Taxonomy, Phylogeny and Habitat Suitability of Bearded Sakis (*Chiropotes,* Lesson 1840)

Maria Oleksandra Stafford

Student Id Number: @00522536

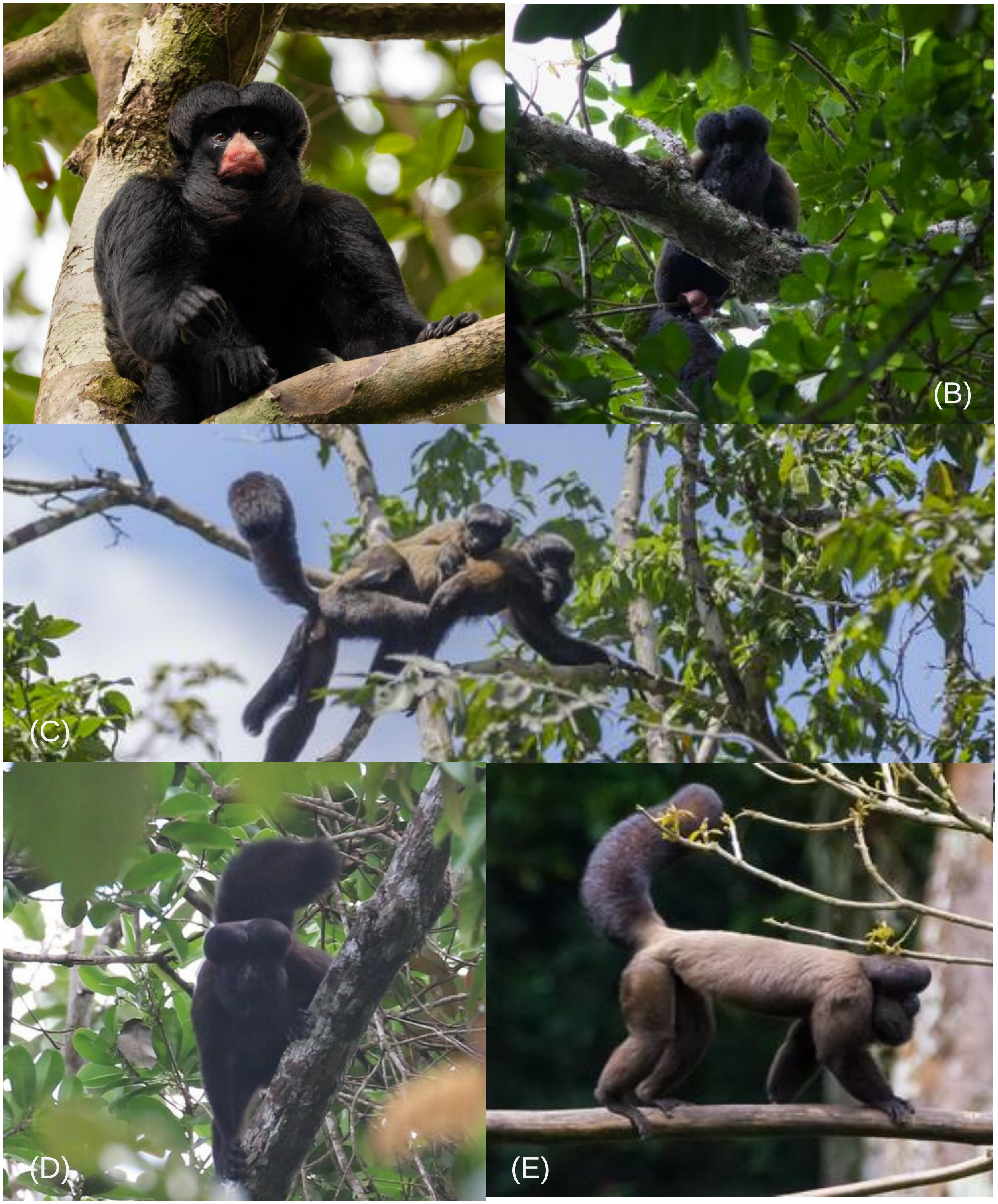
MSc (by Research) Thesis

2023

School of Science, Engineering and Environment

University of Salford

Supervised by Prof. Jean P. Boubli



Bearded sakis: (A) *Chiropotes albinasus*; Jessica dos Anjos. (B) *Chiropotes chiropotes*, Gabriel Leite. (C) *Chiropotes sagulatus*, Thomas Fuhrmann (D) *Chiropotes satanas*, Mats Hilderman. (E) *Chiropotes utahicki*, Nina Wenoli. Photos retrieved from iNaturalist sightings.

Table of Contents

List of Figures

List of Tables

Acknowledgements

Throughout my research, there have been many contributions and invaluable pieces of wisdom shared with me. I could not have done this study without the guidance and patience of my supervisor, Professor Jean P. Boubli, who has always assured me I have the capability to achieve anything. This research would have been impossible without you. I look forward to working with you again in the future and continuing my education. I promise to always provide you with lots of snacks!

I cannot express my appreciation enough to Felipe Ennes Silva and Romina Bastita, who have both provided me with not only a diverting and supportive working environment but consistently assisted me when I needed help. I would also like to note how much I appreciate Felipe, specifically, for providing me with a thorough Rstudio script and taking the time to discuss it with me. You are both a great inspiration to me, and I am in awe of how much you have achieved. I truly hope to work with you both again in the future and learn more from you.

I am forever indebted to my fellow student and friend, Chloe Grant. You have been through this process with me while doing your own research and have always found the time to be my biggest supporter. You are such a passionate and intelligent individual who, even though I am the same age as you, I look up to. I will never be able to thank you enough for making this experience, and the years I have known you, the best I have ever had. I cannot wait to see what you go on to do.

Last, but certainly not least, I would like to thank my mother, Lida Wedgbury, my stepfather, Paul Wedgbury, and my brother, Thomas Stafford. All of you have provided me with so much encouragement. Thomas, you have always been there to lend an empathetic ear and give me moments of comic relief. To my mother, I truly would not be the individual I am today, or have had these opportunities without you. You are both incredible. I am lucky we are so close.

Abstract

Pitheciinae are a subfamily of South American monkeys. They possess dental specialisations that allow them to break open the hard pericarps of fruits, making them ecological seed predators. The genera that make up this subfamily are *Cacajao* (Lesson, 1840), *Chiropotes* (Lesson, 1840), and *Pithecia* (Demarest, 1804). Pithiciinae as a whole are not well understood, with only a few studies being done on their phylogeny and distribution. This study focuses on the genus *Chiropotes*. The overall aim of this study is to review their taxonomy and find information that can shed some light on uncertainties within their lineage. This was completed through a literature review of the species taxonomy, compiling the history of their classifications and how these have changed and continue to be argued. A phylogenetic tree was also produced using all available cyt*b* data for *Chiropotes* available on NCBI. The findings revealed some intriguing developments and bolstered the current debate over species status. The molecular analysis overall uncovered that *Chiropotes albinasus* is sister to all other *Chiropotes* spp. and that *Chiropotes utahickae and Chiropotes satanas* are sister species. The current confusion between *Chiropotes chiropotes, Chiropotes sagulatus,* and *Chiropotes israelita* was seen consistently through my tree, with no clear distinction being made between each species and their branching. I have also plotted the distribution of *Chiropotes* and assessed their habitat suitability. Within this, I shed some light on which bioclimatic variables most affect each species. I then link this to their diet, current deforestation rates, and where protected areas are found in relation to these assessments to provide conservation suggestions for the future. *Chiropotes* spp. have a patchy distribution and are found in dispersed populations throughout their home range. There is concern for deforestation and habitat fragmentation within the species distribution, with the most suitable habitat areas being found in areas with high habitat loss. Studies on *Chiropotes* distribution, survival in fragmented habitats, and their population status need to be prioritised.

Chapter 1 - Literature Review

1.1 Introduction

Pitheciidae is made up of two subfamilies, Callicebinae and Pitheciinae, with six genera spread across the two. The subfamily Callicebinae is made up of three genera: *Callicebus* (Thomas, 1903), *Cheracebus* (Byrne et al., 2016), and *Plecturocebus* (Byrne et al., 2016). The subfamily Pitheciinae is made up of three genera: *Pithecia* (Demarest, 1804), *Cacajao* (Lesson, 1840), and *Chiropotes* (Lesson, 1840). The two latter genera are sister taxa, *Pithecia* is sister to the two. However, there is potential for taxonomic confusion amongst the subfamilies as *Pithecia* and *Chiropotes* share the common name "Saki." This is due to *Chiropotes* previously being part of *Pithecia* before receiving full generic status as *Cheiropotes* by Reichenbach (1862) before being amended to *Chiropotes* by Gray (1870). Therefore, this shared common name is rooted in this historical grouping (Barnett et al., 2012). *Chiropotes* are known commonly in Brazil as cuxiú by indigenous peoples. There have been proposals for the common name of 'bearded saki' to be replaced with the name cuxiú (Barnett et al., 2012). This was not only thought to be more taxonomically appropriate due to the other respective genera in Pitheciidae having indigenously derived names (*Uacari*, *Cacajao,* and Saki, *Pithecia*). This would also reduce any confusion between bearded sakis and sakis being of the same species (Barnett et al., 2012). There is both fossil and molecular evidence to support that *Pithecia* diverged from the other genera 15.5ma, with *Chiropotes* and *Cacajao* diverging from one another 8.95ma (Silva, 2020).

Pitheciinae, more specifically the genus *Chiropotes*, will be the focus of this study. The Pithecines are medium-sized monkeys (1.8–4 kg) and are all arboreal quadrupeds (Rosenberger & Hartwig, 2013). This genus, out of all New World primates, possesses the most prominent flesh-coloured noses. Pithecinae are recognised, however, for their dental specialisations and seed predation. The genus *Chiropotes*, specifically, is one of the most morphologically specialised seed predators. This is a unique niche in the order Primates, and it has been suggested to be an evolutionary adaptation to take advantage of the abundant Lecythidaceae in Amazonia, a family of trees that produce fruits with unusually large nutritious seeds (Ayres et al., 2013). Lecythidaceae, as well as Chrysobalanaceae and Sapotaceae, are their preferred plant families to feed from (Kinzey & Norconk, 1990). They possess robust canines and procumbent incisors that allow them to break open fruits that are protected by a pericarp (Shaffer, 2013). This specialisation has made them play a fundamental role in seed dispersal (Fleagle, 2013). *Chiropotes chiropotes* and *Chiropotes albinasus* have been seen to drop entire seeds while feeding (Boyle, et al., 2012). This means these seeds germinate and continue to mature while on the ground, an often much-ignored part of dispersal biology, making them effective in seed dispersal (Barnett et al., 2012). In *Chiropotes*, seeds, both immature and mature, make up 75% of their diet, with the species consuming more than 175 species of plant. For Shaffer (2013), seed consumption within *Chiropotes* is linked to food abundance, and in months where fruit is scarce, they will instead consume such things as insects and flowers. bearded sakis will actively forage for arthropods (mainly orthopterans and lepidopterans); however, these foods make up a small percentage of their diet and are only foraged for when food is scarce (Van Roosmalen et al., 1988; Norconk, 1996; Veiga & Ferrari, 2006). Their teeth morphology is a foraging adaptation that allows them to break open pericarps with extreme hardness. This has been described as sclerocarpic foraging and is comparable to that of avian seed predation in macaws and parrots (Kinzey & Norconk, 1990). The first observation of geophagy in bearded sakis was made by Veiga & Ferrari (2007). Individuals were seen gathering soil from the termitarium from an arboreal tree. It was believed that the soil was ingested to provide an essential mineral supplement, due to the limited diet they may have due to the size of their reduced forest habitat due to recent fragmentation caused by the flooding from a hydroelectric dam (Veiga & Ferrari, 2007).

There is concomitant variation in group behaviour which includes monogamy within Pithecia, which creates nuclear family groups (Veiga et al., 2013). *Cacajao* and *Chiropotes,* however, are formed of multimale-multifemale groups with a complex fission-fusion society. Pitheciidae are mainly found in shy denizens and high canopies where ecological challenges can be seen reflected in their morphological adaptations. Due to their fast moving and difficult to reach habitats, they are very difficult to study. However, in recent years there has been a surge of research, and as a result there is now knowledge on ecology and taxonomy and the possibility to provide comprehensive comparisons between primates.

1.2 Dissertation aims and objectives

This dissertation consists of three chapters, with the main points of discussion focusing on the taxonomy, phylogeny, and habitat suitability of *Chiropotes*. In Chapter 1, I focus on describing the species as a whole, reviewing aspects such as their distribution, morphology, and ecology. I also provide an up-to-date clarification of their taxonomy and distribution, with a description of how this has changed in recent years. In Chapter 2, I use 59 cytochrome *b* sequences from Genbank (57 from *Chiropotes* and 1 each from *Pithecia* and *Cacajao*) to create a phylogenetic tree of the species. I then present and discuss a phylogenetic analysis of the species using only mitochondrial data before comparing my results to a phylogenetic tree created from full genomes. In Chapter 3, I provide a map of *Chiropotes* distribution that consists of the latest data from various sources (literature reviews, samples, sightings, etc.). This is the largest dataset of *Chiropotes* sightings compiled to date. In this chapter, I also use MaxEnt to create a habitat suitability model and calculate their extent of occurrence and area of occupancy. This, coupled with using different bioclimatic variables, allowed me to make an interpretation of their distribution and biodiversity in different scenarios. Following on from this, I evaluate the extent of suitable areas for each species and discuss whether they would be able to migrate from their home ranges due to habitat fragmentation. This is extremely important for their conservation and will help reassess their distribution.

My objective with this dissertation is to provide a comprehensive and up-to-date revision of *Chiropotes* that can act as a reference for future research. This dissertation establishes a foundation of fundamental aspects of the species upon which additional knowledge and insight can be built. The discussion surrounding *Chiropotes* and the uncertainty of many details regarding their taxonomy, distribution, and conservation means more research is essential. Further research into *Chiropotes* will hopefully expand and continue from this.

1.3 Chiropotes biology, ecology, and conservation

Below, I will focus on a revision of the taxonomy of *Chiropotes* and ongoing conservation efforts. I will be projecting different bioclimatic variables onto their home range in order to gather an estimation of potential future habitat loss as well as areas of refuge in relation to how the species may move localities based on future predictions of deforestation. Therefore, understanding the background of the species is vital for my work.

1.3.1 Morphology

Chiropotes possess broad, wide noses with widely separated nostrils. They all, apart from *Chiropotes albinasus*, have dark faces. The noses of *Chiropotes albinasus* are red and flesh-coloured. The extremities of *Chiropotes* are darker than their bodies, which are thinly lined with hair of a black, brown, and orange colour. *Chiropotes chiropotes* have a rusty orange coloured body, whilst the rest of the genus has dark hair. The body's fur parts down the mid dorsal line from its forehead to tail tip (Peetz & Schuchmann, 2001). *Chiropotes* often appear as though they are wearing capes due to the long hair on their shoulders and upper arms (Ankel-Simons, 2007). Their tails are non-prehensile and quite long and bushy, almost fox-like, with the hairs becoming longer distally and ending in a square tip (Hershkovitz, 1985; Peetz & Schuchmann, 2001). However, for the first two months of their life, their tails are prehensile (Van Roosmalen et al., 1988).

Their most noticeable trait is their coronal tufts and beard, which are thought to have been a modification and evolution of those seen in *Pithecia.* The coronal tuft is round and often forms two distinct spherical shapes on top of their heads. The beard is bulbous and round, too. Males have longer and thicker beards, typically, than females do. The ears are generally not visible due to this thick fur. Typically, pelage difference is the easiest way to distinguish species of bearded saki (Bonvicino et al., 2003). *Chiropotes israelitas* most eminent feature is its tawny-olive and brown dorsum and black extremities. They also possess the coronal tuft as well as a hair either side of their head, which frames their hairless face in an all-black colour (Bonvicino et al., 2003). *Chiropotes chiropotes* are completely black but have light brown and copper hair on their back. Its extremities are also black (Hershkovitz, 1985; Peetz, 2001; Bonvicino et al., 2003). *Chiropotes utahicki* have a coat that is a copper brown colour, but their back is a brownish colour (Hershkovitz, 1985; Bonvicino et al., 2003). In contrast to this, their extremities are a dark brown, as is their beard, however, their tail is a brown-black colour (Hershkovitz, 1985). *Chiropotes satanas* have a dark brown and black back, with their extremities being a somewhat darker colour than their bodies. *C. satanas* have black faces, but often have lighter colours scattered throughout (Hershkovitz, 1985). *Chiropotes albinasus* is mainly black across its entire body, including the underside of its body. They have a sharply contrasting nose and upper lip, which is a whitish colour. In *Chiropotes albinasus,* the female's head tufts are less developed than in males (Hershkovitz, 1985). Adult females, as well as non-adult males, do not possess the supraorbital ridges and sagittal crest that males possess (Hershkovitz, 1985).

Bearded sakis predominantly move by walking and running quadrupedally (Fleagle & Mittermeier, 1980). *Chiropotes satanas* have been seen to move quadrupedally through 80% of all locomotion. They also have been seen to leap; however, this is less frequent and only makes up around 18% of bouts (Fleagle & Mittermeier, 1980). This leaping behaviour correlates with body size and habitat preferences. Bearded sakis pattern of forest use means they leap from terminal branches and gain momentum before leaping to take off. During these leaps, bearded sakis will minimise the force of landing by doing so on all four limbs (Walker, 2005).

Bearded sakis are highly specialised morphologically to consume immature seeds. They possess powerful cranial, mandibular, and dental adaptations. The canines of *Chiropotes* are large and robust. In canine biting specifically, *Chiropotes* possess the most bite force and efficiency of all Pithiciinae monkeys (Ledogar et al., 2018). These canines have buccolingual tapering, which has given the teeth a cutting edge (Hershkovitz, 1987). The shape created by this tapering conserves the muscle force needed to crack open the tough husks of unripe seeds and fruit and preserves the teeth. This is done through first using a forceful scrape into the pericarp of immature fruit. Once the pericarp is punctured, *Chiropotes* use their narrow recumbent incisors to scoop the fruit flesh and seeds from the inside of the husk (Kinzey & Norconk, 1990). The molars and premolars are also well suited to the diet of *Chiropotes* and are able to grind and crush highly fibrous seeds. Secondary breakdowns of seed particles are facilitated through crenulations in the low molar cusps Pithiciinae possess. These highly crenulated teeth increase the number of occlusal surface features, which helps to position seeds during chewing (Ledogar et al., 2013).

1.3.2 Behaviour

1.3.2.1 Social structure and organisation

It has been extremely difficult to conduct social studies on bearded sakis due to their habitat and the difficulty in distinguishing between individuals. However, when their relationships are described, they centre around extremely flexible social groups and interactions. The strong social structures in bearded sakis are due to their social organisation. Males in groups show high levels of affiliation and are commonly seen grooming one another (Peetz, 2001). A common social behaviour of *Chiropotes* is huddling together in groups of 2–8 individuals, which is typically a male-specific behaviour (Peetz, 2001). Males have the highest forms of affiliative interactions and are found to be more social than females (Gregory & Norconk, 2014). Male-affiliative interactions make up 90% of their social behaviour (Viega & Ferrari, 2005). There is no evidence for hierarchical relationships between males, and studies have shown a complete lack of agonistic interaction, even in temporary all male subgroups (Gregory & Norconk, 2014).

Bearded sakis live multi-male, multi-female groups ranging from 8 to 65 individuals, depending on habitat fragmentation (Peetz, 2001; Boyle et al., 2009; Shaffer, 2012; Mittermeier & van Roosmalen, 1981). Bearded sakis are flexible in their social organisations and many groups will break up into subgroups, especially for feeding. *Chiropotes satanas* groups in Suriname have been seen to fission after travelling cohesively to feed in patches, with subgroups being up to 75 m apart (Norconk & Kinzey, 1994). Shaffer (2012) found that *Chiropotes* had a fluid social structure that expanded and contracted based on intra-group social dynamics, and groups only divided into smaller and independently functioning units when food became scarcer (Shaffer, 2012). In contrast to this, Viega et al. (2006) observed groups of *Chiropotes satanas* and *Chiropotes albinasus* being nearly perpetually fragmented into subgroups, typically two or more. They reported that this was due to the availability and distribution of food.

Female-female relationships in bearded sakis are not as well described as male-male relationships; this is thought to be because they do not occur as frequently as male-male interactions (Peetz, 2001). However, they are extremely well bonded, as seen in a study by Peetz (2001), where she observed female-female grooming daily. This observation was then supported by further studies (Viega et al., 2005; Gregory & Norconk, 2014). The recent studies of social structure in *Chiropotes* conclude that *C. satanas*, *C. albinasus,* and *C. sagulatus*, have a complex fission-fusion dynamic. This is consistent with patterns that have been observed in other frugivorous primates. It can be suggested that this practice is standard for all bearded sakis, not just the three previously mentioned.

Chiropotes are sympatric with numerous other species of primates across their range, such as *Pithecia* spp. and *Ateles* spp. (Norconk & Kinzey, 1994; Bobadilla & Ferrari, 2000; Silva & Ferrari, 2009). *Ateles* spp. are also frugivorous, but due to fruit ripeness and part preferences, there is little competition seen between the two (Norconk & Kinzey, 1994). Agonistic behaviour in *Chiropotes* spp. in relation to food has been seen to sometimes occur between *Cebus* spp., when both species come together to feed. *Aloutta* spp. have been observed to be taken over by *Chiropotes* groups or vice versa (Silva & Ferrari, 2009). Activities often become synchronised between *Chiropotes* spp. and other primates to create interspecific association (Mittermeier & van Roosmalen, 1981; Silva & Ferrari, 2009).

1.3.2.2 Mating systems

Bearded sakis are thought to possess a polygynandrous mating system (Veiga et al., 2013), although their mating system as a whole is still not well researched as observations of reproductive behaviour are rare. Definitive answers to dispersal patterns and parental behaviour are also lacking. Preliminary observations indicated that they may form breeding pairs within larger social units, but this did not have enough conclusive evidence (Ayres, 1981). The male-male affiliative behaviour recorded in more recent studies gives evidence to support the polygynandrous system they are thought to have.

Observations done on reproduction of bearded sakis has not been done while they are in their natural habitat, but rather through captive individuals. The observations found on captive individuals indicate they are seasonal breeders (Covert, 2018). Seasonal breeding happens earlier in the year, around February and March, and later in the year around August and September, with gestation occurring over a five month period before reaching birth (Covert, 2018). Mothers have been recorded to only produce one infant per year and are the sole caregivers once the infant is born.

1.3.2.3 Activity budget

The activity budget of primate’s factors in their behaviour and time spent performing certain tasks, this activity budget reflects their survival strategy. This aspect of their behaviour is an important insight into the adaptability of primate species and can be used to form an understanding of their ecological strategies. To date, Ayres (1981) and van Roosmalen et al. (1981) have conducted the longest field studies of bearded sakis, in both habituated and semi-habituated groups. Other important studies, such as the one conducted by Peetz (2001), provide detailed ecological studies that have now become crucial in understanding bearded sakis and have yielded the highest amount of data. These field study results can be seen in Table 1.

Activity in bearded sakis usually occurs before dawn to before dusk as they are diurnal primates (Silva & Ferrari, 2009). Bearded sakis spend the majority of the day feeding and travelling, with other behaviours such as resting, social behaviour and foraging having less time dedicated to them (Silva & Ferrari, 2009). This is not a definitive reflection of the species activity throughout the day, as this has been seen to change across study sites and habitat types (continuous forests vs. habitat fragments). However, as their diet is mainly composed of seeds, it can be assumed that they would adopt a behaviour that allowed them to forage effectively and devote a large amount of time to doing so. Therefore, more time would be spent travelling between dispersed patches of food than socialising and resting. Peetz & Schuchmann (2001) observed *Chiropotes* dedicating more time to feeding in dry seasons, where seeds become the most important food source (Peetz & Schuchmann, 2001). This also suggests activity budgets may change depending on seasonal changes and the availability of resources, a conclusion that was also reflected by Strier (2018). A study done in Venezuela by Peetz (2001) on *Chiropotes chiropotes* showed bearded sakis spent the largest amount of time feeding (37%), followed by foraging (10.1%), nesting (21.4%), and travelling (18.7%), along with other activities (12.8%). When resting and sleeping, the tallest trees available are preferred, with the tree usually different each night (Peetz & Schuchmann, 2001). *Chiropotes* typically sleep with their tails wrapped around their bodies (Silva & Ferrari, 2009).

Table 1: Activity budget and use of space by Chiropotes spp. This table was produced by Viega & Ferrari (2013) in Evolutionary Biology and Conservation of Titis, Sakis, and Uacaris. Below, 16 studies of Chiropotes spp. can be seen, all of which were done on habituated or semi-habituated groups.

Species	Duration of study (months)	Habitat (ha)	Group size	Activity budget (% time)				Use of space[1]			Source
				Rest	Feed/ forage	Move/ travel	Social	Home range (ha)	Day range, Mean ± SD or min-max (m)	Mean ± SD height (m)	
C. albinasus	17	Continuous forest	22.5± 3.5 (*n* = 4)	–	–	–	–	250–350 (est.)	2500–4500	10–29	Ayres (1981)
	11	Continuous forest	56	27	24	36	9	1000 +	3667 ± 1687 1840–7809	–	Pinto (2008)
C. chiropotes	5	Island (180)	14					180 (est.)	1050 424–1780	–	Kinzey & Norconk (1993)
	15	Island (180)	22	21	47	19	11	122	1600 ± 550 500–2700	–	Peetz (2001)
C. sagulatus	3	Fragment (10)	2	–	–	–	–	10	1300	–	Ayres (1981)
	28	Continuous forest	15+	–	–	–	–	200–250 (est.)	2500 (est.)	–	van Roosmalen *et al.* (1981)
	6	Continuous forest	16	–	–	–	–	–	3200 ± 1100	–	Norconk & Kinzey (1994)
	12	Fragment (1100)	30+	–	–	–	–	–	1097 ± 590	–	Frazão (1992)
	13	Continuous forest	45 (18 ± 13)	48.5	20.3	31.1	–	742	2362 ± 821 809–3386	–	Gregory (2011)
	15	Continuous forest	65+	–	–	–	–	800	4000	–	Shaffer (2012)
		Continuous forest and fragments	8–35	–	–	–	–	1, 10, 100, 559	0.04–3000	–	Boyle *et al.* (2009)
C. satanas	7	Mainland (1300)	27	–	–	–	–	57	–	–	Santos (2002)
	6	Island (16.3)	7	16	25	56	3	16	–	15 ± 4	Silva (2003)
	6	Mainland (1300)	34	27	24	46	3	70	–	12 ± 4	Silva (2003)
	12	Mainland (1300)	39	26	29	35	9	99	4025 ± 994 1560–6270	17 ± 4	Veiga (2006)
	3	Fragment (63)	17	14	20	58	8	–	–	15 ± 5	Port-Carvalho & Ferrari (2004)
	12	Island (19.4)	8	23	34	26	15	17	2807 ± 289 1900–3680	19 ± 5	Veiga (2006)
C. utahickae	8	Continuous forest	–	–	–	–	–	–	–	18 ± 7	Bobadilla & Ferrari (1998)
	8	Island (129)	24	9	59	31	1	100 (est.)	–	–	Santos (2002)
	6	Island (129)	23	11	37	51	1	58	2530 ± 1 1940–4080	17 ± 11	Vieira (2005)

1.3.2.4 Anti-predator behaviour

Predation has a large impact on bearded sakis social organisation, even though it is rarely observed. Anti-predation behaviours have been studied in *Chiropotes,* specifically *Chiropotes albinasus*, and shown that they adopt four main strategies when faced with predators, which are a mix of crypsis and reactive behaviours. The most typical behaviours seen are alarm calling, mobbing, and fleeing (Barnett et al., 2017). Other behaviours exhibited included hiding in dense vegetation, freezing, and increasing the distance between individuals within a group. This behaviour of spreading out increases bearded sakis' ability to hide and observe their predator. Hiding within vegetation is usually done by dropping to lower canopies, as this provides more coverage. In circumstances where this is not possible, they have also been known to move on the ground (Barnett et al., 2017). Due to their fission-fusion social system, strategies change depending on how many individuals are within a group at any one time. Larger groups have been seen to produce more reactive predatory responses than smaller groups (Barnett et al., 2017). However, *Chiropotes* as a whole seem to exhibit antipredator strategies within their behaviour. Their sleeping behaviour, and use of sleeping sites in tall trees hidden among lianas provide them with cover from predators. Male bearded sakis in particular seem to exhibit the most defence when facing predators and will often spread out to provide females with infants with further protection. *Chiropotes satanas* males have been seen to lunge at potential predators and leap between canopies while females and their young flee for cover (Veiga & Ferrari, 2006). Overall, these behaviours are typical in most primate species due to them being “risk-sensitive animals." This means these behaviours will constantly be developing and changing in reaction to the severity of these predation events (Tomanek et al., 2020).

1.3.3 Ecology

The focus of primate ecology is how primates interact and travel within their environments. Although various factors contribute to home ranges, distribution and quality of food resources, along with group size, are thought to be the most important (Chapman & Chapman, 2000). One of the most commonly accepted models for determining primate behaviour is the ecological constraints model. The ecological constraints model explains that an increase in group sizes directly affects intragroup feeding competition, therefore constraining group size (Chapman & Chapman, 2000). The applicability of this to seed predators has not been thoroughly studied. It would be expected that seed-eating primates would have small home ranges due to the fact that seeds from immature fruit have higher spatial and temporal availability (Norconk & Veres, 2011). However, *Chiropotes* predominantly consume seeds within their diet and have large home ranges. This specialised diet has necessitated behavioural adaptations in regard to foraging and ranging behaviour to enable them to avoid secondary compounds and indigestible fibre (Norconk et al., 1998). Previous studies done on the home range of bearded sakis reported that they had daily path lengths of 1–3 km and home ranges of 300 ha. However, these studies were conducted in forest fragments over a short period of time (Van Roosmalen et al., 1988; Peetz & Schuchmann, 2001). Research conducted in Venezuela (Peetz, 2001), and Pará, Brazil (Veiga, 2006) also showed populations of Chiropotes living in home ranges of a similar size (16–250 ha) on islands. A study by Boyle et al. (2009) described bearded sakis inhabiting 1–10 ha forest fragments at the Biological Dynamics of Forest Fragment Projects (BDFFP) sites north of Manaus, Brazil. In recent studies on continuous habitats, it is reported that they travel path lengths of over 3 km and have home ranges of around 1000 ha (Gregory, 2011). *Chiropotes*, along with *Cacajao*, are the most widely ranging neotropical primate (Norconk & Veres, 2011).

More recent studies and monitoring have estimated that home range size is influenced by the configuration of the habitat available (Veiga et al., 2013). Current estimates in continued forests place home ranges at over 500 ha. These studies involved large groups of bearded sakis (ranging from up to 60 individuals) and showed a consistency in the genus, with individuals inhabiting home ranges of up to thousands of hectares (Veiga et al., 2013). Due to these large home ranges, bearded sakis also travel long distances each day, regardless of whether the forest they inhabit is fragmented or not. However, the factors that influence and determine this home range size are still not fully understood.

Primates have been known to occupy smaller home ranges in forest fragments, with no clear distinction in what type of fragment is most likely to support these primates (Tutin, 1999; Onderdonk & Chapman, 2000). Boyle (2008) found that bearded sakis have considerably larger home ranges in continuous forests than those living in forest fragments. It was also discovered that the groups inhabiting smaller forest fragments (10 ha) travelled shorter distances, moved more uniformly throughout their habitat, and revisited feeding patches throughout the day. This is an interesting find in relation to bearded sakis habitat preferences, as tree composition and canopy openness may have an impact on whether or not forest fragments are suitable resources for the species. These findings also suggest that the size of the forest fragments influences how the patch is used.

Bearded sakis inhabit tall and lowland terra firme rainforest, with a preference for high rainforest (Mittermeier & van Roosmalen, 1981). They have also been found in savannahs, flooded habitats, montane forests, and mangroves (Mittermeier & van Roosmalen, 1981; Ayres, 1981). Bearded sakis have also been found to make use of riverine forests, typically during the high water season, as these forests hold a large proportion of fruiting trees (Johns & Ayres, 1987). Early observations of *Chiropotes* found no evidence for their occurrence in secondary habitats, which resulted in the conclusion that they are dependent on primary forests and are not tolerant to habitat disturbance (Johns & Ayres, 1987). Recent studies on the amazon basin revealed that anthropogenic impact is more tolerated by bearded sakis than previously thought (Bobadilla & Ferrari, 2000; Boyle, 2008).

1.4 Taxonomic History

The taxonomy of *Chiropotes* has been difficult due to imprecise specimen localities, a lack of distinction in species naming, and a paucity of genetic material available for molecular phylogenetics. The species are difficult to study in the wild due to their large home ranges. This has also made them hard to track and retrieve more data from, leaving them as one of the least known members of the Platyrrhini parvorder. Confusion with species naming has meant there is controversy in the number of species currently recognised. The disagreement over whether the genus possesses five or six species relates to populations inhabiting both the west and east of the Rio Branco. There are taxonomists who believe that *Chiropotes chiropote*s inhabit the west and *Chiropotes* *sagulatus* inhabit the east. Whereas, in recent papers, there is discussion that *Chiropotes israelita* is the species found in the west and *Chiropotes chiropotes* is in the east. Currently, on the IUCN Red List, there are only five species listed. The classification of bearded sakis is still debated. Currently, only two studies have provided a molecular phylogenetic analysis of *Chiropotes*, using cyt*b* data (Bonvicino et al., 2003; Silva-Jr et al., 2013).

Johann Centurius Hoffmannsegg provided the first description of bearded sakis in 1807. The specimen, along with various other biota, was collected from Para, Brazil, and was first described as *Simia satanas* (Hoffmanseg, 1807). Hershkovitz (1985), in his preliminary taxonomic review, said that the specimen was an adult male. In this review, he also gave a name to *Chiropotes utahickae*. Humboldt (1812) described five new taxa of primates while in the Orinoco region, one of which was named *Simia chiropotes*. In Humboldt and Bonpland's written observations (1812), this species, when first described, was referred to as "the capuchin of the Orinoco" (Humboldt et al., 1833). The name "*chiropotes*" was chosen because the primate was observed using both hands cupped to drink water, so "of hand" and "drinker" were used to create this name. The specimen was set for shipment, but unfortunately, he died before this could happen. However, the skin of the specimen was saved (Defler & Hernández-Camacho, 2010). The species underwent a different description by Johann Baptist von Spix (1823), who collected specimens of Neotropical primates during his travels in Brazil (van Heteren, 2019). This specimen was described as *Brachyurus israelita* and collected in Rio Negro. The genus *Chiropotes* was named by Lesson, 1840 and was originally *Simia*. I. Geoffroy Saint-Hillaire and Deville, 1848, described *Chiropotes albinasus*, giving it the specific epithet *albinasa*, and *sagulatus* was described by Traill, 1821.

William Hill (1960) published the first modern revision of the taxonomy of bearded sakis. Within this, he recognised three species, *Chiropotes chiropotes*, *Chiropotes satanas* and *Chiropotes albinasus*, where he decided the epithets *israelita* and *sagulatus* would become synonyms with *C. chiropotes*. Hershkovitz (1985) only recognised two species during his taxonomic review, *Chiropotes chiropotes* and *Chiropotes albinasus*, where he placed *C. satanas*, *C. chiropotes* and *C. utahickae* as subspecies of *Chiropotes*

chiropotes. This taxonomy was maintained until Bonvicino et al. (2003) found new evidence of bearded sakis in the Rio Negro-Rio Branco interfluvium. In this paper, it was proposed that Spix's (1823) *israelita* be reaccredited. After clear distinctions in the karyotype were made and molecular analysis was carried out, *Chiropotes israelita* was revalidated (Bonvicino et al., 2003). The species was found to be reproductively isolated with two or three different pericentric inversions. However, other studies have not confirmed this. During this, *Chiropotes chiropotes* and *Chiropotes utahicki* also gained full species status, separate from being polytypic subspecies of *Chiropotes satanas* (Bonvicino et al., 2003). Therefore, all of Hershkovitz's (1985) subspecies were elevated to full species. Silva and Figueiredo (2002) also agreed with the latter decision and elevated all three subspecies of *Chiropotes satanas* to full species status. Silva-Júnior & Figueiredo (2002), however, considered *Chiropotes chiropotes* to be two species, *Chiropotes chiropotes* and *Chiropotes sagulatus*, having the Rio Branco separate the two. This taxonomic arrangement, and a species arrangement through cytochrome *b* analysis done by Figueiredo (2006) are typically upheld. The validity of *Chiropotes israelita* has been questioned; however, other studies have neither supported nor proposed an alternative taxonomic arrangement. Figueiredo (2006) and Silva-Júnior et al. (2013) believe *israelita* to be synonymous with *Chiropotes chiropotes*. Russel Mittermeier (1981) did extensive research and observations on not only *Chiropotes* but other Surinam primates as well. His work meant that long term monitoring of the habituated groups came to fruition, with him publishing a detailed review of the genus' biology with Marc van Roosmalen (1981). Marilyn Norconk (2011) summarised the behavioural and ecological data written within these, as well as other data available from the twenty-first century. She also noted that the taxonomy of bearded sakis is under revision, so she divided her northern bearded saki group into two, including *Chiropotes sagulatus* and *Chiropotes satanas (Norconk & Veres, 2011)*.

Some believe there is not enough data to support the taxonomic arrangement of *C. sagulatus* (Bonvicino et al., 2003). Many taxonomists consider *Chiropotes sagulatu*s a full species, with others still believing the species to be a subspecies, previously classified as *Chiropotes satanas chiropotes.* Koenig (n.d.) also stated that they questioned the validity of both species. They believed the issue was not the distinction of a new species but rather a confusion within the community about names for the same taxon. Norconk (2007) and Groves (2001) regard *israelita* as a synonym of *Chiropotes satanas chiropotes* also. An unpublished taxonomic review of all primate taxonomy (Rylands, 2021), which I have reviewed, reveals that *Chiropotes israelita* is no longer valid and that it is now synonymous with *Chiropotes chiropotes* (Table 2). Therefore, based on this information, there are five species of *Chiropotes* currently recognised: *Chiropotes satanas, Chiropotes sagulatus, Chiropotes chiropotes, Chiropotes utahickae,* and *Chiropotes albinasus*. However, In my study, I will include *Chiropotes israelita* as a full species, not as a synonym. I will be following Bonvicino et al. 2003 taxonomy in this study. This is so all aspects of their taxonomic history can be described in full to establish *Chiropotes* as a whole.

Table 2: Updated species list of Chiropotes according to Rylands' 2021 taxonomy. Species in red are no longer valid and have been synonymised.

Common Name	Scientific Name	Nomenclature
White-nosed bearded saki	*Chiropotes albinasus*	I. Geoffroy Saint-Hilaire and Deville, 1848
Black bearded saki	*Chiropotes satanas*	Hoffmannsegg, 1807
Rio Negro bearded saki	*Chiropotes chiropotes*	Humboldt, 1811
Uta Hick's bearded saki	*Chiropotes utahickae*	Hershkovitz, 1985
Guianan bearded saki	*Chiropotes sagulatus*	Traill, 1821
Rio Negro bearded saki	*Chiropotes israelita*	Spix, 1823

1.5 Distribution

Chiropotes inhabit a vast variety of forest types, from gallery forests to igapó, across the eastern Amazonia, north and south of the Amazon River in the Guianas, Venezuela, and Brazil (Norconk, 2021), but each species occupies an allopatric range that is separated by major rivers (Figure 1) (Bonvicino et al., 2003). It has been recognised since the nineteenth century that the Amazonian regions' rivers play a zoogeographic role in functioning as barriers to gene flow. This is known as the riverine barrier hypothesis (Wallace, 2009). This hypothesis postulates that rivers play a major role in population and genetic differentiation and can lead to allopatry in interfluvial regions. The Rio Branco and Rio Negro are prime examples of this (Boubli et al., 2015). Recent studies on primates have been based on the fact that the majority of species' ranges are delimited by rivers to a certain extent and could act as drivers for speciation. For other species in the Pitheciidae family, such as Callicebinae, to be exact, the riverine hypothesis is supported (Boubli et al., 2015). However, for *Chiropotes*, more extensive genetic sampling is needed to support the theory and determine what aided in the diversification of this genus.

The geographic distribution of this genus is matched to the distribution of trees and fruits, which are preferred in their diet, with them relying on a small number of trees from the species Lecythidaceae (Rosenberger & Hartwig, 2013). Due to this, it is suggested that they would be unable to survive in primarily savannah and mangrove habitats without access to diverse and productive forests (Veiga et al., 2013). Their preferred habitat was thought to be primary forest, with no preference for inundated or non-inundated terrain. Previously, there was no evidence for their occurrence in secondary habitats, which led to the belief that they would have a low resistance to disturbance (Johns & Ayres, 1987). However, later studies documented bearded saki populations in fragmented landscapes with a tolerance to anthropogenic impact over the long term (Boyle et al., 2009).

Figure 1. Distribution of bearded sakis (Chiropotes). The rivers surrounding their distribution can be seen in the key above. All geographic ranges were retrieved from IUCN (2022).

The IUCN recognises five species of *Chiropotes*, namely:

1) *Chiropotes satanas* is the easternmost species, and is located in the Tocantins-Araguaia basin, in the states of Pará and Maranhão (Siciliano et al., 2015).
2) *Chiropotes utahicki* occupy the Xingu-Tocantins interfluve (Silva Júnior et al., 2013). *Chiropotes utahicki* is the only member of the platyrrhine taxon that is endemic to this area (Bobadilla & Ferrari, 2000). The extent of how far south they are found is still up for debate.
3) *Chiropotes albinasus* is located south of the Amazon, between the Madeira and Xingu rivers and is found as far out as the Guaporé river (Rondônia, Brazil) (Silva Júnior et al., 2013).
4) *Chiropotes chiropotes* occur the furthest north of all *Chiropotes* spp., north of the Amazon River and by the Orinoco (Ferrari et al., 1999). The species is found as far north as Venezuela.
5) *Chiropotes sagulatus* is located north of the Amazon River, with the Branco river separating it from *Chiropotes chiropotes*. *Chiropotes sagulatus* inhabit small, isolated forest fragments as small as 10 ha and have not been witnessed to leave these resident forest groups. This suggests the species has relative adaptability to drastic habitat change and can exist in small habitats even when disturbed. The groups within this species that inhabit continuous forests do not seem to use the habitat evenly in comparison to small fragment groups, therefore suggesting that forest fragment size directly influences spatial use (Boyle, 2008). Those that inhabit small areas raise concern about genetic isolation. Additionally, it is crucial to take a species preferred habitat into account when creating conservation and management plans as bearded saki monkeys do not utilise all habitat types equally.

Chiropotes israelita is not listed on the IUCN Red List. The justifications for this are discussed in this chapter. However, it is found north of the Rio Negro, within the same region as *Chiropotes chiropotes*, giving evidence to them being synonymous. The species is found south of the Orinoco River and is separated from *Chiropotes sagulatus* by the Rio Branco.

