Prey composition within a Flat-headed Cat's home range and core range in the Lower Kinabatangan Wildlife sanctuary.

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Reflection

My year abroad has helped me understand what I want from my future. Being in the field for an entire year, becoming a part of a team and also leading my own research was eye-opening at what I could do in my career. The ability to also network with other students, academics and people from a variety of backgrounds allowed me to explore future opportunities after I graduate. I was allowed to oversee camera trapping, log stock of merchandise, welcome visitors, give presentations and lead certain projects. But more than that I was able to experience many different fields in biology from telemetry, dissections, tracking and so much more. I can say I am confident in small mammal trapping, fishing, UHF and VHF tracking, botanical plots, transects of all sorts and in general species identification in Borneo. One of the hard things within DGFC that I experienced was the isolation at times and difficulties with contacting home because of the 7-hour time difference and the Wi-Fi not being reliable all the time; it also became very tiring towards the end of the placement physically as one of the only pty's left I took on a lot more field work as one of the only experienced volunteers. But this was also super satisfying and doing a good job and working hard for other peoples projects made it worth it; I was honoured to be a part of so many PhD's and masters for however short. Also being someone they could rely on at the centre made me feel a part of the team and the DG team made it feel like home and that I was seen when struggling. I learnt so much over the year and it really helped put into perspective what a research project in the field would consist of and take form me as a person. The atmosphere of the rainforest made me grateful every day to wake up at DG. To be so immersed for a year was an amazing experience and I can't wait to do it again.

Placement Year Report

Abstract

Conservation of the Flat-headed cat, *Prionailurus planiceps*, can only be done when baseline knowledge is acquired of the felines ecology. One of the many aspects understudied is freshwater communities, in the Lower Kinabatangan Wildlife Sanctuary and in general Sabah with the last checklist survey conducted in 2002 (Keat-Chuan et al. 2017). The study conducted involved sampling areas within a wild Flat-headed cat's home range and core range to understand the prey composition of the individual tracked (unpublished; Wilson, A). Over the course of the study from November 2022- August 2023, 289 individuals were caught which covered 17 species and 10 families of freshwater inhabitants. While no significant differences in prey abundance was noted both sites were shown to be heavily dominated by one species. This was noted as a possible sampling bias as a generalist surface feeder and therefore not included in later statistical analysis. All sites while with different morphologies were statistically highly similar in species abundance yet only certain species were caught within Danau Usu. This baseline data can be used to advise future research with further investigation into freshwater communities in varying water bodies.

Introduction

The Flat-headed Cat, *Prionailurus planiceps,* is one of the five species in the family Felidae that are present within Malaysian Borneo (Payne and Francis 2007). It is arguably the most elusive of the five Bornean cat species (Hearn et al. 2010). Its home range extends through Peninsular Thailand and Sumatra however, no recent signs of the feline have been noted within Peninsular Thailand (Hearn et al. 2010). The Flat-headed Cat is said to be a habitat specialist of lowland secondary forest tied to aquatic regions specifically for hunting (Mohd-Azlan and Thaqifah 2020). *P. planiceps* generally prefers tall lowland secondary forest such as riverine forest and or peat swamps (Hearn et al. 2010). Majority of sightings have been incidental and indirect through night boat surveys mainly along the Kinabatangan and connected tributaries such as the Rasang river (Hearn et al. 2010).

The Flat-headed cat can be identified by its brownish colouring from distance but upon closer inspection has grey speckling throughout its fur. Another distinct characteristic is its size, similar to that of the domestic cat and to other cats within Borneo such as the Bay cat and Leopard cat (Payne and Francis 2007; Muul and Lim 1970). Sizes for adults reach approximately 446-521mm from head to the base of the tail and weigh approximately 1.59kg (Johnson et al. 2006). For *P. planiceps* the most distinct markings present on the cat are those on its face. Similar to the leopard cat, the Flat-headed cat has vertical markings on its face along the bridge of its nose a key distinction from other cats.

Generally the canines of the Flat-headed cat are more suited for hunting aquatic prey with the anterior teeth being more equipped at catching slippery prey (Muul and Lim 1970; Rasmussen 2014). When observed in captivity individuals would fully submerge their heads into the water to catch prey and were also observed to be much more intrigued by food put into the pools in their enclosure (Rasmussen, J. 2014). Diet for the cat consists of mainly fish but one study have been shown to eat any food presented as a possible opportunist feeder (Johnson et al. 2006). Likewise post-mortem of an adult showed fish and frogs to make the majority of the gut contents but with small rodents and crustaceans found in traces (Johnson et al. 2006). Being such an elusive cat in the wild the lack of ecological knowledge makes conservational planning more difficult. In Sabah the last checklist survey of freshwater fish conducted at a regional level in 2002 (Keat-Chuan et al. 2017). As an aquatic specialist and a diet composed of majority fish data of freshwater communities are incredibly valuable in preserving aquatic hunters such as the Flat-headed cat.

Freshwater communities need to be researched now more than ever as the conservation status of the Flat-headed cat changed from 'vulnerable' to 'endangered' in 2008, according to the ICUN red list (Johnson et al. 2006). Predictive modelling has pointed out that the Lower Kinabatangan Wildlife Reserve (LKWS) is still a key locality for the cat, despite the remaining suitable habitat in this region being severely fragmented. Sabah and the LKWS specifically contains seasonally flooded forests and lowland dipterocarp forest perfect for this cat. The widespread planting of oil palm, *Elaeis guineenis,* however has added to the fragmentation . Despite this fragmentation, the LKWS is still doing better than other regions of the flat-headed cat's historic range such as Thailand, where fragmentation is more severe and debatably too small to support populations of the Flat-headed cat (Hearn et al. 2010). This may imply that Malaysian Borneo and the LKWS may be one of the final refuges for the flat-headed cat in the long term if proper plans are organised. Knowledge of the species composition of planation drains and the yearly flooding will give us an idea at how oil palm plantations can be included as habitats for the flat headed cat in future conservation planning.

Many threats dictate the state of a population and many work in unison making conservation planning laborious. For the Flat-headed cat, threats include habitat alteration, degradation and anthropogenic disruption (Danum Valley Field Centre 2007). In terms of habitat, plantations are different in structure and composition and with little research it is unknown whether Flat-headed cats can survive long term especially with a water-based hunting preference. It is believed by some that large populations of Flat-headed cannot survive throughout plantations (Wilting et al. 2010). However from unpublished data two individuals have been spotted within an oil palm planation within the LKWS and shows promise in this felines future especially with one individual being pregnant at the time of capture (Unpublished Wilson, A).

Freshwater fish are a vital prey species within the Kinabatangan and current literature is far too limited to understand the scope of the heath of the Lower Kinabatangan's hydrology. Simple surveys in varying water bodies and types will not only give direction towards wild Flat-headed cats but can be used to influence other species reliant on the waterways throughout Sabah such as Otters, Estuarine crocodiles and many endemic birds of Borneo.

Materials and Methods

Study sites

The project was based at the Danau Girang Field centre (DGFC) in Lot 6 of the Lower Kinabatangan Wildlife Sanctuary. The freshwater fish survey was conducted within Hillco Oil Palm Planation and the adjacent oxbow lake, Danau Usu (see Figure 1). Sampling occurred from October 2022 to August 2023. The six study sites were selected based on the tracking data of a Flat-headed cat, *Prionailurus planiceps*, opportunely captured in 2021 (unpublished data; Wilson, A).

