Carnivorous Mammal Monitoring 2014

Five Rivers Reserve, Bronte.

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Cite as: Bryant, S.L. (2014). Carnivorous Mammal Monitoring 2014: Five Rivers Reserve, Bronte. Tasmanian Land Conservancy, Sandy Bay, Tasmania.

Front Image: Tasmanian devil captured on camera on the Five Rivers Reserve 2014.

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Abstract

In 2014 the Tasmanian Land Conservancy initiated a monitoring program for carnivorous mammals centred on their Five Rivers Reserve in the Bronte area. The first mammal survey was undertaken between February and April 2014 primarily targetting the Tasmanian devil *Sarcophilus harrisii*, spotted-tailed quoll *Dasyurus maculatus*, eastern quoll *D. viverrinus* and feral cat *Felis catus*. Information was obtained using motion sensor cameras installed at 46 sites on roads and tracks across the reserve. A total of 24 vertebrate species were identified from 4,375 fauna images collected over 1,669 trap nights. Of the 24 species captured, 15 were terrestrial mammals, bringing the known mammal diversity for the reserve to 22 species.

Tasmanian devils were recorded at 35 of the 46 sites with 157 detections. 41 individual devils and 31 unknown animals were identified and animals at six sites were assigned as potentially having DFTD. The majority of sites captured one individual devil; however, a range of sites attracted multiple devils including two sites attracting five devils. The frequency by which Tasmanian devils were detected, the number of cohorts and the potential number of individuals present, suggests this species remains relatively robust and widespread across the Five Rivers Reserve despite the persistence of DFTD. Eastern quoll were captured at 13 sites with 36 detections and a total of 15 individual eastern quoll were identified with four of unknown status. Spotted-tailed quoll were identified at two sites and two individual animals were confirmed. Fourteen individual feral cats were identified from 31 detections at 14 sites. Four sites recorded the co-attendance of Tasmanian devil, eastern quoll and feral cats.

The presence and co-occurrence of these native and feral species highlights the importance of this reserve for maintaining an intact guild of Australia's largest carnivorous marsupial fauna and their close association with feral cats. A more detailed analysis of this data is currently underway to investigate these associations further.

Acknowledgements

The Tasmanian Land Conservancy sincerely thanks the Save The Tasmanian Devil Program through the UTAS Foundation for the community grant enabling the purchase of the monitoring cameras and equipment needed to kick-start this program. We also thank David Pemberton, Sam Fox, Phil Wise, Bill Brown and Stuart Huxtable from the STDP for their encourage and support with methodology and interpretation. We would also like to sincerely thank the Australian Government for selecting the Five Rivers Reserve for the ABBRS Bush Blitz 2014 Program and the volunteers from BHP Billiton, Earthwatch Australia, Dydee Mann and Phil Bell for their assistance during the survey period. A number of TLC staff assisted with this work, namely Dan Sprod, Matthew Taylor, James Hattam, and a special thank you to Jane Kebble-Williams for assistance and persistence with photo analysis. A fabulous collective effort; sincere thanks to all.

1.0 Introduction

1.1 Five Rivers Reserve

The Tasmanian Land Conservancy's Five Rivers Reserve in Tasmania's Central Highlands is located approximately 15 km northwest of Bronte Park, at latitude 42 02 28.21 S and longitude 146 20 23.79 E (Figure 1). The reserve is 11,113 ha in size and comprises five previously named parcels of land: Skullbone Plains, Viormy, Pine Tier, Roscarborough and Serpentine. The reserve is protected by a permanent conservation covenant and Skullbone Plains has world heritage status. Neighbouring land tenures include State and private conservation reserves, State and privately managed forests, pastoral land, private shacks, and hydro-electricity impoundments/lagoons.

The reserve is at 600 m to over 1,100 m elevation, receives on average over 2,500 mm of rainfall per year, and is exposed to prolonged frost and heavy snowfalls in winter. It is predominantly eucalypt forest and woodland interspersed with a rich and diverse range of alpine and sub-alpine vegetation communities and habitats of high conservation value. The area embraces a network of natural and artificial freshwater systems and in the past has been subject to various intensities of commercial timber harvesting but retains substantial areas of un-logged and regenerating forest plus other priority forest types, grasslands, wetlands and non-forested areas such as moorland, all in varying size and condition. These large and predominantly structurally intact vegetation communities retain functioning ecosystems expressed at a landscape scale (Tasmanian Land Conservancy 2014).

Since the outbreak of devil facial tumour disease DFTD the Bronte region has become an important monitoring site for the nationally endangered Tasmanian devil *Sarcophilus harrisii*. In 2006 it was reported that of the 35 devils trapped at Bronte, 13 were suspected diseased, six juveniles were found to have DFTD – the highest number of young devils with the disease ever trapped at the site, and that the population contained very few older animals at that time (Devil Facial Tumour Disease Newsletter March 2006, p4). Monitoring using cameras and live trapping has been continued in the area on a 3 to 5 yearly basis by staff from the Save The Tasmanian Devil Program STTDP building up an invaluable data set on all the carnivorous mammal species.

1.2 Aim

The monitoring of wild Tasmanian devils has been identified as a high priority action in the draft Tasmanian Devil Recovery Plan (Department of Primary Industries, Parks, Water and Environment 2010). The aim of this work is to establish a monitoring program on the Five Rivers Reserve that can be sustained long term by the Tasmanian Land Conservancy. By adopting standardised survey methodology in accordance with STTDP protocols (Save The Tasmanian Devil Program Monitoring Strategy 2011), this program will gather consistent robust data to improve our knowledge on the status of the Tasmanian devil locally and contribute to the information on the species status state wide. Regular reviews with the STDP will ensure that the monitoring methodologies remain current and that knowledge is shared regularly in a timely manner.