1.6 Threats

Brazil is home to a high diversity of primates, with 115 species of non-human primates occurring over a vast geographic range (Moraes et al., 2020). Over half of the South American species of primate are currently under threat, with 15 species being critically endangered and 21 being endangered (IUCN, 2021). Increasing climate and anthropogenic pressures have the ability to influence forest cover in these areas. These areas could become considerably modified by forest destruction and, in turn, cause changes to the future of primate distribution and survival.

Fragmentation, deforestation, and hunting pose the largest threats to *Chiropotes*. Large mammals are becoming chronically over-hunted due to a rise in the exploitation of wild meat (bushmeat), which has now led to higher hunting pressure (Peres & Barlow, 2004). Bearded sakis are typically hunted for their meat but have also been known to be targeted for their tails, which are sold as tourist souvenirs or used as a duster (Johns & Ayres, 1987). Hunting greatly affects *Chiropotes satanas*. Even though the species is not easy to capture, it is targeted for its meat and fur (Port-Carvalho et al., 2021). The species inhabits the smallest geographic range in comparison to other members of the genus. This area of the Brazilian Amazonia is the smallest but most densely populated. The growing encroachment by people inhabiting this area has led to the species becoming locally extinct within a large section of their range. This geographic range has also become extremely fragmented and is under constant deforestation pressure. This habitat fragmentation could also explain the increased hunting pressure the species faces. Although the species is considerably tolerant of habitat fragmentation, living in small populations for extended periods will not be adequate for maintaining a genetically diverse and rich population long-term. The crucial issue is whether or not species populations and richness can be maintained within these fragmented forests. It has also been suggested that the population will decline by 80%. Therefore, there may be a need for metapopulation management to prevent this. *Chiropotes sagulatus* and *Chiropotes chiropotes* are also hunted by locals and used for food (Gregory, 2011).

The IUCN Red List status of *Chiropotes* ranges from least concern to endangered (Table 3). *Chiropotes chiropotes* and *Chiropotes sagulatus* are both classified as least concern. Both are widely distributed across the Amazon, with areas either being protected or having no signs of substantial forest loss in the future to cause concern. *Chiropotes albinasus* and *Chiropotes utahickae* are both considered vulnerable. Both species are expected to have a 30% or more population loss over the next 30 years, or three generations (IUCN, 2022). The current data provided by the Global Forest Watch shows that if forest loss continues at the current rate, which has already impacted previous generations, then 15%–25% or more of the species' home range is likely to be lost by 2048 (Global Forest Watch, 2022). This, coupled with the continued hunting of the species, has warranted their current status.

Chiropotes satanas are currently the only endangered species. This species currently has a greater loss than that of the latter species mentioned, with 50% or more population reduction suspected over the next 30 years or three generations. They are also predicted to have a further 30% loss by the year 2048. The establishment of the Tucurui hydroelectric dam has caused considerable habitat loss for *Chiropotes satanas* and *Chiropotes utahickae*. The improvement of road structures has directly affected *Chiropotes albinasus*. The implantation of highways and road infrastructure affects *Chiropotes* as a whole. This, along with the proliferation of secondary roads, has led to the widespread exacerbation of forested areas within their region.

Bearded sakis also, although not frequently, face disturbance from other organisms within their environment. Raptors have been thought to pose a risk to bearded sakis, even though their rapid movements through forest canopies may make them difficult targets. Barnett et al. (2017) witnessed nine interactions between raptors and *Chiropotes albinasus*, with both adult and non-adult bearded sakis being targeted. However, this is not thought to cause decline or have a high impact on population. There are too few recorded incidents for these interactions to be anything other than speculation, raptors remain a principal predator for many other platyrrhine species (Veiga et al., 2013). Due to their preference for high forests, they avoid attacks from main predators such as snakes and felids. A study by Martins et al. (2005) showed an incident where a Harpy Eagle attacked a bearded saki (*Chiropotes utahickae*) (De et al., 2005).

1.7 Species status

Current species status, according to the IUCN and its Red List Criteria 2023, can be seen in Table 3.

Chiropotes chiropotes

Assessment information currently available on the IUCN website shows that *Chiropotes chiropotes* are currently listed as "Least Concern (LC)" according to the IUCN SSC Primate Specialist Group. Previously published assessments show that this has not changed for the past 12 years, which may be due to the species inhabiting the most preserved areas within the Amazon with little to no human population and no development projects. The species was previously listed as Lower Risk (LR) in 1996, but this changed to LC in 2003 and has stayed the same since.

Chiropotes satanas

From 1982 to the present, the status of *Chiropotes satanas* has changed frequently. Currently, their IUCN status lists them as Endangered (A4cd) (EN). This criterion was justified as a 50% or more population reduction is suspected to occur over the next 30 years (three generations). Global Forest Watch data on Pará and Maranhão show further tree cover loss and humid primary forest loss where the species is distributed. This, coupled with evidence of hunting of the species, justifies the threat assessment level they currently have. The species was previously assessed as Critically Endangered (CR) in 2008, and it was also listed as LR and LC for four years from 1996-2000. The current assessment made in 2020 however, pushed them back into EN.

Chiropotes albinasus

The current assessment for this species is Vulnerable (A4cd) (VU). *Chiropotes albinasus* was previously assessed as LR/LC in 1996–2003 but was then assessed as

EN in 2008. A recent assessment shows that they have now been pushed into the threshold of VU in 2020 due to only a 30% reduction or more suspected over the course of 30 years (three generations). Global forest watch data for areas in Rondônia (Brazil) show a 19% decrease in tree cover since 2000, which has contributed to this assessment. The total area of humid forest also decreased by 23% in this time frame. Should this trend of forest loss continue, 15% or more of this species habitat is likely to be lost by 2048. These figures, as well as the threat of hunting by locals of this species, has earned them the VU status.

Chiropotes sagulatus

Chiropotes sagulatus are currently listed as LC. This assessment has been consistent since 2020. There is currently not enough data to thoroughly assess this species to elevate it to any other level. Since the species is widely distributed, major threats from forest loss are minimal. Current trends on Global Forest Watch only suggest that 5% of tropical forest within this species range will be lost over three generations. This figure does not cause major concern and is insufficient enough to move their status from LC.

Chiropotes utahickae

Assessment information on the IUCN currently shows *Chiropotes utahickae* as VU (A4cd). This status is reflective of issues similar to *Chiropotes albinasus.* Global forest watch data on Pará and Mato Grosso show a 15% tree cover reduction from 2000 to date and a 22% decrease in humid primary forest also. This suggests that at the current rate of forest loss that 25% or more of the species habitat is likely to be lost by 2048. The species was consistently listed as VU until 2008 when this changed to EN. The current assessment made in 2015 reinstated this VU status, due to forest loss and hunting pressure.

Table 3: IUCN Red List species status, Chiropotes.

Scientific Name	Common Name	IUCN Red List Status	Date assessed	Population
Chiropotes albinasus	White Nosed Saki	Vulnerable (A4cd)	2020	Decreasing
Chiropotes utahickae	Uta Hick's bearded saki	Vulnerable (A4cd)	2015	Decreasing
Chiropotes chiropotes	Bearded saki	Least Concern	2015	Stable
Chiropotes satanas	Black bearded saki	Endangered (A4cd)	2020	Decreasing
Chiropotes sagulatus	Reddish Brown bearded saki	Least Concern	2015	Unknown

Chapter 2 - Molecular phylogeny of *Chiropotes*

2.1 Introduction

The study of evolutionary relationships is known as phylogenetics. Relatedness between biological entities is represented through phylogenetic trees and can be a useful tool in evaluating the evolution of species. More recently, the use of genetic data in phylogenetics has revolutionised the fields of taxonomy and systematics, with profound implications for conservation. In particular, the ability to retrieve whole genomes from a variety of animal remains has become easier than ever. Regardless, mitochondrial DNA remains a cornerstone in molecular phylogenetics. Mitochondrial DNA is currently the most accessible and cost-effective source of genetic data for taxonomic studies. This is important, as many primate species are still hard to sample. Retrieval of tissue or blood samples poses ethical issues, so collecting samples in non-invasive forms is typically relied on. The collection of samples is therefore done through sequences available in databases and historic samples, with the latter being more accurate due to online sequences being incomplete or mislabelled.

There has been little research to date on the taxonomy and phylogenetics of *Chiropotes*. This has led to controversial information within their classification and no clear result of the correct and valid number of taxa. As previously mentioned, only Bonvicino et al. (2003) and Figueiredo (2006) have done studies on *Chiropotes* using mitochondrial markers. Most mitochondrial sequences available for *Chiropotes* are incorrectly named. Furthermore, most specimens, depending on the type used, often have low DNA yield. This makes it difficult to assess species lineages. To assess the evolutionary history of the species, gene trees are constructed from comparisons between orthologous genes. This is considered to be the most accurate way to depict a species' evolutionary history. The current study uses mitochondrial DNA as a way to review the taxonomy and infer the phylogenetic relationships between taxa. To take advantage of the large number of sequences available on NCBI, a cytochrome *b*-based phylogenetic tree and a mitochondrial genome tree was created.

2.2 Methods

2.2.1 Data collection

All samples used for my phylogenetic analyses can be seen in the supplementary material, under Chapter 2—Supplementary Material Tables 1 and 2. All samples were obtained from GenBank ® on NCBI and extracted CDS from complete genomes (National Center for Biotechnology Information, 1988).

2.2.1.1. Sequence acquisition

A nucleotide search was conducted on NCBI, tailoring the search to specify "*Chiropotes*" and "cyt*b*" to identify the correct sequences. These sequences were found on NCBI and downloaded as GenBank ® complete records. These sequences were collected and placed into Geneious Prime 2022.2.1 (https://www.geneious.com). To minimise data analysis problems, sequences with less than 500 base pairs were excluded from the dataset. The final dataset consisted of 57 sequences, not including the two outgroup sequences gathered to root the phylogeny. The outgroups, *Cacajao calvus ucayalli* and *Pithecia pithecia,* were chosen to root the tree and align it.

Sequences ascertained for the full mitogenome tree were done in the same way as previously discussed. Most of the samples were obtained from a study by Janiak et al., (2022), who recently assembled a large amount of new mitochondrial genomes. This resulted in 15 sequences, including two outgroup sequences. The two outgroups *Pithecia* sp. and *Cacajao calvus rubicundus* were chosen to root the tree.

Gathering all available cyt*b* sequences from NCBI, the labelled names for the species are as follows: *Chiropotes albinasus*, *Chiropotes israelita*, *Chiropotes chiropotes*, *Chiropotes sagulatus*, *Chiropotes utahickae* and *Chiropotes satanas*. Upon inspection, two were deleted. The dataset contained mislabeled sequences that were sister species of *Chiropotes* within the family Pitheciidae. The rest of my sequences were checked, and some others were mislabelled but within the same genus. This led to KR582, previously *Chiropotes* sp., being changed to *Chiropotes albinasus,* and KF9894, previously *Chiropotes* sp, being renamed to *Chiropotes chiropotes.* Overall, 59 sequences were used (57 *Chiropotes* and two outgroups) for my phylogenetic tree.

2.2.1.2 CDS Extraction

Once in Geneious, a mitochondrial dataset was created from cyt*b* sequences. To expand my dataset, I also used the gathered whole mitogenomes with their CDS gene regions extracted. I individually aligned these with cyt*b* sequences gathered from genbank and cut them down to retrieve only the cyt*b* portion of the mitochondrial genome. A second matrix was made for the full mitogenomes only. I discovered that some sequences had been mislabelled on NCBI based on their length in comparison to the rest of the sequences.

2.2.2 Data analysis

2.2.2.1 Alignment

The alignment was generated using Geneious Prime 2022.2.1 alignment with default settings (global alignment with free end gaps and a cost matrix of 65% similarity (5.0/-4.0)). The alignments were examined, and where required, insertion and deletion gaps were accounted for. Any gaps at the start and end of the sequences were deleted to ensure all my sequences had the same number of base pairs. But gaps within the alignment were kept. I chose to realign my sequences after cutting to obtain a more accurate alignment. The alignment was then exported as a Nexus file and placed into Aliview (Larsson, 2014). Within this software, all gaps labelled as '-' were changed into '?', which resulted in the look of varying sequence length. The sequences were also renamed to include only the accession number and species name, for example, OM328975_Chiropotes_albinasus. The resulting alignment consisted of 1137 base pairs and was uploaded into IQTree (IQ-TREE multicore version 1.6.12 for Linux 64-bit built Aug 15, 2019) (Nguyen et al., 2015).

2.2.2.2. Phylogenetic analyses

The IQTree (1.6.12) web server in Los Alamos, USA, was used for downstream phylogenetic analysis. The program chose the best nucleotide substitution model for the tree from the sequences provided. A SH-like aLRT test was done due to having an ultrafast bootstrap value of 1,000 replicants. Due to this, the relative support of internal nodes was assessed and optimised. Default parameters were used for all other settings. The best model was TIM2+G4+F (Yang, 1994). This model compensates for the unequal and empirical base frequencies within my sequences and rates heterogeneity with a discrete gamma model. Estimates for the model parameters (epsilon = 0.010, base frequencies A: 0.287, C: 0.290, G: 0.120, and T: 0.303). I rooted the tree by specifying the two sister species as outgroups. The results contained 59 taxa, or tips for my phylogenetic tree and 15 taxa, or tips for my mitogenome tree. The results were then emailed to me and saved as a Newick file. Figtree v1.4.4 (Rambaut, 2007) was then used to visualise the phylogenetic trees. After uploading my files to Figtree, I specified the values as bootstrap. I then edited the trees to align tip labels and include node labels. The tree was then exported as both a JPEG and PNG file.

2.3 Results

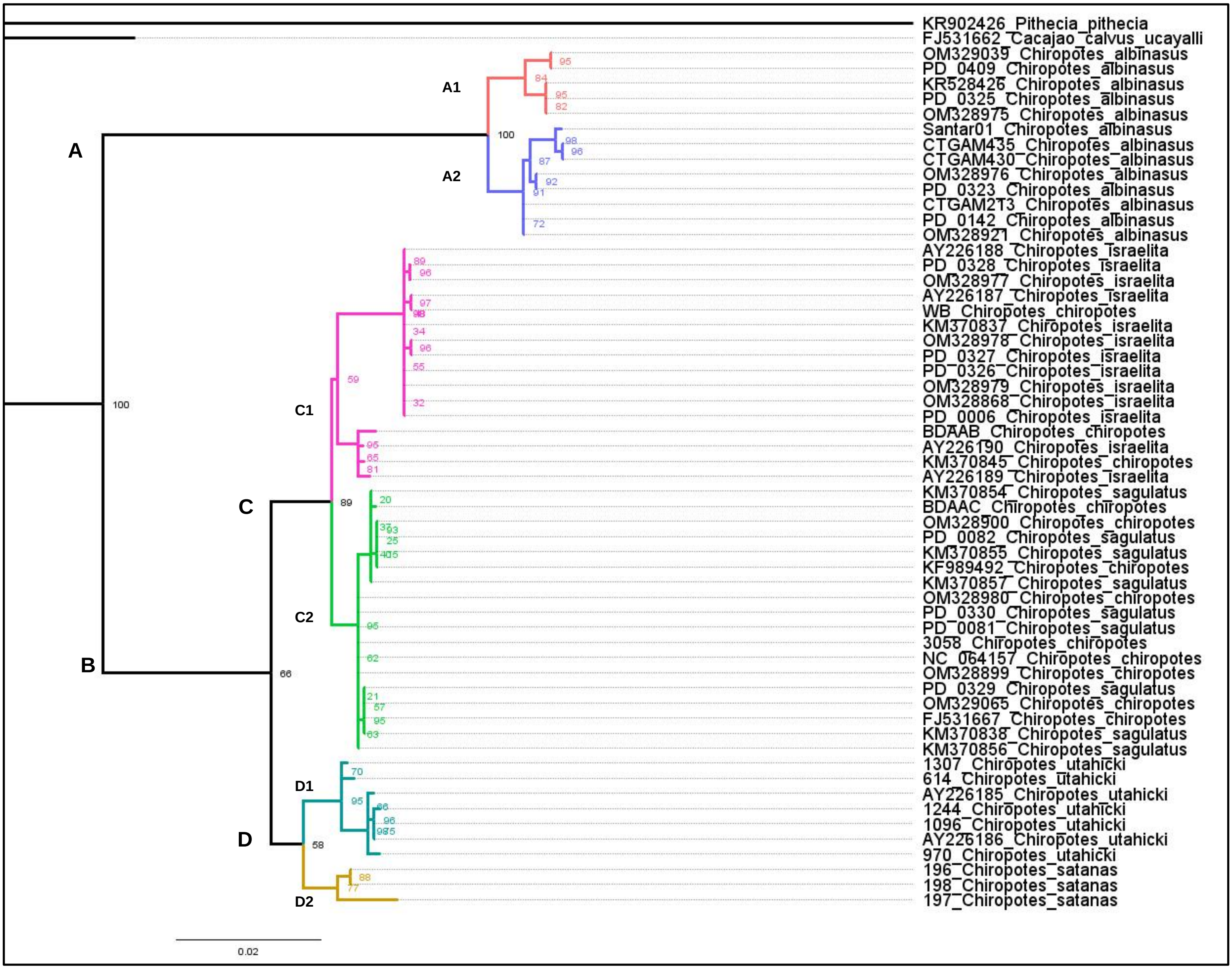


Figure 2: The phylogenetic tree of Chiropotes created using mitochondrial data. The numbers represent the bootstrap values. The different colours shown on the figure correlate to splits between species; these have also been given values (such as A1 and A2) to further describe the splits.

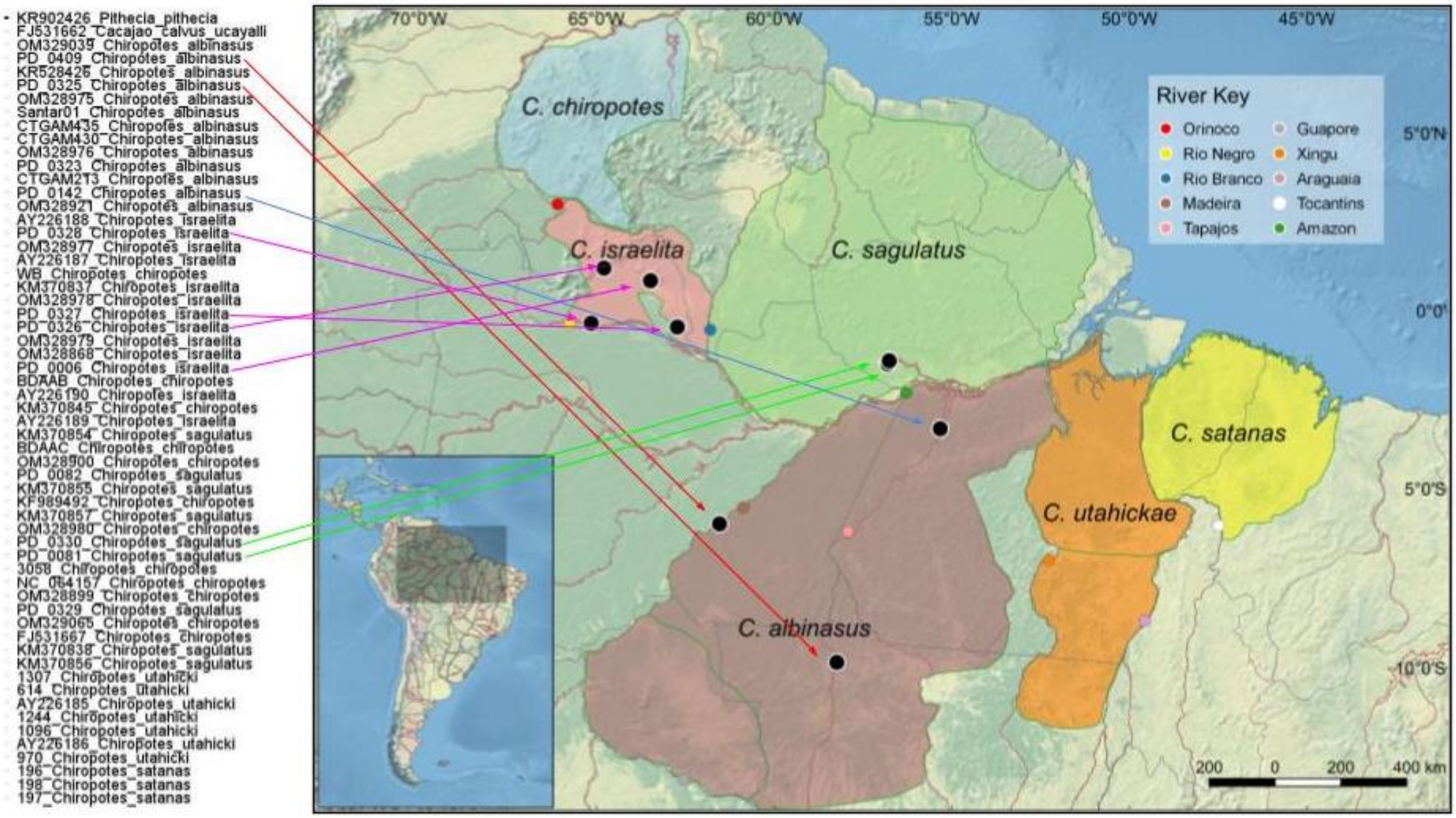


Figure 3: The phylogenetic tree of Chiropotes created using mitochondrial data with available localities of sequences mapped in relation to South American rivers. The arrow colours used correlate to the section of the tree the species was found in, e.g., red is A1.

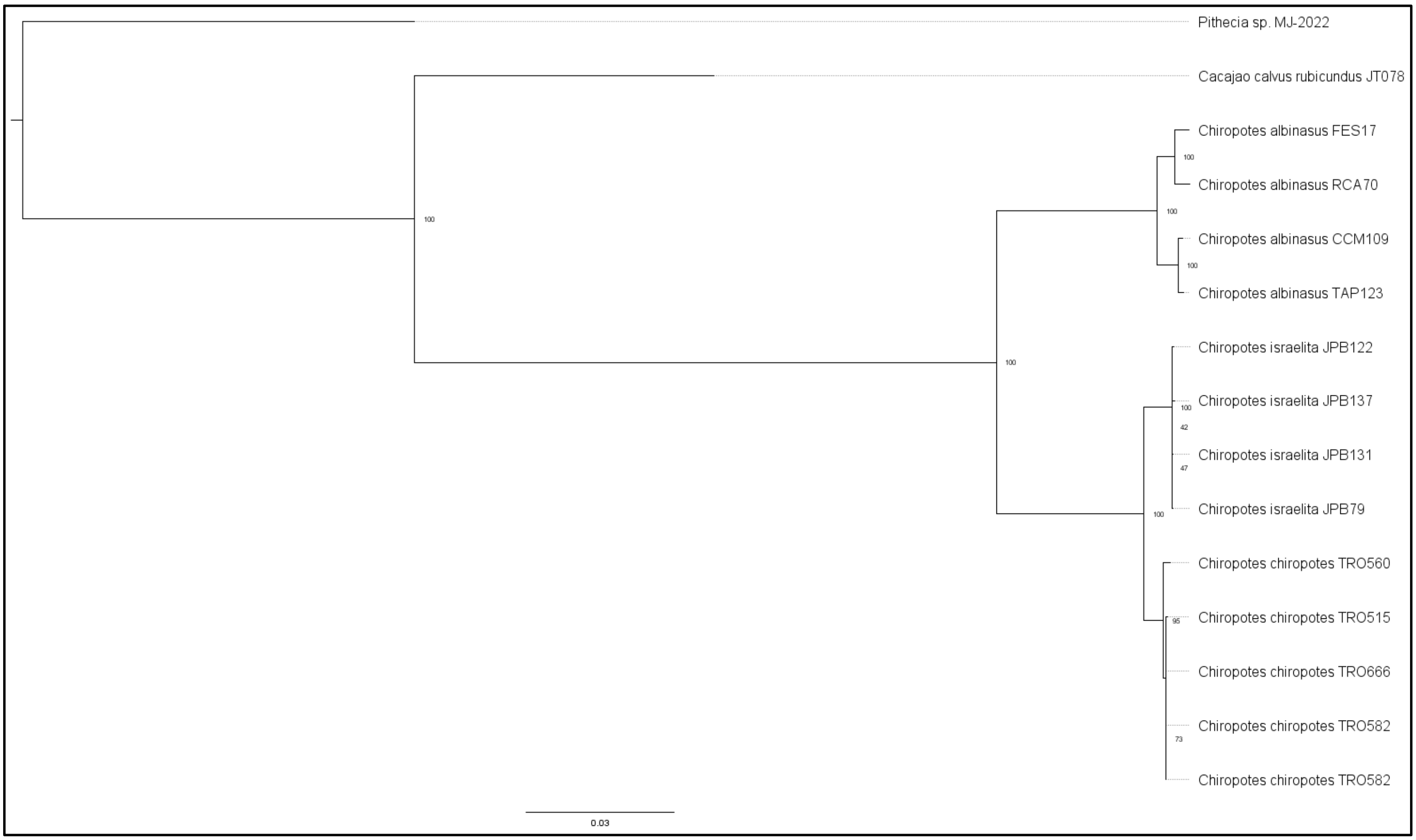


Figure 4: The phylogenetic tree of Chiropotes created using full mitogenomes. These samples have been provided from a study by Janiak et al., 2022.

For *Chiropotes*, there are only six clades within the tree (Figure 2). Support for these clades is high (100%). Bootstrap support ranges from 20–100% throughout the tree. A broad look of the tree shows *C. albinasus* is the offshoot to the rest of *Chiropotes*. From this, it can be said that *C. albinasus* is sister to all other *Chiropotes* species. Within *C. albinasus*, there are two lineages (A1 and A2) supported by a high bootstrap support of 100.

The rest of the species can be seen in the lower half of the tree (B). Meaning *C. albinasus* is sister group to *C. israelita, C. chiropotes* and *C. sagulatus*; with *C. utahicki* and *C. satanas* branching off from the former. This split is seen within (B), consisting of (C) and (D) (bootstrap of 66%), with (D) containing *C. utahicki* and *C. satanas*, and (C) containing *C. chiropotes*, *C. sagulatus*, and *C. israelita*. It can be said that *C. satanas* and *C. utahicki* are closer related to each other than the rest of the species; however, their bootstrap support is low at 58%. Within this clade, the supports on the further splits are higher, ranging from 70–95% between *C. utahicki* and *C. satanas* respectively. Both of these species are sister species to *C. chiropotes*, *C. sagulatus*, and *C. israelita.*

Sections (C1) and (C2) contain *C. chiropotes*, *C. sagulatus*, and *C. israelita*. *C. sagulatus* and *C. chiropotes* seem to be contained within (C2), with bootstrap supports ranging from 20–95%. (C1) contains all *C. israelita* and a few *Chiropotes chiropotes* sequences. These sections split off from each other. (C1) seems to be better supported in its phylogeny, with higher bootstrap values and only a few small percentage anomalies (32%, 34%, and 55%).

The full mitogenome tree consisted of 15 sequences (13 sequences and two outgroups) (Figure 4). For *Chiropotes* sp., there are four major clades within the tree. Support for these clades is high, with the splits between them all being 100%. Within these clades, bootstrap support ranges from 42% to 100%. This tree shows a clear split between *C. albinasus* and the rest of the species, once again showing they are sister to all other *Chiropotes* spp. *Chiropotes albinasus* has a strong split between itself also with a high bootstrap support of 100%. *Chiropotes israelita* and *Chiropotes chiropotes* split off from one another with a bootstrap support of 100% and are sister species. Within *Chiropotes israelita,* there are some low bootstrap supports of 42% and 47% between species.

Chiropotes chiropotes have high bootstrap support between their splits, consisting of 95% and 73%. Within this clade, there is one *Chiropotes chiropotes* sequence that is separate from the other three.

2.4 Discussion

The localities of the sequences gathered, which were available on Genbank, are all correctly labelled and placed within their species geographic ranges. Not all *Chiropotes* species have full mitogenomes available.

The phylogenetic inference here shows *Chiropotes albinasus* is separated from all other *Chiropotes*, as displayed in previous studies (Bonvicino et al., 2003). It is clearly seen that *C. albinasus* is sister to all other *Chiropotes*. Based on cyt*b* data analysis, my findings show that *C. albinasus* is the most distinct of their species. *Chiropotes albinasus* has always been recognised as an allopatric, monotypic species to the rest of the species (Hershkovitz, 1985). *Chiropotes satanas*, until recent studies (Bonvicino et al., 2003), was composed of three subspecies (*Chiropotes satanas chiropotes*, *C.s. satanas,* and *C.s. utahickae*). *Chiropotes albinasus*' split continues to show this separation and higher relatedness between *Chiropotes satanas* and the rest of the taxa. *Chiropotes albinasus* also differs the most physically from the rest of the species and has a uniform black coat, with a more prominent curving of the hairs on the dorsum and a white or skin coloured patch around the nose (Hershkovitz, 1985). Pelage colour is an important factor in identifying species and distinguishing between *Chiropotes* taxa. *Chiropotes utahickae* and *Chiropotes chiropotes* were found to be separate species in previous studies due to differences in morphology and pelage colouration, as well as molecular analysis. This explains their genetic distance and prominence in the tree (Bonvicino et al., 2003). The split between (C) and (D) also shows the close relationship between these species, as reflected in his tree (Figure 2).

Within *Chiropotes albinasus,* we can see a further split into two clades (A1 and A2). The localities for these cyt*b* sequences show that the split occurs between samples taken either side of the Rio Tapajós, with (A1) being on the left and (A2) being on the right (Janiak et al., 2022) (Figure 3). This may suggest a split within the group, as this is fully supported with a bootstrap value of 100. This split and high level of support can also be seen between *C. albinasus* in the full mitogenome tree created (Figure 4). Figueiredo (2002) showed that the Tapajós, although a large river, was not a barrier for *C. albinaus,* whereas the Tocantins was a barrier separating the sister taxa *C. satanas* and *C. utahickae*. She points out, however, that there was a lack of reciprocal monophyly in some of her *C*. *utahickae* samples. Boubli et al. (2015) noted that the Rio Branco, although a physical barrier for species, was not a vicariant agent. However, from the phylogenetic tree above it can be suggested that some populations of *Chiropotes albinasus* underwent a founder event and a few individuals have migrated. This might have also been caused by vicariance, which is possible due to the fragmented and isolated areas in which they inhabit. *Chiropotes albinasus* populations on either side of the Rio Tapajós may now remain separate and have differences evolve from one another. Therefore, using more full genomes and a larger sample size would be necessary to provide a conclusion on the Rio Tapajós role in *Chiropotes* taxonomy.

The formation of (C1) and (C2) is interesting, with a bootstrap value of 89%. My results within these sections show a mix of species within each, with no clear definition of grouped taxa like in the rest of the tree. These clades consist of *Chiropotes sagulatus* and *Chiropotes chiropotes* grouped together, and *Chiropotes israelita* and *Chiropotes chiropotes* grouped together. It would have been expected that these three would be sisters to one another, with *Chiropotes chiropotes* found together in a clade with just *Chiropotes sagulatus* or *Chiropotes israelita* but not within both. *Chiropotes chiropotes* typically form their own separate group, as seen in previous studies (Figueiredo, 2006; Boubli et al., 2015). This can also be seen in Figure 4. Figueiredo (2006), when using cyt*b* data, found a formation of *Chiropotes chiropotes* and *Chiropotes israelita* in a clade, with *Chiropotes sagulatus* being sister to these taxa.

Boubli et al. (2015) uncovered a sister relationship between *Chiropotes chiropotes* and *Chiropotes sagulatus*, with *Chiropotes israelita* being sister to both of these taxa. This is thought to be unusual due to the geographical proximity of *Chiropotes chiropotes* and

Chiropotes israelita. *Chiropotes israelita* and *Chiropotes chiropotes* are found within the same region, north of the Rio Negro. *Chiropotes sagulatus* is located north of the Amazon River and is separated from *Chiropotes chiropotes* by the river Branco. Therefore, this would suggest there is not a possibility of *Chiropotes sagulatus* and *Chiropotes chiropotes* being within the same clade, as seen in (C2). *Chiropotes chiropotes* and *Chiropotes sagulatus* were once placed as subspecies under *Chiropotes satanas*, where *C. sagulatus* was described under the name *Chiropotes satanas chiropotes*, before they both gained full species status Figueiredo (2002). This unclear relationship between *Chiropotes chiropotes* and *Chiropotes sagulatus* in my tree may be due to their historical groupings, as they were once together as subspecies under *Chiropotes satanas*. Overall, this discordance could be due to incomplete lineage sorting or gene flow among the species. The demographic history of these species would need a full review to trace genealogy and understand the evolution that occurred here. The available samples were all from the same source (Boubli et al. 2015) and only five *C. sagulatus* samples were available. If a more diverse range were available the relationships may have changed.

Figure 4 shows that *Chiropotes chiropotes* and *Chiropotes israelita* are sister species to one another, with both having a strong split of 100% and forming their own clades. Following on from this, *Chiropotes chiropotes* has a split within its clade, consisting of one sequence branching off from the other three sequences. This either suggests that this individual has evolved differences from other *Chiropotes chiropotes* populations or that it is possibly mislabelled. From the phylogenetic tree above (Figure 2) and the papers discussed, there may be evidence that this branching sequence is *Chiropotes sagulatus* or *Chiropotes israelita,* but the sequences do not include enough information. This suggests the samples may be mislabelled due to a submission error or that the species is incorrectly described. This leads me to believe there is some taxonomic confusion between these three species. In recent publications, such as Ryland's (2022) primate taxonomy review, *Chiropotes israelita* is listed as synonymous with *Chiropotes chiropotes*; this may account for some of the issues within the tree. It is clear that more data is necessary to resolve the relationship. However, it may also be possible that the species have separated from one another genetically. The placement of sequences within (C1) and (C2) may give evidence to the classification of two *C. chiropotes* taxa as full species. There needs to be more *Chiropotes sagulatus* mitogenomes readily available to be able to expand on this point. When retrieving mitogenomes I could not access any for this species. It would be interesting to see how Figure 4 changes when these are added into the alignment. I believe this would clear up confusion within their taxonomy and shed light on their relatedness.

The low support for the split between (D1) and (D2) is surprising, given that these two taxa are thought to be sister species to one another, with *C. utahickae* previously being a subspecies of *C*. *satanas* and now having full species status. The low support may be due to the species occurring either side of the Tocantins River. The bootstrap values within D1 themselves are high, ranging from 66% to 98%. The same goes for D2, where the bootstrap values are 88% and 77%. Therefore, (D1) and (D2) themselves are highly related to each other, but the support for the split is not as strong as expected. Previous phylogenetic research done on *Chiropotes* shows the same split in *Chiropotes utahickae* and *Chiropotes satanas* (unpublished work, Carnio et al., 2017). This phylogenetic tree estimated genetic distance between the species and showed that they split from one another and are sister species also (Supplementary Material Figure 1). The split of *C. satanas* also gives support to its full species status.

2.5 Conclusion

This study, based on the mitochondrial DNA of *Chiropotes,* revealed some interesting phylogenetic relationships. The results of this tree supported the taxonomic arrangements that have been discussed while also simultaneously creating discordance. There are still issues within the taxonomic arrangement of *Chiropotes sagulatus*, *Chiropotes chiropotes* and *Chiropotes israelita*. More samples need to be collected, and mainly on these three taxa, to be able to identify their relationship between one another. The full species status granted to *Chiropotes satanas* is supported and further validated through this tree. It is clear from the bootstrap support and position in the tree that there are strong differences between these species. The strong split between *Chiropotes albinasus* sequences was unexpected but is intriguing. This may suggest a mutation in those groups samples. This would give evidence to the Tapajós acting as some sort of barrier between these two, or the effect of fragmentation has made them reproductively isolated. I think a lot more research needs to be done to be able to give a sufficient conclusion on this. Whilst the majority of this work suggests current research is correct, I believe there is still a large amount of research that needs to be done into *Chiropotes* taxonomy. Mitochondrial DNA is a useful tool for phylogenetic studies. Within this phylogenetic tree reconstruction, is it important that intraspecific genetic diversity is taken into account. There are still constraints when using cyt*b* data and samples gathered from online sources. Even without all species mitogenomes, the tree produced from this showed a more organised and consistent phylogeny. This suggests that the use of full genomes may be the key to understanding the species completely. Overall, though I believe the results of my tree to be reliable, there is still far more work to be done. I believe a full taxonomic revision of this group is necessary.

Chapter 3 - Habitat suitability of *Chiropotes*

3.1 Introduction

Amazonian deforestation has accelerated at an alarming rate during the last decade. The growing need for wood, agricultural products, biofuels, and urban development means that deforestation is more prevalent now than ever before. The current trajectory of agricultural expansion is predicted to eliminate 40% of Amazon forests by 2050 (Soares-Filho et al., 2006). Due to this, the current threatened ecosystem will cause forest-dwelling species to redistribute. This is the primary threat to primate conservation. Nonhuman primates are an essential element of biodiversity and ecosystem health and maintenance. Recent studies have shown that ~60% of primate species are threatened with extinction, and ~75% have a declining population (Estrada et al., 2017).

Deforestation in the Amazon leads to consistent warming in local climates (Prevedello et al., 2019). It has also been revealed that deforestation can trigger weather events and reduce precipitation (Boers et al., 2017). These changes to the environment can result in a spatial shift in suitable primate habitats and potential population declines. A characteristic typically associated with a landscape or population is spatial heterogeneity. It describes the uneven distribution of different species' concentrations within a given area. Habitat fragmentation limits the movements of populations and access to food sources. A vast majority of animals, in particular mammals, create cognitive maps that represent relations between places. This increases fitness and enables them to associate objects with these maps (Spencer, 2012). Dispersal patterns when a habitat is fragmented can explain why there is so much variation of population densities in concentrated patches (Coombs & Rodríguez 2007). It is important for conservation to understand dispersal among groups and individuals and link this to spatial patterns. This means it is really important to understand the habitat preferences of primates and how bioclimatic variables will reshape their distribution, as this has implications for the conservation and management of species (Wich & Marshall, 2016).

When evaluating the impact of deforestation and habitat fragmentation on a species and their home range, spatial analysis and predicted distribution models can be useful tools.

Species distribution models combine species observations and occurrences with environmental data (Elith & Leathwick, 2009). This method, coupled with the use of different bioclimatic variables, allows an interpretation to be made of various scenarios on biodiversity. This approach to modelling can potentially play an important role in conservation planning and research. A model that encapsulates this perfectly is MaxEnt, a maximum entropy algorithm modelling programme (Phillips et al., 2006). MaxEnt makes predictions or inferences based on incomplete information using presence-only data. The model can also employ climatic and vegetation cover variables and apply them to where a species may potentially occur, therefore being able to predict the suitability of a habitat for a species. MaxEnt can also be applied to presence/absence data depending on the model being used. Both of these uses will be utilised in my research into the habitat suitability and distribution of *Chiropotes* species.

A widely used technology in primate conservation is Geographic Information System (GIS). GIS is a scientific tool for processing and modelling real-world geographic data (Levin, 2013). It is hard to define GIS or classify GIS as a singular system as it has a broad diversity in the field of research and many methods have been applied to it. GIS has been used in various aspects of primate research, ranging from analysing primate and human evolution (Anemone et al., 2011) to conceptualising habitat fragmentation (Arroyo-Rodríguez & Mandujano, 2009).

This study focuses on using species distribution modelling to reassess the geographical distribution of the New World Pitheciidae monkey, *Chiropotes,* the bearded saki. *Chiropotes* have large home ranges that do not overlap. Due to this, being able to evaluate the extent of suitable areas for each species and whether or not they may migrate from their current ranges due to habitat fragmentation, would be extremely useful in their conservation. The purpose of this is to determine in what scenario their geographic range has the highest habitat suitability, in line with the current estimates of deforestation.

3.2 Species distribution

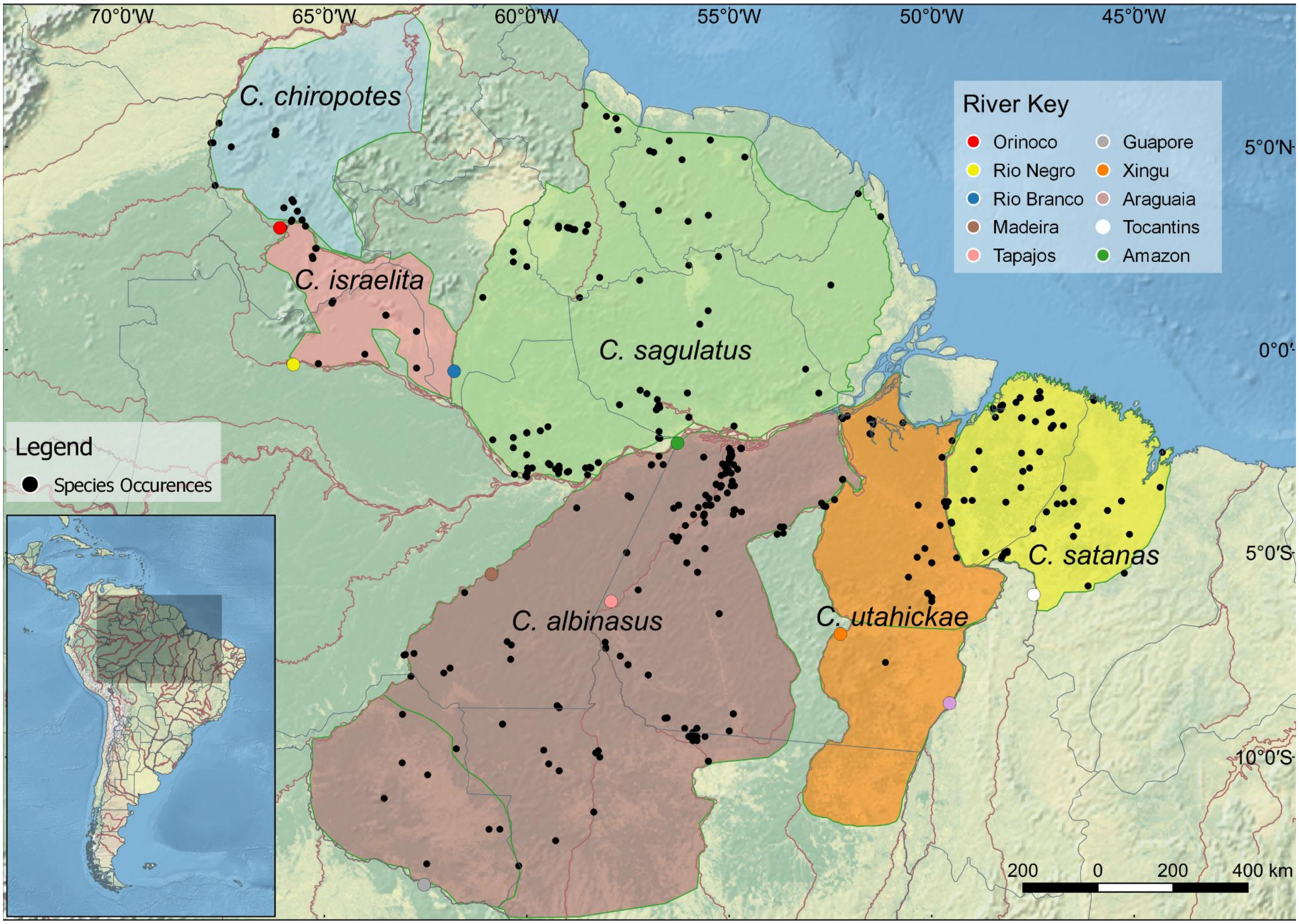


Figure 5: The distribution of Chiropotes in their species home range. The rivers surrounding the species home ranges can be seen in the River Key. This map was created using QGIS version 3.16.11 using information gathered from Natural Earth. Free vector and raster map data @ naturalearthdata.com.