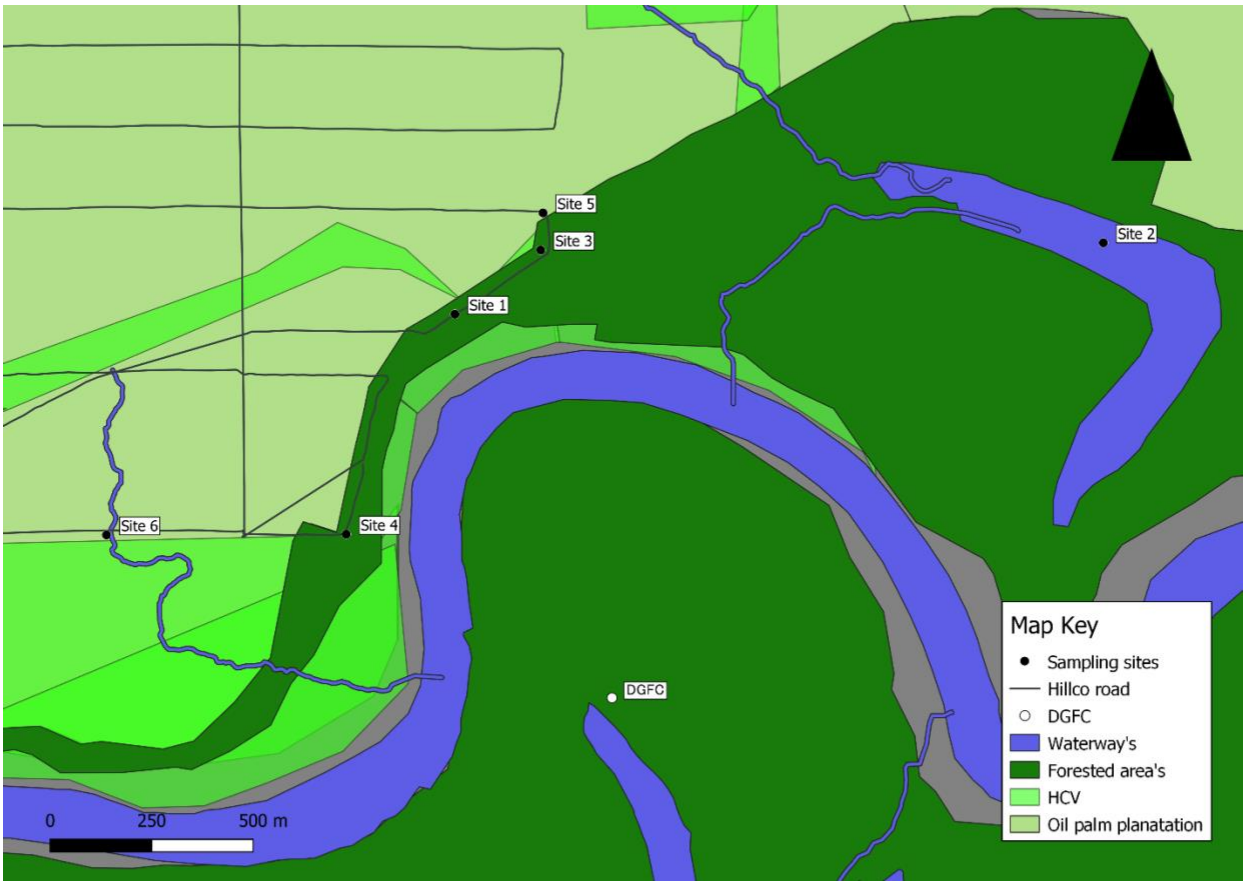


Figure 1- Map showing the sampling sites within Hillco oil palm plantation and the adjacent oxbow lake. Site 1,3,4 and 5 consisted of planation drains while site 2 consisted of an oxbow lake and site 6 was a tributary. Sites 1,3 and 4 were within the individuals core range (>95%) and sites 2,5 and 6 were within the home range (50%) (unpublished data; Wilson, A, 2021).

The core area sites (site 1,3 and 4) were major planation drains as they bordered the riparian reserve adjacent to the Kinabatangan River and consistently maintained water throughout the sampling period. The three sites within the home range consisted of one tributary connecting to the plantations drainage system, one major planation drain and an oxbow lake (see Table 1). Sampling was conducted at each site over four consecutive days with each session being approximately 1 hour.

Site number	Type	Coordinates	Sampling period
Site 1	Major planation drain	N5° 25.339' E118° 02.053'	19/01/2023-23/01/2023
Site 2	Oxbow lake	N5° 25.518' E118° 02.563'	01/02/2023- 04/02/2023
Site 3	Major planation drain	N5° 25.424' E118° 02.168'	02/03/2023- 05/03/2023
Site 4	Major plantations drain	N5° 25.046' E118° 01.908'	22/03/2023-25/03/2023
Site 5	Major planation drain	N5° 25.469' E118° 02.076'	26/03/2023- 27/03/2023 01/02/2023-02/06/2023

Site 6	Tributary	N5° 25.046' E118° 01.588'	10/07/2023 13/07/2023-15/03/2023

Table 1- Table contains a summary of the sites sampled at. Site type, coordinates and dates were given of each site sampled.

Fish Sampling

Sampling methodology was designed for maximum capture at each site therefore methodology changed for each site depending on its morphology. Morphology varied from water depth, size and even vegetation structure (see Figure 2). Four methods were used to fish the sites: gill nets, cast net and scope net were used throughout all sites while hook and line was only used to sample the oxbow lake. The sampling was done after sunset all except for the oxbow lake sample which was sampled in the morning between 8am-10am approximately. For planation drains and tributaries, 30mm mesh gill nets 15 meters in length were opened across the water body; depending on water height one to two nets were cast either connected together as one 30-meter net or at separate points within the drain to facilitate maximum capture. Gill nets were left open for an hour approximately. A 1.4-meter-long scope net with a mesh width of 1mm was used to scope the surface and was checked after every scope for individuals (shown by the triangle symbol in Figure 2). All individuals were collected for speciation, measuring and photographs after the sampling session. Scope netting would be done throughout the hour with rotation to different sections of the drain as well as scoping in smaller drains adjacent to the main drain sampling site . A cast net with a diameter of 4 meters and a mesh size of 1cm was used. Casting was done in various parts of the sampling site as indicated by the circle symbol in Figure 2. Depending on the number of captured individuals casting could last from 10 minutes to one hour depending on capture success.

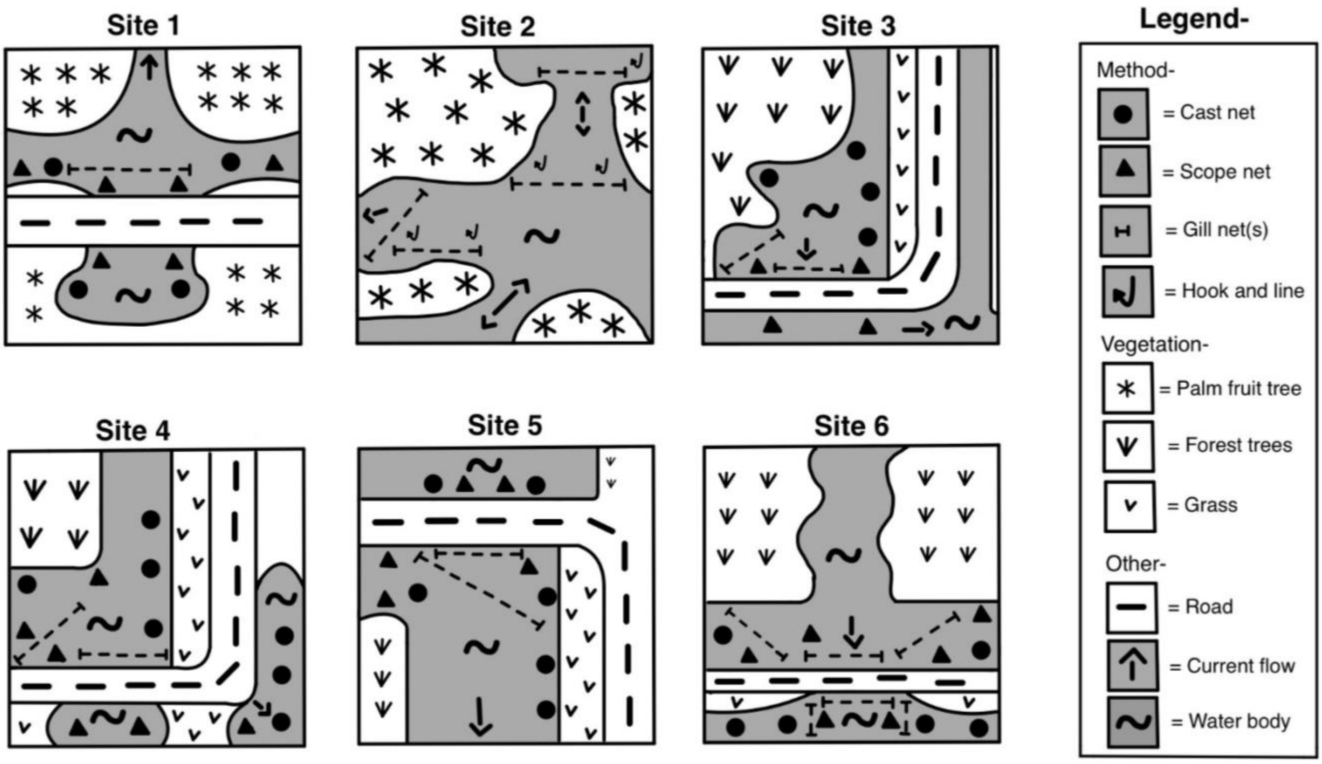


Figure 2- A methodology schematic. All sites varied in morphology therefore fishing techniques were used based on the specific site and what was successful during each session. The grey shaded areas indicate the water bodies and the symbols show where techniques were used in the site, vegetation structure as well as current flow and roads near the site. Sites are not to scale and approximate depictions of the sites.