This program will seek to address key questions in the STTDP Monitoring Strategy:

- is there local extinction of any diseased population in Tasmania
- is DFTD still prevalent in the Bronte Region
- add information to the population status of devils across the State
- is there any change in status of *Dasyurus maculatus*, *D. viverrinus* or feral cats in the Bronte region
- be a potential detection and surveillance method for European red fox

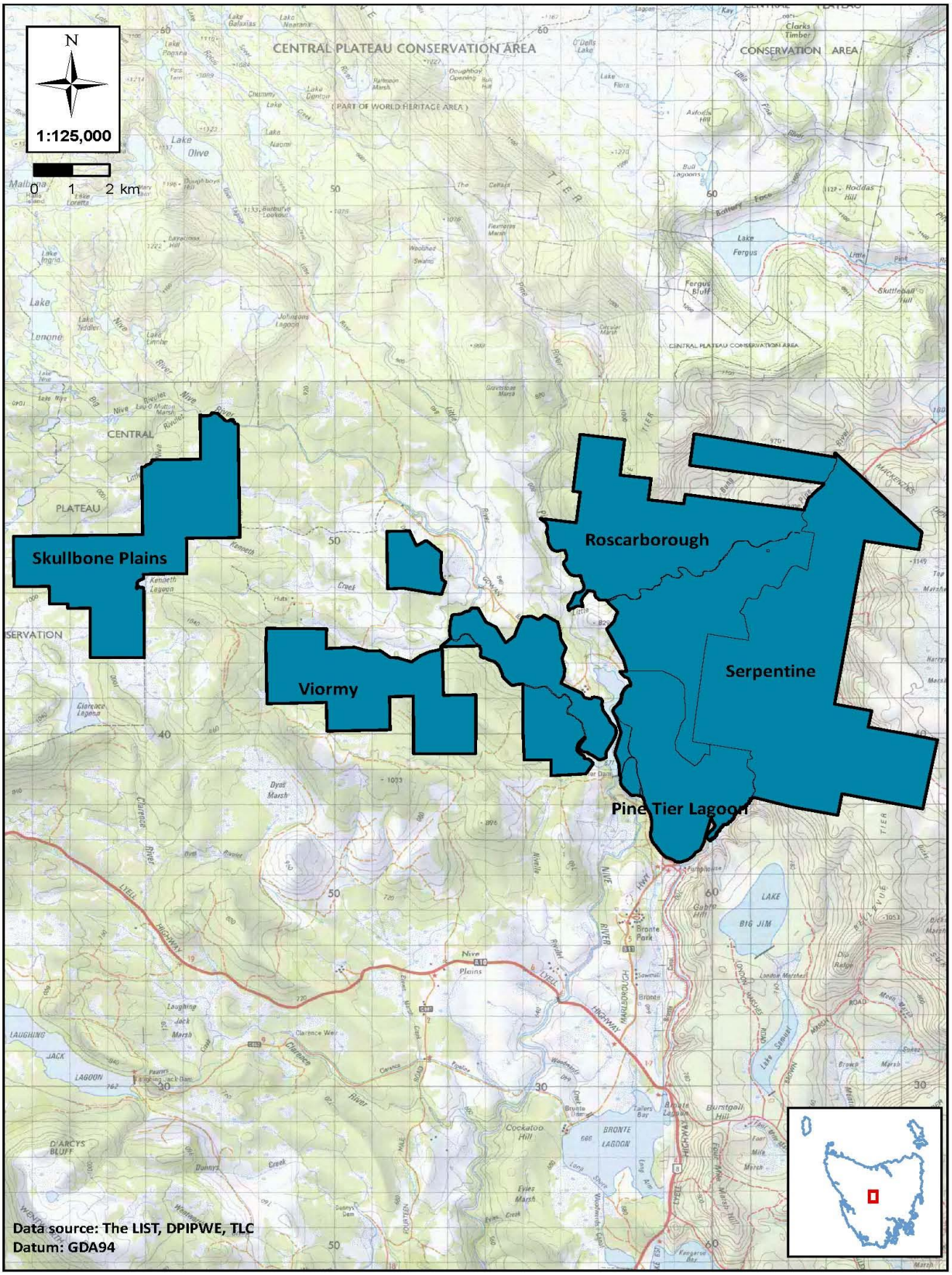

Fig 1. Location of the Five Rivers Reserve in Tasmania's Central Highlands and historic property names.

2.0 Survey Methods

Carnivore monitoring was undertaken by a team of TLC staff and volunteers and cameras were deployed during the national Bush Blitz program in February 2014. Monitoring using remote sensor cameras and methodology for the camera deployments, scent lure placement and data analysis has followed the STDP *Remote camera survey techniques for wildlife: Standard Operating Procedures,* to ensure data collection, retrieval and interpretation is consistent with STTDP programs. This monitoring program has been identified as a key conservation action in the Five Rivers Reserve Management Plan.

2.1 Camera traps

Scout Guard SG560Z Zero Glow 8m cameras purchased from FORTEC® were used to survey terrestrial mammals. Cameras were programed with a setting of mode-camera, photo size 8MP, 1 photo per 30 seconds, flash range 15m, date and time stamp on and an 8GB SD camera card inserted.
Camera traps were installed at sites along roads and tracks across the Five Rivers Reserve (Fig 2). A site is defined as an area of homogeneous habitat corresponding to one of the three conservation targets for the reserve (highland forest and woodland, highland marshes, streams and wetlands). Cameras were position on a tree or steel pole at a height of 1 to 2 m above the ground and an ultra minipod® was used to angle the camera in the direction of an animal runway, clearing or habitat feature (Fig 3). A lure consisting of a cupful of oats saturated in a mix of fish oil and canned fish in a plastic bait pod, was placed 2 to 3 m away from the camera and fixed at least 2m above the ground to attract animals to the desired site where a photo could be taken (Fig 4). Cameras were installed 19 to 22 Feb 2014 and collected 8 to 10 April 2014 and were operational for a maximum of 48 nights (Table 1).