Bearded sakis occupy parapatric ranges, separated by major rivers (Figure 5). They are endemic to the Amazon region (Hershkovitz, 1985). *Chiropotes satanas* are nestled in the eastern margin of the Tocantins - Araguaia basin and are found in the States of Pará and Maranhão in Brazil. They are the easternmost species, extending into the eastern limit of Amazonian Hylea (Silva Jr., 1991). *Chiropotes utahicki* occupies the area between the Xingu and Tocantins rivers, south of the Amazon. Hershkovitz (1985) defined the species as reaching the Rio Itacaiunas in the Serra dos Carajás, however, the extent of its southern range is still undetermined. *Chiropotes albinasus* is dispersed between the Madeira and Xingu rivers, south of the Amazon. Their southern range extends as far as the Guaporé River in Rondônia, Brazil. The species is not found evenly throughout Rondônia, as it is not found between the Mamoré, Madeira, and Ji-Paraná rivers (Ferrari et al., 1999); however, the species has also been spotted further south on the right bank of the Rio Guaporé (Wallace et al., 1996). *Chiropotes chiropotes* are found north of the Amazon River, above and east of the Orinoco in Venezuela. The species dispersed into Venezuela along the east bank of the Orinoco, reaching the Rio Caroni but not far enough east to reach western Guyana (Norconk, 2011). *Chiropotes sagulatus* is located north of the Amazon River and east of the Rio Branco, occupying the northern region of Guyana. *Chiropotes israelita* is located north of the Rio Negro, where its range does not pass the Orinoco River. Its eastern range does not surpass the Rio Branco.

Chiropotes are seed predators and mainly feed off of the family Lecythidaceae. The distribution of this taxon is driven by abiotic factors. The most relevant factor for this study and this species of primate is soil moisture. This factor focuses on the extremes of soil conditions, such as always saturated, not saturated, periodically saturated, or dry areas, etc. This species mainly grows in non-flooded forests but has been known to adapt to other conditions in forest and savannah habitats. However, due to their populations occurring in non-flooded forests, extreme rainfall, especially over long periods of time, can cause high mortality to tree species adapted to these lowland non-flooded forests (Mori et al., 2017). Therefore, the species of plant needs specific conditions to survive. The diet of *Chiropotes* and the fact that they are seed predators may exclude them from the adverse effects of low rainfall and food availability (Norconk & Conklin-Brittain, 2016). Bearded sakis have the ability to make use of scarce resources over many months, even as the seasons change. They also possess flexible social characteristics and special dentition, which will contribute to their ability to inhabit fragmented areas (Norconk & Conklin-Brittain, 2016). Furthermore, it has been found that bearded sakis only use a fraction of their available space in forest fragments, whether that be 1 ha or 100 ha (Boyle, 2008). This indicates that they were concentrating on particular areas of the forest fragments rather than exploring the entire area. The clusters of bearded saki distribution, in line with habitat suitability, seen in my results also gives evidence to this theory. This may give more evidence to bearded sakis being able to inhabit fragmented areas and survive there long term. Previous studies done on *Chiropotes* show that the majority of their day is spent feeding (Peetz & Schuchmann, 2001). Therefore, it is necessary that suitable food sources are available to the species so they can continue this natural behaviour.

Chiropotes are greatly affected by habitat suitability, not only for the food they consume, as previously discussed, but also for how they gather food. Habitat changes in *Chiropotes* home ranges will ultimately affect group size and dynamics. This mitigates intragroup feeding competition. *Chiropotes* adjust group size when feeding, and this ability to expand or contract throughout the day for feeding is independent of habitat quality, anthropogenic disturbance, and fragmentation (Shaffer, 2012). Independent subgroups are formed to forage, which then come back together at the end of the day. It is important that more research be done on this topic to understand the extent to which population size is affected by habitat disturbance and how that could lead to competition within the species for access to food. However, the ability to adjust group size based on food quality and scarcity may ensure the survival of *Chiropotes* and prevent the species from facing intragroup feeding competition. Since these variables are primarily seen in response to low-quality food and scarcer food patches, it is easy to assume that in patches where *Chiropotes* are not occurring as uniformly, although they are living in less suitable habitats, they have already adapted to this.

3.2.1 Deforestation

Deforestation is a large driver for primate species habitat suitability and needs to be referenced when discussing conservation of species. WWF International has compiled areas with a significant concentration of deforestation and areas where forests are still under threat and labelled them “Deforestation Fronts” (Pacheco et al., 2021). The deforestation fronts for Latin America, more specifically the Amazon, can be seen in Figure 6. The largest drivers for deforestation in these areas are cattle ranching, transport infrastructure, smallholder farming, large-scale logging and agriculture, fires, and mining (Pacheco et al., 2021).

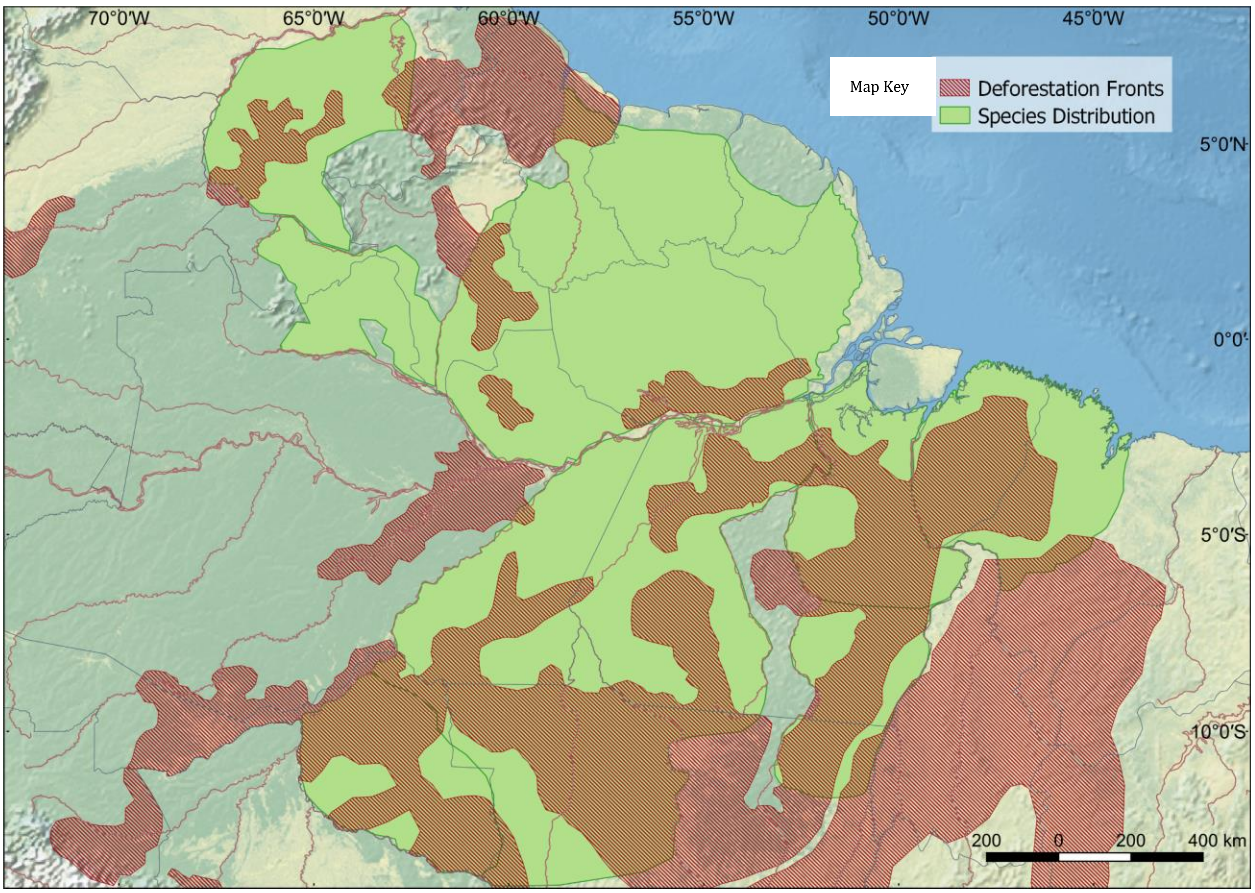


Figure 6: Map of deforestation fronts across Latin America. These have been overlaid on the distribution of Chiropotes spp. All information was retrieved and downloaded from WWF International 2021. The deforestation fronts Amazon Brazil, Cerrado Brazil and Amazon Venezuela/Guyana were used and cover 109.92M hectares of forest.

The habitat ranges of *Chiropotes utahickae* and *Chiropotes satanas* fall in areas that have experienced large amounts of deforestation, with it covering over half of their species distribution. *Chiropotes utahickae* is mainly threatened by habitat loss and fragmentation, according to the IUCN Red List. *C. utahickae* have been observed as being tolerant of habitat fragmentation (Bobadilla & Ferrari, 2000) but it is not currently known what the long-term implications of this would be. *Chiropotes albinasus* also has a large proportion of its distribution under threat of deforestation. *Chiropotes albinasus* inhabits an area that is quite isolated and less deforested than southeastern Amazonia ranges (Veiga et al., 2013). This is also a possibility for *Chiropotes chiropotes*, with deforestation fronts occurring close to their most suitable habitats. These four species have high habitat suitability in areas where deforestation occurs and is a threat. Sales et al. (2020) found that Amazonian primates will be threatened by climate change despite species-specific divergences, especially when coupled with deforestation scenarios. These factors together, and with time, mean that species may be pushed into even more fragmented habitats than they are occupying now.

It has been stated that species in large home ranges have the ability to inhabit fragmented forests, but this will have effects on their ecology, demographics, and behaviour; therefore, further decreases could negatively affect populations (Boyle et al., 2009). *Chiropotes satanas* are thought, with current predictions, to possibly resist range loss in the future, but may disappear entirely outside of fragments that are not protected (Silva et al., 2022). Johns & Ayres (1987) predicted that by the turn of the twentieth century, *Chiropotes satanas* would be extinct. However, this assumption was made before an understanding of the species tolerance to habitat disturbance was known. The northern species seem to be under no immediate threat, whereas the southern and eastern species are all at higher risks of extinction. This is reflected in their IUCN Red List Status', with the two species north of the Amazon (*Chiropotes chiropotes* and *Chiropotes sagulatus*) being Least Concern.

Deforestation fronts do not account for all deforestation within Latin America or the Amazon but symbolise key areas of concern. Therefore, discussing them with reference to species distribution and habitat suitability, I believe, gives a broader view of how

Chiropotes can use and move amongst their home ranges. The spatial requirements for *Chiropotes* are poorly understood, as they have been observed in various home range sizes. They also have been seen to exist in relatively small and isolated populations (Ferrari et al., 2009). This may mean they are a tolerant and resilient species, who can adapt quite quickly to the changes in land. Boyle et al. (2009) found that large tracts of forest need to be preserved for species conservation, due to *Chiropotes* spp. when living in fragmented forests revisiting feeding trees. Impacted ecosystems may have negative effects on *Chiropotes* in particular due to them being seed predators (Ferrari et al., 2013). Although these rates tend to oscillate over time, deforestation still persists.

3.5.2 Conservation and Protected Areas

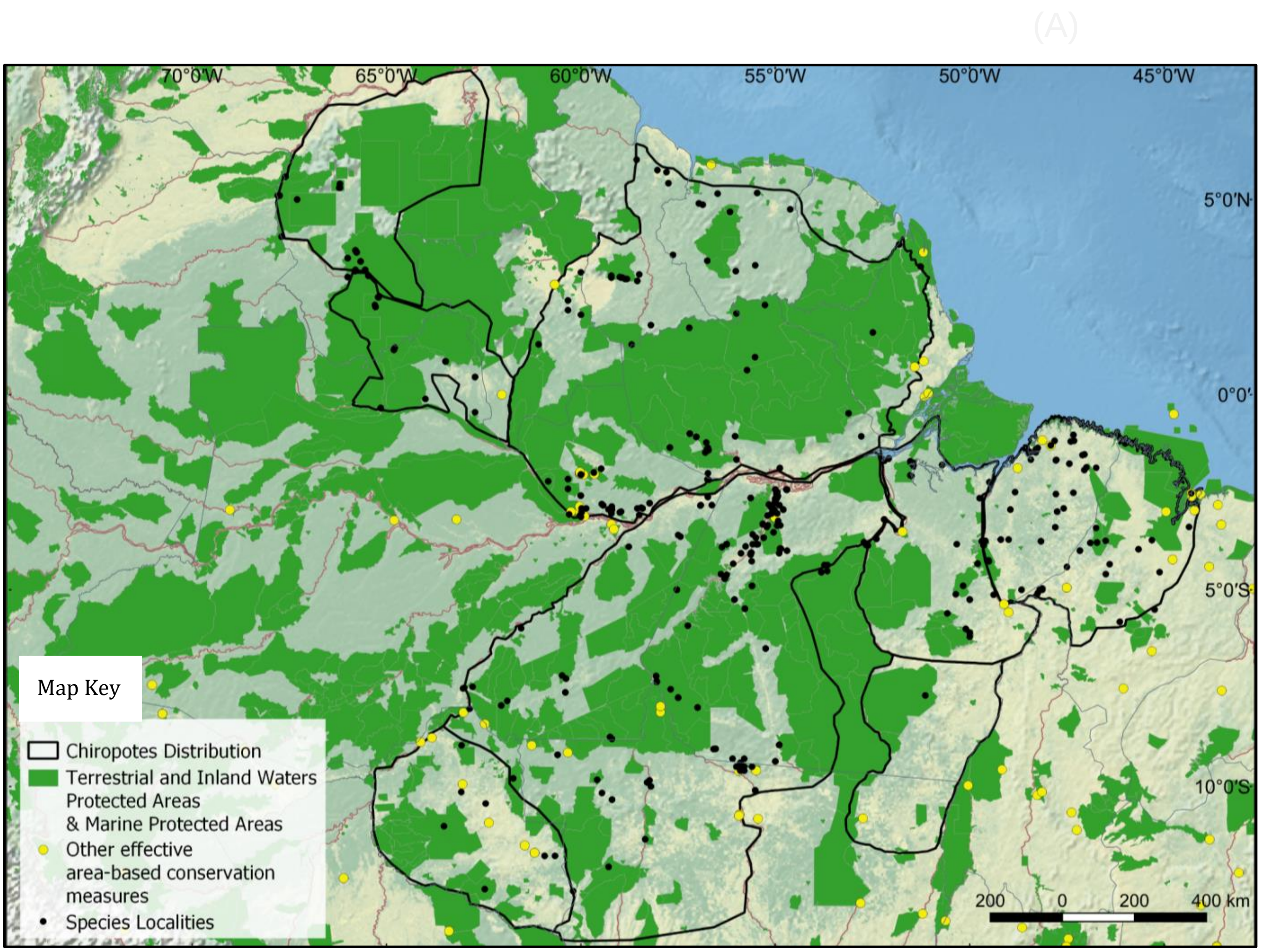


Figure 7: Map of protected areas across South America, with focus on the distribution and home ranges of Chiropotes spp. (A) and where they are located overlaid on habitat suitability (B). Sources for this map can be seen in the supplementary material provided. All information was retrieved from UNEP-WCMC and IUCN 2023. Data for this can be found in Supp. Material Table 11 & 12

There are challenges to the conservation of *Chiropotes* in terms of adhering to an ecosystem level approach. Due to their specialisation as seed predators, this could cause specific pressures on ecosystems and the relative abundance of accessible food. An increase in the density of seed predators is likely to have a detrimental effect on the population and resources of plant species. Over time, habitat fragments may erode the resources available in the long term. The main challenge in conserving this species, as well as its family Pithiciidae, is the lack of data on a wide number of population parameters, which would be crucial to implementing an effective conservation strategy. It is hard to determine which factors affect the absence of species and which environmental variables would contribute to habitat suitability. In recent studies, it has been revealed that the taxa may be highly tolerable of habitat fragmentation, even though the species seem dependent on relatively large tracts of forest for their feeding.

Chiropotes rely on seeds for the larger part of their diet. However, due to their morphology, they lack a specialised gut that enables the digestion of toxins and secondary compounds found in the seeds (Shaffer, 2012). In order to avoid consuming too many toxins from a single species, bearded sakis travels over vast distances every day to consume a wide variety of plant species (on average consuming 50 per month). Therefore, the conservation of *Chiropotes* is highly dependent on understanding the connection between diet and conservation. A better understanding of their diet is necessary to construct an informed conservation management plan. Several steps can be taken to ensure they are placed in the correct environment. These include:

- Extensive research needs to be conducted, or reviewed, to provide lists of preferred dietary items and foods that can be supplemented if these are not readily available.
- Fruit size, hardness, and nutritional composition need to be reviewed to ensure what is used in the future meets nutrition requirements.
- The primates' ability to forage correctly, with group size and composition taken into account. The area's quality and location will contribute highly to this.

Following these as a general rule will help determine how they respond to climate change and their resilience to habitat fragmentation.

There are a large number of protected areas across South America and the Amazon that can contribute to species conservation. A total of 10,111 protected areas are found across Latin America and the Caribbean, with terrestrial protected areas covering 24.9% of land (UNEP-WCMC, 2023). This data has been plotted against the home ranges of *Chiropotes* (Figure 7). From the map above, it is clear to see that protected areas cover a large amount of *Chiropotes* spp. distribution. In this study I will calculate habitat suitability for the species, which I will overlay onto this data and hopefully be able to discuss which specific protected areas greatly benefit *Chiropotes*.

Since 2000, WWF and ARPA (Amazon Region Protected Areas) have scattered protected areas across the Amazon, with 128 million acres being protected to date. This includes strict preservation areas and sustainable use areas. According to a study by Walker (2009), the federal and state governments of Brazil have established a viable network of protected areas in the Amazon. These protected areas act as buffers against potential climatic disturbances and effectively protect the drier ecosystems of the basin (Walker et al., 2009). A study by Gray et al. (2016) showed that biodiversity is 10.6% higher inside protected areas compared to outside these areas, and abundance was at 14.5%. Therefore, these should be maintained and managed effectively. Suriname also has a large number of protected areas. The most prominent is the Central Suriname Nature Reserve, which is a World Heritage Site. Other protected areas include nature parks, special management areas, archeological sites, and plantations (UNEP-WCMC, n.d.). Although protected sites are good at maintaining biodiversity, levels of endemism and species richness do not increase in these areas (Gray et al., 2016). Non-human primates are crucial for maintaining ecosystem diversity. According to the IUCN, there are currently thought to be 173 species and 49 subspecies throughout South America (IUCN, 2023). New species are consistently being described, revised, and reinstated. Many documents are also outdated or have misidentified taxa, meaning information on species diversity is incorrect. These taxonomic instabilities hinder conservation efforts and their implementation, which is typically done for a species as a whole.

3.3 Methods

3.3.1 Data collection

Maximum entropy algorithm modelling program (Phillips et al., 2006) was used in MaxEnt (3.4.3) in RStudio (4.1.1) (RStudio Team, 2022) to estimate potential distribution under different bioclimatic variables to assess habitat suitability. This algorithm finds relationships between species occurrences and environmental variables, enabling the development of a model that predicts potential species distribution in accordance with the selected variables (Phillips et al., 2022).

Species occurrence data was gathered via literature, samples currently in use at the University of Salford, and observations through GBIF (Global Biodiversity Information Facility (GBIF.org), with no records spanning further back than 1952 (Supplementary Material Table 4). The number of occurrence points obtained varied for each species, ranging from large amounts such as 210 for *Chiropotes albinasus* to 20 for *Chiropotes israelita*. The number of coordinates gathered and available seems to correlate to the certainty of species taxonomy, with debated species yielding lower locality points. All records were plotted in a geographical information system (*QGIS 3.16.11*; QGIS Development Team, 2021) against shape layers of their species that were downloaded from the IUCN Red List (iucnredlist.org). These polygon shapes were used as the extent of occurrences (EOO, sensu IUCNredlist.org), and nothing falling outside of them was included. All coordinate records were inspected on QGIS to exclude repeats, inaccurate geographic locations, and uncertain species distributions. After excluding these records, duplicate records were then removed. Any occurrences within these areas were assumed to still be present. Clustered occurrences within a small radius of each other were included. These coordinates would later be filtered through MaxEnt, but they were included to allow enough varied and accurate points throughout the species range, but with a buffer around every point as MaxEnt is sensitive to point density. The remaining coordinates were exported as ESRI shapefiles to be used as polygon shapes in MaxEnt.

3.3.2 Data analysis

3.3.2.1 Species distribution modelling

The software RStudio (4.1.1) was used to perform the habitat suitability modelling in MaxEnt. The script files used to manipulate shapefiles and data were obtained from the authors of Rabelo et al. (2020) and altered accordingly.

The environmental variables projected onto the model were taken from WorldClim (https://www.worldclim.org) and 11 out of the 19 available variables were added onto the model. The species polygon shapes previously gathered were used to crop the environmental variables and coordinates gathered to their respective species shapes, and a Pearson's correlation test was performed for each species. Highly correlated environmental variables were chosen based on how much they influenced the distribution and geographical space of the species distribution. The Pearson's correlation test is parametric and uses this as an analysis. To calculate the dendrogram the correlation matrix needed to be transformed into a dataframe and then into distances. These distances had a maximum value of 1 and hclust() function was used to create a dendrogram from hierarchical clustering. The variables used for plotting the dendrogram were "abline(h=0.25, lty=2, lwd=2)". Variables that have a correlation less than 0.75 were also accounted for. The dendrogram produced from this Pearson's correlation test showed nine similar variables that were seen consistently throughout all species (Table 4). The same variables were chosen throughout all six species, with only a few differing between each. This was to allow a better evaluation of all species and their habitats. This also allowed them to act as control variables and enhance the validity of the model. BIO7 was only used for *Chiropotes sagulatus* as the correlation test showed it was highly important for the species, but not the rest. BIO9 was used for both *Chiropotes sagulatus* and *Chiropotes israelita* for the same reasons.

These selected variables were then prepared by plotting them onto the geographical space and including species records. A MaxEnt model was then generated through RStudio using dismo (1.3-5). The chosen parameters included "randomseed", "writeclampgrid", "betamultiplier=1", "responsecurves", "jackknife", and "pictures". The calculated model was also edited to produce 10 replicants. Evaluations on density plots, threshold data and response curves were also created through the program. An ROC and kappa plot were created. Prevalence was also modelled to find the closest to observed prevalence. After this a presence/absence model was created in the geographical space and exported. BIOCLIM offers a distance statistical approach which allows the presence only data to be used. However, within this, we generated presence/absence data through MaxEnt. Parameters within the script were manipulated to ensure they were tailored to how we needed to use them. A cloud of 500 random points was used, and the software ran 10 repeats to validate the results (nine testing gains and one training gain). The threshold for prediction was set to measure equal specificity and sensitivity. The threshold distance was set to 5 km, with anything shorter being excluded. This threshold maximises the instances where the model incorrectly assigns an unsuitable habitat (true positive) and overlooks a suitable habitat (false positive).

The species occurrence data and shapefiles from IUCN, as previously mentioned, were also used to create a map describing deforestation (Figure 6) in South America. More specifically, with focus on how that affects *Chiropotes* as a species. To create the map of deforestation, information on deforestation fronts were retrieved from WWF (WWF International, 2021). As these included deforestation fronts from all over the world, I only downloaded the fronts across Latin America, which consisted of Amazon Brazil, Cerrado Brazil and Amazon Venezuela/Guyana. This information was downloaded and placed into QGIS where, already having a map of South America, I overlaid these fronts onto it. I then placed the polygon shapes for all *Chiropotes* species under this data to tailor the information onto how each species range is specifically affected by this deforestation.

3.3.2.2. Habitat suitability modelling

QGIS was used to refine habitat suitability models, extent of occurrence (EOO), and area of occupancy (AOO, sensu IUCNredlist.org). Species records and environmental variables were projected onto the polygon shapes. A model was calculated using these and the parameters previously set. The importance of each variable was plotted against their respective polygon shapes. The generated models showed a mean average prediction of habitat suitability. These were then inputted into QGIS and overlaid with unique values and distribution points that had been filtered through our scripts in MaxEnt. The band rendering of the models was changed to better represent the results. These were rendered using linear min/max settings.

The distribution of each species was mapped with their respective IUCN shapes, their EOO/AOO, and their habitat suitability to interpret the data. Mapping deforestation and climate change over a species home range will give us an idea of how species distribution will change over time in line with their extent of occurrence. Understanding which bioclimatic variables affect them most within their home range will be advantageous for finding other suitable environments and aiding in their conservation.

Creating the protected areas map (Figure 7) was similar to creating the one for deforestation. I retrieved protected area information from IUCN Red List (iucnredlist.org), the World Database of Protected Areas (WDPA) and UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) (UNEP-WCMC and IUCN, 2023). I downloaded this information and opened the protected areas file on QGIS. Once I had generated my habitat suitability models, these were then used on this map also. The polygon files for *Chiropotes* spp. were overlaid to act as borders between each species so the extent of protected areas in each separate home range could be understood. I also created a map for protected areas using the occurrence points of each species with their respective IUCN shapes to discuss whether they were distributed more in protected areas or outside of them.

Table 4: Bioclimatic variables used to influence the distribution of Chiropotes. The variables in bold were selected for the final models. Bioclimatic variables were retrieved from WorldClim.

Code	Variable	Reference
BIO1	Annual Mean Temperature	Fick, S.E., and R.J.

		Hijmans, 2017.
BIO2	**Mean Diurnal Range (Mean of monthly (max temp - min temp))**	Fick, S.E., and R.J. Hijmans, 2017.
BIO3	**Isothermality (BIO2/BIO7) (x100)**	Fick, S.E., and R.J. Hijmans, 2017.
BIO4	Temperature Seasonality (standard deviation ×100)	Fick, S.E., and R.J. Hijmans, 2017.
BIO5	Max Temperature of Warmest Month	Fick, S.E., and R.J. Hijmans, 2017.
BIO6	Min Temperature of Coldest Month	Fick, S.E., and R.J. Hijmans, 2017.
BIO7	**Temperature Annual Range (BIO5-BIO6)**	Fick, S.E., and R.J. Hijmans, 2017.
BIO8	**Mean Temperature of Wettest Quarter**	Fick, S.E., and R.J. Hijmans, 2017.
BIO9	**Mean Temperature of Driest Quarter**	Fick, S.E., and R.J. Hijmans, 2017.
BIO10	Mean Temperature of Warmest Quarter	Fick, S.E., and R.J. Hijmans, 2017.
BIO11	Mean Temperature of Coldest Quarter	Fick, S.E., and R.J. Hijmans, 2017.
BIO12	**Annual Precipitation**	Fick, S.E., and R.J. Hijmans, 2017.

BIO13	**Precipitation of Wettest Month**	Fick, S.E., and R.J. Hijmans, 2017.
BIO14	**Precipitation of Driest Month**	Fick, S.E., and R.J. Hijmans, 2017.
BIO15	**Precipitation Seasonality (Coefficient of Variation)**	Fick, S.E., and R.J. Hijmans, 2017.
BIO16	Precipitation of Wettest Quarter	Fick, S.E., and R.J. Hijmans, 2017.
BIO17	Precipitation of Driest Quarter	Fick, S.E., and R.J. Hijmans, 2017.
BIO18	**Precipitation of Warmest Quarter**	Fick, S.E., and R.J. Hijmans, 2017.
BIO19	**Precipitation of Coldest Quarter**	Fick, S.E., and R.J. Hijmans, 2017.

Table 5: Interpretation of Cohen's kappa as seen by (McHugh, 2012). In the table, the column "% of data that are reliable" corresponds to the squared kappa, an equivalent of the squared correlation coefficient, which is directly interpretable.

Value of Kappa	**Level of Agreement**	**% of Data that are Reliable**
0–.20	None	0–4%
.21–.39	Minimal	4–15%
.40–.59	Weak	15–35%
.60–.79	Moderate	35–63%
.80–.90	Strong	64–81%
Above.90	Almost Perfect	82–100%

3.4 *Results*

All abbreviations used below can be seen in Table 4, where they can also be referenced to see the corresponding variable.

3.4.1 Chiropotes albinasus

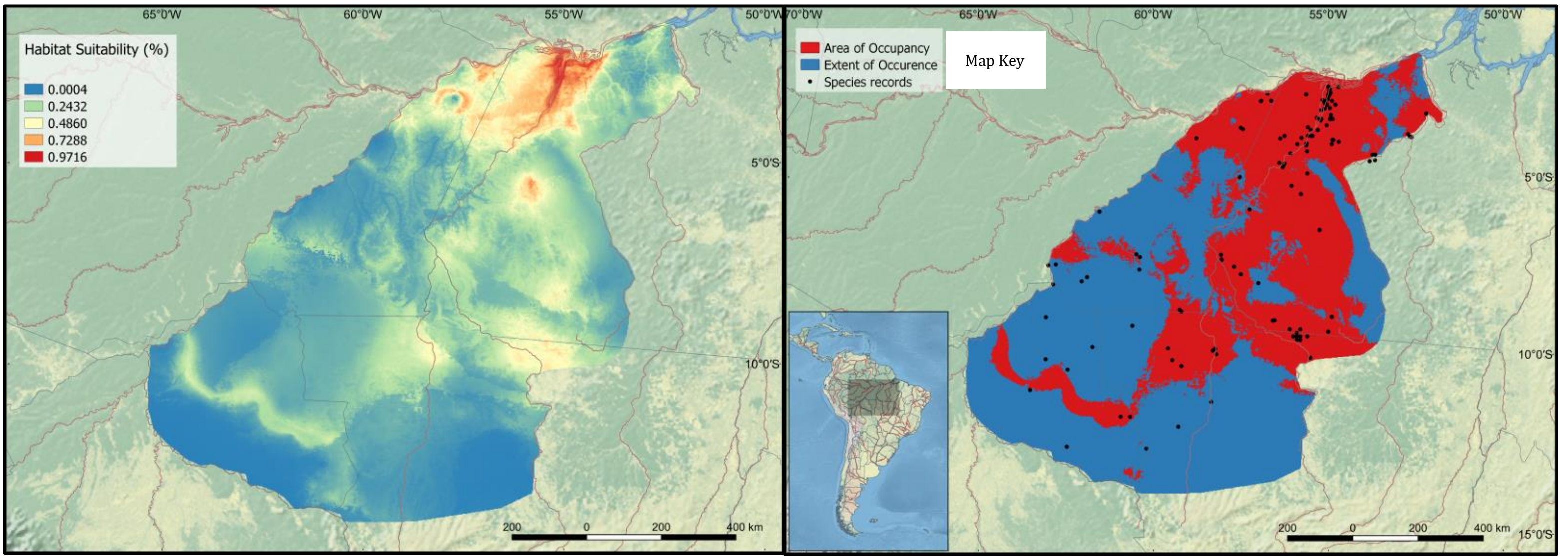


Figure 8: (A) Habitat suitability (%) and (B) predicted area of occupancy for Chiropotes albinasus (White-nosed bearded saki) situated between the Xingu and Madeira rivers.

The model shows that *Chiropotes albinasus* has a large area of occupancy as well as a large extent of occurrence. Variable BIO2 provided the highest percent contribution, and BIO9 provided the highest permutation importance overall. Variable BIO14 provided the lowest percent contribution overall, and BIO13 provided the lowest permutation importance overall.

BIO2 provided the highest gain on the jackknife test. The AUC jackknife test showed that BIO3, BIO9, and BIO8 had the highest environmental variable importance throughout the 10 repeat tests.

The mean threshold of equal sensitivity-specificity (AUC) is 0.808. The correlation coefficient is 0.81.

3.4.2 Chiropotes chiropotes

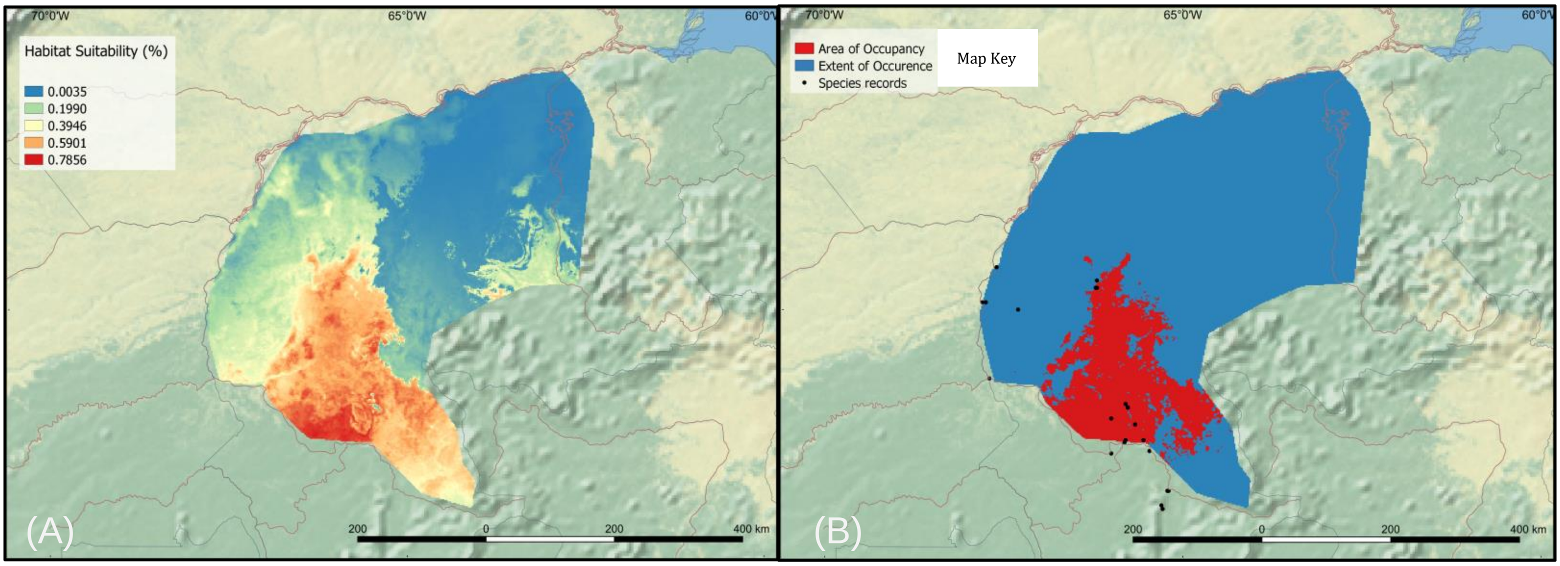


Figure 9: (A) Habitat suitability and (B) predicted area of occupancy for Chiropotes chiropotes (Rio Negro bearded saki) north of the Amazon River.

According to this model, the species has a small area of occupancy, with its extent of occurrence being the rest of its home range. Many of the species' occurrence points align with the higher areas of habitat suitability, and this species is more likely to occur in these points. The extent of occurrence aligns with the least suitable habitat area in the species' home range, where only a few occurrence points were found.

Variable BIO19 provided the highest percent contribution and permutation importance overall. Variables BIO18, BIO13, and BIO3 provide the lowest percent contribution and permutation importance, which was at zero.

BIO19 provided the highest gain on the jackknife test throughout. An anomaly was found on one repeat of the test, where BIO2 was found to have the highest gain. The AUC jackknife test showed BIO2 and BIO14 the most in its results overall, making them the environmental variables with the highest importance.

The mean threshold of equal sensitivity-specificity (AUC) is 0.758. The correlation coefficient is 0.54.

3.4.3 Chiropotes utahickae

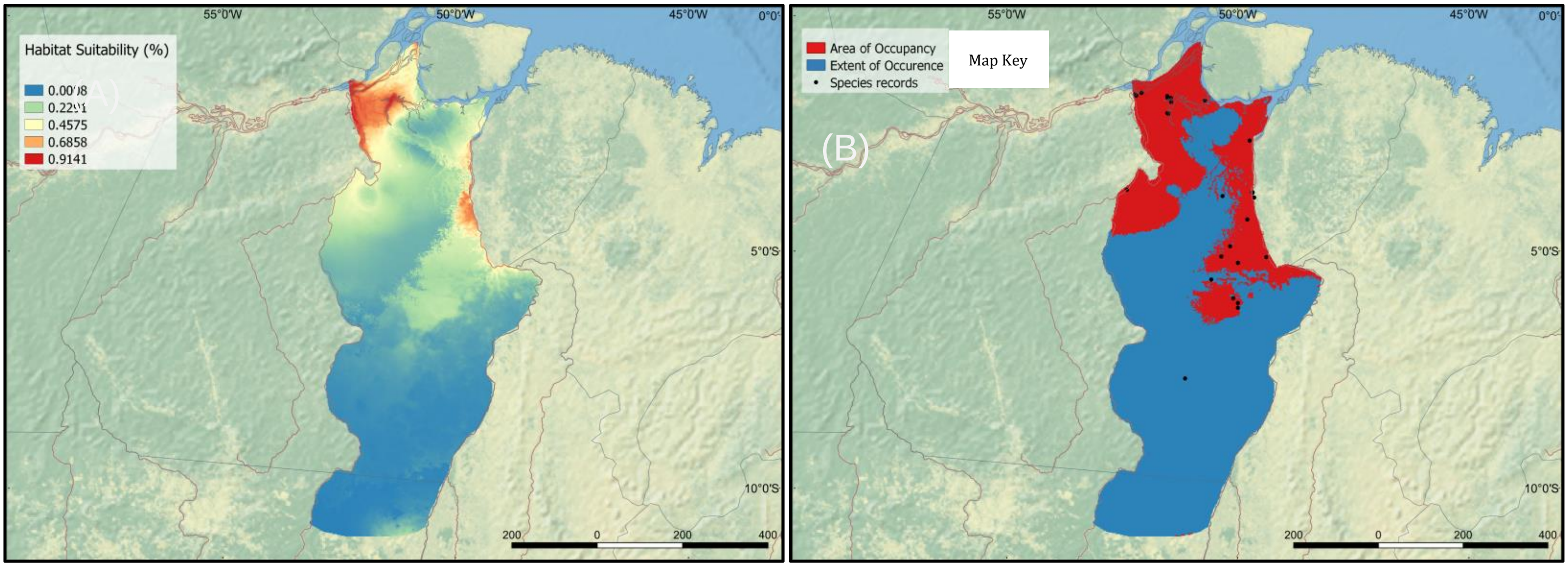


Figure 10: (A) Habitat suitability and (B) predicted area of occupancy for Chiropotes utahickae (Uta Hick's bearded saki) situated in the Xingu-Tocantins interfluve.

The species occurs mainly in its area of occupancy. Variable BIO3 provided the highest percent contribution, and variable BIO18 provided the highest permutation. Variable BIO13 had the lowest percent contribution and permutation importance overall.

BIO3 provided the highest overall gain on the jackknife test. The AUC jackknife test showed BIO13 as the environmental variable with the highest importance.

The mean threshold of equal sensitivity-specificity (AUC) is 0.798. The correlation coefficient is 0.96.

3.4.4 Chiropotes satanas

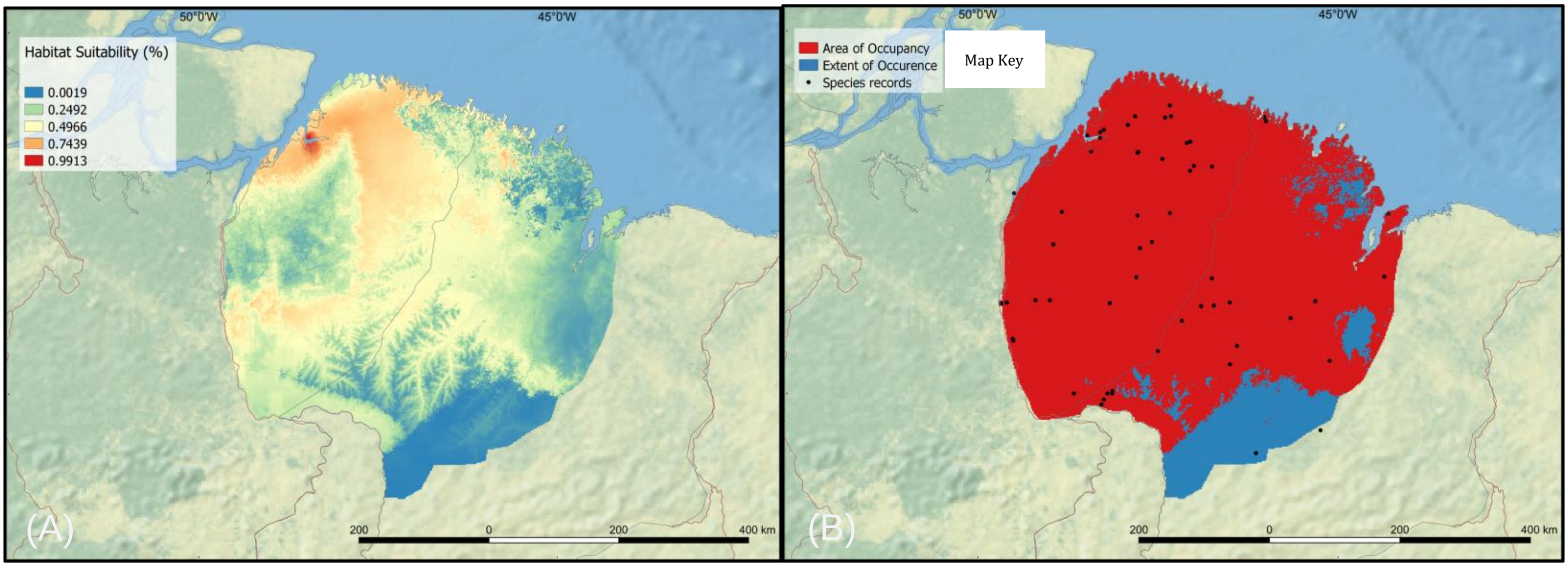


Figure 11: (A) Habitat suitability and (B) predicted area of occupancy for Chiropotes satanas (Black bearded saki) situated in the Tocantins-Araguaia basin.

The species has a large area of occupancy in its geographic range. The extent of occurrence is reflected in habitat suitability, with the least suitable habitat area having the largest extent of occurrence. The model shows that a large proportion of the home range is suitable for this species, with occurrence points being found across the whole region.

Variable BIO8 provided the highest percent contribution and permutation importance overall.

BIO10 had the highest gain on the jackknife test. The AUC jackknife test showed BIO3 to have the highest environmental variable importance.

The mean threshold of equal sensitivity-specificity (AUC) is 0.704. The correlation coefficient is 0.97.