During the sampling period, fish were identified to species level with an unpublished field guide (Fields,

2013) and unknown species were photographed and later speciated with other taxonomic guides (Inger and Chin 2002; Atack; 2016; Fishbase 2023; Seriouslyfish 2023). Fish length, height and girth was also measured on site with a calliper, and or 10-meter tape measure for larger specimens. At the beginning of every session temperature, depth and pH of the water was measured. Temperature and pH was measured with a Multifunction water quality tester (model pH-03/618/K13) while depth was measured approximately with a stick and measured afterwards with a tape measure to one decimal place.

Data Analysis

An Anosim statistical test was used to evaluate whether the differences in species abundance was statistically significance (R>0.05) between the six different sites sampled using package Vegan (version 2.6-4, 2022). Furthermore, the association of fish abundance was evaluated using general linear modelling in R (version 4.1.2, R Core Team 2021) using the R Studio Interface. Water depth, water pH and water temperature were all included as independent variables into the model with no additional interaction terms. The model fit was evaluated by checking the distribution of residuals to ensure assumptions had been met. The model was then refined by stepwise deletions of terms on a change in AIC of >2.

Results

Species composition

Overall ten families were captured, 17 species and 289 individuals (see Table 2). The core range sites had lower abundance of 114 individuals but a higher species richness with 15 species than the home range sites with 175 (21% higher) individuals and 11 species. Species richness was calculated as the number of species sampled in each area type (home range and core range). Yellowtail Rasbora, *Rasbora tornieri,* was the species that dominated the composition with 127 individuals making up 43% of the total individuals caught. Mainly fish were caught but one species of shrimp, *Macrobrachium rosenbergii*, with a total of seven individuals was caught accounting for a 2% of the total individuals. Various other species were spotted within the water bodies such as the White lipped stream frogs, *Chalcorana raniceps*, and Green Paddy frogs, *Hylarana erythraea but none of these species were caught during the sampling but noted due to the lack of knowledge of the felines diet in the wild*. These observations were not included in the final species composition of the sites. The dominating family with seven species captured was *Cyprinidae,* the Carps and Minnows, with 196 individuals caught within this family making 67% of the total individuals caught form this family. Rank abundance plots were produced to see the relative abundance and evenness of the core range sites and the home range sites. The evenness for the core range sites was higher than that of the home range sites but only slightly more. Both sites had relatively low proportions for all the species captured with both sites being dominated by ones species, *Rasbora tornieri* (see Figure 3).

Species	**Home range sites**	**Core range sites**	**Total**
Cyprinidae			
Barbonymus gonionotus	20	14	**34**
Cyclocheilichthys repasson	5	2	**7**
Leptobarbus hoevenii	0	2	**2**
Osteochilus ingeri	0	1	**1**
Puntius bramoides	0	2	**2**
Rasbora tornieri	94	33	**127**
Trichogaster trichopterus	6	16	**22**
Trichogaster pectoralis	0	1	**1**
Siluridae			

Kryptopterus cryptopterus	1	0	**1**
Kryptopterus parvanalis	0	1	**1**
Palaemonidae			
Macrobrachium rosenbergii	2	5	**7**
Engraulidae			
Setipinna melanochir	5	0	**5**
Eleotridae			
Oxyeleotris marmorata	1	2	**3**
Claridae			
Clarias leiacanthus	0	3	**3**
Bagridae			
Leiocassis robustus	3	0	**3**
Loricaridae			
Pterogoplichthys paradalis	0	1	**1**
Channidae			
Channa striata	12	3	**15**

Table 2- Occurrence table with abundance values. Table shows the abundance of each species caught from the ten families. Both catchments were dominated by *Rasbora tornieri* with the other species caught being similar in abundance.

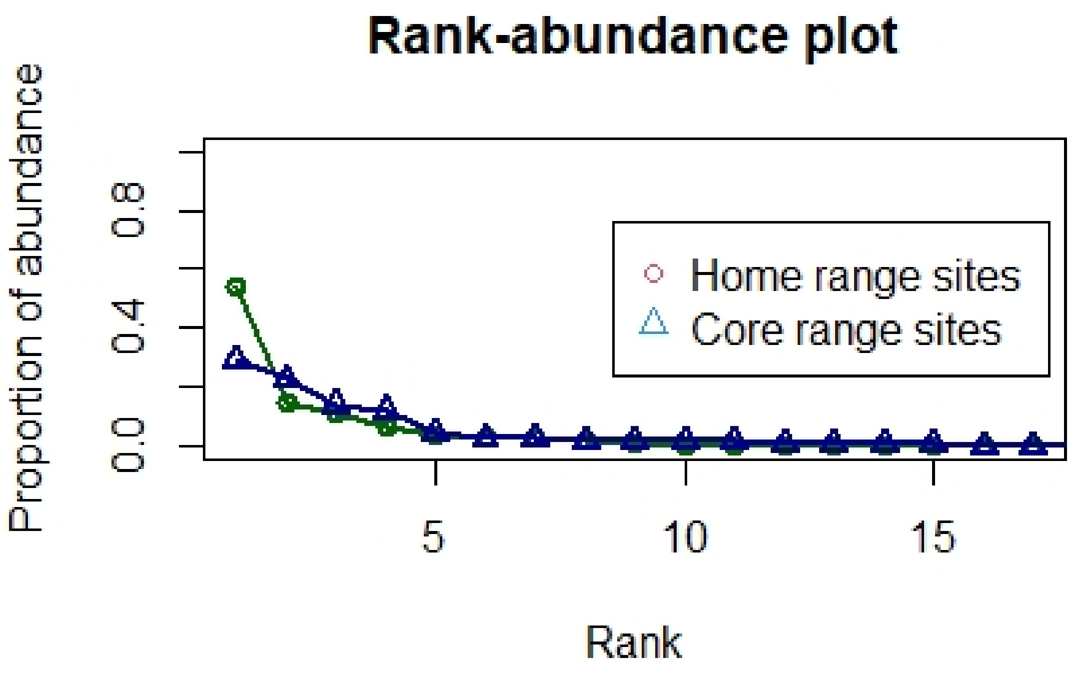


Figure 3- Rank abundance plot/Whittaker plot. The blue triangle represents the rank abundance of the core range sites while the green circle represents the home range sites.

The climbing Perch, *Anabas testudineus,* was the second most common at 18% of the total individuals. This species is a generalist fish with a varied diet and habitat preference. The Mann-Whitney test showed that the species abundance was not significantly different between the core range sites and the home range sites (W statistic= 146.5, p-values=0.63). Nine species were found either in the core range or the home range only: *Clarias leiacanthus, Cyclocheilichthys repasson, Kryptopterus cryptopterus, Kryptopterus* *parvanalis, Leiocassis robustus, Leptobarbus hoevenii, Macrobrachium rosenbergii, Osteochilus ingeri, Oxyeleotris marmorata, Pterogoplichthys paradalis, Puntius bramoides, Rasbora tornieri, Setipinna melanochir, Trichogaster trichopterus, Trichogaster pectoralis*. While five species only had one individual caught throughout the sampling period. Apart from the two most common the species caught the other species were caught in very low abundance which was noted for both sites as shown with very shallow points in the rank abundance plot.

Leptobarbus hoevenii, *Osteochilus ingeri*, *Puntius bramoides*, *Trichogaster pectoralis, Kryptopterus parvanalis and Pterogoplichthys paradalis* were found only within the core range site while *Kryptopterus cryptopterus*, *Setipinna melanochir*, *Clarias leiacanthus*. *Leiocassis robustus*, are the species only found within one site type.

Sampling effort

Each of the sites were sampled for four consecutive days for a total of approximately four hours in total. No singular method could be used to captured all species. Certain species were only caught with one technique. Cast net throws per sampling event ranged from 5 throws to 25 throws. Scope netting ranged from 12 to >30 uses in one session. To determine whether the home range sites and the core range sites were sampled to completeness species accumulation curves were generated using iNEXT (Chao et a. 2014; Hseih Ma & Chao, 2016). Figure 4 shows the overall sample completeness while figure 5 shows the home range sites and core range sites sampling effort using species richness, Shannon's index and Simpson's index as species diversity measures.