A total of 50 cameras were initially deployed, however, four sites had to be abandoned because cameras shifted on the minipod and did not collect images from the target area. This report analyses information from a total of 46 camera sites.

2.2 Photo interpretation

Cameras were downloaded and images were catalogued according to site number. The total number of fauna images and the total number of camera trap nights were calculated for each site. Photos were checked and any image that could not be reliably identified to vertebrate species was assigned ‘unknown species’. A ‘detection rate’ for each species per site was determined by counting the number of discrete times the animal was recorded on a camera image at the site. For example, if an animal was recorded in consecutive images (i.e. photo 1, 2, 3) then it scored ‘one detection’. The use of ‘number of detections’ reduces the bias that arises when one individual spends a prolonged period of time in front of the camera. ‘Detection’ can then be used as a surrogate measure to determine abundance.

A determination of the number of different individuals of Tasmania devils, feral cats, eastern quoll and spotted-tailed quoll, was made. This was done manually by studying every image of a species and assessing its body markings, time sequences and other body characteristics at comparable focal lengths. Animals were assigned an ‘unknown’ status if body markings were blurred or bodies were partly concealed making cross referencing difficult. This was a time consuming process which has not been validated but it does enable the number of individuals per site to be determined and provides an approximation of the relative order of maximum individuals at the site.

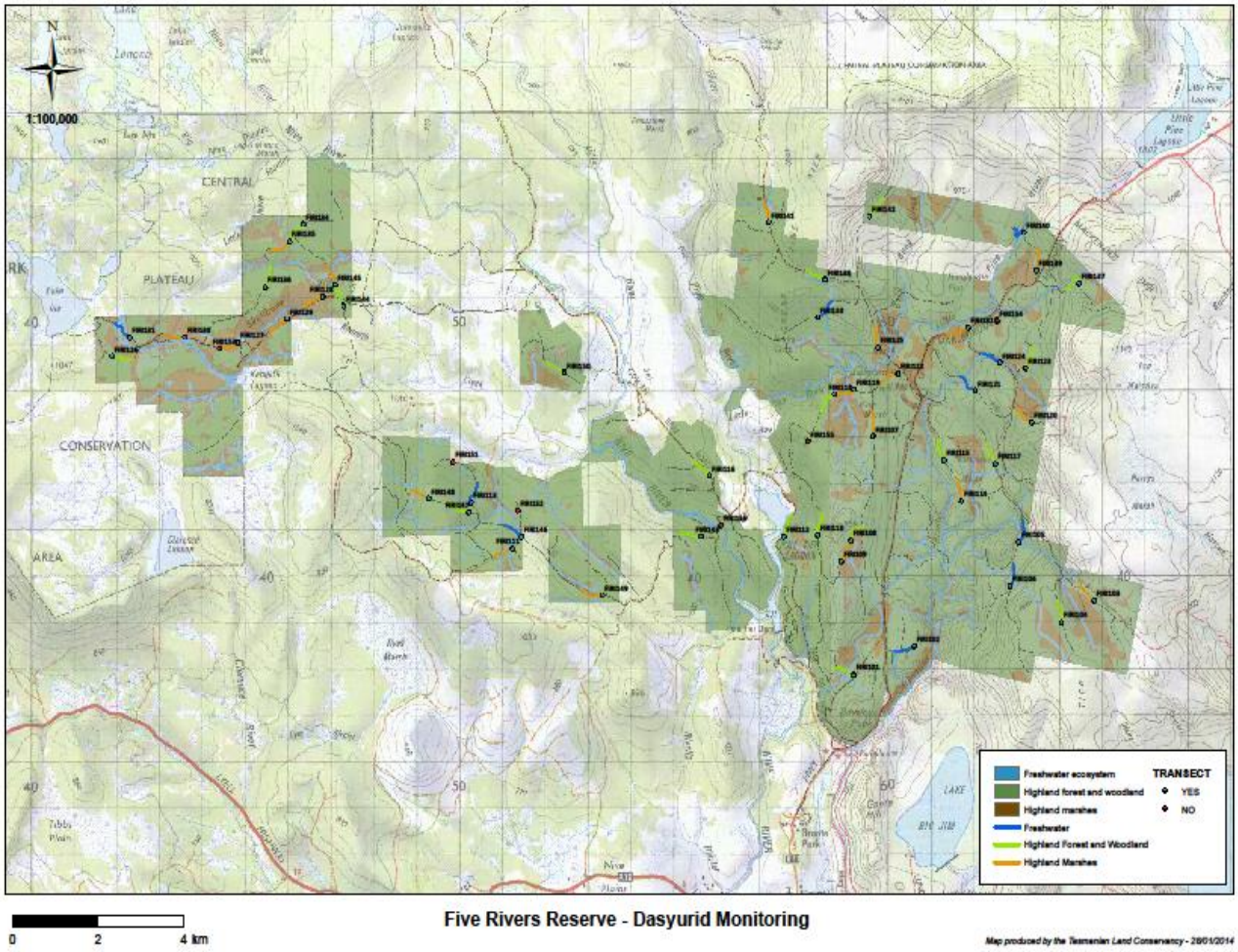

Fig 2. Location of the camera traps across the Five Rivers Reserve.

Fig. 3 Camera mounted on ultra minipod bracket.