3.4.5 Chiropotes sagulatus

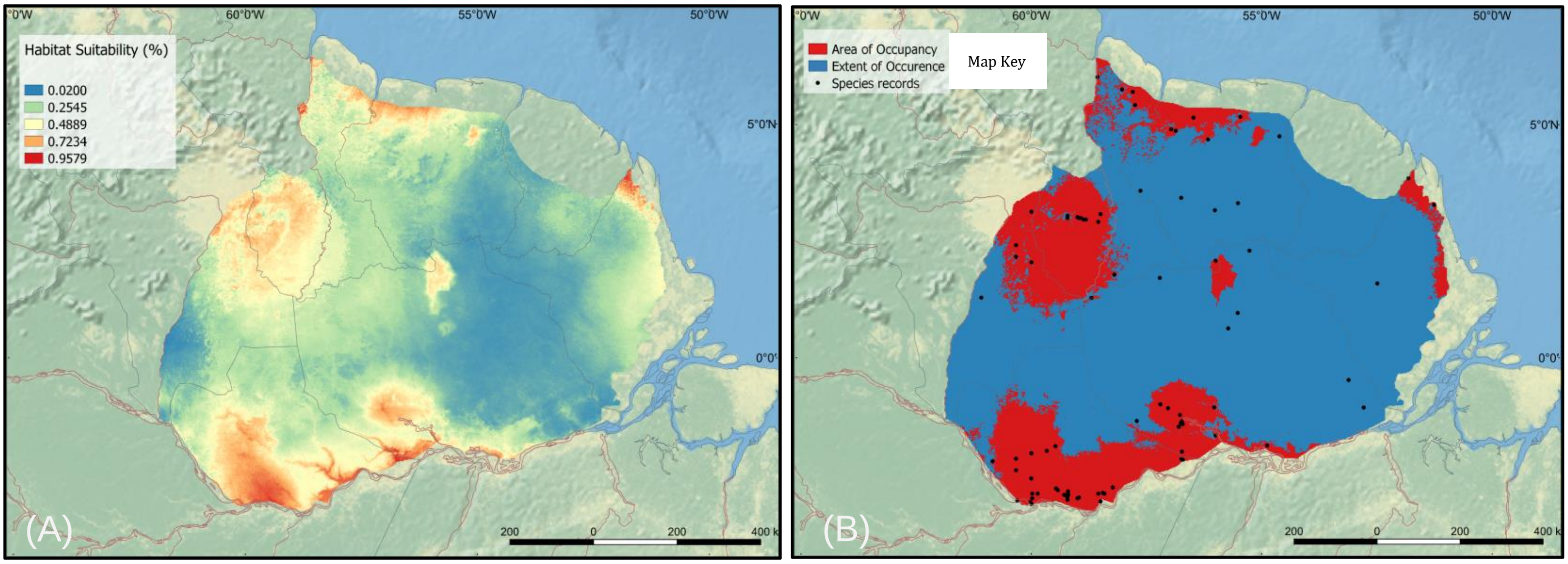


Figure 12: (A) Habitat suitability and (B) predicted area of occupancy for Chiropotes sagulatus (Guianan bearded saki) situated north of the Amazon river.

According to the model, habitat suitability is in line with the extent of occurrence. The species has a very reduced area of occupancy in comparison to its extent of occurrence, with clusters of species records being found within these areas of occupancy. The variable BIO8 provided the highest percent contributions, BIO2 also had a high contribution. Variable BIO18 provided the highest permutation importance overall, BIO3 also had a high contribution. Overall, variable BIO7 contributed the least percentage and permutation importance.

BIO10 provided the highest gain in the jackknife tests. The AUC jackknife test showed that both BIO2 and BIO8 had the highest environmental variable importance.

The mean threshold of equal sensitivity-specificity (AUC) is 0.748. The correlation coefficient is 0.96.

3.4.6 Chiropotes israelita

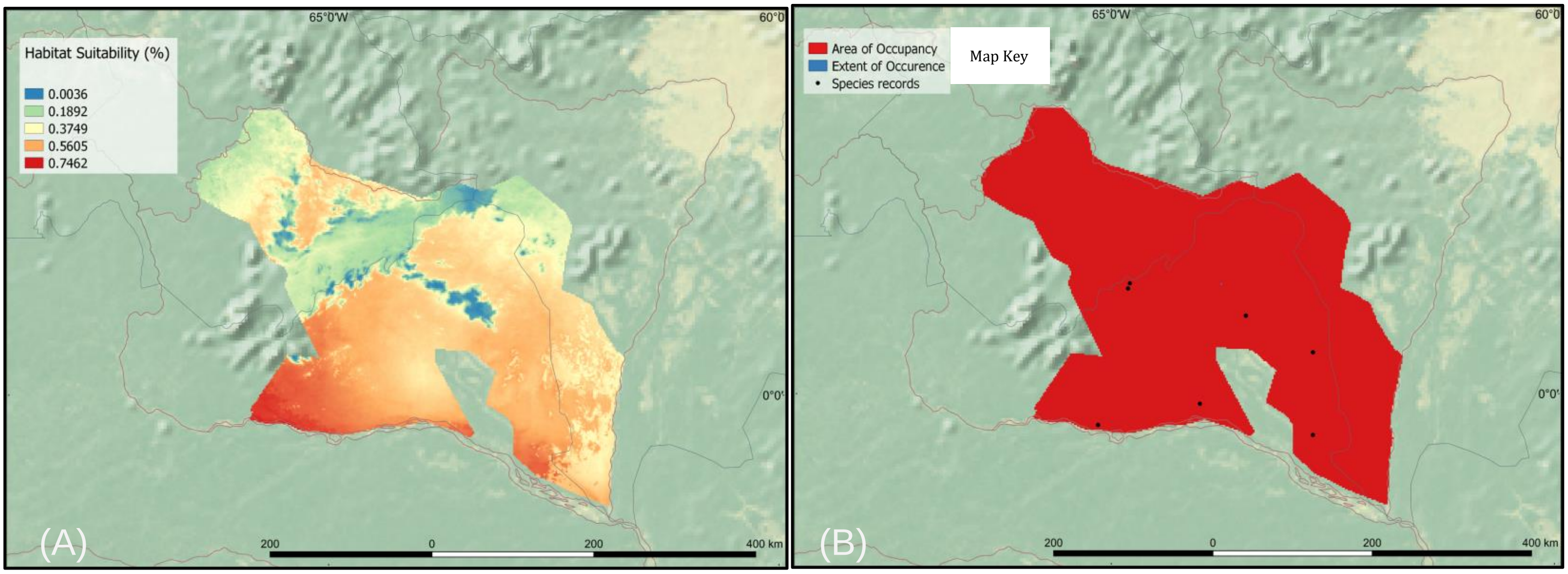


Figure 13: (A) Habitat suitability and (B) predicted area of occupancy for Chiropotes israelita (Rio Negro bearded saki) situated north of the Rio Negro.

This model shows that the species has no extent of occurrence and that its full geographic range is its area of occupancy. Nearly all of the region is suitable for the species, with the highest number of occurrence points being found where it is most suitable.

Variable BIO14 provided the highest percent contribution and permutation importance overall. MaxEnt only provided five repeats instead of 10.

MaxEnt only produced six repeats of jackknife tests for this species. BIO14 provided the highest gain overall. The AUC jackknife test showed that BIO19 provided the highest environmental variable importance.

The mean threshold of equal sensitivity-specificity (AUC) is 0.508. The correlation coefficient is 0.19.

3.4.7. Habitat Suitability

3.4.7.1 Protected Areas

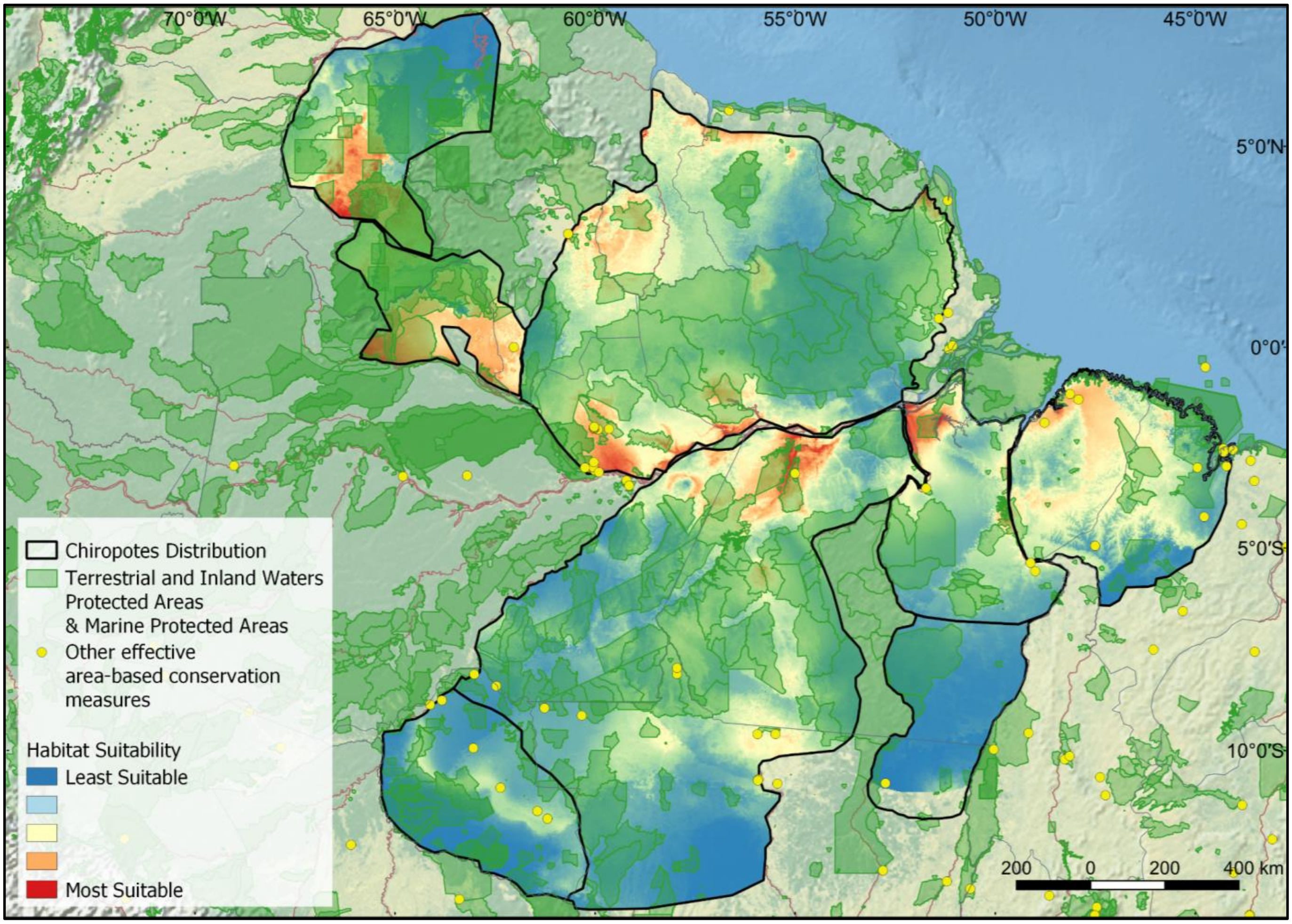


Figure 14: Map of protected areas across South America and where they are located overlaid on habitat suitability of Chiropotes spp.. Sources for this map can be seen in the supplementary material provided. All information was retrieved from UNEP-WCMC and IUCN 2023. Data for this can be found in Supp. Material Table 11 & 12

3.4.7.2 Deforestation

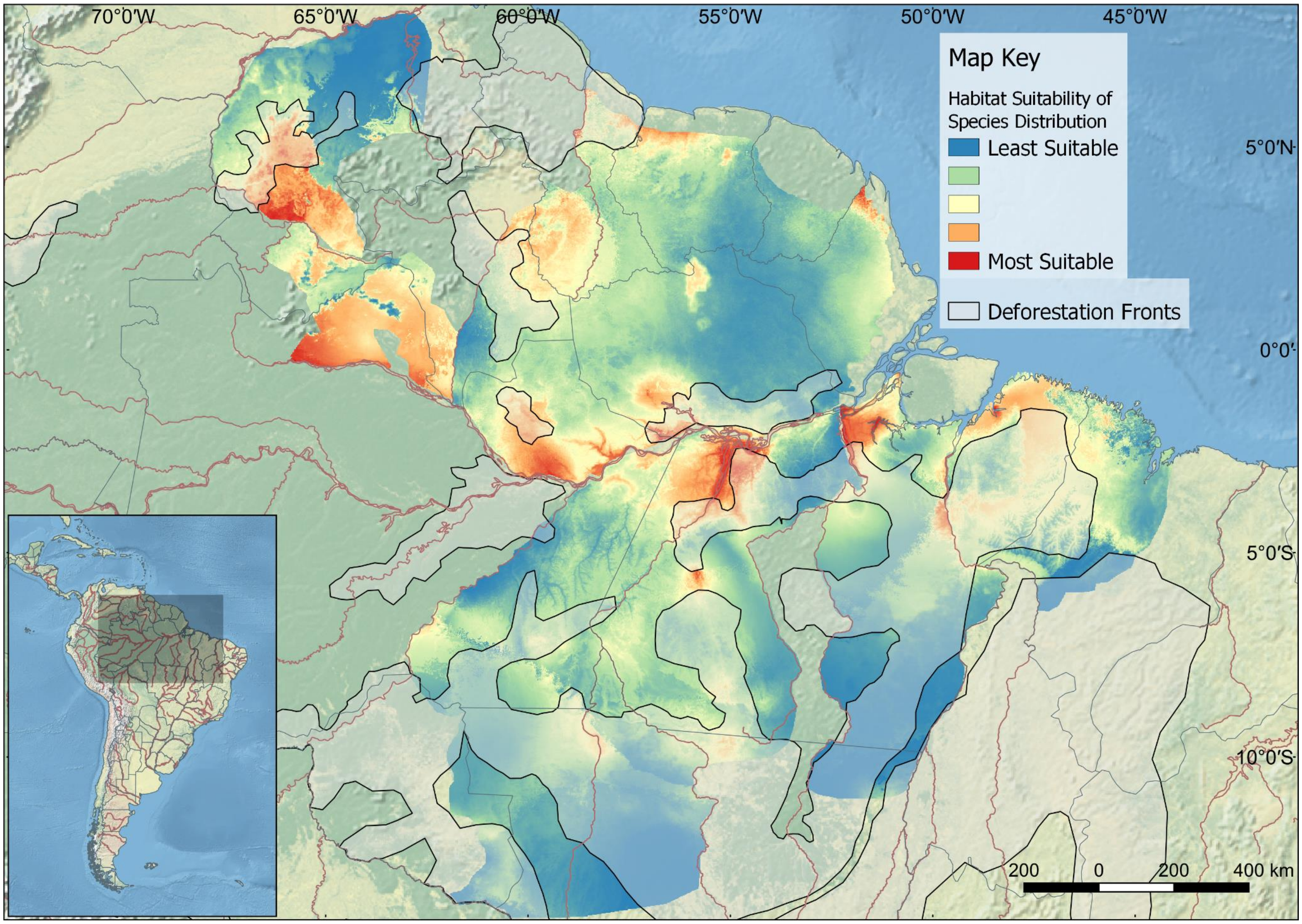


Figure 15: Map of deforestation fronts across Latin America.These have been overlaid on the Habitat Suitability of Chiropotes spp. All information was retrieved and downloaded from WWF International 2021. The deforestation fronts Amazon Brazil, Cerrado Brazil and Amazon Venezuela/Guyana were used and cover 109.92M hectares of forest.

3.5 Discussion

I have taken necessary steps to ensure there is no bias within my results. I had varying amounts of sample sizes, all of which had been spatially filtered in RStudio to minimise any false negatives and reduce omission errors. I chose to include clustered localities, as these are correct distribution records for the species and to filter records would have weakened the prediction. I believe that, although I included close proximity samples, the spatial filtering has increased the predictive power of the model. Moua et al. (2020) showed that performances were altered in MaxEnt when the number of presence data fell below 100. To apply spatial thinning, as a parameter to account for the fact there might be biassed data, I removed species occurrences in the dataframe that were closer to each other than a specified distance threshold (5 km).

The extent of occurrence is large for all *Chiropotes* species, apart from *Chiropotes satanas* and *Chiropotes israelita*, with the area of occupancy being larger than the extent of occurrence. *C. israelita* and *C. satanas*, which have a large extent of occurrence and a small area of occupancy, are not thought to occupy the entirety of this extent uniformly, or at all. The bioclimatic limitations faced within these extent of occurrence areas typically show throughout all species that they are less inhabitable than areas of occupancy. As shown in previous papers, “bearded saki monkeys do not use all habitat types equally; therefore, it is important to consider a species habitat preferences when establishing conservation and management plans” (Boyle, 2008, p.161). This is something I will consider when assessing their habitat suitability.

The result with the highest mean threshold of equal sensitivity-specificity is *Chiropotes albinasus* with an AUC of 0.808. This is the closest value to 1 that any of the *Chiropotes* spp. came to, making these results the most accurate and the ones in which I have the most confidence in its prediction. The accuracy of this model may be due to the large number of localities available; *Chiropotes albinasus* had the highest number of distribution points of any of the models, which I believe contributed greatly to this prediction. However, all models had reasonable performances, with *C. chiropotes*, *C. sagulatu*s, *C. satanas,* and *C. utahickae* all having values over 0.7.

Chiropotes israelita had an AUC value of 0.508, which is particularly low and means the model performance is not as reliable and offers no more prediction than random tests would (Landis & Koch, 1977). The percentage of data that is reliable due to this low score is around 15–35%, which is quite weak, and I have little confidence in the results (Table 5) (McHugh, 2012). MaxEnt only provided five repeats instead of 10, which I do not feel validates the test results enough. This may be due to the low number of distribution points available for the species, as only 20 were available to me.

The model provides predictions on whether other areas would be suitable for the species if they had to migrate. A lot of species localities were found across their respective geographic ranges, but there is a theme of records being in concentrated areas, which align with the areas of highest suitability. Therefore, it is safe to assume that these are the most suitable and occupied sections of their area of occupancy. There are also records of species occurring outside of these most suitable habitat zones, which suggests that species occurring outside of these areas are operating in habitats with environmental constraints that are less suitable. There are fewer records within these less suitable areas of occupancy. It could be argued that both the model and the number of sightings do not provide enough evidence to state that the species do inhabit these areas. As the model predicts whether or not these areas would be suitable for the species, a prediction can be made on how the species would migrate. A lot of the records found are within these areas of occupancy and within the areas with the most habitat suitability. As a result, it is expected that they are mostly unoccupied or that species sightings are the result of the species travelling through these less suitable environmental conditions. Species living in these areas are predicted to have a lower-quality environment.

The most important bioclimatic variable for *Chiropotes albinasus* is Mean Diurnal Range. Temperature has an important influence on distribution because it determines the physical state of water. This is not only important for the species' living conditions so that the temperature remains hot or cool enough for them to survive, but it also greatly affects the life cycle of plant species. This species inhabits forests with subtropical/tropical moist lowland/swamp. This environment is composed of high temperatures and humidity. Changes to this would greatly affect where the species could survive if temperatures got too high or low within these daytime and nighttime ranges.

Chiropotes utahickae were affected by isothermality the most. Primates, typically, experience only mild fluctuations in their seasonal temperatures, therefore, are only adapted to specific ranges of temperatures and will most likely already live in a thermal tolerance. This increases their sensitivity to small changes in temperature (Tewksbury et al., 2008). Therefore, an area with a consistent temperature is preferable, and any fluctuations in this would result in the habitat no longer being suitable. Larger or smaller fluctuations in temperature can help influence species distribution. The most important variable for *Chiropotes satanas* and *Chiropotes sagulatus* is mean temperature of the wettest quarter. The distribution and abundance of biological species is directly affected by climate patterns over monthly seasonal precipitation and temperature. How populations persist, the rate at which they reproduce, and their birth rate can all be affected and fluctuate due to rising temperatures, severe droughts, etc. (Bernard & Marshall, 2020). *Chiropotes israelita* is greatly affected by precipitation of driest month. This suggests that extreme precipitation conditions largely affect the species range.

Chiropotes chiropotes were most affected by precipitation of the coldest quarter. Plant species richness can be greatly affected by precipitation, with higher precipitation typically resulting in higher biodiversity. Therefore, it is clear that this species needs both high temperatures and precipitation to be able to live in an area, less so for themselves as precipitation does not majorly influence primate species richness, but rather for the plants they use to get seeds. *Chiropotes chiropotes* is found north of the Rio Negro up to Venezuela. One study done at a site in Venezuela showed there are dry seasons through December to May, with an annual rainfall totalling 134 cm (Peetz & Schuchmann, 2001). This study site also showed the average temperature of this specific site to be 25.6°C, with temperatures fluctuating between lowest (December to January) and hottest (April and May) (Peetz & Schuchmann, 2001). Seasonal changes have an impact on eating habits, according to other studies in Venezuela. The dry months saw the highest levels of seed consumption, while the wet months saw the highest levels of fruit consumption (Norconk, 1996). Bearded sakis were also observed, in periods where food was scarce, to lengthen their daily paths to find food sources (Peetz & Schuchmann, 2001). So, although seasonal shifts affect feeding and plant species, *Chiropotes* seem to have adapted to consuming different foods as these temperatures change, in line with food availability.

Chiropotes chiropotes had three variables that received 0% contribution and permutation importance. These were Isothermality, Precipitation of Warmest Quarter, and Precipitation of Wettest Month. It is safe to assume that even though these showed up as important variables on the Pearson's correlation test, that the species home range is not affected by these environmental factors. The only other taxa that had three variables receive a 0% contribution and permutation importance is *Chiropotes israelita*, who were not affected by Mean temperature of Driest Quarter, Annual Precipitation and Precipitation of Wettest Month. As *Chiropotes israelita* has results with low validity, this does not give me much confidence that *Chiropotes chiropotes* results are reliable due to them reflecting the same number of variables with no contribution. Both species' polygon shapes are also quite small, and the smallest of all *Chiropotes* spp. distribution. This may have also had an effect on the results and how the environmental variables determined habitat suitability. However, *C. albinasus* had an AUC score of 0.758 which is moderate and means that 35–63% of the data is reliable. Other *Chiropotes* spp. also experienced results that were 0%. *Chiropotes utahickae* was not affected by Annual Precipitation and *Chiropotes sagulatus* was not affected by Temperature Annual Range. Therefore, I feel as though these environmental variables do not affect the habitat ranges in which these species are distributed.

Although *Chiropotes* spp. are resilient to habitat fragmentation, with the rate of deforestation being so highly concentrated in areas of higher suitability, the species could face the risk of becoming critically endangered and experiencing a change in status. As seen in Figure 15, there are large areas of deforestation fronts across Latin America. *Chiropotes sagulatus* had a few areas of high suitability, which were all spaced out across its distribution, mainly at the edges of its home range. *Chiropotes sagulatus* seems to be in an area where deforestation is not as intense as other

Chiropotes spp.. There is one deforestation front that occurs within a high area of habitat suitability towards the south of their distribution. However, there is also a protected area within this area of deforestation (Figure 14). As there are various and spread-out areas with high habitat suitability for this species where they can migrate too, there is not a large cause for concern for deforestation here as there might be with other species.

No deforestation fronts occur within *Chiropotes israelitas* geographical range. Only one deforestation front occurs within *Chiropotes chiropotes* distribution, however this is within the area of highest habitat suitability. There are protected areas found across this area of deforestation, but with there only being one concentrated area with the highest habitat suitability this does warrant concern for migration of the species in the future.

Chiropotes albinasus, Chiropotes satanas and *Chiropotes utahickae* have deforestation fronts that occur over the majority of their species distributions, and largely covers their area of highest habitat suitability. There are many protected areas within their distribution, but these are in small clusters (Figure 14). *Chiropotes utahickae* and *Chiropotes satanas* do not have a large number of protected areas throughout their geographic distributions. These species may have issues migrating to their most suitable habitats in their home range in the future if deforestation continues. It is most likely that they will have to inhabit least suitable and fragmented areas in the future.

Chiropotes spp. currently occupy fragmented areas in their distribution; with future climate change predictions, it may be that they have to migrate from these already sub-optimal environments to even less suitable ones. Port-Carvalho & Ferrari (2004) found that *Chiropotes* can be seen in fragmented landscapes across their home range. A sizable metapopulation of *Chiropotes satanas* and remnant populations were found in all fragments surveyed in this study. It was found that they not only tolerated the habitat fragmentation, but their diet and activity did not differ from those found in other sites not central to Amazonia, where there are larger fragments. This may suggest that all *Chiropotes* spp. have the ability to endure these fragmented habitats. Therefore, the deforestation fronts occurring over a wide range for *C. utahickae* and *C. albinasus* may not be cause for concern in terms of species elimination.

There are protected areas located in the most suitable habitat for all species (Figure 14) (UNEP-WCMC, 2023). These are a mix of different management types.

1) *Chiropotes albinasus* - Tapajós Natural Forest and an extractive reserve (Tapajós Arapiuns).
2) *Chiropotes utahickae* - Caxiuanã National Forest and a marine protected area (Amazon estuary and its mangroves).
3) *Chiropotes satanas* - Metrópole da Amazônia Wildlife Refuge and other effective area-based conservation measures.
4) *Chiropotes chiropotes* - Yapacana National Park, Parú-Euaja Massif Natural Monument, Serranía Yutajé y Coro-coro Natural Monument, Cerro Yaví Natural Monument, Cerro Morrocoy y Cerro Camani National Monument, Duida-Marahuaca National Park and Alto Orinoco-Casiquiare Biosphere Reserve.
5) *Chiropotes sagulatus* - Kanuku Mountains Protected Area, Caverna do Maroaga Environmental Protection Area, Rio Urubu State Forest, Biological Dynamics of Forest Fragments Project Area of Relevant Ecological Interest, Uatumã Sustainable Development Reserve, Saracá-Taquera National Forest, Kaboeri Kreek Nature Reserve Suriname, Snake Kreek, Brownsberg Nature Park, Rio Negro Left Bank Environmental Protection Area, Tupé Sustainable Development Reserve, Rio Negro State Park South Section, Saracá-Taquera National Forest, Rio Trombetas Biological Reserve and Paraná do Arauató Indigenous Land.
6) *Chiropotes israelita* - Tapuruquara Environmental Protection Area, Yanomami Indigenous Land, Pico da Neblina National Park, and Amazonas National Forest.

Most protected areas, for the species as a whole, are found outside of areas where habitat suitability is highest. It is fair to assume that *Chiropotes* will not benefit from these areas as much as they could. If their most suitable habitats are located in areas that are not protected, then they are at risk of having to move into less suitable environments and are therefore not being conserved efficiently. This may also be why we see so many of their distribution points clustered outside of these protected areas as well (Figure 7). A large majority of their localities, however, are outside of these protected areas. This could be for a number of reasons. Many localities have been gathered from findings that may have happened years prior to the management of these protected areas. Because a number of localities were gathered from sightings on websites like GBIF, they will not have been exact sightings for species protection and may not have occurred within these regions. These regions, due to being protected, may not have been chosen to record species localities as they are already assumed to be a safe environment and do not need further research, in terms of conservation. There are still concerns with the use of protected areas for species and their conservation. Protected areas may not be located properly to allow for species to inhabit them as they do not provide the most suitable habitat (Gillingham et al., 2015). In reference to *Chiropotes* distribution against current protected areas (Figure 14), this may be true. However, studies done on protected areas have consistently shown that they are viable for safeguarding species (Velazco et al., 2022). Therefore, I believe they are still an effective tool for conserving *Chiropotes*.

3.6 Conclusion

This study provides important information on the distribution of *Chiropotes* and their habitat suitability. The bioclimatic variables which most affect each taxon have been identified and need to be the focus when coming up with conservation methods in the future. These findings will be valuable in the future to assess the conservation status of the species, with habitat predictions over the next 20, 50, or 100 years now being easier to predict. By defining the Extent of Occurrence and Area of Occupancy, conservation efforts and deforestation monitoring can now be focused within these areas. It is possible to estimate deforestation rates in previous years and in the future, therefore estimating what the species habitat will look like if current rates of habitat loss continue. Recommendations for priority regions based on habitat suitability and extent of occurrence can now be made and coupled with a compiled list of localities I have gathered, this is now easier than ever. These three variables can also be updated on any relevant websites to show the latest data, i.e., IUCN.

Reference List

Anemone, R. L., Conroy, G. C., & Emerson, C. W. (2011). GIS and paleoanthropology: incorporating new approaches from the geospatial sciences in the analysis of primate and human evolution. *American Journal of Physical Anthropology*, *146 Suppl 53*, 19–46.

Ankel-Simons, F. (2007). *Primate Anatomy: An Introduction*. Elsevier.

Arroyo-Rodríguez, V., & Mandujano, S. (2009). Conceptualization and measurement of habitat fragmentation from the primates' perspective. *International Journal of Primatology*, *30*(3), 497–514.

Ayres, J. M. 1981. Observações sobre a ecologia e o comportamento dos cuxiús (Chiropotes albinasus e Chiropotes satanas Cebidae, Primates). Master's thesis, Instituto Nacional de Pesquisas da Amazônia (INPA), Fundação Universidade do Amazonas (FUA), Manaus.

Barnett, A. A., Boyle, S. A., Pinto, L. P., Lourenço, W. C., Almeida, T., Sousa Silva, W., Ronchi-Teles, B., Bezerra, B. M., Ross, C., MacLarnon, A., & Spironello, W. R. (2012). Primary seed dispersal by three Neotropical seed-predating primates (Cacajao melanocephalus ouakary, Chiropotes chiropotes and Chiropotes albinasus). *Journal of Tropical Ecology; Cambridge*, *28*(6), 543–555.

Barnett, A. A., Pinto, L. P., Bicca-Marques, J. C., Ferrari, S. F., Gordo, M., Guedes, P. G., Lopes, M. A., Opazo, J. C., Port-Carvalho, M., Dos Santos, R. R., Soares, R. F., Spironello, W. R., Veiga, L. M., Vieira, T. M., & Boyle, S. A. (2012). A proposal for the common names for species of Chiropotes (Pitheciinae: Primates). *Zootaxa*, *3507*(1), 79.

Barnett, A. A., Silla, J. M., de Oliveira, T., Boyle, S. A., Bezerra, B. M., Spironello, W. R., Setz, E. Z. F., da Silva, R. F. S., de Albuquerque Teixeira, S., Todd, L. M., & Pinto, L. P. (2017). Run, hide, or fight: anti-predation strategies in endangered red-nosed cuxiú (Chiropotes albinasus, Pitheciidae) in southeastern Amazonia. *Primates; Journal of Primatology*, *58*(2), 353–360.

Bernard, A. B., & Marshall, A. J. (2020). Assessing the state of knowledge of contemporary climate change and primates. *Evolutionary Anthropology*, *29*(6),

317–331.
Bobadilla, U. L., & Ferrari, S. F. (2000). Habitat use by Chiropotes satanas utahicki and syntopic platyrrhines in eastern Amazonia. *American Journal of Primatology*, *50*(3), 215–224.
Boers, N., Marwan, N., Barbosa, H. M. J., & Kurths, J. (2017). A deforestation-induced tipping point for the South American monsoon system. *Scientific Reports*, *7*, 41489.
Bonvicino, C. R., Boubli, J. P., Otazú, I. B., Almeida, F. C., Nascimento, F. F., Coura, J. R., & Seuánez, H. N. (2003). Morphologic, karyotypic, and molecular evidence of a new form of Chiropotes (primates, pitheciinae). *American Journal of Primatology*, *61*(3), 123–133.
Boubli, J. P., Ribas, C., Lynch Alfaro, J. W., Alfaro, M. E., da Silva, M. N. F., Pinho, G. M., & Farias, I. P. (2015). Spatial and temporal patterns of diversification on the Amazon: A test of the riverine hypothesis for all diurnal primates of Rio Negro and Rio Branco in Brazil. *Molecular Phylogenetics and Evolution*, *82 Pt B*, 400–412.
Boyle, S. A. (2008). *The Effects of Forest Fragmentation on Primates in the Brazilian Amazon* [Arizona State University]. https://www.proquest.com/dissertations-theses/effects-forest-fragmentation-on-primates/docview/304686139/se-2
Boyle, S. A., Lourenço, W. C., da Silva, L. R., & Smith, A. T. (2009). Travel and Spatial Patterns Change When Chiropotes satanas chiropotes Inhabit Forest Fragments. *International Journal of Primatology*, *30*(4), 515–531.
Chapman, C. A., & Chapman, L. J. (2000). Constraints on Group Size in Red Colobus and Red-tailed Guenons: Examining the Generality of the Ecological Constraints Model. *International Journal of Primatology*, *21*(4), 565–585.
Coombs, M. F., & Rodriguez, M. A. (2007). A field test of simple dispersal models as predictors of movement in a cohort of lake-dwelling brook charr. *Journal of Animal Ecology*, *76*(1), 45-57.
Covert, T. (2018, December). *White-Nosed Saki, Chiropotes albinasus*. New England Primate Conservancy; +OK. https://neprimateconservancy.org/white-nosed-saki/
da Silva, L. B., Oliveira, G. L., Frederico, R. G., Loyola, R., Zacarias, D., Ribeiro, B. R., & Mendes-Oliveira, A. C. (2022). How future climate change and deforestation can drastically affect the species of monkeys endemic to the eastern Amazon, and

priorities for conservation. *Biodiversity and Conservation*, *31*(3), 971–988.

Defler, T. R., & Hernández-Camacho, J. I. (2010). *The true identity and characteristics of Simia albifrons Humboldt, 1812: description of neotype*. *10*. http://dx.doi.org/

De, Souza Martins, S., Moreira, E., & De Sousa, L. J. (2005). Predation of a bearded saki (Chiropotes utahicki) by a Harpy Eagle (Harpia harpyja). *Neotropical Primates: A Newsletter of the Neotropical Section of the IUCN/SSC Primate Specialist Group*, *13*(1). https://doi.org/10.1896/1413-4705.13.1.7

De Sousa e Silva Júnior, J., Figueiredo-Ready, W. M. B., & Ferrari, S. F. (2013). Taxonomy and geographic distribution of the Pitheciidae. In *Evolutionary Biology and Conservation of Titis, Sakis and Uacaris* (pp. 31–42). Cambridge University Press.

Dos Anjos, J. (2020). Red-nosed bearded saki [photograph]. iNaturalist Observations. https://uk.inaturalist.org/observations/64068986

Elith, J., & Leathwick, J. R. (2009). Species Distribution Models: Ecological Explanation and Prediction Across Space and Time. *Annual Review of Ecology, Evolution, and Systematics*, *40*(1), 677–697.

Estrada, A., Garber, P. A., Rylands, A. B., Roos, C., Fernandez-Duque, E., Di Fiore, A., Nekaris, K. A.-I., Nijman, V., Heymann, E. W., Lambert, J. E., Rovero, F., Barelli, C., Setchell, J. M., Gillespie, T. R., Mittermeier, R. A., Arregoitia, L. V., de Guinea, M., Gouveia, S., Dobrovolski, R., … Li, B. (2017). Impending extinction crisis of the world's primates: Why primates matter. *Science Advances*, *3*(1), e1600946.

Ferrari, S. F., Boyle, S. A., & Marsh, L. K. (2013). The challenge of living in fragments. *Of Titis, Sakis …*.

Ferrari, S., Emidio-Silva, C., Lopes, M., & Bobadilla, U. (1999). bearded sakis in south-eastern Amazonia—back from the brink? *Oryx, 33*(4), 346-351. doi:10.1046/j.1365-3008.1999.00078.x

Ferrari, S. F., Iwanaga, S., Coutinho, P. E. G., Messias, M. R., Cruz Neto, E. H., Ramos, E. M., & Ramos, P. C. S. (1999). Zoogeography of Chiropotes albinasus (Platyrrhini, Atelidae) in Southwestern Amazonia. *International Journal of Primatology*, *20*(6).

Fick, S.E. and R.J. Hijmans, 2017. WorldClim 2: new 1 km spatial resolution climate surfaces for global land areas. International Journal of Climatology 37 (12): 4302-4315.

Fleagle, J. G. (2013). *Primate Adaptation and Evolution*. Academic Press.

Fleagle, J. G., & Mittermeier, R. A. (1980). Locomotor behavior, body size, and comparative ecology of seven Surinam monkeys. *American Journal of Physical Anthropology*, *52*(3), 301–314.

Fuhrmann, T. (2019). Northern bearded saki Monkey [photograph]. iNaturalist Observations. https://www.inaturalist.org/observations/67320412

Gillingham, P. K., Bradbury, R. B., Roy, D. B., Anderson, B. J., Baxter, J. M., Bourn, N. A. D., Crick, H. Q. P., Findon, R. A., Fox, R., Franco, A., Hill, J. K., Hodgson, J. A., Holt, A. R., Morecroft, M. D., Oliver, T. H., Pearce-Higgins, J. W., Procter, D. A., Thomas, J. A., Walker, K. J., … Thomas, C. D. (2015). The effectiveness of protected areas in the conservation of species with changing geographical ranges. *Biological Journal of the Linnean Society. Linnean Society of London*, *115*(3), 707–717.

Gray, C. L., Hill, S. L. L., Newbold, T., Hudson, L. N., Börger, L., Contu, S., Hoskins, A. J., Ferrier, S., Purvis, A., & Scharlemann, J. P. W. (2016). Local biodiversity is higher inside than outside terrestrial protected areas worldwide. *Nature Communications*, *7*, 12306.

Gregory, T., & Norconk, M. A. (2014). bearded saki socioecology: affiliative male–male interactions in large, free-ranging primate groups in Suriname. *Behaviour*, *151*(4), 493–533.

Gron, K. J. (2009). Primate Factsheet: bearded saki (*Chiropotes*). In: Primate Info Net, Wisconsin National Primate Research Center, University of Wisconsin – Madison. Available from: <https://primate.wisc.edu/primate-info-net/pin-factsheets/bearded-saki/>. Reviewed by Sarah Boyle. Last modified 26 June 2009.

Hershkovitz, P. (1985). *A preliminary taxonomic review of the South American bearded saki monkeys genus Chiropotes (Cebidae, Platyrrhini), with the description of a new supspecies / Philip Hershkovitz*. Field Museum of Natural History,.

Hershkovitz, P. (1987). The taxonomy of south American sakis, genus Pithecia (Cebidae, Platyrrhini): A preliminary report and critical review with the description of a new species and a new subspecies. *American Journal of Primatology*, *12*(4), 387–468.

Hildeman, M. (2022). Black-bearded saki [photograph]. iNaturalist Observations. https://www.inaturalist.org/observations/135656876

Humboldt, Bonpland, Latreille, Schoell, Stone, & Valenciennes. (1833). *Recueil d’observations de zoologie et d'anatomie compar : faites dans l'ocn atlantique, dans l'intieur du nouveau continent et dans la mer du sud pendant les anns 1799, 1800, 1801, 1802 et 1803* (Vol. 2 (1833), p. 402). A Paris, 1811.[-1833.].

Janiak, M. C., Silva, F. E., Beck, R. M. D., de Vries, D., Kuderna, L. F. K., Torosin, N. S., Melin, A. D., Marquès-Bonet, T., Goodhead, I. B., Messias, M., da Silva, M. N. F., Sampaio, I., Farias, I. P., Rossi, R., de Melo, F. R., Valsecchi, J., Hrbek, T., & Boubli, J. P. (2022). Two hundred and five newly assembled mitogenomes provide mixed evidence for rivers as drivers of speciation for Amazonian primates. *Molecular Ecology*, *31*(14), 3888–3902.

Johns, A. D., & Ayres, J. M. (1987). Southern bearded sakis beyond the brink. *Oryx: The Journal of the Fauna Preservation Society*, *21*(3), 164–167.

Kinzey, W. G., & Norconk, M. A. (1990). Hardness as a basis of fruit choice in two sympatric primates. *American Journal of Physical Anthropology*, *81*(1), 5–15.

Koenig, Z. F. A. (n.d.). *formerly: Bonner zoologische Beitrage*.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33*(1), 159–174.

Ledogar, J. A., Luk, T. H. Y., Perry, J. M. G., Neaux, D., & Wroe, S. (2018). Biting mechanics and niche separation in a specialized clade of primate seed predators. *PloS One*, *13*(1), e0190689.

Ledogar, J. A., Winchester, J. M., St Clair, E. M., & Boyer, D. M. (2013). Diet and dental topography in pitheciine seed predators. *American Journal of Physical Anthropology*, *150*(1), 107–121.

Leite, G. (2019). Red-backed bearded saki [photograph]. iNaturalist Observations. https://www.inaturalist.org/observations/20514372

Levin, S. A. (2013). *Encyclopedia of Biodiversity*. https://repository.vnu.edu.vn/handle/VNU_123/78283

Márcio Ayres, J., Prance, G. T., Barnett, A. A., Veiga, L. M., & Boubli, J.-P. (2013). On the distribution of Pitheciine monkeys and Lecythidaceae trees in Amazonia. In *Evolutionary Biology and Conservation of Titis, Sakis and Uacaris* (pp. 127–140). Cambridge University Press.

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica: Casopis Hrvatskoga Drustva Medicinskih Biokemicara / HDMB*, *22*(3), 276–282.

Mittermeier, R. A., & van Roosmalen, M. G. (1981). Preliminary observations on habitat utilization and diet in eight Surinam Monkeys. *Folia Primatologica; International Journal of Primatology*, *36*(1-2), 1–39.

Moraes, B., Razgour, O., Souza-Alves, J. P., Boubli, J. P., & Bezerra, B. (2020). Habitat suitability for primate conservation in north-east Brazil. *Oryx: The Journal of the Fauna Preservation Society*, *54*(6), 803–813.

Mori, S. A., Kiernan, E. A., Smith, N. P., Kelly, L. M., Huang, Y.-Y., Prance, G. T., & Thiers, B. (2017). *Observations on the phytogeography of the Lecythidaceae clade (Brazil nut family)*. https://www.phytoneuron.net/2017Phytoneuron/30PhytoN-Lecythidaceae.pdf

Moua, Y., Roux, E., Seyler, F., & Briolant, S. (2020). Correcting the effect of sampling bias in species distribution modeling – A new method in the case of a low number of presence data. *Ecological Informatics*, *57*, 101086.

National Center for Biotechnology Information (NCBI)[Internet]. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information; [1988] – [cited 2017 Apr 06]. Available from: https://www.ncbi.nlm.nih.gov/

Norconk, M. A. (2021). Historical antecedents and recent innovations in pitheciid (titi, saki, and uakari) feeding ecology. *American Journal of Primatology*, *83*(6), e23177.

Norconk, M. A. (1996). Seasonal Variation in the Diets of White-Faced and bearded sakis (Pithecia pithecia and Chiropotes satanas) in Guri Lake, Venezuela. In M. A. Norconk, A. L. Rosenberger, & P. A. Garber (Eds.), *Adaptive Radiations of Neotropical Primates* (pp. 403–423). Springer US.

Norconk, M. A., & Conklin-Brittain, N. L. (2016). bearded saki feeding strategies on an island in Lago Guri, Venezuela. *American Journal of Primatology*, *78*(5), 507–522.

Norconk, M. A., Grafton, B. W., & Conklin-Brittain, N. L. (1998). Seed dispersal by neotropical seed predators. *American Journal of Primatology*, *45*(1), 103–126.

Norconk, M. A., & Kinzey, W. G. (1994). Challenge of neotropical frugivory: Travel patterns of spider monkeys and bearded sakis. *American Journal of Primatology*, *34*(2), 171–183.

