettable bonding experience and you can't sit back and be a bystander no matter how revolting the task. Later that day you will be swinging a shovel out in the hot sun next to someone you barely know and may not normally associate with in 'civilian' life but the common purpose makes you team mates and together, you do whatever it takes to get the job done.

That same night you will most likely find yourself packed into a hot, dusty troopie with nine or so other sweaty volunteers as you head off to a night of toad busting in some far flung piece of Kimberley bush. When you get there you will be sent off in small groups into a dark, evil-looking swamp, wading knee deep in gooey, smelly mud and relying on your companions to keep a lookout for crocs and snakes and keep the spotlight focussed on the elusive toad you are trying to catch. All around you in the water you hear ominous splashes and noises made by unknown creatures that you hope are not going to sting you, bite you, eat you or wrap themselves around your neck. It's at times like this that the bonds and mateship form - and you can't wait to get back to camp to re-hash it all and share the night's adventures with the other crews over a pancake.

The 2010 muster involved building a 2km fence around the Point Spring Nature Reserve – a simple concept on the face of it but in the reality of the time and location, a job that took three weeks of back-breaking labour to achieve. Again, whether you were a lawyer, scientist, tradesman, uni graduate, nurse or schoolteacher – it had no bearing - you grabbed a pick, shovel, rake or pair of pliers and pitched in with everybody else. Your sweat was just as hard-earned (and smelly) as the next person's.

It was the same with the set-up crew and later on with all the various things that needing doing around camp. There were no rosters. People just saw what needed to be done and did it. Somehow it all worked remarkably well. That's what the musters bring out in people and they are the only place where I have seen that level of cooperation occur between such a diverse group of people.

Of course, the glue that holds everything together on camp is the multi-talented CEO of STTF, Kim Hands. She works very quietly and unobtrusively in the background, coordinating the whole thing and making sure we don't lose sight of the big picture. She is very good at what she does and you find yourself doing whatever it takes to make her happy and keep that lovely smile on her face. Although young in years, she is everybody's nurse, mother, sister, aunty, best buddy and confidante and a shoulder to cry on when things aren't going so well. Her enthusiasm for what she does and her passion for the Kimberley are very evident and she always leads by example - an amazing woman!

Being at the 2010 Muster from start to finish I had the privilege of seeing the whole thing through and it is an experience I would not have wanted to miss. I met some amazing people from all walks of life and learned a little bit from each of them. I made lifelong friendships there. I have the utmost respect for them all and especially for the core group of people who took on leadership roles at camp. I was proud to be part of that team and would do it all again in an instant.

Gary Pike