Fig. 4 Camera with bait pod in the foreground.

Table 1. Location and results from fauna cameras across the Five Rivers Reserve, 2014.

FIRI Site No	Easting	Northing	Conservation Target & TASVEG code	Camera Nights	Fauna Images	Tot Species Identified	Mammal Species
102	460730	5338673	Streams and Wetlands DDE	9	25	5	4
103	464934	5339657	Highland Marshes DDE	46	232	7	7
104	464174	5339179	Highland Forest and Woodland DDE	15	266	7	6
105	463175	5340912	Streams and Wetlands DDE	45	60	4	3
106	462974	5339968	Streams and Wetlands DDE	46	56	8	6
107	459766	5343201	Highland Marshes DCO	47	285	9	7
111	451350	5340767	Highland Marshes DDE	45	80	6	5
113	450383	5341761	Streams and Wetlands DDP	46	104	7	6
115	461425	5342680	Highland Forest and Woodland DDE	43	91	7	4
116	455946	5342350	Highland Forest and Woodland DDE	44	84	6	6
117	462627	5342600	Highland Forest and Woodland DDE	46	253	8	7
118	458872	5344112	Highland Forest and Woodland DDE	15	102	6	6
119	459326	5344214	Highland Marshes DDE	47	81	5	4
120	463473	5343498	Highland Marshes DDE	43	23	6	5
121	462158	5344186	Streams and Wetlands DDE	34	8	3	3
122	460354	5344550	Highland Marshes DPD	45	117	9	7
123	463330	5344660	Highland Forest and Woodland DDE	46	70	7	5
124	462733	5344787	Streams and Wetlands DPO	20	30	6	5
125	459887	5345113	Highland Marshes DPD	46	218	8	6
126	442005	5344928	Highland Forest and Woodland DDE	46	93	7	6
127	444941	5345214	Highland Marshes DDE	45	17	3	3
129	446088	5345732	Highland Marshes DDE	28	22	6	3
130	443700	5345340	Highland Marshes DDE	8	20	5	4
131	442412	5345332	Streams and Wetlands DPO	13	40	6	4
132	461988	5345547	Highland Marshes DPD	46	30	5	4
133	458482	5345771	Streams and Wetlands DRO	46	30	4	4
135	446145	5347406	Highland Marshes DRO	48	32	6	5
136	445581	5346411	Highland Forest and Woodland DRO	23	35	5	4
137	464583	5346499	Highland Forest and Woodland DPO	46	45	4	3
138	458650	5346583	Highland Forest and Woodland DPO	46	126	6	6
139	463585	5346782	Highland Marshes DPO	46	59	6	5
141	457336	5347819	Highland Marshes DDP	31	53	8	6
142	459688	5347951	Highland Forest and Woodland DPD	29	5	3	3
143	455753	5341044	Highland Forest and Woodland DPD	46	16	4	4
144	447411	5346011	Highland Forest and Woodland DDE	41	46	7	5
145	447212	5346469	Highland Marshes DDE	48	129	9	8
146	451563	5341030	Streams and Wetlands DCO	46	29	8	7
147	450330	5341563	Highland Forest and Woodland DCO	37	87	8	6
148	449400	5341859	Highland Marshes GPH	46	80	8	7
149	453448	5339773	Highland Marshes DDE	10	9	4	4
150	452563	5344567	Highland Forest and Woodland HHE	15	17	5	4
151	449958	5342635	Highland Forest and Woodland HHE	46	178	9	7
152	451476	5341603	Highland Marshes GPH	27	190	7	6
153	444512	5345099	Highland Marshes GPH	46	696	8	6
154	462666	5345696	Highland Marshes DCO	8	53	5	4
155	458256	5343092	Highland Forest and Woodland DCO	24	53	4	4
46 sites			**Total**	**1669**	**4375**	**24**	**15**

3.0 Results

A full list of sites and species recorded on the Five Rivers Reserve is provided in Appendix A. The variation in the number of trap nights per site was due to some of the cameras shifting on their bracket and no longer being focussed on their target areas. This problem will be addressed in future surveys.

3.1 Mammal Diversity

Fifteen species of mammal were recorded during the 2014 carnivore survey including one new species – the long-nosed potoroo *Potorous tridactylus,* bringing the total known mammal fauna for the reserve to 22 species (Table 2). The most commonly recorded species across the 46 sites were Bennetts wallaby (46 sites, 558 detections), and brush-tailed possum (42 sites, 364 detections) with Tasmanian devil and wombat being the next two most frequently recorded species.

Table 2. Mammals recorded on the Five Rivers Reserve during 2014 and previous surveys.

Mammal species (Endemic)	Previously recorded 2010 - 2014	This survey 2014	Total no of detections	Total sites recorded n=46
Ornithorhynchus anatinus platypus	photo, seen	-	-	-
Tachyglossus aculeatus echidna	seen, prints, digging	photo	10	7
Sarcophilus harrisii Tasmanian devil (E)	Scats, prints, photos	photo, scats	157	35
Dasyurus maculatus Spotted-tailed quoll	photos	photo	2	2
Dasyurus viverrinus eastern quoll (E)	Photo, scats	photo	36	13
Vombatus ursinus common wombat	seen, scats, burrow	seen, photo, scats, burrow	128	35
Petaurus breviceps sugar glider	Tree scar, call	-	-	-
Pseudocheirus peregrinus common ringtail possum	call, scats, drey	photo	1	1
Trichosurus vulpecula fuliginosus common brushtail possum	call, scats, photo, hair, prints, smell	photo	364	42
Macropus rufogriseus Bennett's wallaby	Seen, photo, prints, scats, skull	photo, seen, scats	558	46
Thylogale billardieri Tasmanian pademelon (E)	Seen, photos, prints, scats, skull, caracass	photo, seen, scats	171	27
Bettongia gaimardi Tasmanian bettong (E)	carcass	photo	2	1
Potorous tridactylus long nosed potoroo	-	photo	1	1
Pseudomys higginsi longtailed mouse (E)	photos	-	-	-
Rattus luttreolus swamp rat	photo, hair, smell	photo	3	3
Orytolagus cuniculus European rabbit	scats, seen, digging	photo, seen, diggings, scats	5	2
Dama dama fallow deer	seen, stripped saplings, hunted	photo prints, scats	7	3
Felis cattus cat	scats, seen, photo	photo, seen	31	14
Falsistrellus tasmaniensis Eastern falsistrelle	Lisa Cawthen PhD research	-	-	-
Nycotohphilus sp long-eared bat	Lisa Cawthen PhD research	-	-	-
Chalinolobus gouldii Gould's wattled bat	Lisa Cawthen PhD research	-	-	-
Vespadelus sp. forest bat	Lisa Cawthen PhD research	-	-	-