Norconk, M. A., & Veres, M. (2011). Physical properties of fruit and seeds ingested by primate seed predators with emphasis on sakis and bearded sakis. *Anatomical Record* , *294*(12), 2092–2111.

Onderdonk, D. A., & Chapman, C. A. (2000). Coping with Forest Fragmentation: The Primates of Kibale National Park, Uganda. *International Journal of Primatology*, *21*(4), 587–611.

Pacheco, P., Mo, K., Dudley, N., Shapiro, A., Aguilar-Amuchastegui, N., Ling, P.Y., Anderson, C. and Marx, A. 2021. Deforestation fronts: Drivers and responses in a changing world. WWF, Gland, Switzerland.

Peetz, A. (2001). *Ecology and social organization of the bearded saki Chiropotes satanas chiropotes (Primates: Pitheciinae) in Venezuela*. *1*, 1–170.

Peetz, A., & Schuchmann, K.-L. (2001). *Ecology and social organization of the bearded saki Chiropotes satanas chiropotes (Primates: Pitheciinae)*. https://www.researchgate.net/publication/301890444_Ecology_and_social_organization_of_the_bearded_saki_Chiropotes_satanas_chiropotes_Primates_Pitheciinae_in_Venezuela

Peres, C. A., & Barlow, J. (2004). ECOLOGY | Human Influences on Tropical Forest Wildlife. In J. Burley (Ed.), *Encyclopedia of Forest Sciences* (pp. 90–95). Elsevier.

Phillips, S. J., Anderson, R. P., & Schapire, R. E. (2006). Maximum entropy modeling of species geographic distributions. *Ecological Modelling*, *190*(3), 231–259.

Pimenta, F. E. (2005). An update on the distribution of primates of the Tapajós-Xingu interfluvium, Central Amazonia. *Neotropical Primates*, *13*(2), 23-28.

Port-Carvalho, M., & Ferrari, S. F. (2004). Occurrence and diet of the black bearded saki (Chiropotes satanas satanas) in the fragmented landscape of western Maranhão, Brazil. *Neotropical Primates: A Newsletter of the Neotropical Section of the IUCN/SSC Primate Specialist Group*, *12*(1), 17–21.

Port-Carvalho, M., Muniz, M., Jerusalinsky, A. C., & Veiga, L. M. (2021). *Chiropotes* *satanas, Black bearded saki Amendment version Assessment by: Port-Carvalho View on www.iucnredlist.org*. unknown.

Prevedello, J. A., Winck, G. R., Weber, M. M., Nichols, E., & Sinervo, B. (2019). Impacts of forestation and deforestation on local temperature across the globe. *PloS One*, *14*(3), e0213368.

QGIS.org, 2022. QGIS Geographic Information System. QGIS Association. http://www.qgis.org

Rabelo, R. M., Gonçalves, J. R., Silva, F. E., Rocha, D. G., Canale, G. R., Bernardo, C. S. S., & Boubli, J. P. (2020). Predicted distribution and habitat loss for the Endangered black-faced black spider monkey Ateles chamek in the Amazon. *Oryx: The Journal of the Fauna Preservation Society*, *54*(5), 699–705.

Rosenberger, A. L., & Hartwig, W. C. (2013). New World Monkeys. In *eLS*. John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470015902.a0001562.pub3

RStudio Team (2020). RStudio: Integrated Development for R. RStudio, PBC, Boston, MA URL http://www.rstudio.com

Shaffer, C. (2012). *Ranging behavior, group cohesiveness, and patch use in northern bearded sakis (Chiropotes sagulatus) in Guyana*. Washington University in St. Louis. https://doi.org/10.7936/K7FB50XQ

Shaffer, C. A. (2013). Feeding Ecology of northern bearded sakis (Chiropotes sagulatus) in Guyana. *American Journal of Primatology*, *75*(6), 568–580.

Siciliano, S., Emin-Lima, R., Costa, A. F., & Others. (2015). Large-and medium-sized land mammals of northeast Marajó Island, lower Amazon, Brazil. *Natural Resources*, *6*(01), 37.

Silva, F. E. (2020). *Systematics, Biogeography and Conservation of Bald Uakaris (Cacajao Lesson, 1840)* (J. P. Boubli (ed.)) [Ph.D, University of Salford]. https://usir.salford.ac.uk/id/eprint/57434/1/Thesis_final.pdf

Silva, S. S. B., & Ferrari, S. F. (2009). Behavior patterns of southern bearded sakis (Chiropotes satanas) in the fragmented landscape of eastern Brazilian Amazonia. *American Journal of Primatology*, *71*(1), 1–7.

Soares-Filho, B. S., Nepstad, D. C., Curran, L. M., Cerqueira, G. C., Garcia, R. A., Ramos, C. A., Voll, E., McDonald, A., Lefebvre, P., & Schlesinger, P. (2006).

Modelling conservation in the Amazon basin. *Nature*, *440*(7083), 520–523.
Spencer, W. D. (2012). Home ranges and the value of spatial information. *Journal of Mammalogy*, *93*(4), 929–947.
Strier, K. B. (2018). Behavioral Ecology, Primate. In *The International Encyclopedia of Anthropology* (pp. 1–5).
Tewksbury, J. J., Huey, R. B., & Deutsch, C. A. (2008). Ecology. Putting the heat on tropical animals. *Science*, *320*(5881), 1296–1297.
Tomanek, P., Mourthe, I., Boyle, S. A., & Barnett, A. A. (2020). Calls for concern: Matching alarm response levels to threat intensities in three Neotropical primates. *Acta Oecologica*, *109*, 103646.
Tremaine Gregory, L. (2011). *Socioecology of the Guianan bearded saki, Chiropotes sagulatus [dissertation]*. http://dx.doi.org/

Trifinopoulos J, Nguyen LT, von Haeseler A, Minh BQ. W-IQ-TREE: a fast online phylogenetic tool for maximum likelihood analysis. (2016) Nucl. Acids Res. 44 (W1): W232-W235.

Tutin, C. E. (1999). Fragmented living: Behavioural ecology of primates in a forest fragment in the Lopé Reserve, Gabon. *Primates; Journal of Primatology*, *40*(1), 249–265.
UNEP-WCMC. (2023). *Protected Area Profile for Latin America & Caribbean*. World Database on Protected Areas. www.protectedplanet.net
UNEP-WCMC. (n.d.). *Protected Area Profile for Suriname*. World Database on Protected Areas. Retrieved January 4, 2023, from https://www.protectedplanet.net/country/SUR
UNEP-WCMC and IUCN (2023), Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM) [Online], February 2023, Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net.
Urban, M. C. (2015). Climate change. Accelerating extinction risk from climate change. *Science*, *348*(6234), 571–573.

Van Heteren, A. H., & Kraft, R. (2019). Spix's type specimens of Neotropical primates at the Bavarian State Collection of Zoology: a revision with reference to the currently recognised species. *Spixiana*, *42*(1), 141-160.

Van Roosmalen, M. G. M., Mittermeier, R. A., & Fleagle, J. G. (1988). Diet of the northern bearded saki (Chiropotes satanas chiropotes): A neotropical seed predator. *American Journal of Primatology*, *14*(1), 11–35.

Veiga, L. M. (2006). *Ecologia e comportamento do Cuxiú-Preto (Chiropotes Satanas) na paisagem fragmentada da Amazônia Oriental*. http://dx.doi.org/

Veiga, L. M., Barnett, A. A., Ferrari, S. F., & Norconk, M. A. (2013). *Evolutionary Biology and Conservation of Titis, Sakis and Uacaris*. https://ebookcentral-proquest-com.salford.idm.oclc.org/lib/salford/reader.action?docID=1139654

Veiga, L. M., & Ferrari, S. F. (2006). Predation of arthropods by southern bearded sakis (Chiropotes satanas) in Eastern Brazilian Amazonia. *American Journal of Primatology*, *68*(2), 209–215.

Veiga, L. M., & Ferrari, S. F. (2007). Geophagy at termitaria by bearded sakis (Chiropotes satanas) in Southeastern Brazilian Amazonia. *American Journal of Primatology*, *69*(7), 816–820.

Veiga, L. M., L. P. Pinto and S. F. Ferrari (2006) Fission-fusion sociality in bearded sakis (*Chiropotes albinasus* and *Chiropotes Satanas*) in Brazilian Amazonia, *Proceedings of the XXIst Congress of the International Primatological Society,* Uganda.

Veiga, L.M., Silva, S.S.B. & Ferrari, S.F. (2005). Relatives or just good friends? Affiliative relationships among male southern bearded sakis (Chiropotes satanas). — Livro de Re sumos, XI Congresso Brasileiro de Primatologia, Porto Alegre, p. 174.

Velazco, S. J. E., Bedrij, N. A., Rojas, J. L., Keller, H. A., Ribeiro, B. R., & De Marco, P. (2022). Quantifying the role of protected areas for safeguarding the uses of biodiversity. *Biological Conservation*, *268*, 109525.

Walker, R., Moore, N. J., Arima, E., Perz, S., Simmons, C., Caldas, M., Vergara, D., & Bohrer, C. (2009). Protecting the Amazon with protected areas. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(26), 10582–10586.

Walker, S. E. (2005). Leaping behavior of Pithecia pithecia and Chiropotes satanas in eastern Venezuela. *American Journal of Primatology*, *66*(4), 369–387.

Wallace, A. R. (2009). *On the Monkeys of the Amazon (1852)*. https://digitalcommons.wku.edu/dlps_fac_arw/3/

Wallace, R.B. & Painter, R.L.E. (1996). Notes on a distribution river boundary and southern range extension for two species of Amazonian primates. Neotropical Primates, 4, 149–151.

Wenóli, N. (2019). Uta Hick's bearded saki [photograph]. iNaturalist Observations. https://www.inaturalist.org/observations/87396567

Wich, S. A., & Marshall, A. J. (2016). *An Introduction to Primate Conservation*. Oxford University Press.

Yang, Z. (1994). Maximum likelihood phylogenetic estimation from DNA sequences with variable rates over sites: approximate methods. *Journal of Molecular Evolution*, *39*(3), 306–314.

Supplementary Material

Chapter 2

Supplementary Material Table 1: All sequences gathered from NCBI and used for the final full genome tree.

Name	% GC	Description	Genetic Code	Molecule Type	Organism	Sequence Length	Size	Taxonomy	Topology	URN
OM329065	38.40%	Chiropotes chiropotes isolate TRO515 voucher INPA:7480 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	11416	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4b5-f4ttls1
OM329063.1	38.90%	Cacajao calvus rubicundus isolate JT078 voucher IDSM00788 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Cacajao calvus rubicundus	16712	17 KB	Pitheciinae; Cacajao	linear	urn:local:.:3t-fs0yb72
OM329039	38.80%	Chiropotes albinasus isolate FES17 voucher IDSM03689 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4b6-f4ttls1

OM328995.1	39.50%	Pithecia sp. MJ-2022 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Pithecia sp.	16650	17 KB	Pitheciinae; Chiropotes	linear	urn:local:.:3y-fs0yccg
OM328980	38.40%	Chiropotes chiropotes isolate TRO666 voucher INPA:7485 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	11409	37 KB	Pitheciinae; Pithecia	linear	urn:local:.:4b7-f4ttls1
OM328979	38.50%	Chiropotes israelita isolate JPB122 voucher MN:68621 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4b8-f4ttls1
OM328978	38.40%	Chiropotes israelita isolate JPB137 voucher INPA:5721 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4b9-f4ttls1
OM328977	38.40%	Chiropotes israelita isolate JPB79 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4ba-f4ttls1
OM328976	38.70%	Chiropotes albinasus isolate CCM109 voucher INPA:4086 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4bb-f4ttls1

OM328975	38.80%	Chiropotes albinasus isolate RCA70 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local::4bc-f4ttls1
OM328921	38.70%	Chiropotes albinasus isolate TAP213 voucher INPA:7415 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local::4bd-f4ttls1
OM328900	38.50%	Chiropotes chiropotes isolate TRO560 voucher INPA:7481 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local::4be-f4ttls1
OM328899	38.40%	Chiropotes chiropotes isolate TRO582 voucher INPA:7483 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local::4bf-f4ttls1
OM328868	38.50%	Chiropotes israelita isolate JPB131 voucher INPA:5717 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	11409	37 KB	Pitheciinae; Chiropotes	linear	urn:local::4bg-f4ttls1
NC_064157	38.40%	Chiropotes chiropotes isolate TRO582 voucher INPA:7483 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	11409	40 KB	Pitheciinae; Chiropotes	linear	urn:local::4bh-f4ttls1

Supplementary Material Table 2: All sequences gathered from NCBI and used for the final cytb tree.

Name	% GC	Description	Genetic Code	Molecule Type	Organism	Sequence Length	Size	Taxonomy	Topology	URN
KR902426.1	42.90%	Pithecia pithecia clone Ppi_9554 cytochrome b (cytB) gene, complete cds; mitochondrial	Vertebrate Mitochondrial	DNA	Pithecia pithecia	1258	8 KB	Pitheciinae; Pithecia	linear	urn:local:.:7u-fwa0wca
FJ531662.1	41.20%	Cacajao calvus ucayalli MPEG1849 cytochrome b (cytb) gene, complete cds; mitochondrial	Vertebrate Mitochondrial	DNA	Cacajao_calvus_ucayalli	1137	8 KB	Pitheciinae; Cacajao	linear	urn:local:.:7q-fwa0sa9
OM329065 - CYTB CDS	41.00%	Chiropotes chiropotes isolate TRO515 voucher INPA:7480 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	4 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4qq-f4ul1d7
OM329039 - CYTB gene	41.80%	Chiropotes albinasus isolate FES17 voucher IDSM03689 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	1137	4 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4qj-f4ul096

OM328980 - CYTB CDS	40.90%	Chiropotes chiropotes isolate TRO666 voucher INPA:7485 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4qc-f4ukyqq
OM328979 - CYTB CDS	40.50%	Chiropotes israelita isolate JPB122 voucher MN:68621 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4q5-f4ukxoq
OM328978 - CYTB gene	40.60%	Chiropotes israelita isolate JPB137 voucher INPA:5721 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4py-f4ukwnf
OM328977 - CYTB CDS	40.50%	Chiropotes israelita isolate JPB79 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4pr-f4ukt5n
OM328976 - CYTB CDS	41.20%	Chiropotes albinasus isolate CCM109 voucher INPA:4086 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4pk-f4ukrvu
OM328975 - CYTB gene	41.50%	Chiropotes albinasus isolate RCA70 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4pd-f4ukqj0
OM328921 - CYTB gene	41.10%	Chiropotes albinasus isolate TAP213 voucher INPA:7415 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes albinasus	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4p6-f4ukp9z

OM328900 - CYTB CDS	41.00%	Chiropotes chiropotes isolate TRO560 voucher INPA:7481 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4oz-f4uknyx
OM328899 - CYTB CDS	40.90%	Chiropotes chiropotes isolate TRO582 voucher INPA:7483 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4os-f4ukmk6
OM328868 - CYTB CDS	40.50%	Chiropotes israelita isolate JPB131 voucher INPA:5717 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes israelita	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4ol-f4ukjyj
NC_064157 - CYTB CDS	40.90%	Chiropotes chiropotes isolate TRO582 voucher INPA:7483 mitochondrion, complete genome	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	4 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4oe-f4ukioj
KR528426	42.10%	Chiropotes sp. isolate Z64 cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes sp.	627	8 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nv-f4uk9g7
KM370857	42.00%	Chiropotes chiropotes sagulata isolate CTGAM666combined cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes sagulata	524	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nu-f4uk9g7

KM370856	41.40%	Chiropotes chiropotes sagulata isolate CTGAM582combined cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes sagulata	754	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nw-f4uk9g7
KM370855	40.70%	Chiropotes chiropotes sagulata isolate CTGAM561combined cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes sagulata	416	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4ns-f4uk9g7
KM370854	41.20%	Chiropotes chiropotes sagulata isolate CTGAM560combined cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes sagulata	493	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nt-f4uk9g7
KM370845	41.20%	Chiropotes chiropotes isolate USNM406592 cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	985	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4ny-f4uk9g7
KM370838	41.10%	Chiropotes chiropotes sagulata isolate UFPA3056 cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes sagulata	991	8 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nz-f4uk9g7
KM370837	41.40%	Chiropotes israelita isolate JPB120 cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes israelita	766	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nx-f4uk9g7
KF989492	40.40%	Chiropotes sp. ZFMK_2008.244 cytochrome b (cytb) gene, partial cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes sp. ZFMK_2008.244	391	6 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4nr-f4uk9g7

FJ531667	41.00%	Chiropotes chiropotes UFPA-Csa3056 cytochrome b (cytb) gene, complete cds; mitochondrial	Vertebrate Mitochondrial	DNA	Chiropotes chiropotes	1137	7 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4o1-f4uk9g7
C_utahicki_1307	39.20%			DNA	Chiropotes utahicki	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4m1-f4ujtqa
C_utahicki_1244	39.20%			DNA	Chiropotes utahicki	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4m0-f4ujtqa
C_utahicki_1096	39.20%			DNA	Chiropotes utahicki	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4lz-f4ujtqa
C_utahicki_970	39.40%			DNA	Chiropotes utahicki	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4ly-f4ujtqa
C_utahicki_614	39.20%			DNA	Chiropotes utahicki	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4lx-f4ujtqa
C_satanas_198	38.60%			DNA	Chiropotes satanas	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4lw-f4ujtqa
C_satanas_197	38.80%			DNA	Chiropotes satanas	1304	1 KB	Pitheciinae ; Chiropotes	linear	urn:local:.:4lv-f4ujtqa

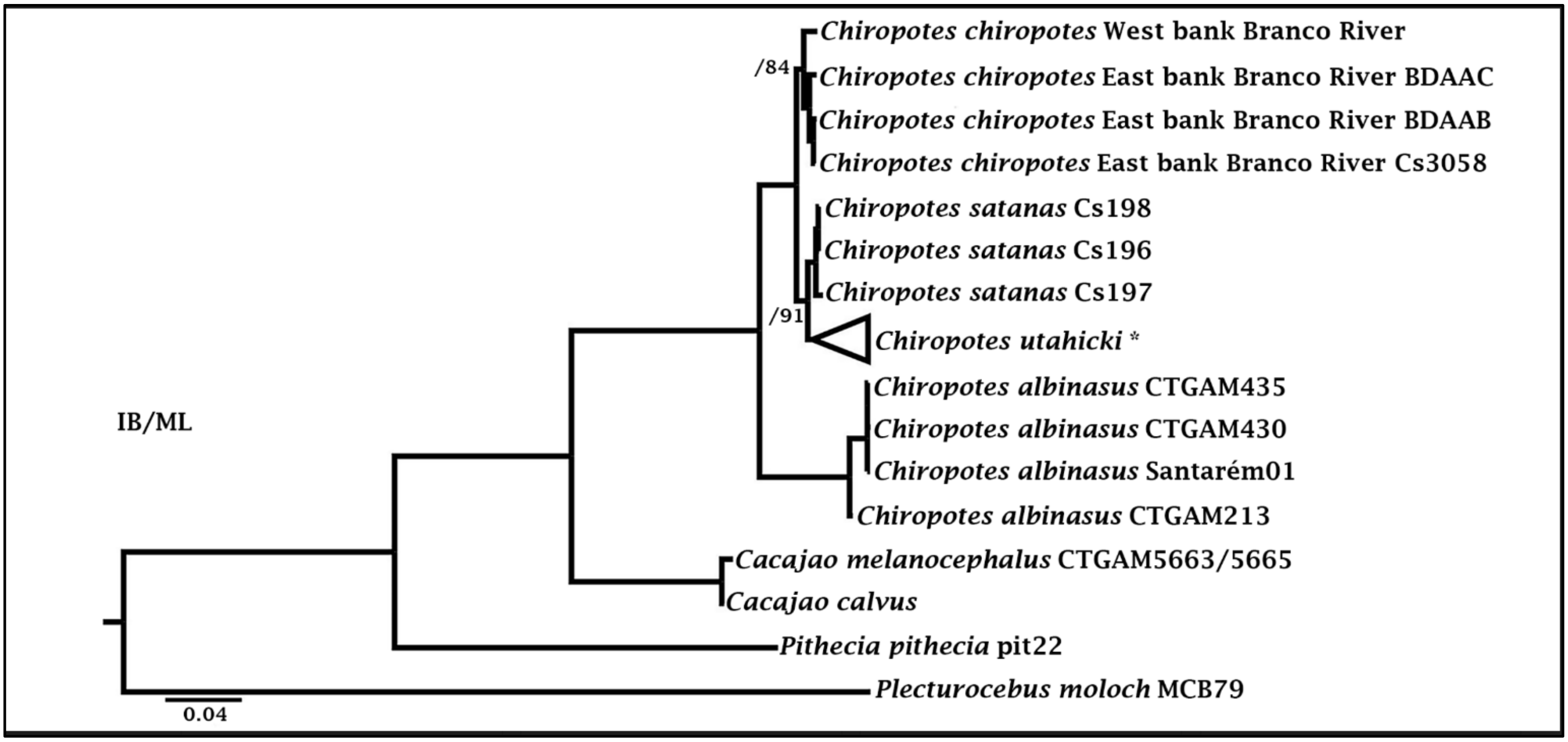
C_satanas_196	38.60%			DNA	Chiropotes satanas	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lu-f4ujtqa
C_chiropotes_WB	40.50%			DNA	Chiropotes chiropotes	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lt-f4ujtqa
C_chiropotes_BDAAC	39.10%			DNA	Chiropotes chiropotes	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4ls-f4ujtqa
C_chiropotes_BDAAB	39.40%			DNA	Chiropotes chiropotes	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lr-f4ujtqa
C_chiropotes_3058	39.20%			DNA	Chiropotes chiropotes	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lq-f4ujtqa
C_albinasus_Santar01	39.60%			DNA	Chiropotes albinasus	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lp-f4ujtqa
C_albinasus_CTGAM435	39.60%			DNA	Chiropotes albinasus	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lo-f4ujtqa
C_albinasus_CTGAM430	39.60%			DNA	Chiropotes albinasus	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4ln-f4ujtq9
C_albinasus_CTGAM213	39.60%			DNA	Chiropotes albinasus	1304	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lm-f4ujtq9

AY226190.1:1-1087	40.80%			DNA	Chiropotes israelita	1087	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lh-f4ujtq9
AY226189.1:1-1100	40.90%			DNA	Chiropotes israelita	1100	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4ll-f4ujtq9
AY226188.1:1-1100	40.70%			DNA	Chiropotes israelita	1100	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lk-f4ujtq9
AY226187.1:1-1100	40.60%			DNA	Chiropotes israelita	1100	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lj-f4ujtq9
AY226186.1:1-801	41.90%			DNA	Chiropotes utahicki	801	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4lg-f4ujtq9
AY226185.1:1-1100	41.10%			DNA	Chiropotes utahicki	1100	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4li-f4ujtq9
428_PD_0325@CYTB	41.50%			DNA	Chiropotes albinasus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4n5-f4ujvcp
293_PD_0330@CYTB	40.90%			DNA	Chiropotes sagulatus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4n4-f4ujvcp
290_PD_0082@CYTB	41.00%			DNA	Chiropotes sagulatus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local::4n3-f4ujvcp

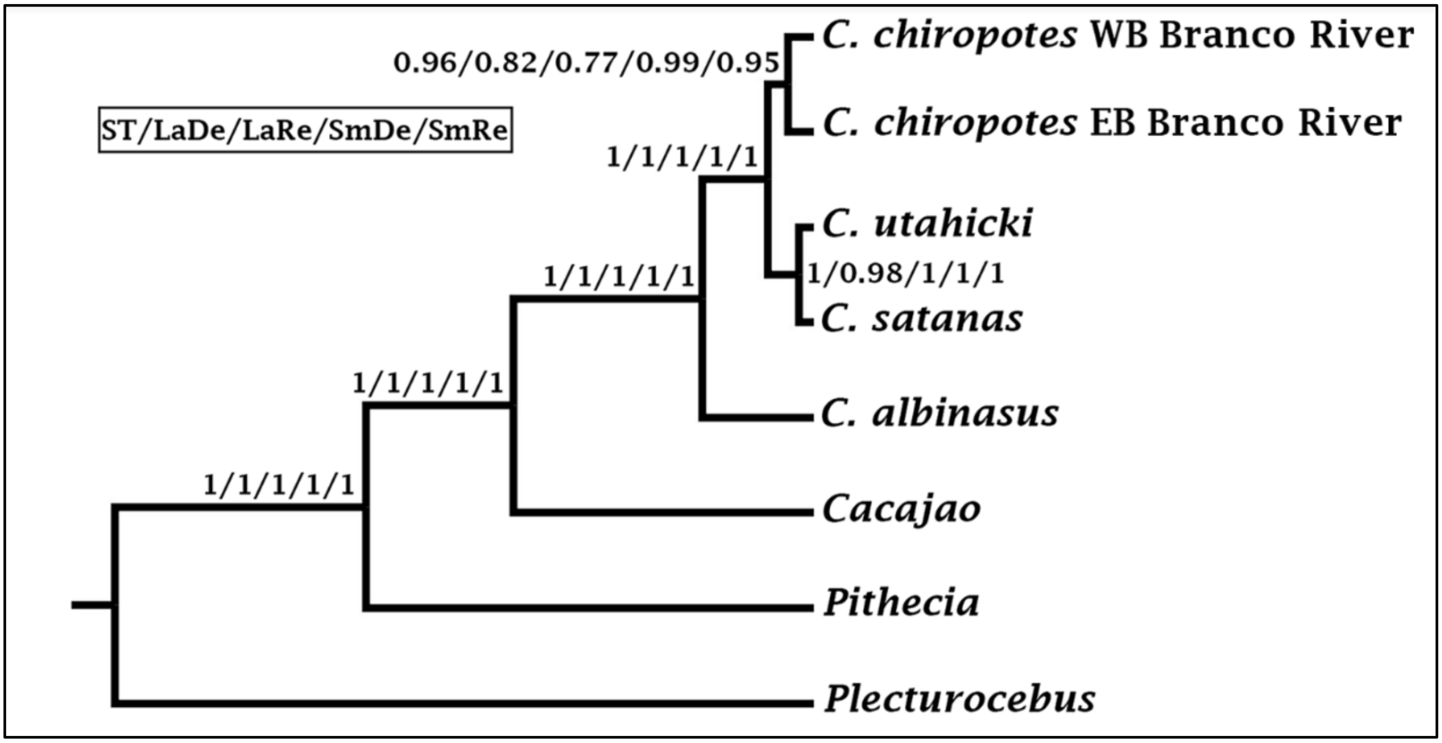
287_PD_0081@CYTB	40.90%			DNA	Chiropotes sagulatus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4n2-f4ujvcp
274_PD_0329@CYTB	41.00%			DNA	Chiropotes sagulatus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4n1-f4ujvcp
240_PD_0142@CYTB	41.10%			DNA	Chiropotes albinasus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mz-f4ujvcp
194_PD_0409@CYTB	41.80%			DNA	Chiropotes albinasus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4my-f4ujvcp
60_PD_0328@CYTB	40.50%			DNA	Chiropotes israelita	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mx-f4ujvcp
46_PD_0327@CYTB	40.60%			DNA	Chiropotes israelita	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mw-f4ujvcp
42_PD_0006@CYTB	40.50%			DNA	Chiropotes israelita	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mv-f4ujvcp
34_PD_0326@CYTB	40.50%			DNA	Chiropotes israelita	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mu-f4ujvcp
7_PD_0323@CYTB	41.20%			DNA	Chiropotes albinasus	1137	1 KB	Pitheciinae; Chiropotes	linear	urn:local:.:4mt-f4ujvcp

Supplementary Material Table 3: NCBI *Chiropotes* sequences with localities available, used to create Figure. 3.

Genus	Sequencing ID	Voucher ID	Origin	Latitude	Longitude
Chiropotes israelita	PD 0081	INPA7483	Para	-1.4822	-56.8009
Chiropotes israelita	PD 0082	INPA7481	Para	-1.4822	-56.8009
Chiropotes israelita	PD 0329	INPA7480	Para	-1.4885	-56.7974
Chiropotes israelita	PD 0330	INPA7485	Para	-1.4037	-56.7595
Chiropotes_albinasus	FES17	IDSM03689	-	-5.9841	61.5374
Chiropotes_albinasus	PD_0409_	IDSM03689	-	-5.9841	-61.5374
Chiropotes_albinasus	PD_0325_	-	-	-9.8456	-58.2354
Chiropotes_albinasus	RCA70	-	Brazil	-9.8456	58.2354
Chiropotes_albinasus	TAP213	INPA7415	Brazil	-3.3143	55.3242
Chiropotes_albinasus	PD_0142_	INPA7415	Brazil	-3.3143	-55.3242
Chiropotes_albinasus	CCM109	INPA:4086	Brazil	-3.64	57.44
Chiropotes_israelita	PD_0328_	-	Brazil	-0.3426	-65.15
Chiropotes_israelita	JPB79	-	Brazil	-0.3426	65.15
Chiropotes_israelita	JPB137	INPA:5721	Brazil	-0.4523	62.724
Chiropotes_israelita	JPB122	MN:68621	Brazil	-1.207	64.7898
Chiropotes_israelita	JPB131	INPA:5717	Brazil	-0.8523	63.4814
Chiropotes_israelita	PD_0006_	-	Brazil	0.8523	-63.4814
Chiropotes_israelita	PD_0326_	-	Brazil	1.207	-64.7898
Chiropotes_chiropotes	TRO560	INPA:7481	Brazil	-1.4822	56.8009
Chiropotes_chiropotes	TRO515	INPA:7480	Brazil	-1.4885	56.7974
Chiropotes_chiropotes	TRO582	INPA:7483	Brazil	-1.4822	56.8009
Chiropotes_chiropotes	TRO666	INPA:7485	Brazil	-1.4037	56.7595



Supplementary Material Figure 1: Unpublished phylogenetic tree of *Chiropotes* based on Maximum Likelihood and Bayesian Inference. This was provided to me by my supervisor Jean P. Boubli. Research was completed by Carneiro, J., Sampaio, I., de Sousa e Silva-Júnior, J., Farias, I., Hrbek, T., Martins-Junior, A., Boubli, J. & Schneider, H.



Supplementary Material Figure 2: Unpublished species tree of *Chiropotes* run in BEAST and using Posterior Probability. This was provided to me by my supervisor Jean P. Boubli. Research was completed by Carneiro, J., Sampaio, I., de Sousa e Silva-Júnior, J., Farias, I., Hrbek, T., Martins-Junior, A., Boubli, J. & Schneider, H.

Chapter 3

Supplementary Material Table 4: Records of *Chiropotes* used in the species distribution modelling.

Scientific Name	Longitude	Latitude	Country	Locality	Type of Record	Year	Reference
Chiropotes albinasus	-54.716667	-2.433333	Brazil	Santarém	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-54.7	-2.433333	Brazil	Mojuí dos Campos	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-54.95	-2.633333	Brazil	Belterra	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55	-2.666667	Brazil	Cajutuba	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55	-2.716667	Brazil	Aramanaí	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.016667	-2.783333	Brazil	Maguari	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-54.966667	-2.666667	Brazil	Piquiatuba	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.133333	-2.833333	Brazil	Caxiricatuba	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.083333	-2.9	Brazil	Tapaiúna	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.033333	-2.95	Brazil	Itapoama	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.3	-3.666667	Brazil	Fordlândia	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.45	-3.833333	Brazil	FLONA Tapajós	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.483333	-3.833333	Brazil	Rio Tapurucurazinho	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.466667	-3.833333	Brazil	Araipá	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.633333	-4.1	Brazil	Monte Cristo	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.616667	-4.05	Brazil	Pedreira, Rio Tapajós	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-56.3	-4.716667	Brazil	Rio Jamanxim	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-56.283333	-4.666667	Brazil	Estrada do Palhau km 5	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-56.05	-5.25	Brazil	Santarém-Cuiabá highway km 446	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.783333	-5.483333	Brazil	Cachoeira da Estiva	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-58.066667	-7.2	Brazil	Upper Cururu	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-58.05	-7.35	Brazil	São Manoel, Rio Teles Pires	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.516667	-10.1	Brazil	Fazenda São José, Peixoto de Azevedo	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55	-9.366667	Brazil	Serra do Cachimbo	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.25	-6.5	Brazil	Jamanxim-Curuá	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-53.816667	-4.55	Brazil	Mundo Novo, right margin of the Rio Irirí	Report	2005	Pimenta, F. E. (2005)

Chiropotes albinasus	-52.666667	-3.85	Brazil	Irirí-Xingu	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-54.9	-8.95	Brazil	Cachimbo	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-52.2	-3.2	Brazil	Altamira	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-57.5	-7.75	Brazil	Rio Cururu	Report	2005	Pimenta, F. E. (2005)
Chiropotes albinasus	-55.8	-9.5	Brazil	Mato Grosso, BR	Human observation	2021	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.9	-9.5	Brazil	Mato Grosso, BR	Human observation	2021	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.8	-9.6	Brazil	Mato Grosso, BR	Human observation	2020	GBIF.org (28 September 2022)
Chiropotes albinasus	-56.1	-9.3	Brazil	Pará, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes albinasus	-56	-9.5	Brazil	Mato Grosso, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes albinasus	-58.3	-9.9	Brazil	Mato Grosso, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes albinasus	-59.2	-8.8	Brazil	Mato Grosso, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes albinasus	-58.2	-10	Brazil	Mato Grosso, BR	Human observation	2018	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.8	-9.3	Brazil	Pará, BR	Human observation	2018	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.8	-9.6	Brazil	Mato Grosso, BR	Human observation	2015	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.9	-9.4	Brazil	Pará, BR	Human observation	2014	GBIF.org (28 September 2022)
Chiropotes albinasus	-56.4	-4.6	Brazil	Itaituba, BR-PA, BR	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.8	-9.6	Brazil	Mato Grosso, BR	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.9	-9.5	Brazil	Mato Grosso, BR	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.6	-9.5	Brazil	Mato Grosso, BR	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.9	-9.6	Brazil	Brazil | Mato Grosso | Cristalino Jungle Lodge, Trilha das Rochas	Machine observation	2005	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.9	-9.6	Brazil	Brazil | Mato Grosso | Cristalino Jungle Lodge, Trilha de Teles Pires	Machine observation	2005	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.6	-4.9	Brazil	Itaituba, Br. 165, Santarém-Cuiabá Km 446, Zona Sul, Rio Jamaxizinho	Preserved specimen	1976	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.6	-4.9	Brazil	Itaituba, Br. 165, Santarém-Cuiabá Km 446, Zona Sul, Rio Jamaxizinho	Preserved specimen	1976	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.6	-4.9	Brazil	Itaituba, Br. 165, Santarém-Cuiabá Km 446, Zona Sul, Rio Jamaxizinho	Preserved specimen	1976	GBIF.org (28 September 2022)
Chiropotes albinasus	-60.6	-9.2	Brazil	Aripuana	Preserved specimen	1975	GBIF.org (28 September 2022)
Chiropotes albinasus	-60.6	-9.2	Brazil	Aripuana	Preserved specimen	1974	GBIF.org (28 September 2022)
Chiropotes albinasus	-60.6	-9.2	Brazil	Aripuana	Preserved specimen	1974	GBIF.org (28 September 2022)
Chiropotes albinasus	-63	-7.5	Brazil	Humaita, Br. 230, Itaituba-Humaitá, Km 969, Transamazonica Hwy.	Preserved specimen	1974	GBIF.org (28 September 2022)
Chiropotes albinasus	-54.7	-4	Brazil	Santarém, Br 165, Santarém To Cuiabá, Km. 212	Preserved specimen	1973	GBIF.org (28 September 2022)

Chiropotes albinasus	-55.1	-2.9	Brazil	Rio Tapajós, right bank, Tapaiuna	Preserved specimen	1961	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.1	-2.9	Brazil	Rio Tapajós, right bank, Tapaiuna	Preserved specimen	1960	GBIF.org (28 September 2022)
Chiropotes albinasus	-55.1	-2.9	Brazil	Rio Tapajós, right bank, Tapaiuna	Preserved specimen	1960	GBIF.org (28 September 2022)
Chiropotes albinasus	-57	-8	Brazil	R. Bank tributary of R. Tapajós, Altocuruv River, Para	Preserved specimen	1957	GBIF.org (28 September 2022)
Chiropotes albinasus	-57	-8	Brazil	R. Bank tributary of R. Tapajós, Altocuruv River, Para	Preserved specimen	1957	GBIF.org (28 September 2022)
Chiropotes albinasus	-57.44	-3.64	Brazil	Rio Urupadí, alto rio Maraú, cabeceira do rio Maués	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-57.5	-3.6	Brazil	Unknown	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-61.5374	-5.9841	Brazil	Unknown	Tissue sample	Unknown	Chiro coordinates of samples
Chiropotes albinasus	-55.195	-3.3498	Brazil	Brasil, PA: Rio Tapajós, margem direita FLONA	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-55.3242	-3.3143	Brazil	Brasil, PA: Rio Tapajós, margem esquerda, próximo à comunidade de Cametá	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-55.2203	-3.3918	Brazil	Brasil, PA: Rio Tapajós, margem direita	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-55.2038	-3.3555	Brazil	Brasil, PA: Rio Tapajós, margem direita FLONA	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-58.2354	-9.8456	Brazil	Cotriguaçu	Tissue sample	Unknown	Salford Primate Tissue Samples
Chiropotes albinasus	-56.37310538	-3.908231485	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-63.52244014	-11.00278207	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-61.74195447	-9.797530231	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-62.47350568	-12.58348753	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-59.28871912	-12.02614988	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-63.07065316	-8.960792827	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-54.71666667	-2.433333333	Brazil	Santarém	Report	2020	CPB
Chiropotes albinasus	-54.7	-2.433333333	Brazil	Mojuí dos Campos	Report	2020	CPB
Chiropotes albinasus	-54.95	-2.633333333	Brazil	Belterra	Report	2020	CPB

Chiropotes albinasus	-55	-2.666666667	Brazil	Cajutuba	Report	2020	CPB	
Chiropotes albinasus	-55	-2.716666667	Brazil	Aramanaí	Report	2020	CPB	
Chiropotes albinasus	-55.01666667	-2.783333333	Brazil	Maguari	Report	2020	CPB	
Chiropotes albinasus	-54.96666667	-2.666666667	Brazil	Piquiatuba	Report	2020	CPB	
Chiropotes albinasus	-55.13333333	-2.833333333	Brazil	Caxiricatuba	Report	2020	CPB	
Chiropotes albinasus	-55.08333333	-2.9	Brazil	Tapaiúna	Report	2020	CPB	
Chiropotes albinasus	-55.03333333	-2.95	Brazil	Itapoama	Report	2020	CPB	
Chiropotes albinasus	-55.3	-3.666666667	Brazil	Fordlândia	Report	2020	CPB	
Chiropotes albinasus	-55.48333333	-3.833333333	Brazil	FLONA Tapajós	Report	2020	CPB	
Chiropotes albinasus	-55.48333333	-3.833333333	Brazil	Rio Tapurucurazinho	Report	2020	CPB	
Chiropotes albinasus	-55.46666667	-3.833333333	Brazil	Araipá	Report	2020	CPB	
Chiropotes albinasus	-55.63333333	-4.1	Brazil	Monte Cristo	Report	2020	CPB	
Chiropotes albinasus	-55.61666667	-4.05	Brazil	Pedreira, Rio Tapajós	Report	2020	CPB	
Chiropotes albinasus	-56.3	-4.716666667	Brazil	Rio Jamanxim	Report	2020	CPB	
Chiropotes albinasus	-56.28333333	-4.666666667	Brazil	km 5 Estrada do Palhau	Report	2020	CPB	
Chiropotes albinasus	-56.05	-5.25	Brazil	km 446 da estrada Santarém-Cuiabá	Report	2020	CPB	

Chiropotes albinasus	-55.78333333	-5.483333333	Brazil	Cachoeira da Estiva	Report	2020	CPB
Chiropotes albinasus	-58.06666667	-7.2	Brazil	superior Cururu	Report	2020	CPB
Chiropotes albinasus	-57.5	-7.75	Brazil	Rio Cururu	Report	2020	CPB
Chiropotes albinasus	-58.05	-7.35	Brazil	São Manoel, Rio Teles Pires	Report	2020	CPB
Chiropotes albinasus	-54.9	-8.95	Brazil	Cachimbo	Report	2020	CPB
Chiropotes albinasus	-52.66666667	-3.85	Brazil	Irirí-Xingu	Report	2020	CPB
Chiropotes albinasus	-55.51666667	-10.1	Brazil	Fazenda São José	Report	2020	CPB
Chiropotes albinasus	-55	-9.366666667	Brazil	Serra do Cachimbo	Report	2020	CPB
Chiropotes albinasus	-55	-9.366666667	Brazil	Serra do Cachimbo	Report	2020	CPB
Chiropotes albinasus	-54.9	-8.95	Brazil	Cachimbo	Report	2020	CPB
Chiropotes albinasus	-55.25	-6.5	Brazil	Jamanxim-Curuá	Report	2020	CPB
Chiropotes albinasus	-53.81666667	-4.55	Brazil	Mundo Novo	Report	2020	CPB
Chiropotes albinasus	-52.66666667	-3.85	Brazil	Irirí-Xingu	Report	2020	CPB
Chiropotes albinasus	-52.66666667	-3.85	Brazil	Cocal, Rio Irirí	Report	2020	CPB
Chiropotes albinasus	-52.2	-3.2	Brazil	Altamira	Report	2020	CPB
Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB

Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-56.25	-3.833333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-57.53333333	-5	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-52.72119496	-3.78167277	Brazil	rio Iriri	Human observation	2020	CPB
Chiropotes albinasus	-53.66568809	-4.521511165	Brazil	Mundo Novo, banco direito rio Iriri	Human observation	2020	CPB
Chiropotes albinasus	-53.737047	-4.367096697	Brazil	Estrada secundária da estrada PA-180	Human observation	2020	CPB
Chiropotes albinasus	-54.96666667	-2.583333333	Brazil	Unknown	Extinct	2020	CPB
Chiropotes albinasus	-54.97271082	-2.531906257	Brazil	Iruçanga	Extinct	2020	CPB
Chiropotes albinasus	-55	-2.666666667	Brazil	Cajutuba	Human observation	2020	CPB
Chiropotes albinasus	-55	-2.716666667	Brazil	Aramanaí	Extinct	2020	CPB
Chiropotes albinasus	-55.01666667	-2.783333333	Brazil	Maguarí	Human observation	2020	CPB