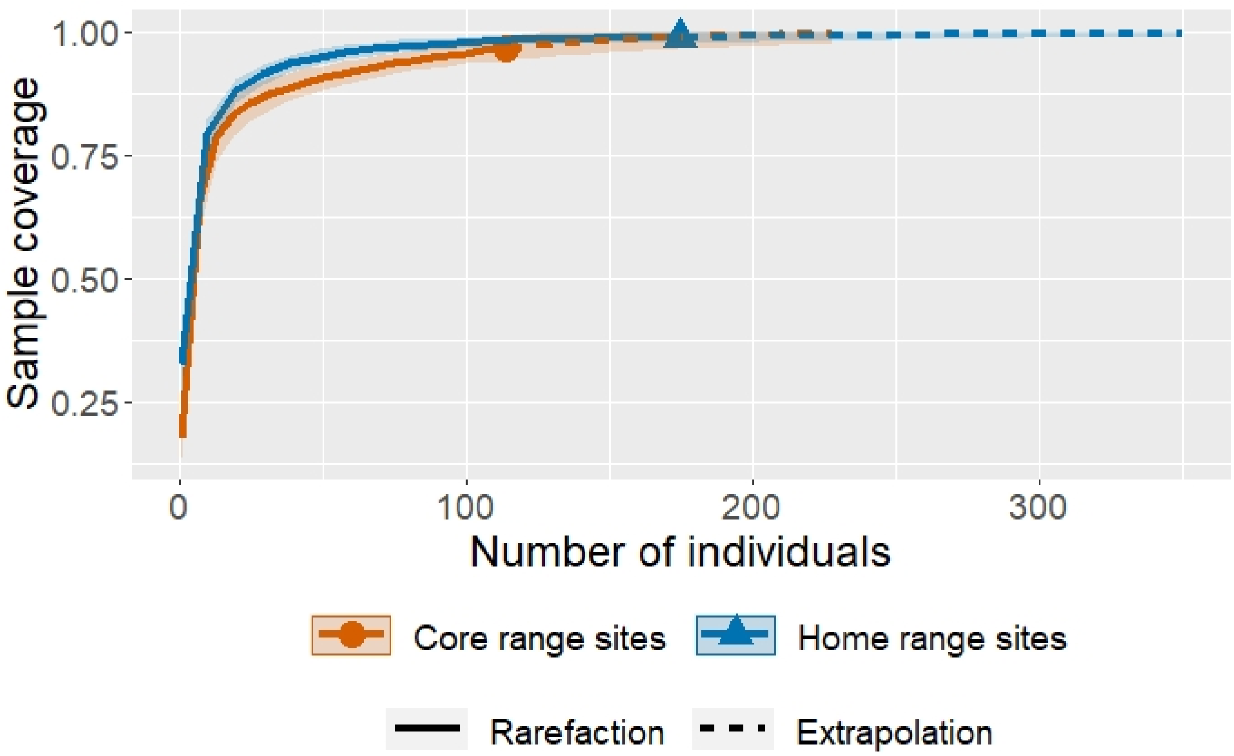


Figure 4- Sample coverage graph made using iNEXT (Chao et a. 2014; Hseih Ma & Chao, 2016). Core range sites (orange line) sample coverage was observed at 98% while the home range sites (blue line) was observed at 96%.

For the core range sites, the species richness (q= 0) curve doesn't level out when extrapolated from the data. The species richness upper confidence is observed as 17 compared to the 15 observed when sampling. While the home ranges upper confidence level was 13 compared to the observed 11 species.

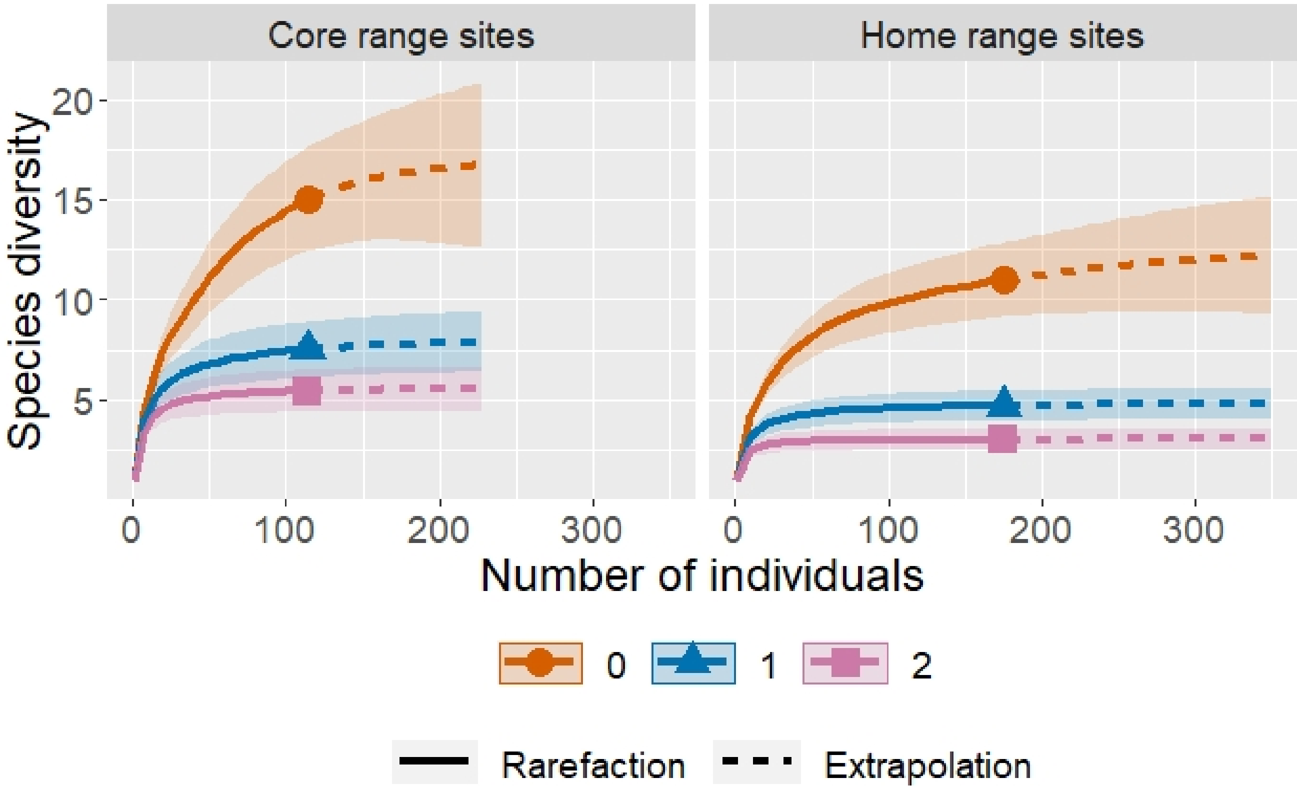
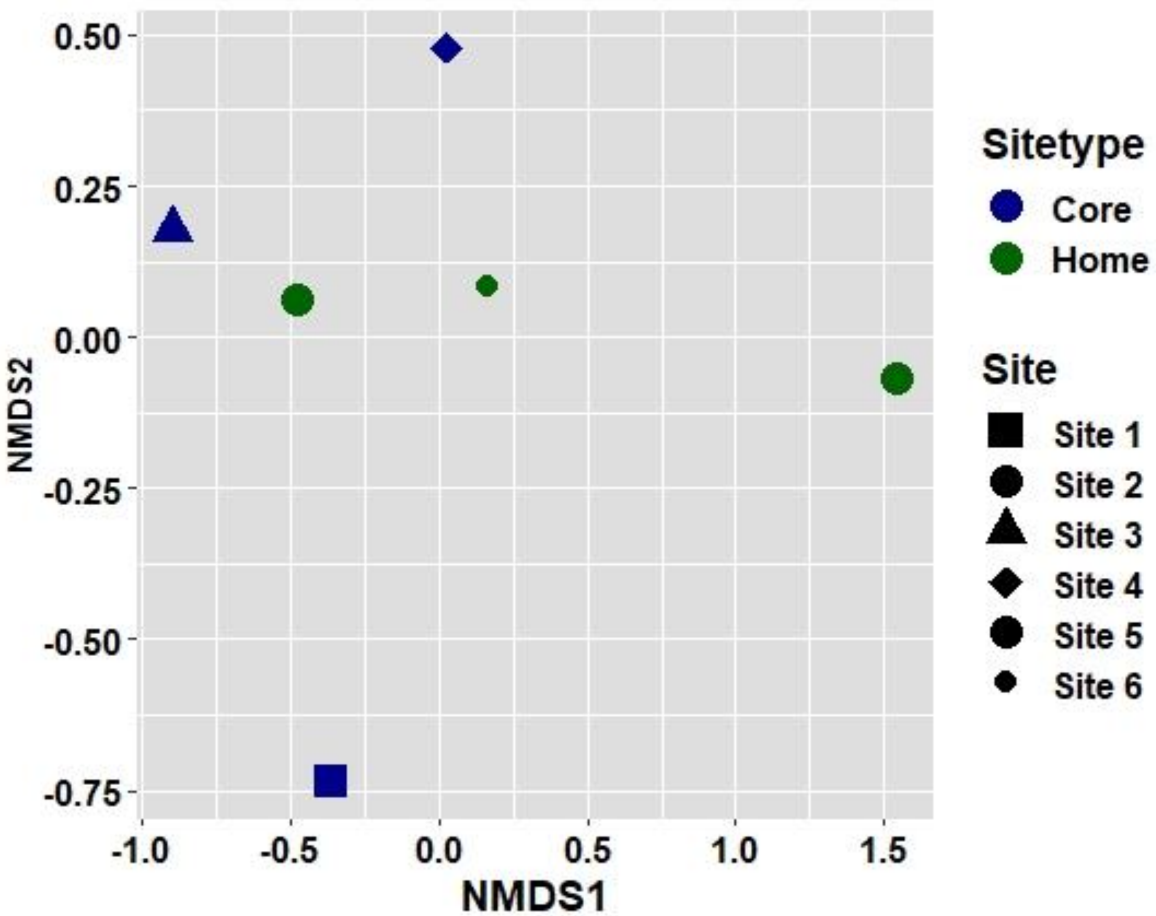