The potoroo was captured at only one site on one image and the Tasmanian bettong at one site on two images. This low detection rate could be due to either 'rarity' or that a meat based lure is not attractive to these species. Similary, the common ringtail possum was detected at only one site and the sugar glider and two species of pygmy possums were not detected at all during this survey which again suggests either rarity or more likely inappropriate camera placement for these predominantly arboreal species. Small carnivorous or omnivorous mammals such as bandicoots, antechinus sp, dunnart, and a range of native and introduced rodents should have been attracted to a meat-based lure but none of these were detected. More intensive survey effort including lower camera placement accompanied by hair-tube traps may improve the chances of detecting these species in their preferred habitat in the future.

3.2 Carnivorous Mammals

Good spatial information was obtained on the distribution and abundance of the four carnivorous mammals, the Tasmanian devil, eastern quoll, spotted-tailed quoll and cat. Tasmanian devils were widely distributed across the reserve at 35 of the 46 sites (Fig 5) with a high detection rate. An assessment of coat pattern estimated that at least 48 individual devils were present with a further 31 images of unknown individual status. The number of individual devils recorded at any one site ranged from one animal to a maximum of five different individuals (Table 3). Tasmanian devils generally appeared healthy and robust with a range of body sizes observed on camera. However, devil facial tumour disease was detected in devils at six sites by the appearance of obviously large facial swellings beyond what would be considered normal facial scarring (Sites FIRI 104, 117, 136, 138, 146, 107). A further two animals had unusual characteristics which could not be explained (? mange / mottled body fur, facial spotting) but these were not scored as DFTD.

Table 3 Number of individuals of each species detected at sites.

Species	No of sites recorded	Sites with unknown individuals	Sites with 1 individual	Sites with 2 individuals	Sites with 3 individuals	Sites with 4 individuals	Sites with 5 individuals
Tasmanian devil	35	10	14	4	4	1	2
Eastern quoll	13	1	8	4	0	0	0
S-tailed quoll	2	0	2	0	0	0	0
Cat	14	3	9	1	1	0	0

Eastern quoll were captured at 13 sites and both the black and grey colour phases were identified (Fig 5). An assessment of the number of individual eastern quoll has been undertaken and a total number of 15 individual animals have been identified with four of unknown status. This time consuming process is challenging and requires verification. Spotted-tailed quoll were identified at two sites and two individual animals were confirmed. Fourteen individual feral cats were identified from a total of 31 detections at 14 sites. A further 15 cat images were unabled to be assigned, so the number of individuals could potentially be higher. Cats appeared in good body condition and their coat colouration and patterns varied from tabby, ginger to all black, with various gradations in between. One image clearly depicted a cat carrying a black currawong in its mouth. The number of individual cats detected at any one site ranged from 1 to 3 individuals.

No evidence was obtained of the presence of the European red fox.

Table 4 and Figure 5 show the number and sites where the four carnivorous species occurred (n=41 sites) either as the sole species or co-occurred with the other three species. The Tasmanian devil was recorded as the only predator present at 16 of its 35 sites, however, on it also co-occurred with the three other predator species including at four sites where it was recorded co-occurring with eastern quoll and feral cats.

Table 4 Co-occurrence of the four carnivorous mammal species.

Species	No of sites recorded	Total no of images	No of individuls identified	Sites sole predator recorded n=41	Sites coocurring with devils	Sites cooccurring with devils and cats
Tasmanian devil	35	383	48 known & 31 unknown	16	-	-
Eastern quoll	13	50	15 known & 4 unknown	1	8	4
S-tailed quoll	2	4	2 individuals	1	1	0
Cat	14	50	14 known & 15 unknown	4	6	-