Chiropotes albinasus	-55.08849168	-2.847190016	Brazil	Caxiricatuba	Human observation	2020	CPB
Chiropotes albinasus	-55.1	-3.05	Brazil	Piquiatuba	Human observation	2020	CPB
Chiropotes albinasus	-54.96666667	-2.583333333	Brazil	Unknown	Extinct	2020	CPB
Chiropotes albinasus	-54.9525	-2.503611111	Brazil	Iruçanga	Extinct	2020	CPB
Chiropotes albinasus	-55	-2.666666667	Brazil	Cajutuba	Human observation	2020	CPB
Chiropotes albinasus	-55	-2.716666667	Brazil	Aramanaí	Extinct	2020	CPB
Chiropotes albinasus	-55.01666667	-2.783333333	Brazil	Maguarí	Human observation	2020	CPB
Chiropotes albinasus	-55.08849168	-2.859598381	Brazil	Caxiricatuba	Human observation	2020	CPB
Chiropotes albinasus	-55.1	-3.05	Brazil	Piquiatuba	Human observation	2020	CPB
Chiropotes albinasus	-54.70833333	-2.443055556	Brazil	Doze sítios ao longo da BR-163, incluindo a Flona Tapajós	Human observation	2020	CPB
Chiropotes albinasus	-54.95388889	-3.046111111	Brazil	base 2 FLONA Tapajós, floresta contínua	Interview	2020	CPB
Chiropotes albinasus	-54.89472222	-2.835	Brazil	Massafra	No observation	2020	CPB
Chiropotes albinasus	-54.79555556	-2.951388889	Brazil	São Benedito	No observation	2020	CPB
Chiropotes albinasus	-54.79916667	-2.941944444	Brazil	São Benedito	No observation	2020	CPB
Chiropotes albinasus	-54.94444444	-3.355277778	Brazil	base 3 FLONA Tapajós, floresta contínua	Human observation	2020	CPB
Chiropotes albinasus	-54.87333333	-3.351666667	Brazil	Sítio do Oswaldo	Human observation	2020	CPB

Chiropotes albinasus	-54.92361111	-3.331666667	Brazil	Fazenda do Goiano	Human observation	2020	CPB
Chiropotes albinasus	-54.9275	-3.238333333	Brazil	Fazeda Tocantins	No observation	2020	CPB
Chiropotes albinasus	-54.86972222	-3.9425	Brazil	base 5 FLONA Tapajós, floresta contínua	Human observation	2020	CPB
Chiropotes albinasus	-54.85555556	-3.949444444	Brazil	Sr. Ceará	Human observation	2020	CPB
Chiropotes albinasus	-54.90138889	-4.065555556	Brazil	Antônio Medeiros	Human observation	2020	CPB
Chiropotes albinasus	-54.8825	-3.95	Brazil	Sr. Ceará	Human observation	2020	CPB
Chiropotes albinasus	-54.95388889	-3.355277778	Brazil	Base 117 ou Base Sucupira	Human observation	2020	CPB
Chiropotes albinasus	-58.76916667	-3.9	Brazil	Santa Maria	Interview	2020	CPB
Chiropotes albinasus	-56.53583333	-9.0475	Brazil	margem esquerda do rio São Benedito	Human observation	2020	CPB
Chiropotes albinasus	-56.53333333	-9.0475	Brazil	margem direita do rio São Benedito	Interview	2020	CPB
Chiropotes albinasus	-55.76602265	-3.889769215	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-55.04622512	-3.530247018	Brazil	Base Sucupira	Human observation	2020	CPB
Chiropotes albinasus	-63.07806015	-10.14096546	Brazil	Unknown	Human observation	2020	CPB
Chiropotes albinasus	-62.05	-7.95	Brazil	Rio dos Marmelos	Human observation	2020	CPB
Chiropotes albinasus	-61.89497615	-7.831712913	Brazil	Fazenda Vista Alegre	Human observation	2020	CPB

Chiropotes albinasus	-60.48447595	-7.186229772	Brazil	Rio Aripuanã	Report	2020	CPB	
Chiropotes albinasus	-56.92837276	-2.845499084	Brazil	Lago Andira	Collection	2020	CPB	
Chiropotes albinasus	-59.45944444	-10.16666667	Brazil	Coxin	Collection	2020	CPB	
Chiropotes albinasus	-53.65938141	-4.366577564	Brazil	Rio Iriri	Collection	2020	CPB	
Chiropotes albinasus	-55.60757334	-4.269879446	Brazil	Itaituba-Altamira, Km 25	Collection	2020	CPB	
Chiropotes albinasus	-60.38333333	-7.266666667	Brazil	Rio Aripuanã	Collection	2020	CPB	
Chiropotes albinasus	-62.78670632	-7.473144253	Brazil	Rio Madeira	Collection	2020	CPB	
Chiropotes albinasus	-60.4	-7.616666667	Brazil	Foz do Castanho	Collection	2020	CPB	
Chiropotes albinasus	-59.25	-8.75	Brazil	Muriru (Mureru), Foz do Igarapé, Rio Aripuanã	Collection	2020	CPB	
Chiropotes albinasus	-56.91666667	-2.833333333	Brazil	Muriru (Mureru), Foz do Igarapé, Rio Aripuanã	Collection	2020	CPB	
Chiropotes albinasus	-56.73583333	-2.628333333	Brazil	Villa Bella Imperatriz	Collection	2020	CPB	
Chiropotes albinasus	-56.63333333	-2.833333333	Brazil	Serra de Parintins	Collection	2020	CPB	
Chiropotes albinasus	-62.86302287	-8.032591034	Brazil	Calama, Rio Madeira, boca do Rio Ji Paraná	Collection	2020	CPB	
Chiropotes albinasus	-58.34694444	-11.33444444	Brazil	Fontanillas, margem direita Rio Juruena	Collection	2020	CPB	
Chiropotes albinasus	-58.05	-7.333333333	Brazil	boca do Rio Juruena, afluente do Rio Tapajós	Collection	2020	CPB	

Chiropotes albinasus	-62.45	-10.43333333	Brazil	Unknown	Collection	2020	CPB
Chiropotes albinasus	-60.93333333	-11.75	Brazil	Serra dos Parecis	Collection	2020	CPB
Chiropotes albinasus	-60.66666667	-11.75	Brazil	Barão Melgaço, Rio Comemoração	Collection	2020	CPB
Chiropotes albinasus	-60.2	-12.63333333	Brazil	boca do Rio Piroculuina, Rio Comemoração	Collection	2020	CPB
Chiropotes albinasus	-59.58333333	-9.833333333	Brazil	Capivara, Rio Branco	Collection	2020	CPB
Chiropotes albinasus	-59.2	-10.33333333	Brazil	Cachoeira de Dardanelos	Collection	2020	CPB
Chiropotes albinasus	-59.2	-10.33333333	Brazil	Humboldt	Collection	2020	CPB
Chiropotes albinasus	-55.51666667	-10.1	Brazil	Fazenda San José, banco R Rio Peixoto de Azevedo	Collection	2020	CPB
Chiropotes albinasus	-55.63333333	-2.65	Brazil	Aruam, Rio Arapiuns	Collection	2020	CPB
Chiropotes albinasus	-55.63333333	-2.65	Brazil	Limoal, Rio Tapajós	Collection	2020	CPB
Chiropotes albinasus	-55	-2.433333333	Brazil	Igarapé Amorim, Rio Tapajós	Collection	2020	CPB
Chiropotes albinasus	-55	-2.433333333	Brazil	Igarapé Bravo, Rio Tapajós	Collection	2020	CPB
Chiropotes albinasus	-55.32138889	-3.326944444	Brazil	Arapiuns	Collection	2020	CPB
Chiropotes albinasus	-54.7	-2.433333333	Brazil	Rio Tapajós	Collection	2020	CPB
Chiropotes albinasus	-54.93333333	-2.6	Brazil	Caxiricatuba, Rio Tapajós	Collection	2020	CPB
Chiropotes albinasus	-54.96666667	-2.666666667	Brazil	Piquiatuba, Rio Tapajós	Collection	2020	CPB

Chiropotes albinasus	-55.16666667	-2.816666667	Brazil	Boim, Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-55.08333333	-2.9	Brazil	Tapaiuna, Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-55.58333333	-3.583333333	Brazil	Sumaúma, Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-55.5	-3.666666667	Brazil	Fordlândia, banco L , Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-55.58333333	-3.833333333	Brazil	Rio Tapurucurazinho, Km 25, Itaituba-Altamira	Collection	2020	CPB	
Chiropotes albinasus	-55.63333333	-4.066666667	Brazil	Fazenda Monte Cristo, banco L, Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-55.88333333	-4.066666667	Brazil	Barreira, banco L, Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-56.08333333	-4.333333333	Brazil	Unknown	Collection	2020	CPB	
Chiropotes albinasus	-56.25	-4.616666667	Brazil	Burbure, banco L Rio Tapajós	Collection	2020	CPB	
Chiropotes albinasus	-56.3	-4.716666667	Brazil	Rio Jamanchim (ou Rio Jamanxim)	Collection	2020	CPB	
Chiropotes albinasus	-55.78333333	-5.483333333	Brazil	Cachoeira da Estiva, Rio Jamanchim	Collection	2020	CPB	
Chiropotes albinasus	-57.25	-5.916666667	Brazil	Km 212, Itaituba-Jacareacanga	Collection	2020	CPB	
Chiropotes albinasus	-58.05	-7.35	Brazil	São Manoel, Rio Teles Pires	Collection	2020	CPB	
Chiropotes albinasus	-57.69242284	-7.537412551	Brazil	Rio Teles Pires	Collection	2020	CPB	
Chiropotes albinasus	-57.5	-7.75	Brazil	Rio Cururu	Collection	2020	CPB	
Chiropotes albinasus	-52.2	-3.2	Brazil	Rio Xingu	Collection	2020	CPB	
Chiropotes albinasus	-52.61666667	-3.866666667	Brazil	Cocal, Rio Iriri, boca do Iriri	Collection	2020	CPB	

Chiropotes albinasus	-54.9	-8.95	Brazil	Cachimbo	Collection	2020	CPB
Chiropotes albinasus	-56.58805191	-9.054363855	Brazil	Capoeira 1 grupo Jacareacanga, PA (margem esquerda são bendito)	Human observation	2020	CPB
Chiropotes albinasus	-58.05	-7.333333	Brazil	Juruena, Rio, mouth, Tributary of Rio Tapajós	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-62.45	-10.433333	Brazil	Jam Biological Reserve, Oryx	Preserved specimen	1983	Hershkovitz, P. (1985).
Chiropotes albinasus	-60.933333	-11.75	Brazil	Parecis, Serra dos, Comissao Rondon	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-60.666667	-11.75	Brazil	Barao Melgaco, Rio Comemoração, Comissão Rondon	Preserved specimen	1914	Hershkovitz, P. (1985).
Chiropotes albinasus	-60.2	-12.633333	Brazil	Piroculuina, Rio (mouth), Rio Comemoração	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-59.583333	-9.833333	Brazil	Capivara, Rio Branco,	Preserved specimen	1979	Hershkovitz, P. (1985).
Chiropotes albinasus	-59.2	-10.333333	Brazil	Dardanelos, Cachoeira de, Rio Aripuanã	Preserved specimen	1977	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.516667	-10.1	Brazil	San Jose, Fazenda, R bank Rio Peixoto de Azevedo	Preserved specimen	1977	Hershkovitz, P. (1985).
Chiropotes albinasus	-56.733333	-1.366667	Brazil	Nhamundá, Rio, Primeira Cachoeira	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.633333	-2.65	Brazil	Aruam, Rio Arapiuns	Preserved specimen	1936	Hershkovitz, P. (1985).
Chiropotes albinasus	-55	-2.433333	Brazil	Amorim, Igarapé, Rio Tapajós	Preserved specimen	1931	Hershkovitz, P. (1985).
Chiropotes albinasus	-54.7	-2.433333	Brazil	Arapiuns	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-54.933333	-2.6	Brazil	Caxiricatuba, Rio Tapajós	Preserved specimen	1936	Hershkovitz, P. (1985).
Chiropotes albinasus	-54.966667	-2.666667	Brazil	Piquiatuba, Rio Tapajós	Preserved specimen	1936	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.166667	-2.816667	Brazil	Boim, Rio Tapajós	Preserved specimen	1932	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.083333	-2.9	Brazil	Tapaiuna, Rio Tapajós	Preserved specimen	1960	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.583333	-3.583333	Brazil	Sumauna, Rio Tapajós	Preserved specimen	1963	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.5	-3.666667	Brazil	Fordlandia, L bank, Rio Tapajós	Preserved specimen	1971	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.583333	-3.833333	Brazil	Tapurucurazinho, Rio. Itaituba-Altamira	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.633333	-4.066667	Brazil	Monte Cristo, Fazenda, L bank, Rio Tapajós	Preserved specimen	1920	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.883333	-4.066667	Brazil	Barreira, L bank, Rio Tapajós,	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-56.083333	-4.333333	Brazil	Parque Nacional da Amazonia, L bank Rio Tapajós, Itaituba-Altamira	Human observation	1981	Hershkovitz, P. (1985).
Chiropotes albinasus	-56.25	-4.616667	Brazil	Burbure, L bank Rio Tapajós	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-56.3	-4.716667	Brazil	Jamanchim, or Jamanxim, Rio	Preserved specimen	1917	Hershkovitz, P. (1985).
Chiropotes albinasus	-55.783333	-5.483333	Brazil	Estiva, Cachoeira da, Rio Jamanchim	Preserved specimen	1909	Hershkovitz, P. (1985).
Chiropotes albinasus	-57.25	-5.916667	Brazil	Km 212, Itaituba-Jacareacanga,	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-58.05	-7.35	Brazil	São Manoel, Rio Teles Pires	Preserved specimen	1914	Hershkovitz, P. (1985).
Chiropotes albinasus	-57.5	-7.75	Brazil	Cururu, Rio	Preserved specimen	1957	Hershkovitz, P. (1985).

Chiropotes albinasus	-52.2	-3.2	Brazil	Altamira, Rio Xingu	Preserved specimen	1985	Hershkovitz, P. (1985).
Chiropotes albinasus	-52.616667	-3.866667	Brazil	Cocal, Rio Iriri, mouth of Iriri	Preserved specimen	1914	Hershkovitz, P. (1985).
Chiropotes albinasus	-54.9	-8.95	Brazil	Cachimbo	Preserved specimen	1955	Hershkovitz, P. (1985).
Chiropotes albinasus	-51.15	-7.716667	Brazil	Gorotire, Ciradaus, Rio Fresco, Rio Xingu	Preserved specimen	1957	Hershkovitz, P. (1985).
Chiropotes albinasus	-62.883333	-8.05	Brazil	Fontanillas, Rio Juruena, right bank. Not precisely located, see Juruena, Rio, mouth	Preserved specimen	1981	Hershkovitz, P. (1985).
Chiropotes utahickae	-50.1	-6	Brazil	Pará, BR	Human observation	2021	GBIF.org (28 September 2022)
Chiropotes utahickae	-50.1	-6	Brazil	Pará, BR	Human observation	2021	GBIF.org (28 September 2022)
Chiropotes utahickae	-50	-6.2	Brazil	Pará, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes utahickae	-50	-6.1	Brazil	Pará, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes utahickae	-52.4	-3.7	Brazil	Altamira, 52 Km SSW, E Bank Rio Xingu	Material sample	1986	GBIF.org (28 September 2022)
Chiropotes utahickae	-50.57600398	-5.602699659	Brazil	Unknown	Human observation	2021	CPB
Chiropotes utahickae	-51.44309558	-1.836270537	Brazil	Caxiuanã	Human observation	2021	CPB
Chiropotes utahickae	-50.35923109	-5.114960636	Brazil	Reservatório da usina hidrelétrica de Tucuruí	Biological material	2021	CPB
Chiropotes utahickae	-50.71222222	-1.804444444	Brazil	Unknown	Citation	2021	CPB
Chiropotes utahickae	-50.1695548	-4.898187737	Brazil	Área indígena Parakanã	Citation	2021	CPB
Chiropotes utahickae	-49.79638889	-4.330555556	Brazil	Unknown	Citation	2021	CPB
Chiropotes utahickae	-49.68047948	-3.752180368	Brazil	Usina hidrelétrica de Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-50	-5.25	Brazil	Usina hidrelétrica de Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-49.64583333	-3.864722222	Brazil	Ilha do Germoplasma	Human observation	2021	CPB
Chiropotes utahickae	-51.52916667	-1.708333333	Brazil	Estação Científica Ferreira Penna (ECFPn)	Human observation	2021	CPB

Chiropotes utahickae	-51.52083333	-1.753611111	Brazil	Estação Científica Ferreira Penna (ECFPn) (Plot 4)	Human observation	2021	CPB
Chiropotes utahickae	-50.71222222	-1.804444444	Brazil	Estação Científica Ferreira Penna	Human observation	2021	CPB
Chiropotes utahickae	-49.79638889	-4.330555556	Brazil	Fazenda Aratau	Human observation	2021	CPB
Chiropotes utahickae	-49.68938361	-3.75635845	Brazil	Rio Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-50	-5.25	Brazil	Rio Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-51.45	-1.75	Brazil	Estação Científica Ferreira Penna (ECFPn)	Human observation	2021	CPB
Chiropotes utahickae	-50.33333333	-3.833333333	Brazil	Fazenda Aratau	Human observation	2021	CPB
Chiropotes utahickae	-51.14249747	-7.693599408	Brazil	Rio fresco, Rio Xingú.Gorotire. Gradaús	Collection	2021	CPB
Chiropotes utahickae	-49.38531676	-5.128176774	Brazil	Itapiranga	Collection	2021	CPB
Chiropotes utahickae	-49.7468162	-2.655286408	Brazil	"Baião" Pedral, Rio Tocantins	Collection	2021	CPB
Chiropotes utahickae	-51.52751666	-2.070824704	Brazil	Portel, Rio Pracupi	Collection	2021	CPB
Chiropotes utahickae	-52.2214188	-1.670282985	Brazil	Recreio, Rio Majary	Collection	2021	CPB
Chiropotes utahickae	-52.08710821	-1.642574633	Brazil	Tapara, Rio Xingu	Collection	2021	CPB
Chiropotes utahickae	-49.68311648	-3.764714615	Brazil	Reservatório da Usina hidrelétrica (UHE) de Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-50	-5.25	Brazil	Reservatório da Usina hidrelétrica (UHE) de Tucuruí	Human observation	2021	CPB
Chiropotes utahickae	-52.2	-1.7	Brazil	Recreio, Rio Majary, R bank Rio Xingu	Preserved specimen	1921	Hershkovitz, P. (1985)
Chiropotes utahickae	-52.083333	-1.633333	Brazil	Tapara, R bank Rio Xingu	Preserved specimen	1931	Hershkovitz, P. (1985)
Chiropotes utahickae	-51.5	-2.083333	Brazil	Rio Pracopi, Portel	Preserved specimen	1939	Hershkovitz, P. (1985)

Chiropotes utahickae	-49.033333	-5.133333	Brazil	Itupiranga, L bank Rio Tocantins	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes utahickae	-55.266667	-2.3	Brazil	Tirios or Trios, aldea, upper Rio Paru	Preserved specimen	1981	Hershkovitz, P. (1985)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.4	2.4	Brazil	Mucajaí, BR-RR, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61	1.5	Brazil	Caracaraí - RR, 69360-000, Brasil	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	5	Suriname	Suriname - Brownsberg NP	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes chiropotes	-60.1	2	Brazil	Presidente Figueiredo, BR-AM, BR	Human observation	2018	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	5	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.2	4.9	Suriname	Suriname - Brownsberg NP	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.8	4.7	Guyana	Rest of Region 8, GY-PT, GY	Human observation	2017	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.8	3.9	Guyana	Upper Takutu-Upper Essequibo, Guyana	Human observation	2016	GBIF.org (28 September 2022)

Chiropotes chiropotes	-60.1	2.7	Brazil	Brazil | Amazonas | Manaus; Fazenda Experimental da UFAM	Human observation	2014	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.2	1.3	Brazil	Caracaraí - RR, 69360-000, Brazil	Human observation	2014	GBIF.org (28 September 2022)
Chiropotes chiropotes	-57.2	4.5	Suriname	Suriname - Sipaliwini	Human observation	2014	GBIF.org (28 September 2022)
Chiropotes chiropotes	-54.3	2.2	French Guiana	Guyane française	Human observation	2013	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.7	3.8	Guyana	Rewa River, Guyana	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.1	1.3	Brazil	Brazil - Viruá NP	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	4	Guyana	Upper Takutu-Upper Essequibo, Guyana	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.9	Guyana	Upper Takutu-Upper Essequibo, Guyana	Human observation	2012	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)

Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-54.1	3.3	French Guiana	Unknown	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.8	3.1	French Guiana	97353|Maripasoula	Human observation	2011	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-52.7	2.9	French Guiana	97356|Camopi	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53	2.4	French Guiana	Guyane française	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-54.3	2.3	French Guiana	Guyane française	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.2	2.4	French Guiana	Guyane française	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-53.9	3.5	French Guiana	Guyane française	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes chiropotes	-54.7	4.3	Suriname	Lely Plateau	Human observation	2005	GBIF.org (28 September 2022)
Chiropotes chiropotes	-65.8	3.7	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-65.3	2.3	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-65.8	3.2	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-66.2	5.3	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-66.2	5.4	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-67.8	5.1	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)
Chiropotes chiropotes	-65.8	3.7	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Preserved specimen	1967	GBIF.org (28 September 2022)

Chiropotes chiropotes	-65.2	2.5	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.8	3.3	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.2	1.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.5	5.2	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-59.5	2.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.5	3.4	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-56.5	3.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-56.5	3.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-55.5	5.2	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-56.5	3.1	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.4	5.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.5	6	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.8	0.4	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.8	0.4	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-58.9	4.9	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-61.2	10.5	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-59.5	2.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-59.5	2.8	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-66.2	5.3	Unknown	Unknown	Unknown	Unknown	GBIF.org (28 September 2022)
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens

Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-65.77	3.65	Venezuela	Belen, 56 Km NNW Esmeralda, Rio Cunucunuma	Tissue sample	2021	FMNH Primate specimens
Chiropotes chiropotes	-62.59978666	-0.265321744	Brazil	Unknown	Unknown	2020	CPB
Chiropotes chiropotes	-65.05	1.166666667	Brazil	Unknown	Human observation	2020	CPB
Chiropotes chiropotes	-66.86666667	0.4333333333	Brazil	Unknown	Human observation	2020	CPB
Chiropotes chiropotes	-61.12805556	1.816111111	Brazil	Bem Querer, Rio Branco	Collection	2020	CPB
Chiropotes chiropotes	-62.25636422	1.549265585	Brazil	Rio Catrimani	Collection	2020	CPB
Chiropotes chiropotes	-61.2	2.533333333	Brazil	Tuapara, Rio Mucajai	Collection	2020	CPB
Chiropotes chiropotes	-61.05	2.7	Brazil	Água Boa. Igarapé, Rio Mucajaí	Collection	2020	CPB
Chiropotes chiropotes	-60.91666667	2.666666667	Brazil	Poção, Rio Mucajaí	Collection	2020	CPB
Chiropotes chiropotes	-60.9	2.416666667	Brazil	Rio Mucajai, banco N	Collection	2020	CPB
Chiropotes chiropotes	-60.9	2.43	Brazil	Mt. Arimani	Collection	2020	CPB
Chiropotes chiropotes	-60.85216559	2.658582499	Brazil	Boa Vista, baixo Rio Mucajaí	Collection	2020	CPB

Chiropotes chiropotes	-62.25	1.5	Brazil	Serra do Pacu, Rio Catrimani	Collection	2020	CPB
Chiropotes chiropotes	-61.13333333	1.833333333	Brazil	Rio Mucajaí	Collection	2020	CPB
Chiropotes chiropotes	-63.55	1.566666667	Brazil	Rio Toototobi, Rio Demeni	Collection	2020	CPB
Chiropotes chiropotes	-66.00276615	0.3571009513	Brazil	Unknown	Human observation	2020	CPB
Chiropotes chiropotes	-61.46959689	1.28824276	Brazil	Unknown	Human observation	2020	CPB
Chiropotes chiropotes	-61.70013523	3.344834483	Brazil	Unknown	Human observation	2020	CPB
Chiropotes chiropotes	-61.35026081	1.741719856	Brazil	Unknown	Human observation	2020	CPB
Chiropotes satanas	-48.3	-1.4	Brazil	Pará, BR	Human observation	2021	GBIF.org (28 September 2022)
Chiropotes satanas	-46.9	-3.8	Brazil	Maranhão, BR	Human observation	2019	GBIF.org (28 September 2022)
Chiropotes satanas	-60	-2.3	Brazil	Amazonas, BR	Human observation	2018	GBIF.org (28 September 2022)
Chiropotes satanas	-47.8	-3.4	Brazil	Paragominas, BR-PA, BR	Human observation	2018	GBIF.org (28 September 2022)
Chiropotes satanas	-59.9	-3.1	Brazil	Maués, BR-AM, BR	Human observation	2015	GBIF.org (28 September 2022)
Chiropotes satanas	-53	3	French Guiana	Guyane française	Human observation	2010	GBIF.org (28 September 2022)
Chiropotes satanas	-58.8	3.3	Guyana	Pobawau Creek	Human observation	2001	GBIF.org (28 September 2022)
Chiropotes satanas	-58.8	3.2	Guyana	Cacique Mountain	Human observation	2001	GBIF.org (28 September 2022)
Chiropotes satanas	-59.4	2.2	Guyana	Guyana | Parabara savannah	Machine observation	2000	GBIF.org (28 September 2022)
Chiropotes satanas	-59	1.4	Guyana	Guyana | Upper Takutu-Upper Essequibo | Acari Mountains, near border of Brazil	Machine observation	1998	GBIF.org (28 September 2022)
Chiropotes satanas	-58.8	3.2	Guyana	Guyana | Upper Takutu-Upper Essequibo | left bank of Kwitaro River	Machine observation	1998	GBIF.org (28 September 2022)
Chiropotes satanas	-60	-2.5	Brazil	Brazil | Amazonas | Manaus	Machine observation	1994	GBIF.org (28 September 2022)
Chiropotes satanas	-59.3	3.3	Guyana	Rupununi region East of Rupununi River	Human observation	1993	GBIF.org (28 September 2022)
Chiropotes satanas	-67.3	5	Venezuela	Venezuela | Amazonas | ESE Pto Ayacucho; Upper Rio Ventuari; Junglaven Camp	Machine observation	1990	GBIF.org (28 September 2022)
Chiropotes satanas	-66	3.5	Venezuela	Venezuela | Amazonas	Machine observation	1990	GBIF.org (28 September 2022)
Chiropotes satanas	-66	3.5	Venezuela	Venezuela | Amazonas	Machine observation	1990	GBIF.org (28 September 2022)

Chiropotes satanas	-52.4	-3.7	Brazil	Altamira, 52 Km SSW, E Bank Rio Xingu	Material sample	1986	GBIF.org (28 September 2022)
Chiropotes satanas	-56.5	3.8	Suriname	Wilhelmina Mts, West R	Preserved specimen	1961	GBIF.org (28 September 2022)
Chiropotes satanas	-56.5	3.8	Suriname	Wilhelmina Mts, West R	Preserved specimen	1961	GBIF.org (28 September 2022)
Chiropotes satanas	-56.5	3.8	Suriname	Wilhelmina Mts, West R	Preserved specimen	1961	GBIF.org (28 September 2022)
Chiropotes satanas	-56.5	3.1	Suriname	Kayser Gebergte Airstrip, E of Zuid R	Preserved specimen	1960	GBIF.org (28 September 2022)
Chiropotes satanas	-56.5	3.1	Suriname	Kayser Gebergte Airstrip, E of Zuid R	Preserved specimen	1960	GBIF.org (28 September 2022)
Chiropotes satanas	-46.50342178	-3.748824835	Brazil	Reserva Indígena Caru	Record	2020	CPB
Chiropotes satanas	-48.16833333	-3.758888889	Brazil	Unknown	Human observation	2020	CPB
Chiropotes satanas	-46.74861111	-1.875833333	Brazil	Fazenda Amanda	Human observation	2020	CPB
Chiropotes satanas	-48.95305556	-2.947222222	Brazil	Unknown	Citation	2020	CPB
Chiropotes satanas	-47.78333333	-1.683333333	Brazil	Unknown	Citation	2020	CPB
Chiropotes satanas	-47.43805556	-1.771111111	Brazil	Unknown	Citation	2020	CPB
Chiropotes satanas	-46.7256279	-3.789923191	Brazil	Unknown	Citation	2020	CPB
Chiropotes satanas	-48.16833333	-3.758888889	Brazil	Fazenda Cauaxi	Human observation	2020	CPB
Chiropotes satanas	-49.67698322	-4.409339179	Brazil	Ilha de Germoplasma (Usina Hidrelétrica de Tucuruí)	Human observation	2020	CPB
Chiropotes satanas	-46.7256279	-3.789923191	Brazil	Unknown	Human observation	2020	CPB
Chiropotes satanas	-51.46666667	-1.7	Brazil	Estação Científica Ferreira Penna	Human observation	2020	CPB
Chiropotes satanas	-50.33333333	-3.833333333	Brazil	Fazenda Arataú	Human observation	2020	CPB

Chiropotes satanas	-49.59610409	-3.750703034	Brazil	Terra Indígena Parakanã	Human observation	2020	CPB
Chiropotes satanas	-47.58333333	-2.916666667	Brazil	Fazenda Vitória	Human observation	2020	CPB
Chiropotes satanas	-48.95305556	-2.947222222	Brazil	Tailândia	Citation	2020	CPB
Chiropotes satanas	-47.77111111	-1.674166667	Brazil	São Domingos do Capim	Citation	2020	CPB
Chiropotes satanas	-47.43805556	-1.771111111	Brazil	Irituia	Citation	2020	CPB
Chiropotes satanas	-46.7256279	-3.789923191	Brazil	Gurupí	Citation	2020	CPB
Chiropotes satanas	-49.79638889	-4.330555556	Brazil	Novo Repartimento	Citation	2020	CPB
Chiropotes satanas	-46.5	-4.6	Brazil	Fazenda MAPISA	Human observation	2020	CPB
Chiropotes satanas	-48.83333333	-2.5	Brazil	CRAI-dendê	Human observation	2020	CPB
Chiropotes satanas	-47.78333333	-2.55	Brazil	Fazenda Badajós	Human observation	2020	CPB
Chiropotes satanas	-47.33333333	-2.516666667	Brazil	Fazenda São Marcos	Human observation	2020	CPB
Chiropotes satanas	-47	-1.866666667	Brazil	Fazenda São sebastião	Human observation	2020	CPB
Chiropotes satanas	-46.75	-3.416666667	Brazil	Unknown	Human observation	2020	CPB
Chiropotes satanas	-47.31666667	-1.183333333	Brazil	Fazenda Monte Verde	Extinct	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Unknown	Human observation	2020	CPB

Chiropotes satanas	-47.87030077	5.577718274	Brazil	Reserva de Celmar S. A. (Indústria de Celulose e Papel)		Human observation	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Reserva de Celmar S. A. (Indústria de Celulose e Papel)		Human observation	2020	CPB
Chiropotes satanas	-49.6725	-3.766111111	Brazil	Reservatório da UHE de Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.68311648	-3.764714615	Brazil	Reservatório da UHE de Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.51666667	-4.25	Brazil	Reservatório da hidrelétrica Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.51666667	-4.25	Brazil	Reservatório da hidrelétrica Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.51666667	-4.25	Brazil	Reservatório da hidrelétrica Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.2	-3.716666667	Brazil	Reservatório da Usina Hidrelétrica de Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-50	-5.25	Brazil	Reservatório da Usina Hidrelétrica de Tucuruí		Human observation	2020	CPB
Chiropotes satanas	-49.68333333	-3.75	Brazil	Ilha de João do Bô - P1		Human observation	2020	CPB
Chiropotes satanas	-49.68333333	-3.75	Brazil	Base 4 ê P2		Human observation	2020	CPB
Chiropotes satanas	-45.65833333	-3.963333333	Brazil	Unknown		Interview	2020	CPB
Chiropotes satanas	-46.13861111	-5.819444444	Brazil	Unknown		Interview	2020	CPB
Chiropotes satanas	-45.24333333	-5.505555556	Brazil	Unknown		Interview	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Aldeia do Ponto		Interview	2020	CPB

Chiropotes satanas	-45.59400558	-6.123584747	Brazil	Área indígena Porquinhos	Interview	2020	CPB
Chiropotes satanas	-45.11666667	-4.55	Brazil	Unknown	Interview	2020	CPB
Chiropotes satanas	-44.35861111	-3.3925	Brazil	Unknown	Interview	2020	CPB
Chiropotes satanas	-45.56532255	2.716766923	Brazil	Pirocaúna	Interview	2020	CPB
Chiropotes satanas	-46.02	-1.195	Brazil	Fazenda Santa Bárbara	Interview	2020	CPB
Chiropotes satanas	-45.56532255	2.716766923	Brazil	Aldeia Urutawí-Rendá	Interview	2020	CPB
Chiropotes satanas	-46.40111111	-4.345833333	Brazil	Unknown	Interview	2020	CPB
Chiropotes satanas	-45.56532255	2.716766923	Brazil	Aldeia Gurupiúna	Interview	2020	CPB
Chiropotes satanas	-45.31472222	-3.731111111	Brazil	Praia do açúcar	Interview	2020	CPB
Chiropotes satanas	-45.56532255	2.716766923	Brazil	Reserva Indígena Pindaré	Interview	2020	CPB
Chiropotes satanas	-46.13861111	-5.819444444	Brazil	Arame	Interview	2020	CPB
Chiropotes satanas	-47.54583333	-6.6125	Brazil	Unknown	Interview	2020	CPB
Chiropotes satanas	-50.71222222	-1.804444444	Brazil	Reserva Indígena Alto Guamá	Interview	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Alto do Pão de Açúcar	Interview	2020	CPB

Chiropotes satanas	-44.30277778	-2.529722222	Brazil	São Luís	Interview	2020	CPB	
Chiropotes satanas	-45.56532255	2.716766923	Brazil	Margem esquerda do rio Tocantins	Biological material	2020	CPB	
Chiropotes satanas	-49.59954387	-3.747719372	Brazil	Margem oriental do reservatório de hidrelétrica de Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-49.51666667	-4.25	Brazil	Reserva Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-49.51666667	-4.25	Brazil	Reserva Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-49.6725	-3.766111111	Brazil	Reservatório de hidrelétrica de Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-49.6725	-3.766111111	Brazil	Reservatório de Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-48.13333333	-5	Brazil	Martirinho	Human observation	2020	CPB	
Chiropotes satanas	-48.28333333	-5.15	Brazil	Primavera	Human observation	2020	CPB	
Chiropotes satanas	-48.2	-5	Brazil	Coração do Brasil	Human observation	2020	CPB	
Chiropotes satanas	-48.25	-5.083333333	Brazil	Santa Rosa	Human observation	2020	CPB	
Chiropotes satanas	-48.13333333	-4.966666667	Brazil	Esplanada	Human observation	2020	CPB	
Chiropotes satanas	-49.51666667	-4.25	Brazil	Usina Hidroelétrica de Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-49.51666667	-4.25	Brazil	Usina Hidroelétrica de Tucuruí	Human observation	2020	CPB	
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Fazenda Monte Verde	Human observation	2020	CPB	

Chiropotes satanas	-47.87030077	5.577718274	Brazil	Fazenda Aratau	Human observation	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Fazenda São Marcos	Human observation	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Real Agropecuária S.A.	Human observation	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Fazenda Badajós	Human observation	2020	CPB
Chiropotes satanas	-51.46666667	-1.7	Brazil	Estação Científica Ferreira Penna (ECFPn)	Human observation	2020	CPB
Chiropotes satanas	-46.7256279	-3.789923191	Brazil	Unknown	Human observation	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Território Paracanã	Human observation	2020	CPB
Chiropotes satanas	-49	-3.716666667	Brazil	Reservatório da Usina Hidrelétrica (UHE) de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-50	-5.25	Brazil	Reservatório da Usina Hidrelétrica (UHE) de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-49.2	-3.716666667	Brazil	Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-50	-5.25	Brazil	Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-49.2	-3.716666667	Brazil	Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-50	-5.25	Brazil	Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-49.59954387	-3.747719372	Brazil	Reservatório da Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-49.50666667	-4.273611111	Brazil	Reservatório da Usina Hidrelétrica de Tucuruí	Human observation	2020	CPB
Chiropotes satanas	-45.65833333	-3.963333333	Brazil	Santa Luzia	Collections	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Ponto de João Chavez, Rio Tocantins	Collections	2020	CPB

Chiropotes satanas	-49.49583333	-2.244444444	Brazil	Cametá, banco R do Rio Tocantins	Collections	2020	CPB
Chiropotes satanas	-48.66666667	-5	Brazil	Estrada Belem-Maraba	Collections	2020	CPB
Chiropotes satanas	-48.48333333	-1.45	Brazil	Unknown	Collections	2020	CPB
Chiropotes satanas	-48.48333333	-1.45	Brazil	Unknown	Collections	2020	CPB
Chiropotes satanas	-48.42707564	-1.666666667	Brazil	Rio Aracá	Collections	2020	CPB
Chiropotes satanas	-48.25	-1.366666667	Brazil	Unknown	Collections	2020	CPB
Chiropotes satanas	-47.91666667	-1.3	Brazil	Unknown	Collections	2020	CPB
Chiropotes satanas	-47.81666667	-1.183333333	Brazil	Sítio Leucas , Anhanga	Collections	2020	CPB
Chiropotes satanas	-47.33333333	-1.033333333	Brazil	Unknown	Collections	2020	CPB
Chiropotes satanas	-47.4	-1.2	Brazil	Fazenda São Francisco de Trombetas	Collections	2020	CPB
Chiropotes satanas	-47.78333333	-1.683333333	Brazil	Capim, Km 93, BR 14, Bele-Brasilia.	Collections	2020	CPB
Chiropotes satanas	-47.75	-3	Brazil	Putiripa (ou Puritira ou Putirita)	Collections	2020	CPB
Chiropotes satanas	-48.30166667	-1.482222222	Brazil	Bacia do Rio Capim	Collections	2020	CPB
Chiropotes satanas	-47.1	-1.55	Brazil	Ourém	Collections	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Km 97, Rodovia BR- 14 Capim	Collections	2020	CPB
Chiropotes satanas	-47.87030077	5.577718274	Brazil	Km 107, Belem-Brasilia	Collections	2020	CPB

Chiropotes satanas	-47.87030077	5.577718274	Brazil	Vila Araui	Collections	2020	CPB
Chiropotes satanas	-47.0525	-1.934166667	Brazil	Igarapé Pedral, Rio Guama . M. Moreira	Collections	2020	CPB
Chiropotes satanas	-47.05	-1.533333333	Brazil	Igarapé Açu (ou Assu)	Collections	2020	CPB
Chiropotes satanas	-47.16666667	-4	Brazil	Km 307, Belém-Brasília	Collections	2020	CPB
Chiropotes satanas	-47.5	-4.416666667	Brazil	Itinga	Collections	2020	CPB
Chiropotes satanas	-46	-1.25	Brazil	Pirocaua	Collections	2020	CPB
Chiropotes satanas	-48.666667	-5	Brazil	Paragominas, ca.	Preserved specimen	1970	Hershkovitz, P. (1985)
Chiropotes satanas	-48.483333	-1.45	Brazil	Para, old name of Belem (q.v.). Belem	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes satanas	-40.416667	-1.666667	Brazil	Acara, Rio	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes satanas	-48.25	-1.366667	Brazil	Benevides	Preserved specimen	1911	Hershkovitz, P. (1985)
Chiropotes satanas	-47.916667	-1.3	Brazil	Castanhal	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes satanas	-47.333333	-1.033333	Brazil	Nova Timboteua	Preserved specimen	1948	Hershkovitz, P. (1985)
Chiropotes satanas	-47.4	-1.2	Brazil	São Francisco de Trombetas (Fazenda)	Preserved specimen	1948	Hershkovitz, P. (1985)
Chiropotes satanas	-47.783333	-1.683333	Brazil	Capim	Preserved specimen	1959	Hershkovitz, P. (1985)
Chiropotes satanas	-47.75	-3	Brazil	Putiripa (or Puritira or Putirita), Rio Campin basin	Preserved specimen	1981	Hershkovitz, P. (1985)
Chiropotes satanas	-47.05	-1.533333	Brazil	Acu (or Assu), Igarape	Preserved specimen	1904	Hershkovitz, P. (1985)
Chiropotes satanas	-47.166667	-4	Brazil	Km 307, Belem-Brasilia	Preserved specimen	1960	Hershkovitz, P. (1985)
Chiropotes satanas	-47.5	-4.416667	Brazil	Itinga	Human Observation	1979	Hershkovitz, P. (1985)
Chiropotes satanas	-46	-1.25	Brazil	Pirocaua, ca.	Preserved specimen	1909	Hershkovitz, P. (1985)
Chiropotes satanas	-51.216667	0.066667	Brazil	Vila Nova, Rio, Mazagao	Preserved specimen	1930	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.6959	1.285419	Brazil	Estação Ecológica (ESEC) Grão-Pará North, municipality of Oriximiná	Human observation	2016	Rossi, R. V., Miranda, C. L., & Semedo, T. B. F. (2017)
Chiropotes sagulatus	-55.7285	0.630281	Brazil	Estação Ecológica (ESEC) Grão-Pará Center, municipality of Óbidos	Human observation	2016	Rossi, R. V., Miranda, C. L., & Semedo, T. B. F. (2017)
Chiropotes sagulatus	-55.5223	0.962769	Brazil	Floresta Estadual (FLOTA) Trombetas, near the Curuá	Human observation	2016	Rossi, R. V., Miranda, C. L., & Semedo, T. B. F. (2017)
Chiropotes sagulatus	-57.2133	1.714011	Brazil	Floresta Estadual (FLOTA) Faro, right margin of the Nhamundá River, municipality of Faro	Human observation	2016	Rossi, R. V., Miranda, C. L., & Semedo, T. B. F. (2017)
Chiropotes sagulatus	-57.2	-1	Brazil	Oriximiná, Cachoeira Porteira	Preserved specimen	1976	GBIF.org (28 September 2022)
Chiropotes sagulatus	-57.2	-1	Brazil	Oriximiná, Cachoeira Porteira	Preserved specimen	1976	GBIF.org (28 September 2022)

Chiropotes sagulatus	-56.8009	-1.4822	Brazil	Brasil, PA: Rio Trombetas, margem direita próximo à comunidade de Mãe-Cué, FLONA Saracá-Taquera	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-56.7174	-1.4234	Brazil	Brasil, PA: Rio Trombetas, margem direita próximo à comunidade de Mãe-Cué, FLONA Saracá-Taquera	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-56.8009	-1.4822	Brazil	Brasil, PA: Rio Trombetas, margem esquerda próximo à comunidade de Mãe-Cué, REBIO Trombetas	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-56.7174	-1.4234	Brazil	Brasil, PA: Rio Trombetas, margem esquerda próximo à comunidade de Mãe-Cué, REBIO Trombetas	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-56.8009	-1.4822	Brazil	Brasil, PA: Rio Trombetas, margem direita próximo à comunidade de Mãe-Cué, FLONA Saracá-Taquera	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-56.7595	-1.4037	Brazil	Brasil, PA: Rio Trombetas, margem esquerda próximo à comunidade de Mãe-Cué, REBIO Trombetas	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes sagulatus	-61.2610488	1.782059764	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-61.2610488	1.782059764	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-61.25448846	-2.45272324	Brazil	reserva indigena Waimiri Atroari	Interview	Unknown	CPB
Chiropotes sagulatus	-61.5	-2.5	Brazil	reserva indigena Waimiri Atroari	Interview	Unknown	CPB
Chiropotes sagulatus	-59.98333333	-2.916666667	Brazil	Reserva Florestal Adolfo Ducke	Human observation	Unknown	CPB
Chiropotes sagulatus	-59.98333333	-3.016666667	Brazil	Reserva Florestal Adolfo Ducke	Human observation	Unknown	CPB
Chiropotes sagulatus	-56	-1.666666667	Brazil	Porto de Trombetas	Human observation	Unknown	CPB
Chiropotes sagulatus	-55.26666667	2.3	Brazil	Tiriós ou Triós, aldea, alto Rio Paru	Collection	Unknown	CPB
Chiropotes sagulatus	-52.49222222	1.595833333	Brazil	Área situada na confluência dos rios Amapari e Anacuí	Citation	Unknown	CPB
Chiropotes sagulatus	-60	2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB

Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60	-2.05	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60.00406074	-2.589884436	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60.00406074	-2.589884436	Brazil	Projeto Dinâmica Biológica de Fragmentos Florestais	Human observation	Unknown	CPB
Chiropotes sagulatus	-60.025	-3.101944444	Brazil	Unknown	Citation	Unknown	CPB
Chiropotes sagulatus	-60.025	-3.101944444	Brazil	Unknown	Citation	Unknown	CPB
Chiropotes sagulatus	-60.18611111	-3.284722222	Brazil	Reserva 1501 (INPA -- Instituto Nacional de Pesquisa da Amazônia/World Wildlife Fund -- U.S.)	Human observation	Unknown	CPB
Chiropotes sagulatus	-59.86560726	-2.917021	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-56.71305556	-2.186111111	Brazil	Castanhal Faro	Collection	Unknown	CPB
Chiropotes sagulatus	-59.46528397	-2.805841961	Brazil	Km 46, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59.20517719	-2.868100254	Brazil	Km 48, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59.42755117	-2.840782322	Brazil	Estrada Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-57.7126441	-1.356586623	Brazil	Rio Paratucu	Collection	Unknown	CPB
Chiropotes sagulatus	-56.745	-2.171388889	Brazil	Faro San José	Collection	Unknown	CPB
Chiropotes sagulatus	-56.745	-2.171388889	Brazil	Faro	Collection	Unknown	CPB
Chiropotes sagulatus	-60.33333333	-2.166666667	Brazil	Fazenda Dimona, Km 74, BR- 174	Collection	Unknown	CPB

Chiropotes sagulatus	-60.33333333	-2.416666667	Brazil	Reserva do INPA, Km 45, BR-1 74	Collection	Unknown	CPB
Chiropotes sagulatus	-60.025	-3.101944444	Brazil	Igarapé Passarinho	Collection	Unknown	CPB
Chiropotes sagulatus	-60	-3.133333333	Brazil	Unknown	Collection	Unknown	CPB
Chiropotes sagulatus	-60.30452813	-3.070547895	Brazil	Rio Negro	Collection	Unknown	CPB
Chiropotes sagulatus	-52.7890892	-1.069257617	Brazil	Cararaucu, Rio Amazonas	Collection	Unknown	CPB
Chiropotes sagulatus	-60.025	-3.101944444	Brazil	Suframa, Rio Cuieiras	Collection	Unknown	CPB
Chiropotes sagulatus	-59.21666667	-3	Brazil	Praia do Cachorro, Rio Urubu	Collection	Unknown	CPB
Chiropotes sagulatus	-59.21666667	-3.05	Brazil	Km 134, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59	-3.016666667	Brazil	Km 165, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-58.96666667	-3	Brazil	Km 170. Manaus Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59.29115365	-2.943303119	Brazil	Km 175. Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59.25850511	-2.947767706	Brazil	Km 190, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-59.19968559	-2.940208122	Brazil	Km 200, Manaus-Itacoatiara	Collection	Unknown	CPB
Chiropotes sagulatus	-58.5	-3.083333333	Brazil	Lago do Serpa	Collection	Unknown	CPB
Chiropotes sagulatus	-58.55	-2.916666667	Brazil	Igarapé Aniba, Rio Amazonas	Collection	Unknown	CPB
Chiropotes sagulatus	-58.41666667	-2.916666667	Brazil	Boca do Rio Urubu	Collection	Unknown	CPB
Chiropotes sagulatus	-58.45	-2.9	Brazil	Silves, Rio Amazonas	Collection	Unknown	CPB

Chiropotes sagulatus	-58.23333333	-2.783333333	Brazil	Rio Itabani, Rio Amazonas	Collection	Unknown	CPB
Chiropotes sagulatus	-59.66666667	-2	Brazil	Fazenda Esteio, Km 23, ZF-3,	Collection	Unknown	CPB
Chiropotes sagulatus	-56.73333333	-1.366666667	Brazil	Rio Nhamundá, Primeira Cachoeira	Collection	Unknown	CPB
Chiropotes sagulatus	-56.73333333	-2.183333333	Brazil	Faro, Rio Amazonas	Collection	Unknown	CPB
Chiropotes sagulatus	-57.03333333	-1.083333333	Brazil	Cachoeira da Porteira, banco L do Rio Trombetas	Collection	Unknown	CPB
Chiropotes sagulatus	-56.03333333	-1.066666667	Brazil	Cachoeira do Tronco, Rio Erepecuru	Collection	Unknown	CPB
Chiropotes sagulatus	-54.88333333	-1.883333333	Brazil	Lago Cuiperia, Rio Amazonas	Collection	Unknown	CPB
Chiropotes sagulatus	-52	-1.166666667	Brazil	Rio Jari	Collection	Unknown	CPB
Chiropotes sagulatus	-51.21666667	-0.06666666667	Brazil	Rio Vila Nova, Mazagão	Collection	Unknown	CPB
Chiropotes sagulatus	-51.26080406	3.283181811	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-56.77624505	-1.228707364	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-50.3248885	1.546457187	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-60.84266543	-2.222028298	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-53.11607142	-0.4779311954	Brazil	Unknown	Human observation	Unknown	CPB
Chiropotes sagulatus	-59.47833333	-1.899166667	Brazil	Unknown	Human observation	Unknown	CPB

Chiropotes sagulatus	-61.08782072	1.290375976	Brazil	Parque Nacional do Viruá	Unknown	Unknown	CPB
Chiropotes sagulatus	-58.566667	6.016667	Brazil	Moraballi Reserve, Essequibo River	Preserved specimen	1975	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.2	1.783333	Brazil	Amuku Creek, New River	Preserved specimen	1964	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.033333	5.75	Brazil	Seba, Demerara River	Preserved specimen	1952	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.8	5.95	Brazil	Tauraculli, Abary River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.8	5.7	Brazil	Wiruni River	Preserved specimen	1975	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.75	5.416667	Brazil	Wikki River, Berbice River	Preserved specimen	1975	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.1	5.95	Brazil	Kaboeri Creek, Corantijn River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.483333	5.15	Brazil	Stondansi Falls, Nickerie River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.866667	4.866667	Brazil	Lonbock Falls, Nickerie River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.966667	4.9	Brazil	Paris Jacob Creek, Nickerie River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.633333	3.583333	Brazil	Lucie River, Corantijn River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.75	3.433333	Brazil	West River, Wilhelmina Mts.	Preserved specimen	1961	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.016667	3.166667	Brazil	Kaiserberg Airstrip	Preserved specimen	1960	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56	2.083333	Brazil	Sipaliwini Airstrip, Sipaliwini River	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-55.466667	5.166667	Brazil	Loksie Hattie, Saramacca River	Preserved specimen	1962	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.166667	4.683333	Brazil	Voltzberg	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-54.616667	4.75	Brazil	Nassau Mts.	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-55.516667	3.316667	Brazil	Palomeu Camp, Tapahoni River	Preserved specimen	1961	Hershkovitz, P. (1985)
Chiropotes sagulatus	-51.816667	3.85	Brazil	Oyapock (= St. George)	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-67.6	5.583333	Brazil	Atures	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-67.75	5.1	Brazil	Morganito, 70 km SSW Puerto Ayacucho	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-66.216667	5.3	Brazil	San Juan, Rio Manapiare	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.766667	3.65	Brazil	Belen, Rio Cunucunuma	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.666667	3.416667	Brazil	Duida, Mt. or Cerro Duida	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.55	3.2	Brazil	Foothills Camp, Mt. Duida	Preserved specimen	1928	Hershkovitz, P. (1985)
Chiropotes sagulatus	-66	3.016667	Brazil	Cunucunuma (Rio), mouth	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-67.7	4.05	Brazil	San Fernando de Atabapo, Rio Orinoco	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.816667	3.166667	Brazil	Tamatama, Rio Orinoco	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.466667	3.05	Brazil	Cauirima, Carlo, Rio Orinoco	Preserved specimen	1966	Hershkovitz, P. (1985)
Chiropotes sagulatus	-65.216667	2.5	Brazil	Mavaca (Rio), mouth	Preserved specimen	1966	Hershkovitz, P. (1985)

Chiropotes sagulatus	-65.283333	2.25	Brazil	Mavaca, Rio	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-62.25	1.5	Brazil	Boa Vista, lower Rio Mucajai (q.v.).	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-61.133333	1.833333	Brazil	Caracarai	Preserved specimen	1959	Hershkovitz, P. (1985)
Chiropotes sagulatus	-60.333333	2.166667	Brazil	Dimona, Fazenda, Km 74, BR- 174	Preserved specimen	1981	Hershkovitz, P. (1985)
Chiropotes sagulatus	-60.333333	2.416667	Brazil	INPA, Reserva do, Km 45, BR-1 74	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-60	3.133333	Brazil	Manaus	Preserved specimen	1928	Hershkovitz, P. (1985)
Chiropotes sagulatus	-59.216667	3	Brazil	Praia do Cachorro, Rio Urubu	Preserved specimen	1956	Hershkovitz, P. (1985)
Chiropotes sagulatus	-59.216667	3.05	Brazil	Km 134, Manaus-Itacoatiara	Preserved specimen	1966	Hershkovitz, P. (1985)
Chiropotes sagulatus	-59	3.016667	Brazil	Km 1 65, Manaus-Itacoatiara	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.966667	3	Brazil	Km 170. Manaus-Itacoatiara	Preserved specimen	1967	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.933333	3	Brazil	Km 175. Manaus-Itacoatiara	Preserved specimen	1965	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.866667	2.966667	Brazil	Km 190, Manaus-Itacoatiara	Preserved specimen	1965	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.816667	2.966667	Brazil	Km 200, Manaus-Itacoatiara	Preserved specimen	1965	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.5	3.083333	Brazil	Serpa, Lago do	Preserved specimen	1936	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.55	2.916667	Brazil	Igarapé Aniba, Rio Amazonas	Preserved specimen	1937	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.416667	-2.916667	Brazil	Urubu, Rio (mouth)	Preserved specimen	1937	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.45	-2.9	Brazil	Silves, Rio Amazonas	Preserved specimen	1937	Hershkovitz, P. (1985)
Chiropotes sagulatus	-58.233333	-2.783333	Brazil	Itabani, Rio, Rio Amazonas	Preserved specimen	1937	Hershkovitz, P. (1985)
Chiropotes sagulatus	-59.666667	-2	Brazil	Esteio, Fazenda, Km 23, ZF-3	Preserved specimen	1981	Hershkovitz, P. (1985)
Chiropotes sagulatus	-63.033333	-7.516667	Brazil	Humaita, Rio Madeira	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-60.4	-7.616667	Brazil	Castanho, Foz do	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes sagulatus	-59.25	-8.75	Brazil	Muriru (Mureru), Foz do Igarape, Rio Ari- puana	Human observation	1979	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.916667	-2.833333	Brazil	Lago Andira	Preserved specimen	1930	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.733333	-2.016667	Brazil	Faro, Rio Amazonas	Preserved specimen	1931	Hershkovitz, P. (1985)
Chiropotes sagulatus	-57.033333	-1.083333	Brazil	Cachoeira da Porteira, L bank, Rio Trombetas	Preserved specimen	1977	Hershkovitz, P. (1985)
Chiropotes sagulatus	-56.033333	-1.066667	Brazil	Cachoeira do Tronco, Rio Erepecuru	Preserved specimen	1937	Hershkovitz, P. (1985)
Chiropotes sagulatus	-54.883333	-1.883333	Brazil	Cuiperia, Lago, Rio Amazonas	Preserved specimen	1985	Hershkovitz, P. (1985)
Chiropotes isrealita	-65.77	3.65	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-66.18	5.35	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-65.15	-0.3426111111	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper

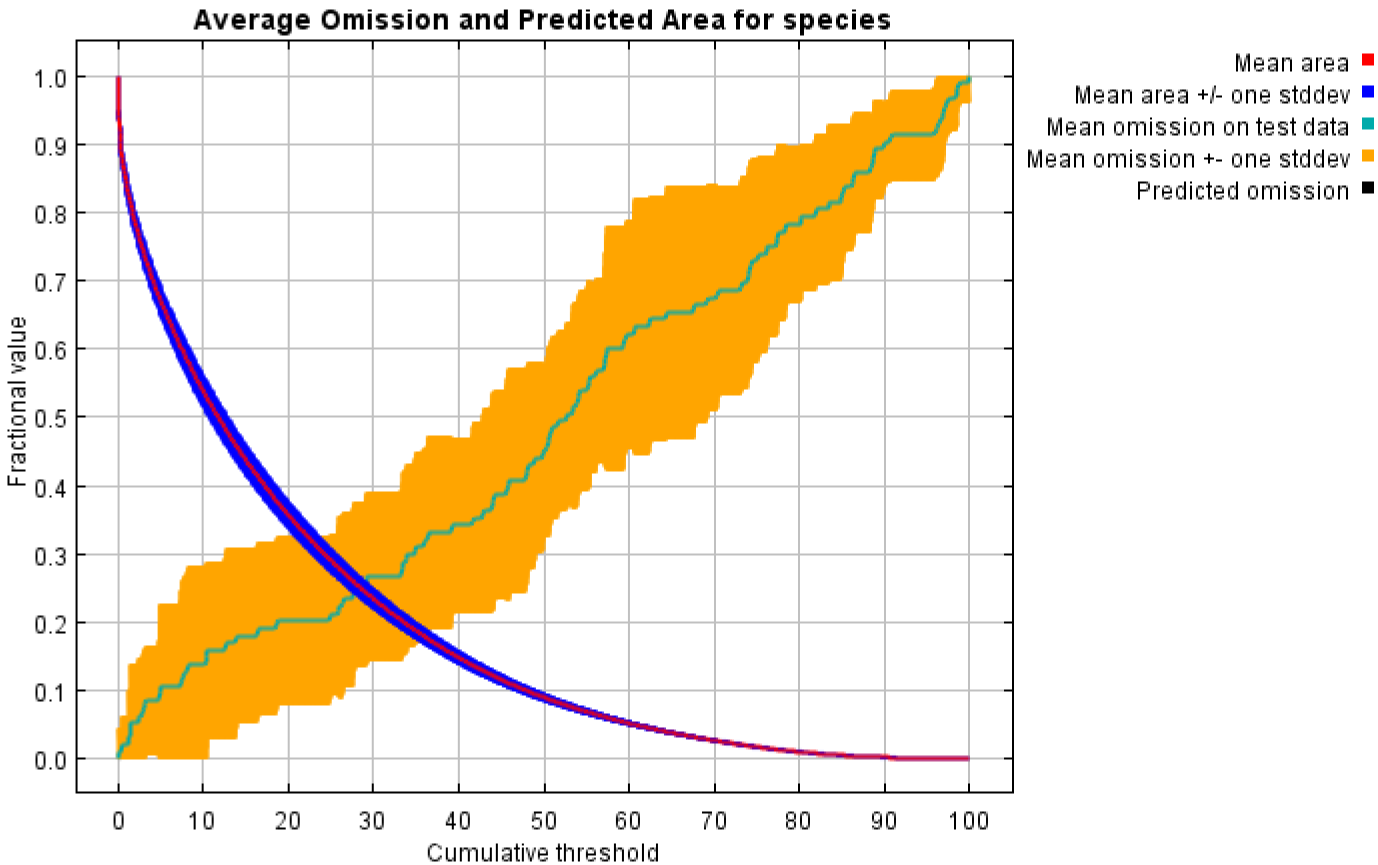
Chiropotes isrealita	-64.81083333	1.150277778	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-64.78977778	1.207	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-63.48136111	0.8523333333	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-63.48136111	0.8523333333	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-62.724	0.4523333333	Brazil	Unknown	Unknown	Unknown	Planiha Por Genera Paper
Chiropotes isrealita	-65.15	-0.3426111111	Brazil	Sitio Ze Maria, Rio Marauia, Amazonas Brazil	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-64.81083333	1.150277778	Brazil	Marari, Am, Brazil	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-64.78977778	1.207	Brazil	Marari, Am, Brazil	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-63.48138889	0.8522222222	Brazil	Pé da Serra do Aracá, acampamento Anta	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-63.48138889	0.8522222222	Brazil	Pé da Serra do Aracá, acampamento Anta	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-63.48136111	0.8523333333	Brazil	Ig Anta, Am, Brazil	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-63.48136111	0.8523333333	Brazil	Ig Anta, Am, Brazil	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-62.724	0.4523333333	Brazil	Rio Demeni, AM	Tissue sample	2021	Primatas NSF
Chiropotes isrealita	-64	-0.11	Brazil	Margem esquerda do Rio Padauarí, afluente da margem esquerda do Rio Negro	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes isrealita	-64.7898	1.207	Brazil	Marari, Am, Brazil	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes isrealita	-63.4814	0.8523	Brazil	Ig Anta, Am, Brazil	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes isrealita	-63.4814	0.8523	Brazil	Ig Anta, Am, Brazil	Tissue sample	2021	Salford Primate Tissue Samples

Chiropotes isrealita	-62.724	-0.4523	Brazil	Rio Demeni, AM	Tissue sample	2021	Salford Primate Tissue Samples
Chiropotes isrealita	-65.15	-0.3426	Brazil	Sitio Ze Maria, Rio Marauia, Amazonas Brazil	Tissue sample	2021	Salford Primate Tissue Samples

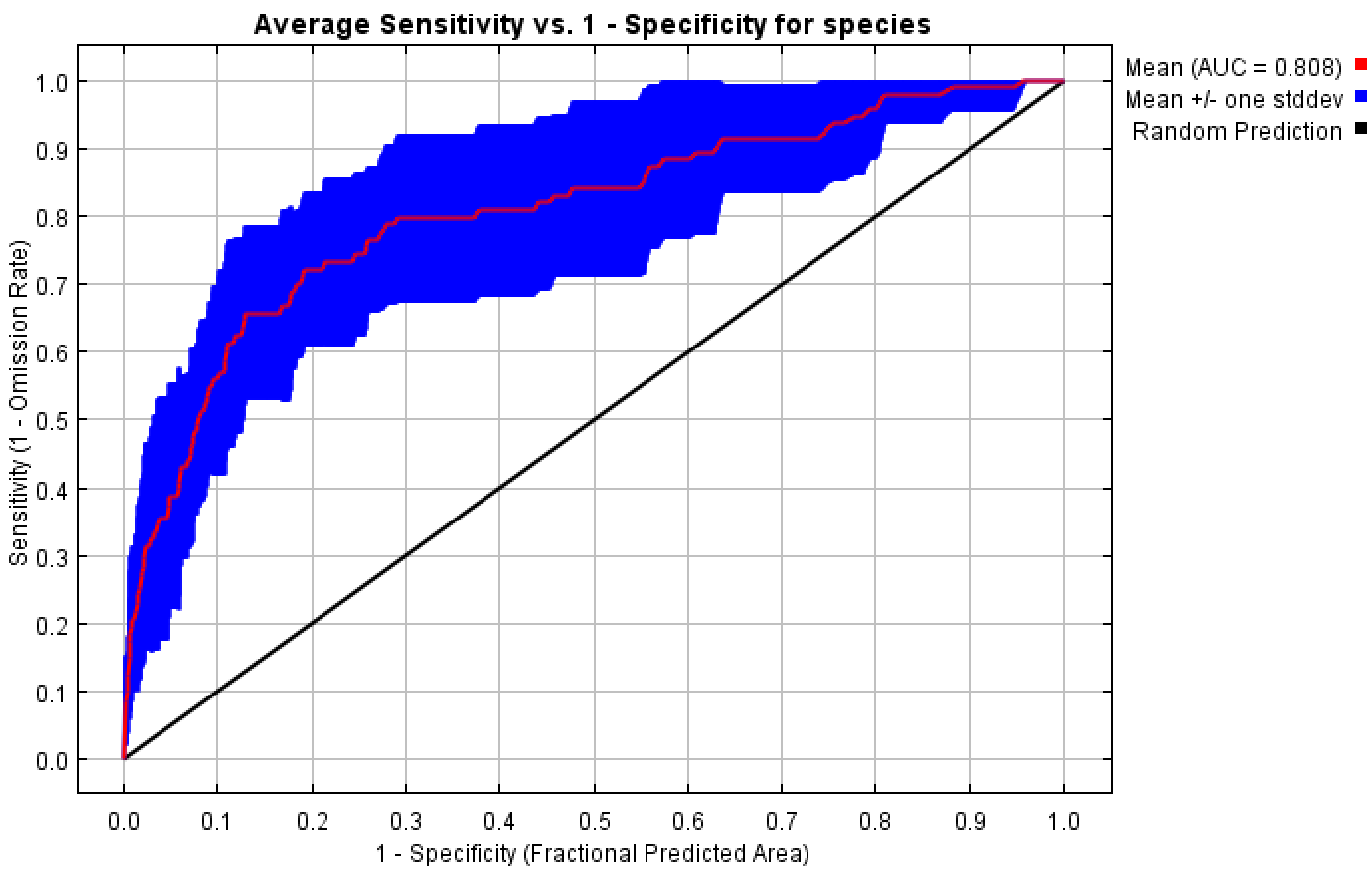
Supplementary Material Table 5: Estimates of the relative contributions to *Chiropotes albinasus* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	**Percent contribution**	**Permutation importance**
X2clipped_varswc2.1_30s_bio_2	40.9	3.7
X2clipped_varswc2.1_30s_bio_18	11.3	3.8
X2clipped_varswc2.1_30s_bio_9	9.6	30.9
X2clipped_varswc2.1_30s_bio_8	9.5	15.7
X2clipped_varswc2.1_30s_bio_19	7.4	10.7
X2clipped_varswc2.1_30s_bio_13	6.8	1.2
X2clipped_varswc2.1_30s_bio_12	6.1	8.1

X2clipped_varswc2.1_30s_bio_3	5.7	8.4
X2clipped_varswc2.1_30s_bio_14	2.7	17.5



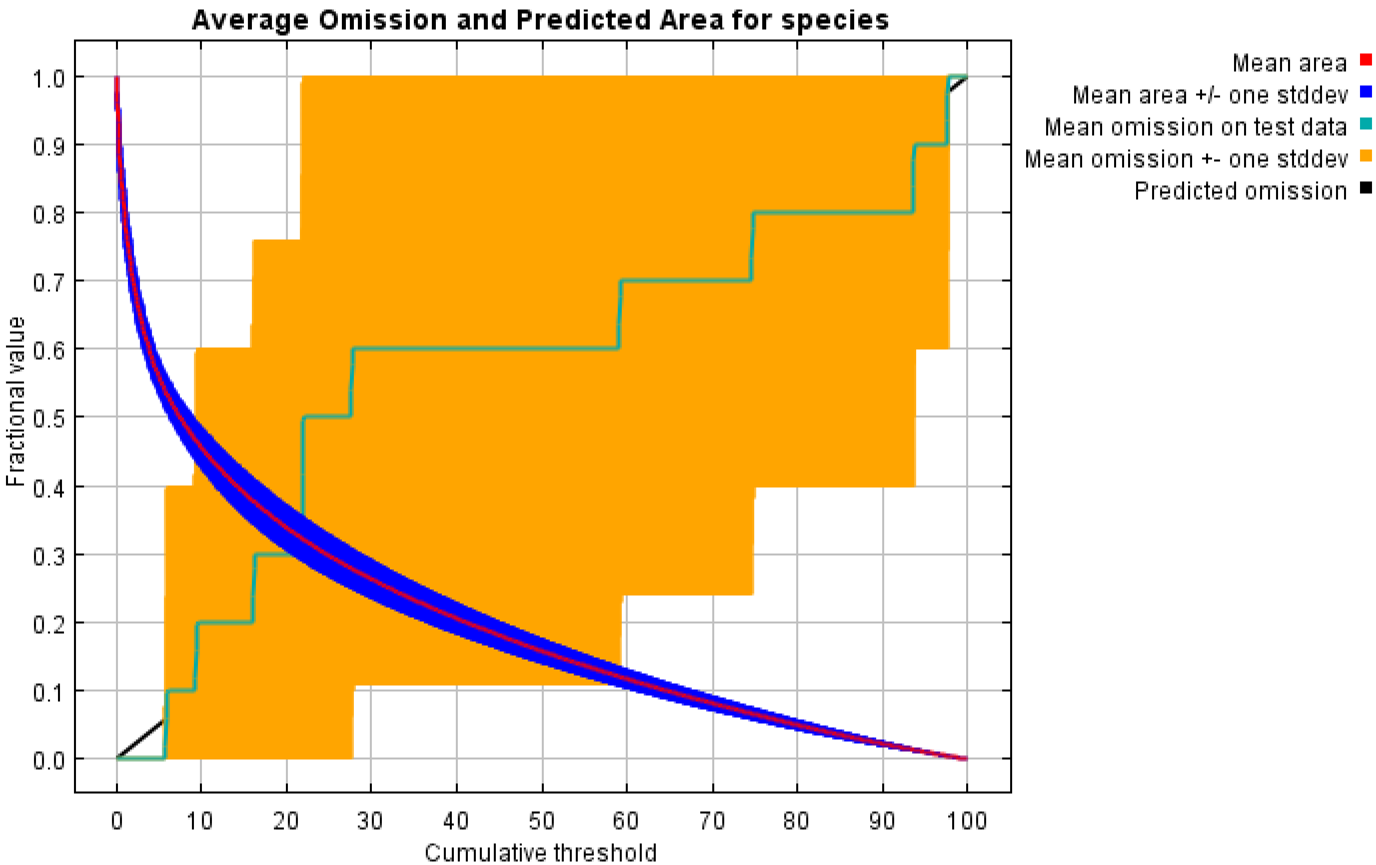
Supplementary Material Figure 3: Average omission rate and predicted area for *Chiropotes albinasus,* over replicate runs.



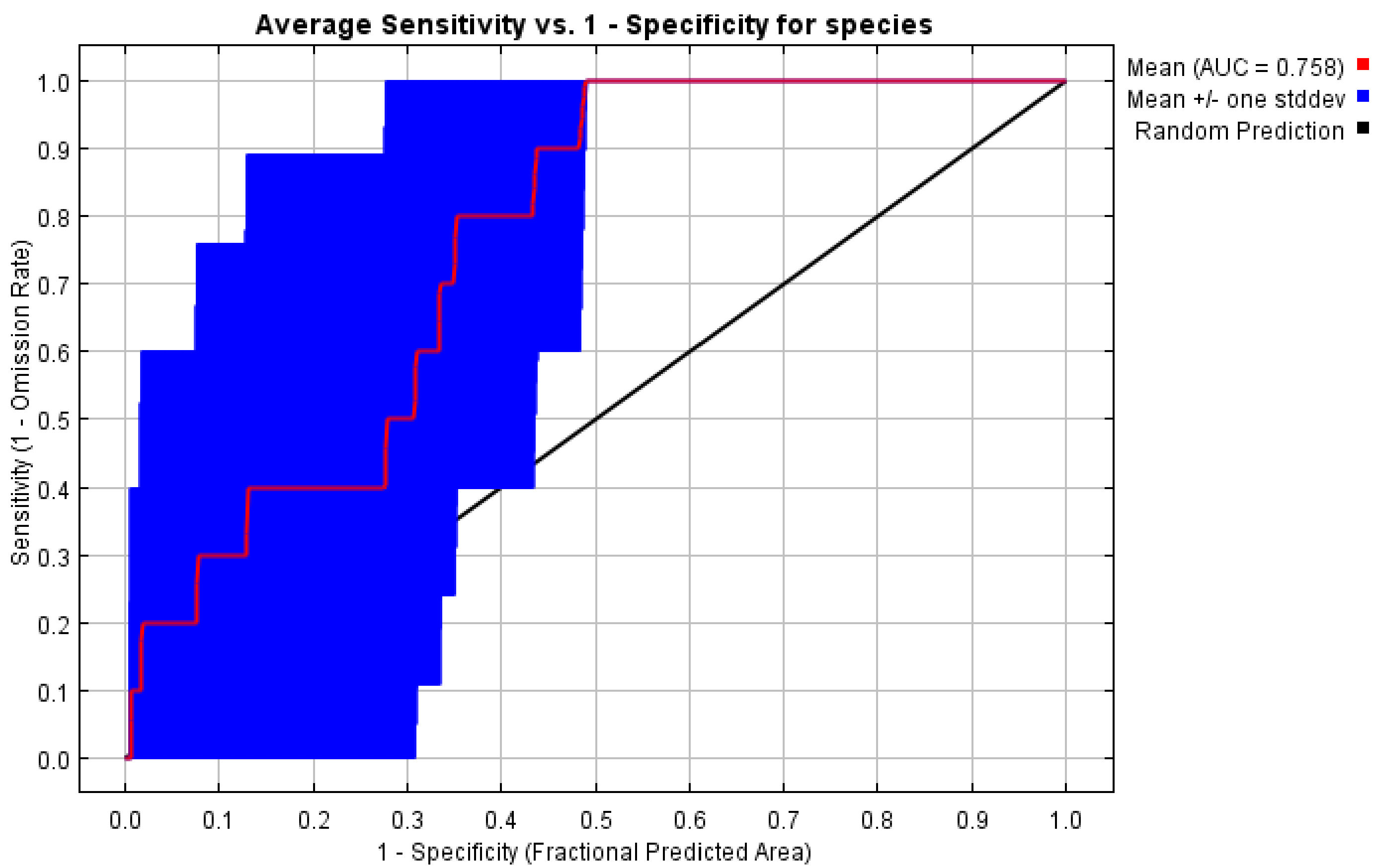
Supplementary Material Figure 4: Receiver operating characteristics (ROC) curve for *Chiropotes albinasus,* averaged over replicate runs.

Supplementary Material Table 6: Estimates of the relative contributions to *Chiropotes chiropotes* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	**Percent contribution**	**Permutation importance**
X2clipped_varswc2.1_30s_bio_19	69.4	82.2
X2clipped_varswc2.1_30s_bio_12	14.1	6.4
X2clipped_varswc2.1_30s_bio_14	8.5	1.1
X2clipped_varswc2.1_30s_bio_2	5.7	6.1
X2clipped_varswc2.1_30s_bio_15	1.8	3.6
X2clipped_varswc2.1_30s_bio_8	0.5	0.7
X2clipped_varswc2.1_30s_bio_18	0	0
X2clipped_varswc2.1_30s_bio_13	0	0
X2clipped_varswc2.1_30s_bio_3	0	0



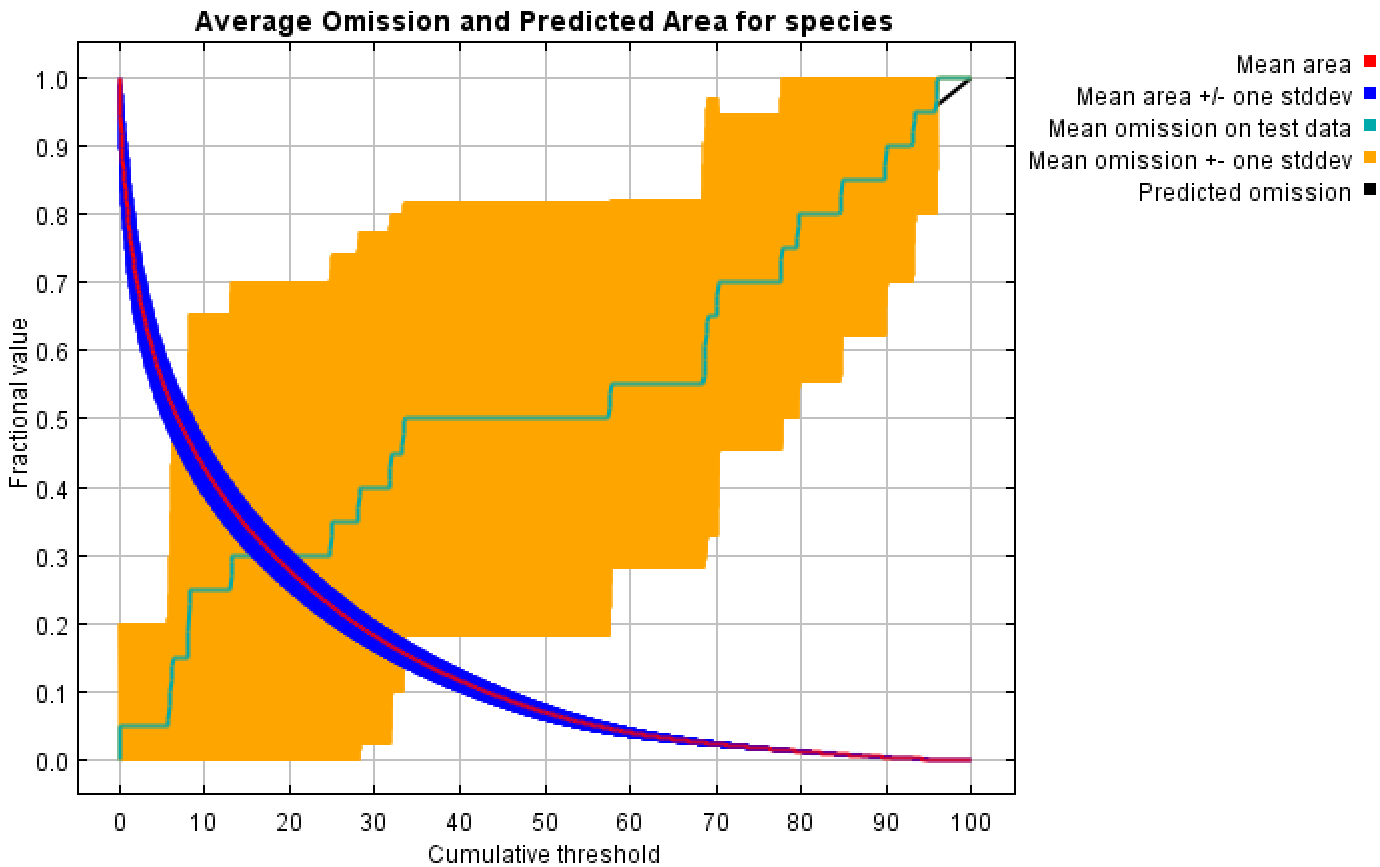
Supplementary Material Figure 5: Average omission rate and predicted area for *Chiropotes chiropotes,* over replicate runs.



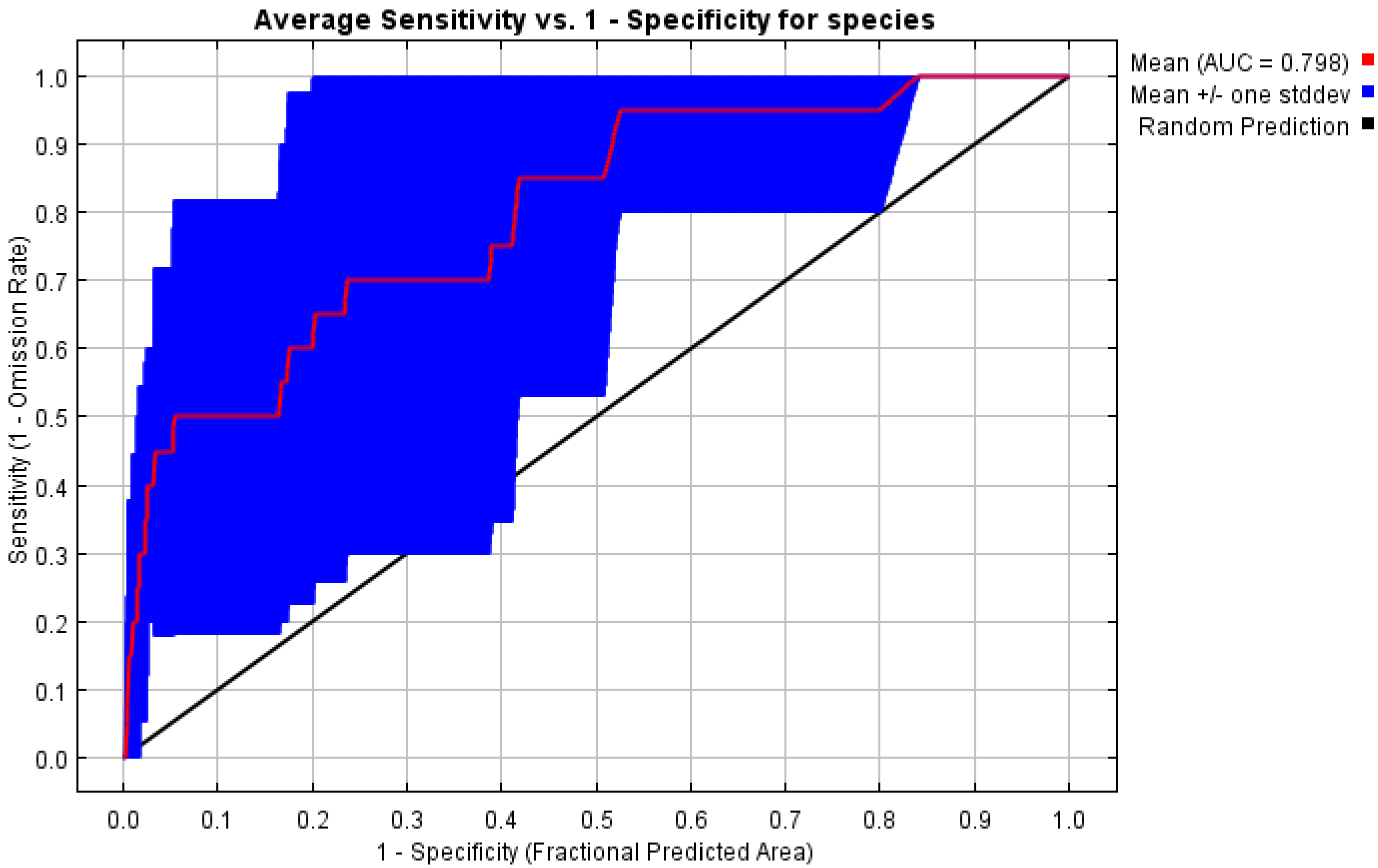
Supplementary Material Figure 6: Receiver operating characteristics (ROC) curve for *Chiropotes chiropotes,* averaged over replicate runs.

Supplementary Material Table 7: Estimates of the relative contributions to *Chiropotes utahickae* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	**Percent contribution**	**Permutation importance**
X2clipped_varswc2.1_30s_bio_3	38	16.3
X2clipped_varswc2.1_30s_bio_18	27.1	43.3
X2clipped_varswc2.1_30s_bio_15	20.3	19.9
X2clipped_varswc2.1_30s_bio_8	6.5	8.4
X2clipped_varswc2.1_30s_bio_19	5.8	8.7
X2clipped_varswc2.1_30s_bio_12	1.8	1.7
X2clipped_varswc2.1_30s_bio_2	0.5	1.3
X2clipped_varswc2.1_30s_bio_14	0.1	0.3
X2clipped_varswc2.1_30s_bio_13	0	0



Supplementary Material Figure 7: Average omission rate and predicted area for *Chiropotes utahickae,* over replicate runs.

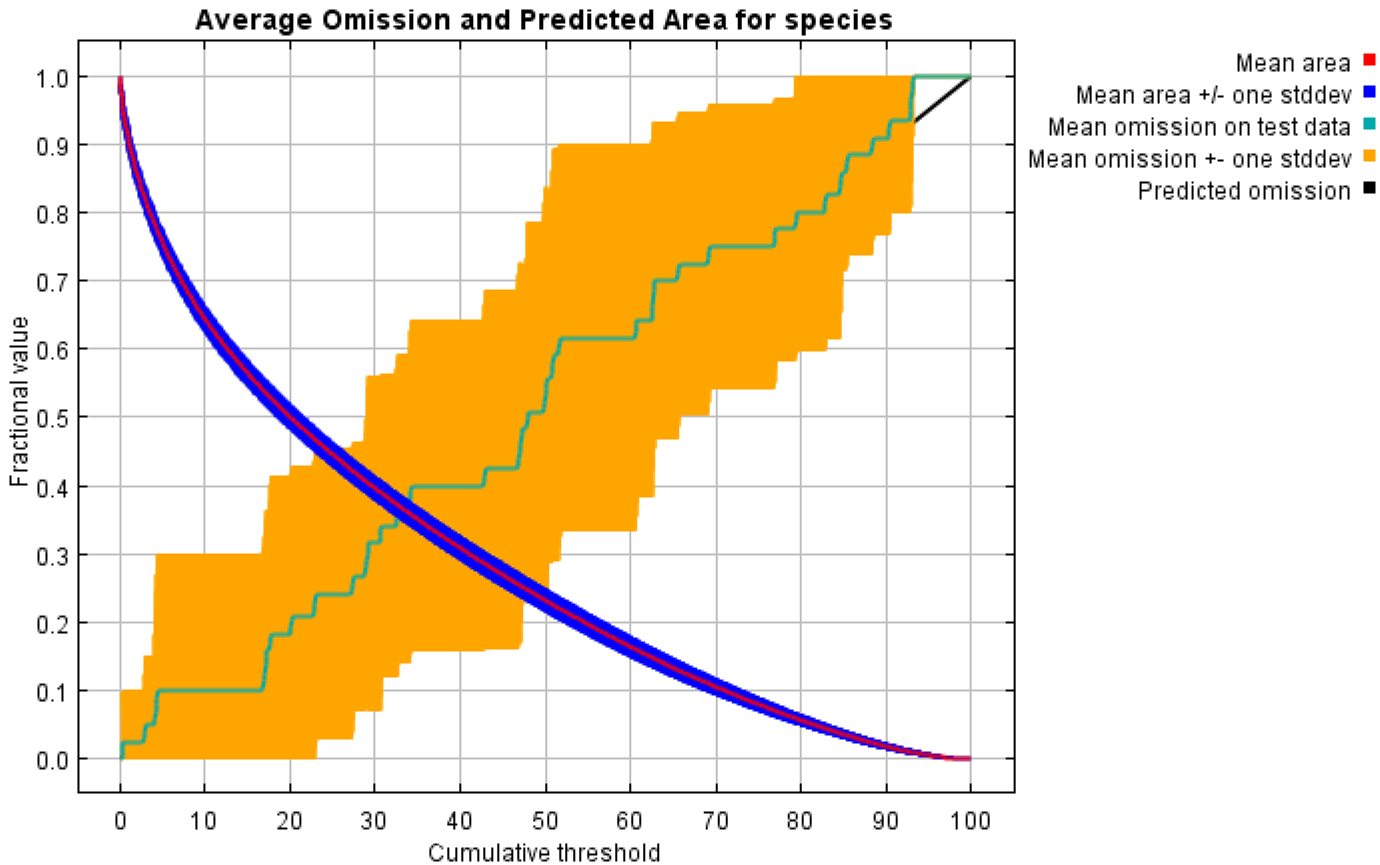


Supplementary Material Figure 8: Receiver operating characteristics (ROC) curve for *Chiropotes utahickae,* averaged over replicate runs.