Figure 4- iNEXT sampling curves of the core range sites and the home range sites with the three Hill numbers (q=0, 1 and 2). For the home ranges sites and core range sites species richness (q=0), Shannon's diversity (q=1) and Simpon's diversity (q=2) were all calculated. When extrapolated the species richness for core range sites doesn't level but the Shannon's index and Simpson index does when abundance is taken into account.

The home range sites species richness came to 15 species while the Shannon's diversity was recorded at 7.50 and the Simpsons index was recorded at 5.44. The core range sites 11 species whole the Shannon's index was 4.69 and the Simpson's index was 3.01. The extrapolated species richness of double the sample size only increased by a single species more for both the home and core range sites.



The NMDS plot NMDS plots

Figure 5- NMDS plot of each sites abundance. Blue icons represent sites within the core range and the green icons represent sites within the home range. The Anosim test statistic showed the six sites to be very similar in species richness and abundance (*R*= 0.03704). The sites were also not significantly different in composition.

visualised the sites through data scores of the abundance of each species caught while shown to be separated on the plot are not significantly different form one another. The site deviating most from the others was Site 2 which was Danu Usu which could be due to the site being the only oxbow lake and was the only site to have *Leiocassis robustus* and *Setipinna melanochir* were caught. *Leiocassis robustus* is a freshwater catfish known to be only caught through hook and line with earthworm bait and was only caught in the oxbow lake.

Statistical analysis

General linear mixed modelling (GLMM) was used to evaluate significance of the species abundance. Environmental factors water depth, water pH and water temperature were included as dependent variables to add to the GLMM. The abundance value of *Rasbora tornieri* was removed from the model due to the bias in sampling. A negative binomial model with the lowest AIC was used. Species abundance was not significantly different throughout the sites (Theta: 1.273, Std. Err.: 0.472).

Discussion

This study's main goal was to determine to composition of the freshwater communities within the Flat-headed Cat's home range and core range to gain insight of its possible prey species. Tracking data came from a pregnant individual in 2021 and throughout the sampling period two sets of prints were spotted as possible Flat-headed cat paw prints; noted by thin nail marks from their retractable claws and slight webbing indentation (unpublished Wilson, A; Quentin and Quentin 2018). Sightings were seen on the main road next to major planation drains on 30th November 2022 and 17th July 2023. Minimal knowledge is known of this feline's ecology and more specifically what a wild individuals diet would consist of with reference to prey preference only in a 2014 study on two captive individuals at Sungai Dusun Wildlife Reserve (Rasmussen, J. 2014). This study however only tested four combinations with mainly observations in feeding behaviour; an opportunistic post-mortem of a wild individual revealed the main component of its diet to have been fish with traces of crustaceans and rodents. This may show while a specialist hunter in aquatic habitats the cat is able to survive of a more varied diet like the Fishing cat, *Prionailurus viverrinus* (Cutter, 2015). This study can also be seen as a survey of fishes caught with the Lower Kinabatangan wildlife sanctuary and idea of the composition of fishes within Oil Palm plantations drains a new locality for wildlife to find refugee in. Freshwater fishes especially within the Lower Kinabatangan support other species such as Otters (family- Lutrinae), Estuarine crocodiles (*Crocodylus raninus)* and certain bird such as the Greater Egret (*Ardea alba*) (Philips and Phillips 2018).

17 species across 10 families were identified across the home and core range of a Flat-headed cat. Species composition was heavily dominated by *Rasbora tornieri* likely due to sampling bias from it being easier to catch as well as occupying the surface of most water bodies. Very little literature has been conducted on freshwater communities within Sabah with one checklist paper from Danum Valley nature reserve in (Martin-smith, 1998) sharing six out of the 17 species caught in this study. The six species found within this survey were also found in the study conducted in the Segama river and Kuamut river two other major rivers running through Sabah. The species included: *Cyclocheilichthys repasson*, *Kryptopterus parvanalis, Leiocassis robustus, Osteochilus ingeri, Setipinna melanochir, Trichogaster trichopterus.* Out of the 17 species only seven species are native and with three species without sufficient research to determine locality and ICUN status (ICUN 2023). The most common species in abundance, *Rasbora tornieri* and *Anabas testudineus,* are hardy species*. Anabas testudineus* is a generalist in both habitat preference and diet eating anything from plant debris to small fishes such as *Rasbora tornieri*, (Inger and chin, 2002); this was seen through the gut contents of one specimen being dissected. A survey in the Tasek Merimbun, the largest natural lake within Brunei showed eight species out of the 17 from this study to be captured: *Anabas testudineus, Channa striata, Cyclocheilichthys repasson*, *Leiocassis robustus*, *Rasbora tornieri*, *Trichogaster trichopterus, Trichogaster pectoralis* (Sulaiman and Shahdan, 2015). Within the literature there are no surveys done within oil palm plantation drains so there is no baseline of comparison with the individuals captured in this study. The abundance was not significantly different between the sites and the evenness was similar yet heavily dominate by one species. The oil palm plantations are known to use a variety of pesticides, herbicides and fertilisers in aid of palm fruit production; the quantification of the effects of the chemicals have yet too been fully understood and the effect of this on waterways even more.

Out of the 17 species caught all with sufficient data were labelled as Least Concerned by the ICUN Red list while the rest were data deficient. The five species that were data deficient were understudied with no records on online fish databases such as Seriouslyfish and Fish base (2023). Many taxonomic difficulties were faced with minimal sources of identification and many taxonomical variations of the fish. Online databases also had many gaps of certain species captured and therefore identification was reliant one usually one guide and local field assistants knowledge of the fishes.

Two notable species captured were *Pterogoplichthys paradalis* and *Setipinna melanochir. Pterogoplichthys paradalis* otherwise known as the Amazon Sailfin catfish, is a confirmed invasive species with its native locality in south America specifically in the Amazon and adjoining tributaries (Hossain et al. 2018). This invasive species has been brought over by the fish aquaculture trade and seen to be propagating in many southeast Asian countries. This has also been a noted issue in the Kinabatangan. With only a single individual caught, many juveniles have been spotted in the planation drains throughout the oil palm planation throughout the sampling periods. *Setipinna melanochir* is a noted marine species (Fish base

2023). This anchovy is noted to propagate in freshwater lakes and is understudied in its reproductive mechanisms and whether it truly is a temporary visitor to Sabah's water ways (Inger and Chin 2002).

Limitations for this research starts with the small data set. A technique not piloted within this study was electric fishing; while the effects of electric fishing have on individuals is still disputed it could give us a better understanding of the biodiversity with many limitations to the more traditional fishing methods when it comes to planation drains. Understanding the composition of the sites sampled of these sites are hindered by the lack of taxonomy clarity and outdated guides. Many fish species are understudied especially in Sabah Borneo and therefore makes speciation heavily biased to one or two sources. Further research for this felines diet would be to fish within another individuals home range however the data used within this report was unique and one of a kind. Another method would be to catch individuals and to do scat analysis to identify prey species. However, being one of the most elusive of the Bornean cats scat sampling may need to be through night walks and identifying scat through visual appearance and later sequencing for confirmation. Alongside this however many fish species would need to barcoded to allow for species recognition through the scat samples.