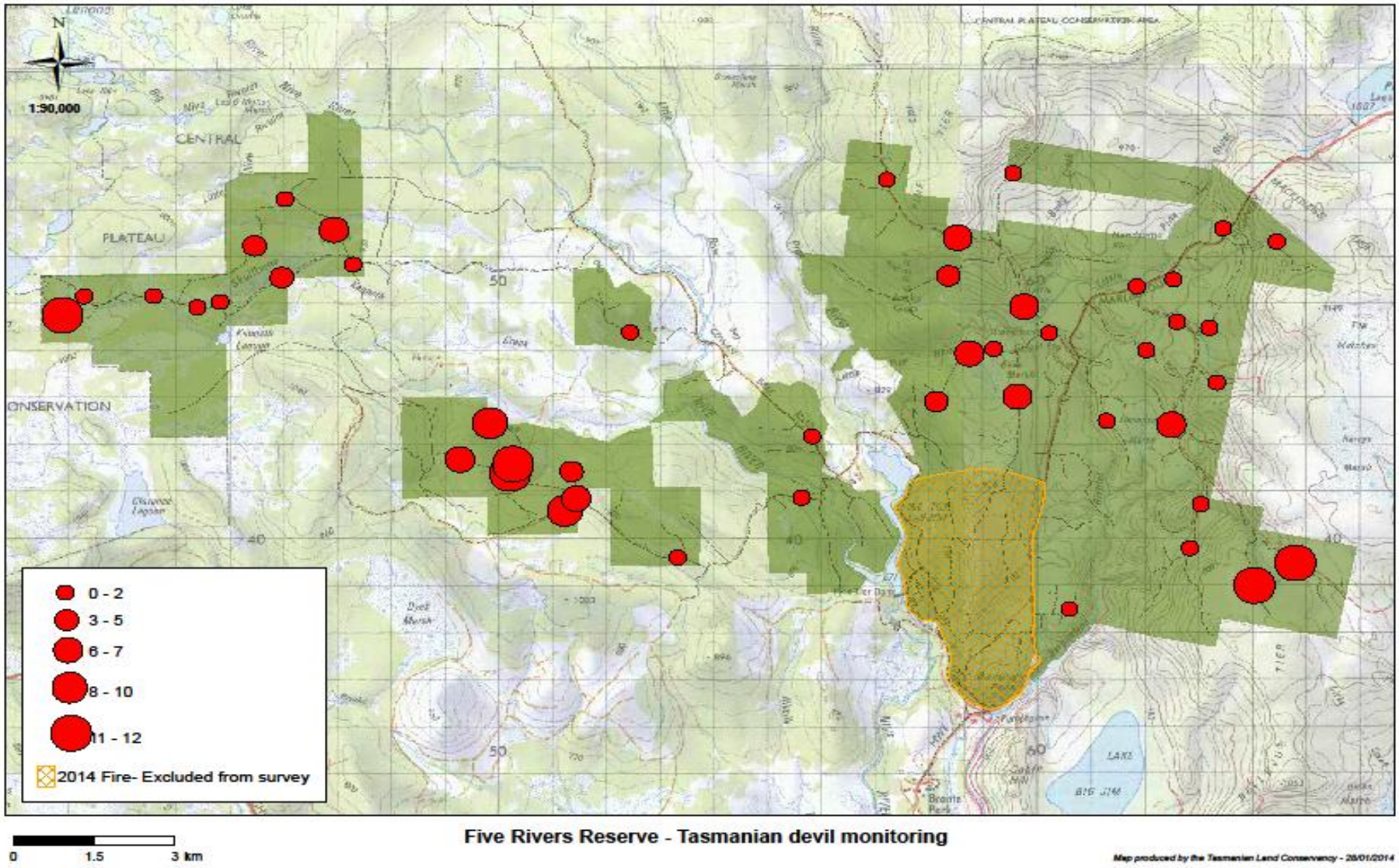

Fig 4 Capture sites of Tasmanian devils on the Five Rivers Reserve and rates of detection.

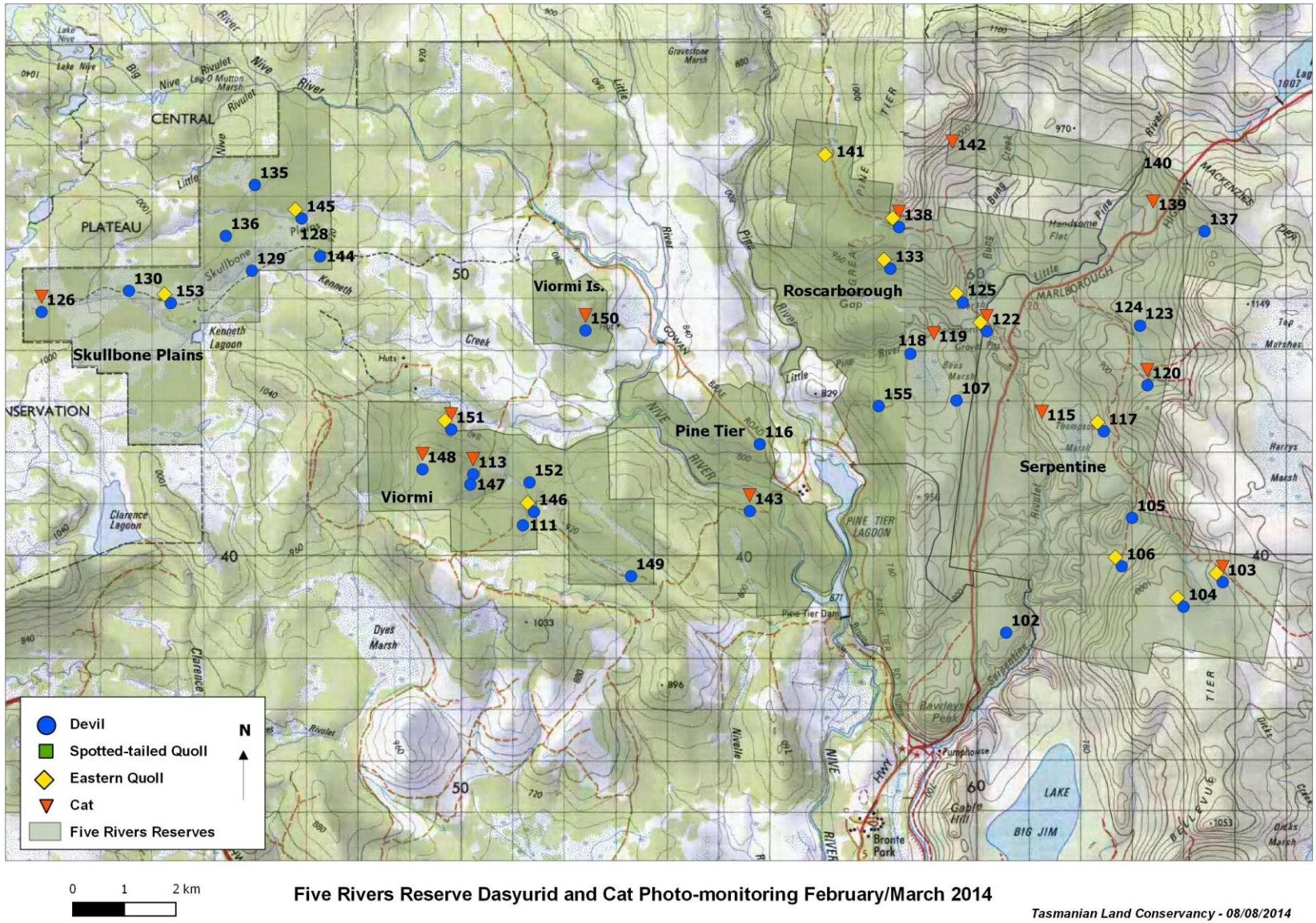

Fig 5 Capture sites of carnivorous mammals on the Five Rivers Reserve and their co-occurrence.

4.0 Discussion

Recent technological advances in wildlife research using remote sensing camera traps offer less invasive and more ethical and economical ways of gathering information about species presence and distribution (Meek *et al.* 2014). The information collected during this survey has added to the growing body of knowledge on the vertebrate fauna of the Five Rivers Reserve and has provided significant insight into the density and distribution of the four carnivorous mammal species. A total of 15 mammals were recorded during this survey including 1 new species for the reserve *Potorous tridactylus*. This species diversity is typical of what is to be expected in Tasmania's high country in areas where mixed forest types, marshland and riparian habitats are interconnected by a network of roads and tracks which facilitate movement and dispersal of predator and prey species. This mosaic and structural diversity of habitats, abundance of fallen timber, rocks and scree and access to water, increases habitat richness and niche availability for these and many other native fauna species. There remain, however, some obvious gaps in knowledge particularly for the medium to smaller weight range mammals and arboreal species. Future surveys should aim to improve detectability of smaller sized mammals especially bandicoot, rodents and bats.

Remote sensing cameras are but one of several survey tools that should be used in combination with other methods to monitor vertebrate species (Meek *et al*. 2014). This study demonstrated that some species may avoid detection either due to an alternate habitat preference, diet or life history traits and therefore more targeted surveys incorporating a variety of camera heights, settings and lure preferrences may potentially improve species detectability in the future. The presence of the long-nosed potoroo *Potorous tridactylus*, and the Tasmanian bettong *Bettongia gaimardi* reflects the size and diversity of habitats across this landscape enabling these two species to coexist in relative close proximity. Their low detection rate could be due to unattractive lure, inappropriate camera placement or naturally low occurrence of these species due to limited resources, competition or threats. A rapid decline in Tasmanian bettong numbers has been detected within four months of local incursions of feral cats (Fancourt 2014) which could also be a contributing factor to their low level of occurrence on this reserve.

The data obtained for these non-target mammal species provides essential baseline information about the abundance and availability of potential prey species of devils, quoll and cats.

The use of camera traps has enabled us to gain valuable information on the distribution and abundance of Tasmania's three largest carnivorous marsupials and their regular interaction with feral cats. The finding of four sites where Tasmanian devils *Sarcophilus harrisii*, eastern quolls *Dasyurus viverrinus* and feral cats *Felis catus* visited the same lure over several nights demonstrates the close proximity, potential regular encounters and competitiveness of this association. The Tasmanian devil population appears to be relatively widespread across the reserve despite the ongoing persistence of the fatal Devil Facial Tumour Disease (Hamede *et al.* 2013), however ongoing monitoring will enable a better determination of population trends of this species into the future. While Tasmanian devils can easily travel the distance between several monitoring sites in one night, the identification of a relatively large number of individual devils suggests that a resident and breeding population of this species occurs permanently on the reserve. This conclusion is further supported by the identification of several maternal den sites and latrine sites across the reserve and the abundance of devil scat on roads and tracks.

Eastern quoll were captured at 13 sites with 36 detections which is a good finding given the camera placement did not favour this species preferred habitat. The eastern quoll has recently been nominated for listing as endangered on Tasmania's threatened species legislation due to concerns about statewide population declines (Fancourt *et al.* 2013). The availability of pasture, grassland and forest for food and den resources would suggest this area is an ideal location for this species and that any low or declining population levels would be due to eg predation, competition or disease. Fancourt has undertaken monitoring of eastern quoll in this Five Rivers Reserve area over the past few years and although she has had fewer cameras and closer camera placement, in 2012 she recorded 176 eastern quoll detections along a 2km transect. From quoll images, she ascertained that there were between 23-28 individual animals. She reported that this high number appeared inconsistent with the absence of eastern quoll captured by the STTDP only 1 year earlier and that this may be related to the availability of optimum habitat and change in density of devils due to DFTD (Fancourt 2012).

Continued monitoring is essential for this species and future camera placement around marshland and open grassland may potentially increase its level of detection. As the genetic diversity within eastern quoll shows significant regional differentiation, with the populations in central Tasmania being the most diverse; the Five Rivers Reserve may well become a high priority for their management and source of animals for future conservation initiatives (Cardoso *et al*. 2014).

The low detection rate and number of individuals of spotted-tailed quoll may reflect either the natural rarity of this species in the area, its large territory size or that its aboreal nature reduces the frequency by which it is captured on camera at ground level. Continued monitoring and trialling camera placement may improve the detection rate of this species in the future.