Many gasp are present with freshwater fish communities and what condition Sabah's network of rivers are in. Spatial ecology of the fishes could indicate movement patterns when flooding begins as well as areas of priority when fishes begin reproducing. Research projects could be to start quantifying how much the effect of oil palm planation's have on fish populations. This could include water quality testing within and around oil palm plantations and sampling drains in various oil palm planation's, tributarie

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Appendix

All fishes caught within the study with additional measurements included.

Date	Time	Location	Latin name	Method	L	H	G
19/01/2023	06:23	RD	*Trichogaster trichopterus*	CN	6.4	3.7	0.8
19/01/2023	06:24	RD	*Trichogaster trichopterus*	CN	7.2	3.9	0.7
19/01/2023	06:26	RD	*Trichogaster trichopterus*	CN	7	3.6	0.6
19/01/2023	06:28	RD	*Anabas testudineus*	CN	9.8	3.4	1.4

19/01/2023	06:32	RD	*Anabas testudineus*	CN	0.7	3.5	1
19/01/2023	06:33	RD	*Trichogaster trichopterus*	CN	7.1	3.5	0.5
19/01/2023	06:34	RD	*Trichogaster trichopterus*	CN	6.5	3.6	0.7
19/01/2023	06:36	RD	*Anabas testudineus*	CN	8.6	3.4	1.1
19/01/2023	06:37	RD	*Anabas testudineus*	CN	11	4	2
19/01/2023	06:38	RD	*Clarias leiacanthus*	CN	27	6.8	2.5
19/01/2023	06:44	RD	*Clarias leiacanthus*	CN	24.5	4.3	2
19/01/2023	06:49	RD	*Trichogaster trichopterus*	CN	7.6	3.7	0.7
19/01/2023	06:50	RD	*Trichogaster pectoralis*	CN	14.3	4.5	1.3
19/01/2023	06:52	RD	*Clarias leiacanthus*	CN	23	3.7	2.2
19/01/2023	06:56	RD	*Barbonymus gonionotus*	CN	8.6	3.6	1.8
19/01/2023	06:57	RD	*Trichogaster trichopterus*	CN	6.8	3.3	0.6
19/01/2023	06:58	RD	*Trichogaster trichopterus*	CN	6.7	2.9	0.3
19/01/2023	06:59	RD	*Trichogaster trichopterus*	CN	5.9	2.8	0.3
19/01/2023	07:00	RD	*Barbonymus gonionotus*	CN	7.5	2.8	0.8
19/01/2023	07:01	RD	*Barbonymus gonionotus*	CN	9.5	3.7	1
19/01/2023	07:02	RD	*Leptobarbus hoevenii*	CN	12.2	2	3.5
19/01/2023	07:04	RD	*Leptobarbus hoevenii*	CN	13.5	3.7	2
20/01/2023	06:17	RD	*Barbonymus gonionotus*	CN	7.1	3.3	0.6
20/01/2023	06:45	RD	*Barbonymus gonionotus*	CN	7.7	3.1	0.8
20/01/2023	06:46	RD	*Trichogaster trichopterus*	CN	10.1	3.1	1.4
22/01/2023	06:46	RD	*Cyclocheilichthys repasson*	CN	7.5	2.9	0.9
22/01/2023	06:48	RD	*Barbonymus gonionotus*	CN	7.7	3.2	0.7
22/01/2023	06:49	RD	*Barbonymus gonionotus*	CN	7.5	2.8	0.9
22/01/2023	06:51	RD	*Barbonymus gonionotus*	CN	9.5	3.9	1.1
22/01/2023	06:52	RD	*Barbonymus gonionotus*	CN	9.2	3.9	1.1
22/01/2023	06:53	RD	*Barbonymus gonionotus*	CN	6.9	3.2	1
22/01/2023	06:54	RD	*Trichogaster trichopterus*	CN	6.4	2.1	0.7
22/01/2023	06:59	RD	*Osteochilus ingeri*	CN	10.1	3.7	1.2
22/01/2023	07:00	RD	*Barbonymus gonionotus*	CN	8.8	3.6	1.1
23/01/2023	06:39	RD	*Anabas testudineus*	CN	8.9	3.9	1
23/01/2023	06:42	RD	*Anabas testudineus*	CN	10.7	4.1	4.3
23/01/2023	06:43	RD	*Trichogaster trichopterus*	CN	8	3.1	0.9
23/01/2023	06:55	RD	*Barbonymus gonionotus*	CN	10.3	4.5	1.3
23/01/2023	06:56	RD	*Barbonymus gonionotus*	CN	7.5	2.9	1
23/01/2023	06:58	RD	*Barbonymus gonionotus*	SC	2.1	0.4	NA
23/01/2023	07:00	RD	*Rasbora tornieri*	SC	2	0.4	NA
23/01/2023	07:01	RD	*Rasbora tornieri*	SC	2.9	0.5	NA
23/01/2023	07:03	RD	*Rasbora tornieri*	SC	3.6	0.6	NA
23/01/2023	07:05	RD	*Rasbora tornieri*	SC	4.1	0.9	NA
23/01/2023	07:06	RD	*Rasbora tornieri*	SC	3.1	0.6	NA
23/01/2023	07:11	RD	*Rasbora tornieri*	SC	2.4	0.4	NA
23/01/2023	07:12	RD	*Rasbora tornieri*	SC	2.9	0.6	NA
23/01/2023	07:13	RD	*Rasbora tornieri*	SC	3.3	0.8	NA
23/01/2023	07:14	RD	*Rasbora tornieri*	SC	2.2	0.4	NA
23/01/2023	07:15	RD	*Rasbora tornieri*	SC	2.6	0.5	NA
23/01/2023	07:16	RD	*Rasbora tornieri*	SC	2.4	0.4	NA
23/01/2023	07:17	RD	*Rasbora tornieri*	SC	1	0.3	NA
23/01/2023	07:18	RD	*Rasbora tornieri*	SC	1.4	0.4	NA

23/01/2023	07:28	RD	*Rasbora tornieri*	SC	2.7	0.7	NA
23/01/2023	07:29	RD	*Rasbora tornieri*	SC	1.3	0.3	NA
23/01/2023	07:30	RD	*Rasbora tornieri*	SC	1.6	0.6	NA
23/01/2023	07:31	RD	*Rasbora tornieri*	SC	2.1	0.4	NA
23/01/2023	07:32	RD	*Rasbora tornieri*	SC	1	0.3	NA
02/03/2023	05:57	CDR	*Macrobrachium rosenbergii*	SC	1.9	0.1	>0.1
02/03/2023	05:59	CDR	*Rasbora tornieri*	SC	1.4	>0.1	>0.1
02/03/2023	06:01	CDR	*Rasbora tornieri*	SC	0.4	>0.1	>0.1
02/03/2023	06:02	CDR	*Rasbora tornieri*	SC	0.5	>0.1	>0.1
02/03/2023	06:03	CDR	*Rasbora tornieri*	SC	0.4	>0.1	>0.1
02/03/2023	06:05	CDR	*Rasbora tornieri*	SC	0.5	>0.1	>0.1
02/03/2023	06:06	CDR	*Rasbora tornieri*	SC	1.4	0.1	>0.1
02/03/2023	06:07	CDR	*Rasbora tornieri*	SC	1.3	0.1	>0.1
02/03/2023	06:08	CDR	*Rasbora tornieri*	SC	1.7	0.1	>0.1
02/03/2023	06:18	CDR	*Anabas testudineus*	CN	11.2	3.7	1.9
02/03/2023	06:20	CDR	*Anabas testudineus*	CN	10.4	3.4	2.1
02/03/2023	06:22	CDR	*Anabas testudineus*	CN	10.9	3.4	2.1
02/03/2023	06:38	CDR	*Trichogaster trichopterus*	CN	7.1	3.2	0.9
03/03/2023	07:00	CDR	*Oxyeleotris marmorata*	GN	15.2	3.1	2.4
03/03/2023	07:01	CDR	*Anabas testudineus*	GN	8.2	3	1.2
03/03/2023	07:03	CDR	*Anabas testudineus*	GN	10.6	3.1	1.7
03/03/2023	07:05	CDR	*Anabas testudineus*	GN	10.5	4.8	2.6
03/03/2023	07:06	CDR	*Anabas testudineus*	GN	13.1	4.2	2.1
03/03/2023	07:53	CDR	*Anabas testudineus*	GN	11.7	4.6	2.1
03/03/2023	07:54	CDR	*Anabas testudineus*	GN	13.9	4.5	2.9
04/03/2023	06:24	CDR	*Rasbora tornieri*	SC	1.7	>0.1	>0.1
04/03/2023	06:28	CDR	*Rasbora tornieri*	SC	1.2	0.1	>0.1
04/03/2023	06:29	CDR	*Macrobrachium rosenbergii*	SC	1.4	>0.1	>0.1
04/03/2023	07:21	CDR	*Anabas testudineus*	GN	10.9	3.5	1.4
04/03/2023	07:23	CDR	*Anabas testudineus*	GN	10.6	3.3	2.6
04/03/2023	07:24	CDR	*Anabas testudineus*	GN	10.5	3.9	1.8
05/03/2023	07:06	CDR	*Rasbora tornieri*	SC	2.8	0.4	>0.1
05/03/2023	07:08	CDR	*Rasbora tornieri*	SC	2.6	0.6	>0.1
05/03/2023	07:10	CDR	*Rasbora tornieri*	SC	3.8	0.9	0.3
05/03/2023	07:11	CDR	*Rasbora tornieri*	SC	2.1	0.6	>0.1
05/03/2023	07:14	CDR	*Macrobrachium rosenbergii*	SC	2.9	0.4	0.3
05/03/2023	07:15	CDR	*Macrobrachium rosenbergii*	SC	2.5	0.4	0.2
05/03/2023	07:25	CDR	*Anabas testudineus*	GN	10.9	3.9	2.8
26/03/2023	NA	TD	*Anabas testudineus*	CN	14.1	5.8	4.0
26/03/2023	NA	TD	*Anabas testudineus*	CN	16.1	8.1	5.3
26/03/2023	NA	TD	*Anabas testudineus*	CN	14.7	6.8	4.6
26/03/2023	NA	TD	*Anabas testudineus*	CN	15.3	6.8	4.3
26/03/2023	NA	TD	*Anabas testudineus*	CN	14.7	6.4	5.3
26/03/2023	NA	TD	*Anabas testudineus*	CN	12.4	5.8	4.9
26/03/2023	NA	TD	*Channa striata*	CN	22.3	9.6	3.6
26/03/2023	NA	TD	*Channa striata*	CN	29.5	12.3	5.7

26/03/2023	NA	TD	*Channa striata*	CN	31.9	13.6	6.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.4	1.2	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.6	1.2	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	0.9	0.2
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.2	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.6	1.3	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.3	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.0	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.3	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.4	1.3	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.0	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.7	1.7	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.7	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.9	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.5	1.2	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.1	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.5	0.6	0.1
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.5	0.7	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	1.0	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.2	1.1	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	1.0	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.9	1.0	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.4	1.2	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.4	0.8	0.2
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.5	1.2	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.2	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.5	0.8	0.2
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.1	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.6	0.9	0.2
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.8	0.2
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.2	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	0.9	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.1	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.5	0.7	0.1
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.9	0.3

26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.7	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	1.8	0.9	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.0	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.1	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.1	0.3
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.8	1.5	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.5	1.3	0.5
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.1	1.0	0.4
26/03/2023	NA	TD	*Rasbora tornieri*	SC	2.3	1.2	0.4
27/03/2023	NA	TD	*Trichopodus trichopterus*	GN	7.8	2.1	2.5
27/03/2023	NA	TD	*Trichopodus trichopterus*	GN	8.8	2.1	3.2
27/03/2023	NA	TD	*Trichopodus trichopterus*	GN	10.6	2.4	3.3
27/03/2023	NA	TD	*Anabas testudineus*	GN	10.1	4.8	3.4
27/03/2023	NA	TD	*Anabas testudineus*	GN	13.3	5.9	3.8
27/03/2023	NA	TD	*Anabas testudineus*	GN	12.8	6.1	4.2
27/03/2023	NA	TD	*Anabas testudineus*	GN	13.7	6.1	3.9
27/03/2023	NA	TD	*Anabas testudineus*	GN	15.7	7.2	5.1
27/03/2023	NA	TD	*Anabas testudineus*	GN	17.3	8.0	5.5
27/03/2023	NA	TD	*Barbonymus gonionotus*	GN	10.5	5.5	3.4
27/03/2023	NA	TD	*Barbonymus gonionotus*	GN	10.4	5.9	3
27/03/2023	NA	TD	*Barbonymus gonionotus*	GN	14.2	7.5	4.6
27/03/2023	NA	TD	*Channa striata*	GN	16.1	7.1	2.8
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	10.6	4.4	1.9
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	11.3	4.5	1.5
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	12.4	5.2	1.6
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	11.1	4.3	1.7
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	10.1	3.6	1.2
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	1.7	4.7	1.3
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	9.0	4.1	1.6
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	8.7	3.2	1
01/06/2023	NA	TD	*Barbonymus gonionotus*	GN	10.3	4.0	1.3
01/06/2023	NA	TD	*Oxyeleotris marmorata*	GN	17.4	3.1	4.2
02/06/2023	NA	TD	*Trichopodus trichopterus*	CN	5.7	2.4	0.5
02/06/2023	NA	TD	*Trichopodus trichopterus*	CN	5.7	1.4	0.6
02/06/2023	NA	TD	*Barbonymus gonionotus*	CN	8.6	3.7	0.9
02/06/2023	NA	TD	*Anabas testudineus*	CN	9.2	3.3	1.5
02/06/2023	NA	TD	*Anabas testudineus*	CN	8.7	2.7	1.7
02/06/2023	NA	TD	*Anabas testudineus*	CN	9.1	2.0	1.3
02/06/2023	NA	TD	*Anabas testudineus*	CN	4.2	3.1	1.1
02/06/2023	NA	TD	*Anabas testudineus*	CN	8.9	2.1	1.1
02/06/2023	NA	TD	*Barbonymus gonionotus*	CN	10.6	3.5	1.5
02/06/2023	NA	TD	*Barbonymus gonionotus*	CN	9.2	3.6	1.1
02/06/2023	NA	TD	*Anabas testudineus*	CN	7.3	2.6	1.2
02/06/2023	NA	TD	*Anabas testudineus*	CN	8.4	1.5	1.9
02/06/2023	NA	TD	*Anabas testudineus*	CN	7.8	2.9	1.8
02/06/2023	NA	TD	*Anabas testudineus*	CN	8.0	2.7	1.8
22/03/2023	06:15	ED	*Trichogaster trichopterus*	CN	6.1	2.8	0.2
22/03/2023	06:52	ED	*Anabas testudineus*	CN	6.6	2.2	1.1
22/03/2023	06:56	ED	*Anabas testudineus*	CN	7.1	2.5	1.4