A significant but not suprising finding was the number of feral cats identified on camera and their distribution across the reserve. This Bronte area has a wealth of food resources combined with a long history of disturbance and modification which favours cat establishment. Cats have been regularly shot be hunters in the area but it is unlikely that this activity has either reduced their population levels or their impact on prey species in the area. The observation of a cat carrying a black currawong in its mouth supports the fact that cats are known to prey on a wide range of species and despite the abundance of rabbits in the region are likely to be predating most small to medium weight range native fauna and occupying the same niche as native carnivores. This confirms that they are not only a significiant predator in the region but also a significant competitor for devils and quolls. More information on feral cat populations and their ecology will help inform decisions about the most effective ways of reducing cat numbers and their impact in the reserve.

The information collected from this program will be discussed with staff from the STTDP over the coming months so that monitoring techniques can be refined and data analysed in a more rigorous and consistent way before the surveys are repeated again in 2015.

As more time and work is needed to analyse the data collected from this first monitoring program, the results and findings reported in this document should be considered as preliminary.

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Appendix A. Vertebrate species recorded on camera traps across the Five Rivers Reserve. Number refers to number of detections, number of individuals is shown in brackets for Tasmanian devils, eastern quoll, spotted-tailed quoll and cats.

SPECIES SITE	brushtail possum	ringtail possum	bennetts wallaby	pademelon	wombat	Tasmanian devil	eastern quoll	sp-tailed quoll	cat	black c'wong	potoroo	bettong	skink	tiger snake	Unknown	owlet nightjar	deer	rabbit	echidna	raven	swamp rat	green rosella	wedge-t eagle	com b-wing	grey shrike-thrus	total no of occurrences	total species	Total Trap Nights
FIRI102	7		2		2	1 (1)				2																14	5	9
FIRI103	29		11	5	6	10 (3)	1 (1)		2 (1)						2											66	7	46
FIRI104	15		16	1	2	11 (5)	7 (2)			1					1											54	7	15
FIRI105	4		22			1 (1)				1																28	4	45
FIRI106	8		4	5	1	1 (?)	3 (1)			5						1										28	8	46
FIRI107	14		59	14	12	5 (4)				3					4		1			1						113	8	47
FIRI111	3		11	17	1	9 (3)				3					2											46	6	45
FIRI113	24		18	3	1	10 (1)			8 (3)	6					11											81	7	46
FIRI115	4		4		3				1 (1)	3			16	1	1											33	7	43
FIRI116	2		9	12	3	1 (1)													2							29	6	44
FIRI117	12		42	34	25	7 (2)	1 (?)			6					5		5									137	8	46
FIRI118	17		7	2	1	6 (?)									1						1					35	6	15
FIRI119			32		4				1 (1)	10					1		1									49	5	47
FIRI120	3		6			1 (1)			1 (1)	1	1				1											14	6	43
FIRI121	3		1		1																					5	3	34
FIRI122	7		25	5	1	1 (?)	2 (1)		2 (1)	18					3							1				65	9	45
FIRI123	14	1	14		2	1 (1)				6										4						42	7	46
FIRI124	1		5	4	1			1 (1)							2										2	16	6	20

FIRI125	12		31	5	4	6 (1)	7 (2)			11					6									1		83	8	46
FIRI126	13		21	2		12 (2)			5 (2)	2		2			4											61	7	46
FIRI127	2		3		1																						6	3	45
FIRI129			3		3	4 (1)				1					2					1			3			17	6	28
FIRI130	4		1		2	1 (?)														1						9	5	8
FIRI131	13		4	1	1					1										1						21	6	13
FIRI132	9		2	2						3					1				1							18	5	46
FIRI133			7		3	4 (?)	1 (1)																			15	4	46
FIRI135	5		4		3	1 (?)				5									1							19	6	48
FIRI136	4		5	1		3 (2)							3													16	5	23
FIRI137	6		13			2 (?)				1																22	4	46
FIRI138	16		7		1	6 (1)	1 (1)		2 (?)						1											34	6	46
FIRI139	3		13	5	2				2 (1)	3					2											30	6	46
FIRI141	3		8		2		2 (2)			2			4						1		1					23	8	31
FIRI142	2		1						1 (1)																	4	3	29
FIRI143	1		5			1 (?)			1 (?)																	8	4	46
FIRI144	12		8	2	1	2 (1)				3									2							30	7	41
FIRI145	2		22	12	4	6 (?)	7 (2)						27		4			1			1					86	9	48
FIRI146			4	3	1	7 (3)	1 (1)			1									1							18	7	46
FIRI147	5		4	7	1	12 (5)				9					1										1	40	7	37
FIRI148	5		13	2	4	5 (2)			1 (1)	9					1				2							42	8	46
FIRI149	4		1	1		2 (1)																				8	4	10
FIRI150	4		1			1 (1)			1 (?)	4																11	5	15
FIRI151	30		23	14	10	9 (3)	1 (1)		3 (1)	9			3		1											103	9	46
FIRI152	18		15	4	9	3 (1)		1 (1)		1					2											53	7	27
FIRI153	16		40	1		1 (?)	2 (1)			10								4		33						107	8	46

FIRI154	1		1	7	7					2					1												19	5	8
FIRI155	7		10		3	4 (1)																					24	4	24
Total detections per species	364	1	558	171	128	157	36	2	31	142	1	2	53	1	60	1	7	5	10	41	3	1	3	1	3	1782		1669
Total Sites recorded n=46	42	1	46	27	35	35	13	2	14	31	1	1	5	1	24	1	3	2	7	6	3	1	1	1	2			