22/03/2023	06:57	ED	*Trichogaster trichopterus*	CN	6.5	3.6	0.6
22/03/2023	07:00	ED	*Anabas testudineus*	CN	8.6	3.1	1.5
22/03/2023	07:03	ED	*Anabas testudineus*	CN	6.8	3.1	1.5
22/03/2023	07:19	ED	*Trichogaster trichopterus*	CN	7.6	3.3	1.1
22/03/2023	07:21	ED	*Anabas testudineus*	CN	8.1	2.7	1
22/03/2023	07:24	ED	*Puntius bramoides*	CN	8.4	3.4	1
22/03/2023	07:44	ED	*Anabas testudineus*	CN	9.3	3.6	1
22/03/2023	07:45	ED	*Channa striata*	CN	17.1	2.6	2.1
23/03/2023	07:25	ED	*Anabas testudineus*	CN	7.9	3.1	0.5
23/03/2023	07:33	ED	*Rasbora tornieri*	SC	3.5	0.9	1.7
23/03/2023	07:34	ED	*Macrobrachium rosenbergii*	SC	2.9	0.7	0.4
24/03/2023	07:21	ED	*Cyclocheilichthys repasson*	SC	4.8	1.3	0.9
24/03/2023	07:31	ED	*Pterogoplichthys paradalis*	SC	4.2	0.9	1.7
24/03/2023	07:53	ED	*Channa striata*	CN	1.6	0.9	1.2
24/03/2023	07:59	ED	*Oxyeleotris marmorata*	SC	4.8	0.8	0.4
25/03/2023	07:23	ED	*Anabas testudineus*	CN	3.9	3.4	1.8
25/03/2023	07:24	ED	*Anabas testudineus*	CN	3.4	1.4	0.5
25/03/2023	07:40	ED	*Puntius bramoides*	CN	6.4	1.4	0.9
25/03/2023	07:43	ED	*Channa striata*	CN	15.4	2.5	2
25/03/2023	07:54	ED	*Kryptopterus parvanalis*	SC	4.8	1	0.2
01/02/2023	09:11	DU02	*Leiocassis robustus*	HL	8.5	5.5	2.8
01/02/2023	09:26	DU01	*Setipinna melanochir*	GN	9.6	4.7	0.9
02/02/2023	08:37	DU04	*Leiocassis robustus*	HL	9.6	8.2	5.9
02/02/2023	09:24	DU03	*Setipinna melanochir*	GN	21.2	5.4	1.4
02/02/2023	09:26	DU03	*Setipinna melanochir*	GN	23.1	9.4	0.9
02/02/2023	09:29	DU03	*Anabas testudineus*	GN	10.3	3.4	1.6
02/02/2023	09:31	DU03	*Setipinna melanochir*	GN	18.1	4.6	0.9
02/02/2023	09:32	DU03	*Anabas testudineus*	GN	12.6	4.5	2.6
03/02/2023	08:47	DU06	*Leiocassis robustus*	HL	9.6	5.5	3.3
04/02/2023	09:36	DU04	*Cyclocheilichthys repasson*	GN	8.5	2	1
04/02/2023	09:38	DU04	*Setipinna melanochir*	GN	9.2	5.6	0.9
10/07/2023	NA	DEH	Rasbora tornieri	SC	3.3	0.7	0.1
10/07/2023	NA	DEH	Rasbora tornieri	SC	3	0.7	0.1
10/07/2023	NA	DEH	Macrobrachium rosenbergii	SC	2.7	0.4	0.2
10/07/2023	NA	DEH	Rasbora tornieri	SC	2.9	0.8	0.1
10/07/2023	NA	DEH	Rasbora tornieri	SC	2.9	0.8	0.1
10/07/2023	NA	DEH	Rasbora tornieri	SC	2.3	0.8	0.2
10/07/2023	NA	DEH	Rasbora tornieri	SC	2.7	0.7	0.2
10/07/2023	NA	DEH	Rasbora tornieri	SC	3.4	0.7	0.2
10/07/2023	NA	DEH	Rasbora tornieri	SC	2.6	0.6	0.2
10/07/2023	NA	DEH	Rasbora tornieri	SC	1.7	0.3	0.1
10/07/2023	NA	DEH	Rasbora tornieri	SC	1.7	0.4	0.1
10/07/2023	NA	DEH	Rasbora tornieri	SC	1.7	0.3	0.1
10/07/2023	NA	DEH	Anabas testudineus	CN	5.2	1.7	0.6
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.4	0.8	0.2
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.2	1	0.1
13/07/2023	NA	DEH	Rasbora tornieri	SC	3	0.9	0.1
13/07/2023	NA	DEH	Cyclocheilichthys repasson	SC	3.6	0.9	0.1

13/07/2023	NA	DEH	Channa striata	SC	3.4	0.6	0.8
13/07/2023	NA	DEH	Rasbora tornieri	SC	3	0.9	0.2
13/07/2023	NA	DEH	Cyclocheilichthys repasson	SC	4.8	0.9	0.4
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.3	0.6	0.3
13/07/2023	NA	DEH	Rasbora tornieri	SC	4.2	0.8	0.4
13/07/2023	NA	DEH	Rasbora tornieri	SC	2.4	0.5	0.1
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.5	1	0.2
13/07/2023	NA	DEH	Rasbora tornieri	SC	2.8	0.9	0.3
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.1	0.8	0.1
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.5	0.7	0.2
13/07/2023	NA	DEH	Rasbora tornieri	SC	3.6	0.9	0.3
13/07/2023	NA	DEH	Rasbora tornieri	SC	3	0.5	0.1
14/07/2023	NA	DEH	Barbonymus gonionotus	CN	5.9	2	0.6
14/07/2023	NA	DEH	Channa striata	SC	4	0.6	0.4
14/07/2023	NA	DEH	Cyclocheilichthys repasson	SC	4.2	1	0.3
14/07/2023	NA	DEH	Macrobrachium rosenbergii	SC	2.6	0.3	0.3
14/07/2023	NA	DEH	Trichogaster trichopterus	SC	1.7	0.4	0.1
14/07/2023	NA	DEH	Rasbora tornieri	SC	3.4	0.9	0.05
14/07/2023	NA	DEH	Channa striata	SC	4.2	0.1	0.4
14/07/2023	NA	DEH	Channa striata	SC	5.5	0.9	0.6
14/07/2023	NA	DEH	Barbonymus gonionotus	SC	4.2	1.1	0.3
14/07/2023	NA	DEH	Channa striata	SC	6.1	0.9	0.6
14/07/2023	NA	DEH	Rasbora tornieri	SC	3.5	0.9	0.2
14/07/2023	NA	DEH	Rasbora tornieri	SC	3.3	0.7	0.1
14/07/2023	NA	DEH	Rasbora tornieri	SC	2.9	0.7	0.1
14/07/2023	NA	DEH	Rasbora tornieri	SC	3.2	0.6	0.2
14/07/2023	NA	DEH	Cyclocheilichthys repasson	SC	2.3	0.5	0.1
15/07/2023	NA	DEH	Channa striata	SC	7.6	1	0.8
15/07/2023	NA	DEH	Barbonymus gonionotus	SC	5.6	2	0.5
15/07/2023	NA	DEH	Anabas testudineus	SC	3.8	1.4	0.5
15/07/2023	NA	DEH	Rasbora tornieri	SC	3.3	0.5	0.1
15/07/2023	NA	DEH	Barbonymus gonionotus	SC	3.4	0.7	0.2
15/07/2023	NA	DEH	Channa striata	SC	4.2	0.5	0.6
15/07/2023	NA	DEH	Anabas testudineus	SC	2.7	0.8	0.2
15/07/2023	NA	DEH	Rasbora tornieri	SC	3.3	0.7	0.1
15/07/2023	NA	DEH	Barbonymus gonionotus	SC	2.5	0.9	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	2.5	0.4	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	3.1	0.7	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	2.3	0.2	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	2.3	0.5	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	2.3	0.8	0.1
15/07/2023	NA	DEH	Rasbora tornieri	SC	3.2	0.7	0.2
15/07/2023	NA	DEH	Channa striata	SC	34.8	3.7	4.6
15/07/2023	NA	DEH	Kryptopterus cryptopterus	SC	13.6	3.5	0.4

All habitat factors recorded over the sampling.

Site name	Site number	Site type	Depth	Temperature	pH

Ranni's drain	Site 1	Core	1	29	7.07
Ranni's drain	Site 1	Core	1.2	27.2	6.9
Ranni's drain	Site 1	Core	1.2	27.2	6.9
Ranni's drain	Site 1	Core	1.2	29	7.54
Ranni's drain	Site 1	Core	1.3	27.8	7.29
Corner drain 1	Site 3	Core	1	29	7.07
Corner drain 1	Site 3	Core	1.2	27.2	6.9
Corner drain 1	Site 3	Core	1.2	27.2	6.9
Corner drain 1	Site 3	Core	1.2	29	7.54
Corner drain 1	Site 3	Core	1.3	27.8	7.29
Elephant house drain	Site 4	Core	0.5	27.9	7.1
Elephant house drain	Site 4	Core	0.5	27.5	7.1
Elephant house drain	Site 4	Core	0.5	27.1	6.9
Elephant house drain	Site 4	Core	0.5	27.1	6.9
Elephant house drain	Site 4	Core	0.6	28.2	7
Elephant house drain	Site 4	Core	0.6	28.2	7
Elephant house drain	Site 4	Core	0.6	27.6	6.8
Elephant house drain	Site 4	Core	0.6	27.6	6.8
Usu oxbow	Site 2	Home	20	26	7.43
Usu oxbow	Site 2	Home	20	27.4	7.28
Usu oxbow	Site 2	Home	20	27.4	7.28
Usu oxbow	Site 2	Home	20	27.6	7.23
Usu oxbow	Site 2	Home	20	27.6	7.38
Usu oxbow	Site 2	Home	20	27.6	7.38
Usu oxbow	Site 2	Home	20	27.6	7.52
Usu oxbow	Site 2	Home	20	27.6	7.52
Usu oxbow	Site 2	Home	20	27.6	7.52
Tyler's drain	Site 5	Home	1.2	28.7	6.9
Tyler's drain	Site 5	Home	1.2	29.1	6.8
Tyler's drain	Site 5	Home	1.3	29.7	6.7
Tyler's drain	Site 5	Home	1.3	29.6	6.6
Tyler's drain	Site 5	Home	0.6	28.7	6.7
Tyler's drain	Site 5	Home	0.6	28.7	6.7
Tyler's drain	Site 5	Home	0.5	28.9	7.04
Tyler's drain	Site 5	Home	0.5	29.1	7.15
Elephant house tributary	Site 6	Home	1.5	29.6	7.29
Elephant house tributary	Site 6	Home	0.5	28.5	5.85
Elephant house tributary	Site 6	Home	0.75	27.6	6.25
Elephant house tributary	Site 6	Home	1	28.3	6.95