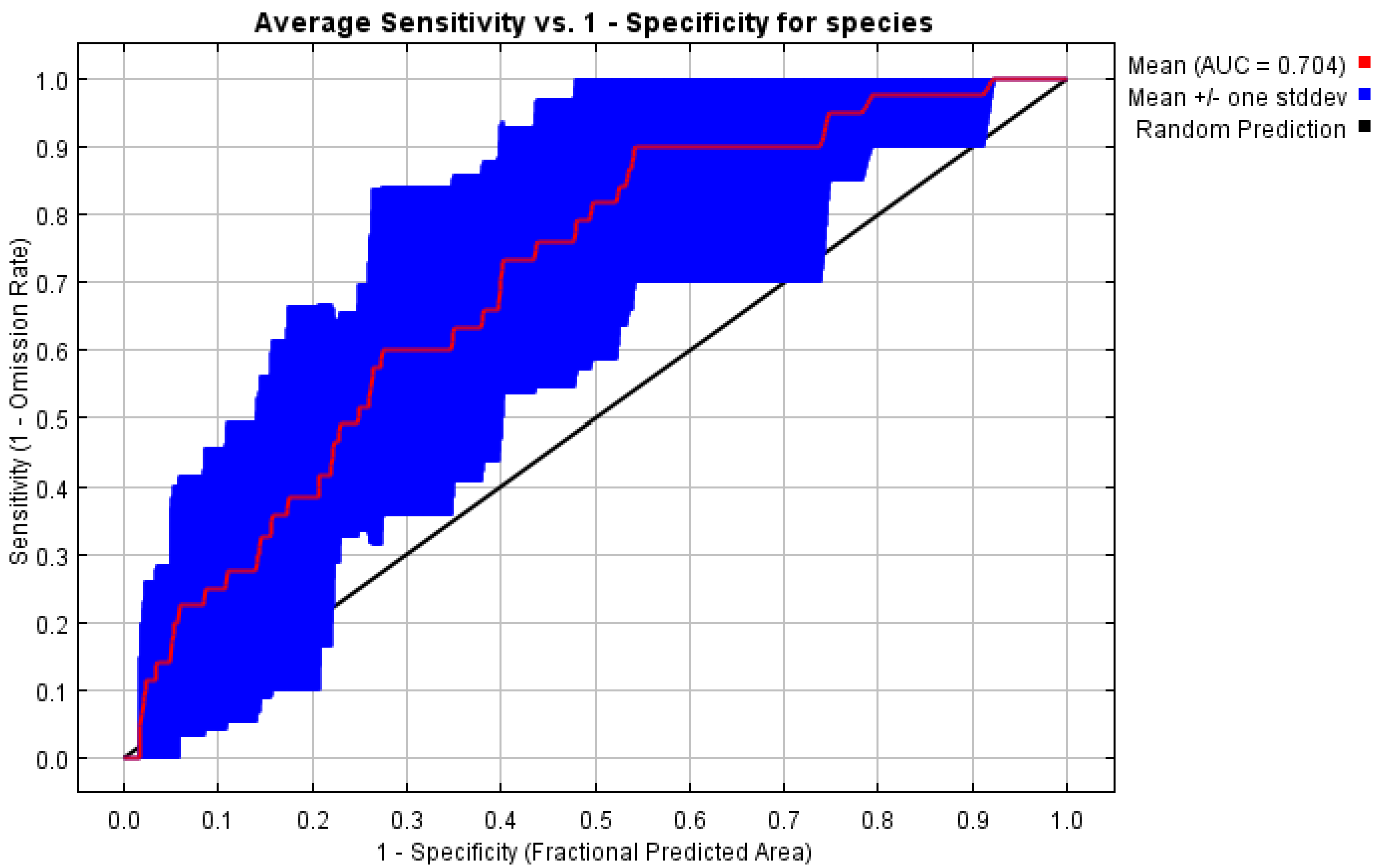
Supplementary Material Table 8: Estimates of the relative contributions to *Chiropotes satanas* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	**Percent contribution**	**Permutation importance**
X2clipped_varswc2.1_30s_bio_8	37.3	43.7
X2clipped_varswc2.1_30s_bio_14	19.8	5.9
X2clipped_varswc2.1_30s_bio_3	14	11.5
X2clipped_varswc2.1_30s_bio_13	10.2	5.6
X2clipped_varswc2.1_30s_bio_19	8.5	13.5
X2clipped_varswc2.1_30s_bio_12	4.7	2.6
X2clipped_varswc2.1_30s_bio_15	2.5	2.5
X2clipped_varswc2.1_30s_bio_2	2.1	12.7

X2clipped_varswc2.1_30s_bio_18	1	1.9



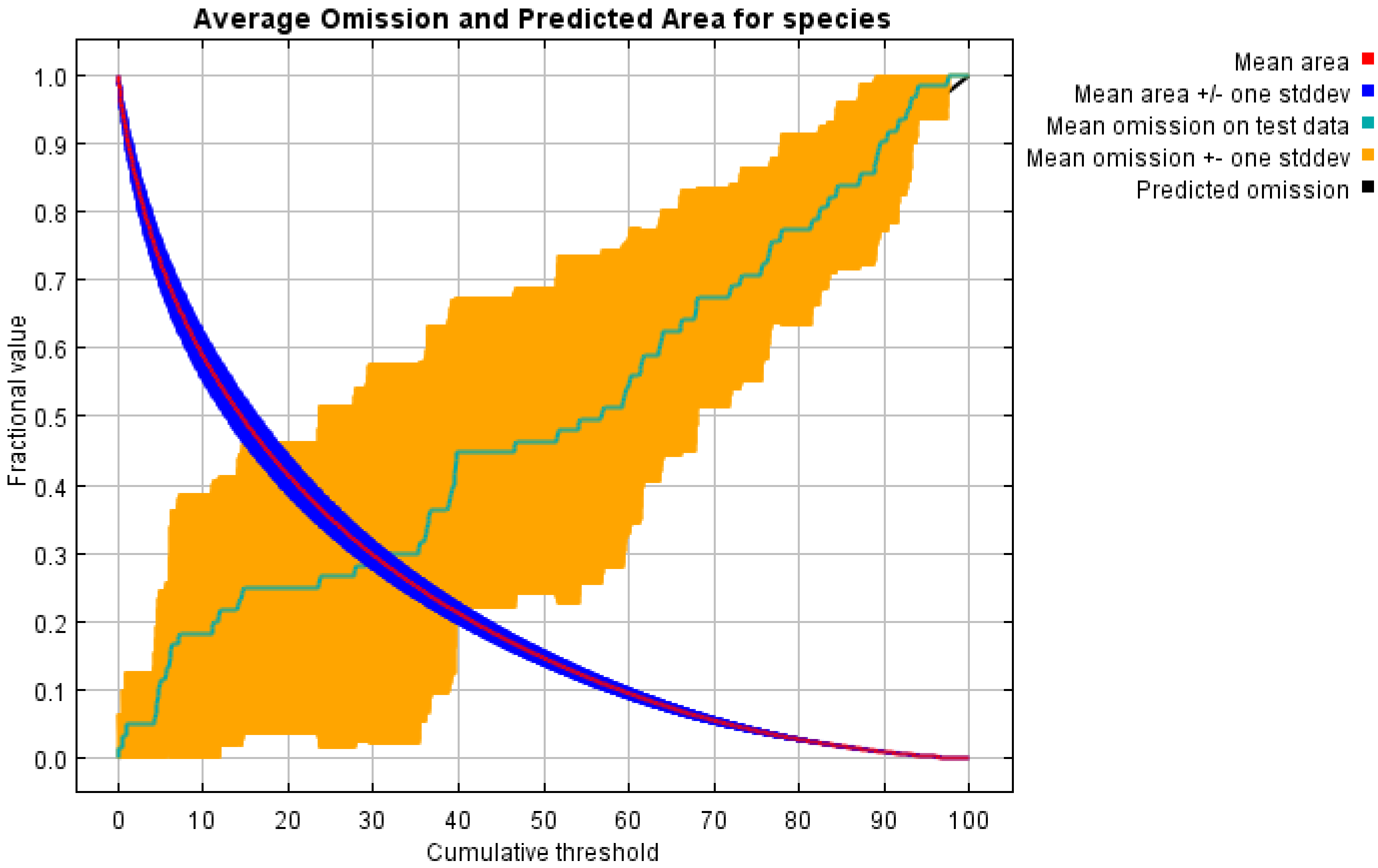
Supplementary Material Figure 9: Average omission rate and predicted area for *Chiropotes satanas,* over replicate runs.



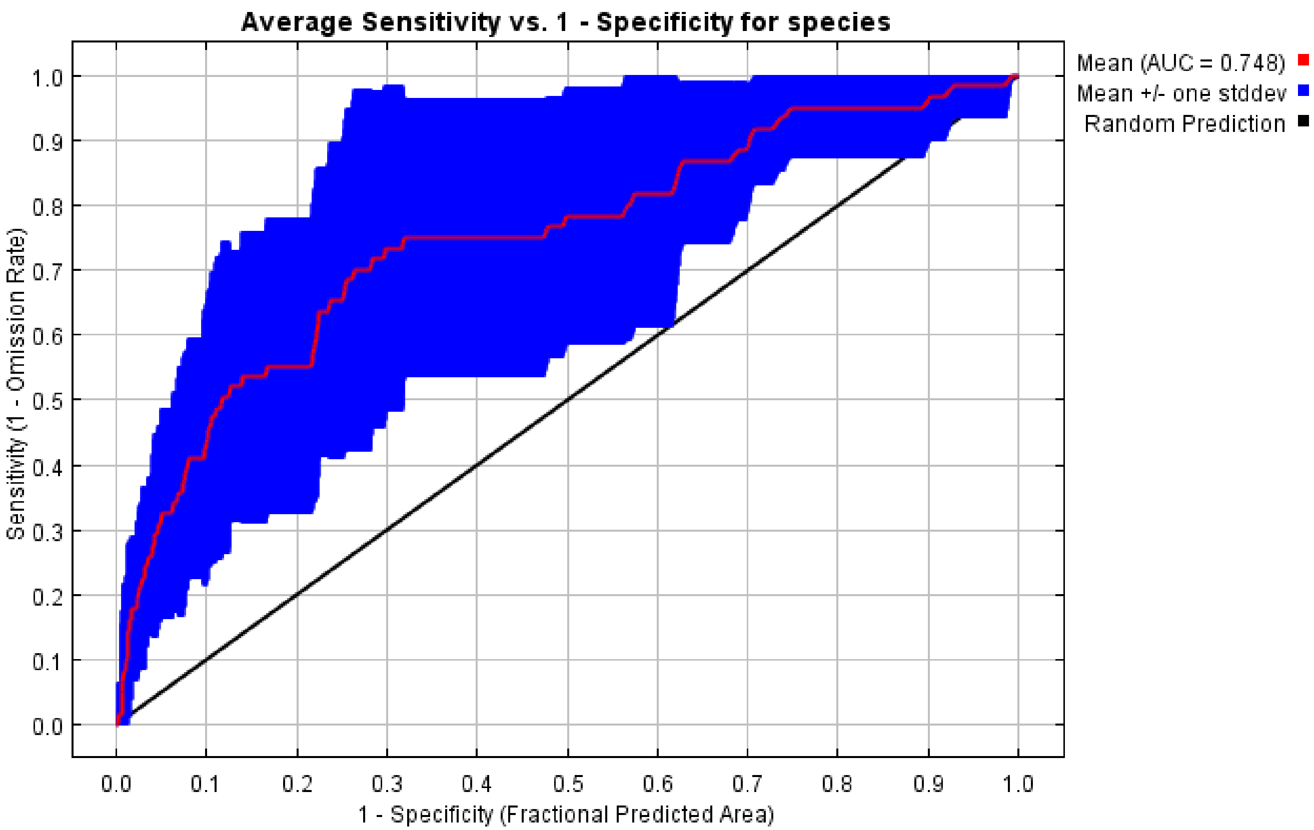
Supplementary Material Figure 10: Receiver operating characteristics (ROC) curve for *Chiropotes satanas,* averaged over replicate runs.

Supplementary Material Table 9: Estimates of the relative contributions to *Chiropotes sagulatus* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	**Percent contribution**	**Permutation importance**
X2clipped_varswc2.1_30s_bio_8	27.2	5
X2clipped_varswc2.1_30s_bio_2	17.8	9.6
X2clipped_varswc2.1_30s_bio_19	17.3	16.9
X2clipped_varswc2.1_30s_bio_3	15.1	21.2
X2clipped_varswc2.1_30s_bio_18	11.9	32.8
X2clipped_varswc2.1_30s_bio_9	7.2	3.5
X2clipped_varswc2.1_30s_bio_13	2.7	3.3
X2clipped_varswc2.1_30s_bio_12	0.7	7.8
X2clipped_varswc2.1_30s_bio_7	0	0



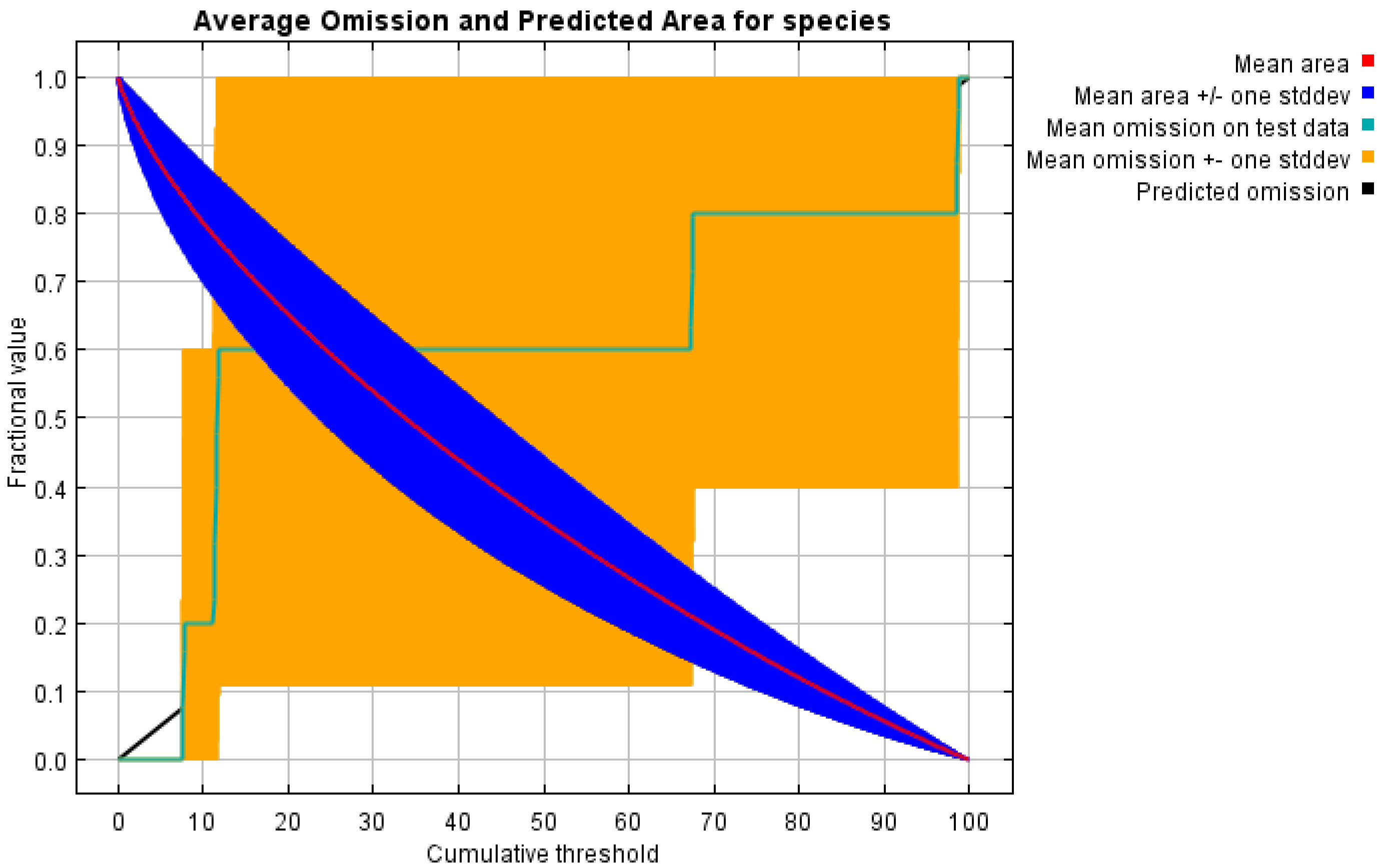
Supplementary Material Figure 11: Average omission rate and predicted area for *Chiropotes sagulatus,* over replicate runs.



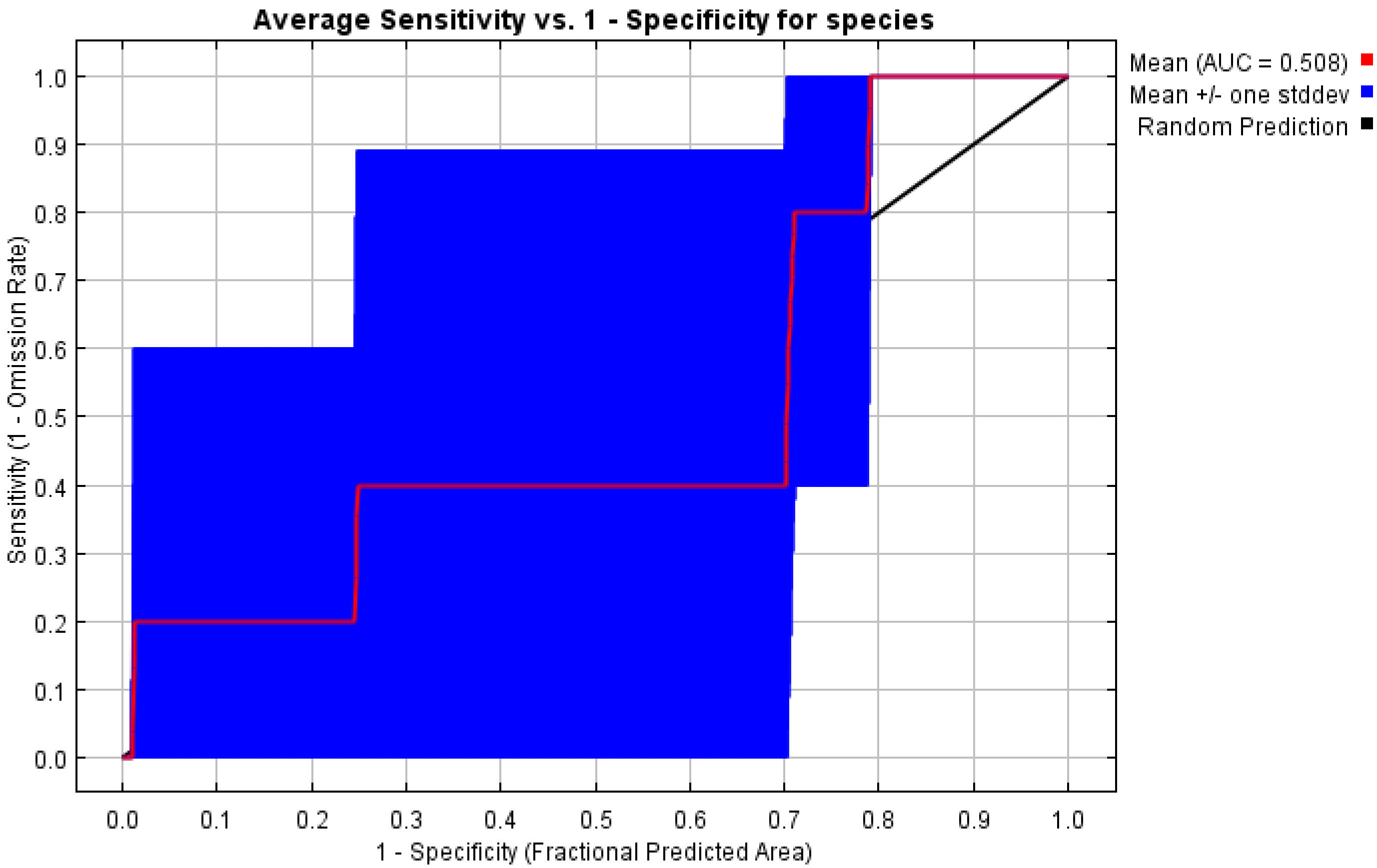
Supplementary Material Figure 12: Receiver operating characteristics (ROC) curve for *Chiropotes sagulatus,* averaged over replicate runs.

Supplementary Material Table 10: Estimates of the relative contributions to *Chiropotes israelita* in the MaxEnt model for each environmental variable. Percent contribution relates to how much the environmental variable affects the regularised gain of the model in each iteration. Permutation importance relates to how for each environmental variable the model is re-evaluated after the values of the variable on training presence and background data are randomly permuted. Values shown are mean values over replicate runs.

Variable	Percent contribution	Permutation importance
X2clipped_varswc2.1_30s_bio_14	46.2	41.9
X2clipped_varswc2.1_30s_bio_19	23.9	32.6
X2clipped_varswc2.1_30s_bio_3	18.5	15.2
X2clipped_varswc2.1_30s_bio_8	10.2	7.2
X2clipped_varswc2.1_30s_bio_2	1.2	2.9
X2clipped_varswc2.1_30s_bio_18	0	0.2
X2clipped_varswc2.1_30s_bio_9	0	0
X2clipped_varswc2.1_30s_bio_13	0	0
X2clipped_varswc2.1_30s_bio_12	0	0


Average Omission and Predicted Area for species
Fractional value
Cumulative threshold
0
10
20
30
40
50
60
70
80
90
100
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Mean area
Mean area +/- one stddev
Mean omission on test data
Mean omission +- one stddev
Predicted omission

Supplementary Material Figure 13: Average omission rate and predicted area for *Chiropotes israelita,* over replicate runs.



Supplementary Material Figure 14: Receiver operating characteristics (ROC) curve for *Chiropotes israelita,* averaged over replicate runs.

Supplementary Material Table 11: Summary, descriptions and allowed values for the WDPA and OECM database fields. This information was used to create the map seen in Figure 7 & 14.

Requirement	Provided by	Field Name	Type	Length	WDPA accepted a values	OECM database accepted values
Minimum	UNEP-WCMC	WDPAID	Number (Double)	N/A	Assigned by UNEP-WCMC. Unique identifier for a protected Area.	Same as WDPA accepted values.
Minimum	UNEP-WCMC	WDPA_PID	Text (String)	52	Assigned by UNEP-WCMC. Unique identifier for parcels or zones within a protected area.	Same as WDPA accepted values.
Minimum	Data provider	PA_DEF	Text (String)	20	Allowed values: 1 (meets IUCN and CBD protected area definitions)	Allowed values: 0 (meets the CBD definition of an OECM)
Minimum	Data provider	NAME	Text (String)	254	Name of the protected area (PA) as provided by the data provider.	Same as WDPA accepted values.
Minimum	Data provider	ORIG_NAME	Text (String)	254	Name of the protected area in original language.	Same as WDPA accepted values.
Minimum	Data provider	DESIG	Text (String)	254	Name of designation.	Same as WDPA accepted values.
Complete	Data provider	DESIG_ENG	Text (String)	254	Designation in English. Allowed values for international-level designations: Ramsar Site, Wetland of International Importance; UNESCO-MAB Biosphere Reserve; World Heritage Site (natural or mixed). Allowed values for regional-level designations: Baltic Sea Protected Area (HELCOM); Specially Protected Area (Cartagena Convention); Marine Protected Area (CCAMLR); Marine Protected Area (OSPAR); Site of Community Importance (Habitats Directive); Special Protection Area (Birds Directive); Specially Protected Areas of Mediterranean Importance (Barcelona Convention). No fixed values for protected areas designated at a national level.	Designation in English. No fixed values.
Minimum	Data provider	DESIG_TYPE	Text (String)	20	Allowed values: National, Regional, International, Not Applicable	Same as WDPA accepted values.

Complete	Data provider	IUCN_CAT	Text (String)	20	Allowed values: Ia, Ib, II, III, IV, V, VI, Not Applicable, Not Assigned, Not Reported	Allowed values: Not Applicable
Minimum	UNEP-WCMC	INT_CRIT	Text (String)	100	Assigned by UNEP-WCMC. For World Heritage and Ramsar sites only.	Allowed values: Not Applicable
Minimum	UNEP-WCMC	MARINE	Text (String)	20	Allowed values: 0 (predominantly or entirely terrestrial), 1 (Coastal: marine and terrestrial), and 2 (predominantly or entirely marine). The value '1' is only used for polygons.	Same as WDPA accepted values.
Minimum	Data provider	REP_M_AREA	Number (Double)	N/A	Marine area in square kilometres.	Same as WDPA accepted values.
Minimum	UNEP-WCMC	GIS_M_AREA	Number (Double)	N/A	Assigned by UNEP-WCMC.	Same as WDPA accepted values.
Minimum	Data provider	REP_AREA	Number (Double)	N/A	Area in square kilometres.	Same as WDPA accepted values.

Requirement	Provided by	Field Name	Type	Length	WDPA accepted a values	OECM database accepted values
Minimum	UNEP-WCMC	GIS_AREA	Number (Double)	N/A	Assigned by UNEP-WCMC.	Same as WDPA accepted values.
Complete	Data provider	NO_TAKE	Text (String)	50	Allowed values: All, Part, None, Not Reported, Not Applicable (if no marine component).	Same as WDPA accepted values.
Complete	Data provider	NO_TK_AREA	Number (Double)	N/A	Area of the no-take area in square kilometres.	Same as WDPA accepted values.
Minimum	Data provider	STATUS	Text (String)	100	Allowed values: Proposed, Inscribed, Adopted, Designated, Established.	Same as WDPA accepted values.
Minimum	Data provider	STATUS_YR	Number (Long Integer)	12	Year of enactment of status (STATUS field).	Same as WDPA accepted values.

Complete	Data provider	GOV_TYPE	Text (String)	254	Allowed values: Federal or national ministry or agency, Sub-national ministry or agency, Government-delegated management, Transboundary governance, Collaborative governance, Joint governance, Individual landowners, Non-profit organisations, For-profit organisations, Indigenous peoples, Local communities, Not Reported.	Same as WDPA accepted values.
Complete	Data provider	OWN_TYPE	Text (String)	254	Allowed values: State, Communal, Individual landowners, For-profit organisations, Non-profit organisations, Joint ownership, Multiple ownership, Contested, Not Reported.	Same as WDPA accepted values.
Complete	Data provider	MANG_AUTH	Text (String)	254	Individual or group that manages the protected area.	Same as WDPA accepted values.
Complete	Data provider	MANG_PLAN	Text (String)	254	Link or reference to the protected area's management plan.	Same as WDPA accepted values.
Complete	Data provider	SUPP_INFO	Text (String)	254	N/A	Link or reference to supporting information on the OECM, such as details of how it fulfils each element of the OECM definition.
Minimum	UNEP-WCMC	VERIF	Text (String)	20	Assigned by UNEP-WCMC. Fixed values: State Verified, Expert Verified, Not Reported (for unverified data that was already in the WDPA prior to the inclusion of the 'Verification' field).	Same as WDPA accepted values.
Minimum	UNEP-WCMC	RESTRICT	Text (String)	20	Not publicly available, for UNEP-WCMC use only.	Same as WDPA accepted values.

Requirement	Provided by	Field Name	Type	Length	WDPA accepted a values	OECM database accepted values

Minimum	UNEP-WCMC	METADATA ID	Number (Long Integer)	12	Assigned by UNEP-WCMC. Link to source table.	Same as WDPA accepted values.
Complete	Data provider	SUB_LOC	Text (String)	100	Allowed values: ISO 3166-2 sub-national code where the PA is located. Separated by a semi-colon if multiple.	Same as WDPA accepted values.
Minimum	Data provider	PARENT_ISO3	Text (String)	20	Allowed values: ISO 3166-1 Alpha-3 character code of the country where the PA is located. Separated by a semi-colon if multiple.	Same as WDPA accepted values.
Minimum	Data provider	ISO3	Text (String)	20	Allowed values: ISO 3166-1 Alpha-3 character code of country or territory where the PA is located. Separated by a semi-colon if multiple.	Same as WDPA accepted values.

Supplementary Material Table 12: WDPA Sources (Jan 2023) used to create the map seen in Figure 7 & 14.

metadata id	data_title	resp_party	year	update_yr	char_set	ref_system	scale	lineage	citation	disclaimer	language	verifier
6	Protected areas of Benin	Institut National de l'Information géographique et forestière, France	1984	1984	Not Reported	Not Reported	1:600,000	Protected areas for Benin are taken from a 1:600,000 scale map République Populaire du Benin (1984) published by the Institut Géographique National (France), portraying national parks, hunting zones and classified forests.		Not Reported	French	Insititut National de l'Information géographique et forestière, France
10	Protected Areas of Belarus	Department of Environment and Protection, Belarus	1996	1996	Not Reported	Transverse Mercator Central Meridian, False E, False N, Lat of Orig	1:500,000	Map produced for the Department of Environment and Protection. Publisher: Belgeadezia. All polygons and points on the map were captured.		Not Reported	English	Department of Environment and Protection, Belarus
13	Protected Areas of Bermuda	Government of Bermuda, Ministry of Environment	1990	2017	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Government of Bermuda, Ministry of Environment
72	Protected areas of Gabon	Insititut Géographique National - Paris, France	1993	1993	Not Reported	Not Reported	1:1,000,000	No data have been made available for the Forest Reserves of Gabon.		Not Reported	Not Reported	Insititut Géographique National - Paris, France
73	Protected Areas of Guinea	Centre Technique Forestier Tropical (CTFT)/ Bureau pour le Développement de la Production Agricole (BDPA)/-SCET AGRI (1989)	1989	1989	Not Reported	Not Reported	1:700,000	Vegetation map which accompanies the report entitled "Potentialités et Possibilités de Relance de l'Activité Forestière". Land use data on map derived from 79-80 aerial photography (Japan Int Cooperation Ag.),upd. using Landsat MSS 84-85-86.	Potentialités et Possibilités de Relance de l'Activité Forestière, CTFT/BDPA-SCET AGRI (1989); Synthèse Régionale et Nationale.	Not Reported	Not Reported	Centre Technique Forestier Tropical (CTFT)/ Bureau pour le Développement de la Production Agricole (BDPA)/-SCET AGRI (1989)

78	World Directory of the Hellenic Military Geographical Service	Hellenic Military Geographical Service, Greece	1985	1985	Not Reported	Not Reported	1:1,000,000	Not Reported		Not Reported	English	Hellenic Military Geographical Service, Greece
113	Protected Areas of Italy	Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Italian Environment Ministry	1995	1995	Not Reported	Not Reported	1:1,000,000	Not Reported		Not Reported	Not Reported	Ministero dell'Ambiente e della Tutela del Territorio e del Mare, Italian Environment Ministry
178	Forest Administrative Boundaries and Stations, Kenya	Survey Branch of the Kenya Forest Department	1980	1980	Not Reported	Not Reported	1:1,000,000	Mauritanie (1980)		Not Reported	Not Reported	Survey Branch of the Kenya Forest Department
183	Road Map of Sri Lanka - (2nd Edition)	Department of Wildlife Conservation, Sri Lanka	1990	1990	Not Reported	Not Reported	1:500,000	Not Reported		Not Reported	Not Reported	Department of Wildlife Conservation, Sri Lanka
209	Protected areas of Nouvelle Caledonie	Insititut National de l'Information géographique et forestière, France	1981	1981	Not Reported	Not Reported	1:500,000	No cartographic information on mining or reserves available		Not Reported	English	Insititut National de l'Information geographique et forestière, France
212	Protected areas of Nigeria	Nigerian Conservation Foundation	1990	1990	Not Reported	Not Reported	Not Reported	Nigerian Conservation Foundation (1990) w/ additions from Julian Caldecott		Not Reported	Not Reported	None
213	Protected areas of Nigeria	Government of Nigeria, Ministry of Agriculture and Rural Development, Federal Department of Forestry	1978	1978	Not Reported	Not Reported	1:250,000	Vegetation and land use [Nigeria] 1978 - interpretation, field studies & cartography by Hunting Technical Services Limited ; prepared for and printed by Government of Nigeria, Ministry of Agriculture and Rural Development, Federal Department of Forestry		Not Reported	Not Reported	Government of Nigeria, Ministry of Agriculture and Rural Development, Federal Department of Forestry
218	Review of the Protected Areas System of the Indomalayan Realm	The Asian Bureau for Conservation (ABC)	1990	1990	Not Reported	Not Reported	1:1,000,000	Based on early AVHRR and Landsat data and existing reports/maps		Not Reported	Not Reported	UNEP-WCMC and Asian Bureau for Conservation, UK
219	Protected areas of Pakistan	Pakistan - National Council for Conservation of Wildlife, Ministry of Food, Agriculture and Cooperatives	1990	1990	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	Pakistan - National Council for Conservation of Wildlife, Ministry of Food, Agriculture and Cooperatives
232	Polska Mapa Ochrony Pryzyrody - Conservation of Nature	Institute of Environmental Protection, Poland	1992	1992	Not Reported	Not Reported	1:750,000	Polska Mapa Ochrony Pryzyrody - Conservation of Nature (1992)		Not Reported	Not Reported	Institute of Environmental Protection, Poland
269	Protected areas of Vanuatu	South Pacific Regional Environment Programme, Vanuatu	1990	1990	Not Reported	Not Reported	Not Reported	Vanuatu taken from Fourth South Pacific Conference on Nature Conservation and Protected Areas. Fourth South Pacific Conference on Nature Conservation and Protected Areas.		Not Reported	English	None

279	World Heritage Sites and Man and Biosphere Reserves in the USA	US Geological Survey, USA	1990	1990	Not Reported	Not Reported	Not Reported	Republica de Venezuela - Areas Bajo Regimen de Administracion Especial (1991)		Not Reported	English	US Geological Survey, USA
290	Republic of Zambia - Forest Estate	Ministry of Lands and Natural Resources, Zambia	1988	1988	Not Reported	Not Reported	1:1,500,000	Both national forest and local forest polygons digitised - they have not been differentiated in the polygon data.		Not Reported	Not Reported	Ministry of Lands and Natural Resources, Zambia
302	Protected areas of Turks and Caicos Islands	Ordnance Survey of UK	1985	1985	Not Reported	UTM Zone 18/19	1:2,500	Digitised at UNEP-WCMC		Not Reported	English	Ordnance Survey of UK
303	Protected areas of Turks and Caicos Islands	Not Reported	1995	1995	Not Reported	Not Reported	1:2,500	Photocopied A4 sheet showing protected area outline		Not Reported	English	None
318	Biodiversity Conservation of Kazakhstan, Uzbekistan, Turkmenistan and Tajikistan	WWF Russian Programme Office	1997	1997	Not Reported	Not Reported	1:1,000,000	Protected Area polygons fitted to MundoCart digital database at WCMC		Not Reported	Not Reported	WWF Russian Programme Office
358	Washington Datafest with Conservation International October 2002	Conservation International, Washington, USA	2002	2002	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	Data exchange workshop between multiple NGOs convened by Conservation International in Washington in October 2002		Not Reported	Multiple	None
831	Vietnam Man and Biosphere Reserves	Vietnam MAB Committee	2009	2009	UTF8 - 8 bit UCS Transfer Format	Not Reported	Not Reported	Not Reported		Not Reported	English	None
367	Protected Areas of the Ukraine	Main Department of National Nature Parks and Reserves, Ministry of the Environment, Ukraine	1999	1999	Not Reported	Not Reported	1:250,000	Not Reported	Protected Areas of the Ukraine – Digital Map, 1999. Main Department of National Nature Parks and Reserves, Ministry of the Environment, Ukraine.	No commercial use of dataset is allowed unless written permission of authors provided.	Not Reported	Main Department of National Nature Parks and Reserves, Ministry of the Environment, Ukraine
383	Protected Areas of France	Museum National d'Histoire Naturelle, France	1999	1999	Not Reported	Not Reported	1:50,000	Not Reported		Not Reported	Not Reported	Museum National d'Histoire Naturelle, France
390	Protected areas of Madagascar	Ministry of Environment	2002	2020	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	Not Reported		Not Reported	English	Ministry of Environment
391	Protected Areas of Cayman Islands	Department of Environment, Cayman Islands	2003	2016	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	Not Reported		Not Reported	English	Department of Environment, Cayman Islands

482	Protected areas of Bangladesh, Bhutan, China (Part), Himalayas, India, Lao PDR, Myanmar, Nepal, Pakistan, Viet Nam	Conservation International, Washington, USA	2002	2002	Not Reported	Not Reported	Not Reported	Data exchange workshop between multiple NGOs convened by Conservation International in Washington in October 2002		Not Reported	English	None
484	Protected areas of Bolivia, Brazil, Guyana, Venezuela	Amazonia SURPA	2002	2002	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Multiple	None
493	GIS Data Response - ARCBC (ASEAN Regional Centre for Nature Conservation)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2003	2003	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
495	Protected areas of Kenya	UNEP, Nairobi, Kenya	2003	2003	Not Reported	Not Reported	Not Reported	UN List 2003 update for Kenya		Not Reported	Not Reported	None
504	Protected areas of Seychelles	Ministry of Environment, Republic of Seychelles	2003	2020	Not Reported	Not Reported	Not Reported	Ministry of Environment, Republic of Seychelles. UN List 2003 reply, May 2003		Not Reported	English	Ministry of Environment, Republic of Seychelles
506	Protected Areas of Iran	Department of Environment (DOE), Bureau of Habitats and Protected Areas, Iran	2002	2002	Not Reported	Not Reported	Not Reported	Bureau of habitats and protected areas as of 31/07/2002. UN List 2003 reply, May 2003. Updated Info/New GIS: DOE, June 2003		Not Reported	Not Reported	Department of Environment, Iran
509	Protected Areas of Ireland	Dúchas - The Heritage Service, Ireland	2003	2003	Not Reported	Not Reported	Not Reported	Nature Reserves and NP checked/updated from GIS dataset downloaded 09/09/2003. SAC's and SPA GIS dataset downloaded from Duchas - Heritage Service 09/09/2003 and 10/09/2003.		Not Reported	English	Dúchas - The Heritage Service, Ireland
523	Protected Areas of Jersey Channel islands	Government of Jersey	2003	2018	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	Government of Jersey
526	Nature Reserves of China	Institute of Zoology, Chinese Academy of Sciences	2003	2003	Not Reported	Not Reported	Not Reported	GIS data received from source to be used for UN List 2003 update. Three polygons were subsequently copied to Ramsar Sites in 2011 (see metadataid 915)	XIE Yan, Wang Sung, DU Youmei, LI Shengbiao, DU Youcai and et. al. (2003) 'China Species Information System'. Institute of Zoology, Chinese Academy of Sciences.	Not Reported	English	None

544	Southern Africa Development Community (SADC) Protected Areas dataset	Consultant on behalf of Conservation International, Washington, USA	2002	2002	Not Reported	Not Reported	Not Reported	Southern Africa Development Community (SADC) Protected Areas dataset compiled for CI. Rob Davies sent SADC Protected Areas dataset compiled by consultant for CI.		Not Reported	English	None
560	Galapagos Island	The Directorate of the Galapagos National Park	2004	2004	Not Reported	Not Reported	Not Reported	GIS dataset supplied by the Galapagos National Park.		Not Reported	Not Reported	The Directorate of the Galapagos National Park
568	World Heritage Convention, Natural Heritage China	Ministry of Construction, China	2004	2004	Not Reported	Not Reported	Not Reported	Sketch map provided by Ministry of Construction (1991). World Heritage Convention Natural Heritage China. Image of sketch map registered and digitized at UNEP-WCMC		Not Reported	Not Reported	Ministry of Construction, China
602	GIS dataset supplied by ARCBC - ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2004	2004	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	ASEAN GIS Dataset supplied by ARCBC (dataset date 2004), January 2005. Contents compiled since early 80's on base charts from MundoCart and DCW. ONC charts used for digitizing outlines where more precise geo-referenced maps were not available.		Not Reported	English	None
603	GIS dataset supplied by ARCBC - ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2004	2004	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	ASEAN GIS Dataset supplied by ARCBC (dataset date 2004), January 2005. Contents compiled since early 80's on base charts from MundoCart and DCW. ONC charts used for digitizing outlines where more precise geo-referenced maps were not available.		Not Reported	English	None
608	Nialama and Souti-Yanfu Forest Reserve, Guinea	United States Agency for International Development (USAID)	2002	2002	Not Reported	Not Reported	Not Reported	Digitized Nialama and Souti-Yanfu Forest Reserve boundaries from registered map from USAID website		Not Reported	Not Reported	None
611	GIS dataset supplied by ARCBC - ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2004	2004	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	ASEAN GIS Dataset supplied by ARCBC (dataset date 2004), January 2005. Contents compiled since early 80's on base charts from MundoCart and DCW. ONC charts used for digitizing outlines where more precise geo-referenced maps were not available.		Not Reported	English	None

830	Protected areas of the Dominican Republic	Ministry of Environment (MoE), Dominican Republic	2004	2022	UTF8 - 8 bit UCS Transfer Format	UTM Zone 18/19	Not Reported	Attribute information updated by protectedareas UNEP-WCMC through MoE website, March 2011: http://www.ambiente.gob.do/cms/index.php?option=com_content&task=blogcategory&id=60&Itemid=232. Previous source: Caribbean Region's Environment Unit (LATEN), 1996		Not Reported	Spanish	UNEP-WCMC from Ministry of Environment (MoE), Dominican Republic website
614	Protected Areas System for Sri Lanka's Natural Forests	Environmental Management Division, Forest Department, Ministry of Lands, Agriculture and Forestry, Sri Lanka	1997	1997	Not Reported	Not Reported	Not Reported	GIS dataset produced for 1997 IUCN & WCMC Report to design an optimum PA system for Sri Lanka's natural forests. Dataset includes 90% of forest reserves listed in the WDPA and detailed boundaries for national park, nature reserves and sanctuaries		Not Reported	Not Reported	Environmental Management Division, Forest Department, Ministry of Lands, Agriculture and Forestry, Sri Lanka
631	Waddensea	Common Wadden Sea Secretariat Virchowstr. 1 D-26382 Wilhelmshaven Germany	1997	1997	Not Reported	Not Reported	Not Reported	Kerinci Seblat, Gunung Leuser and Bukit Barisan Selatan NP polygon boundary JPEG map. Digitised at UNEP-WCMC. Ministerial Declaration of the Eighth Trilateral Govt. Conference on the Protection of the Wadden Sea.		Not Reported	Not Reported	Common Wadden Sea Secretariat Virchowstr. 1 D-26382 Wilhelmshaven Germany
649	Bolivia protected areas dataset	Servicio Nacional de Áreas Protegidas (SERNAP), Bolivia	2004	2004	Not Reported	Not Reported	Not Reported	Bolivia protected areas dataset provided by Servicio Nacional de Áreas Protegidas (SERNAP) via Conservation International		Not Reported	Spanish	Servicio Nacional de Áreas Protegidas (SERNAP), Bolivia
676	Data for Caspian Sea area for the IMaPs project	Caspian Interactive Map Service (IMapS), Republic of Kazakhstan	2006	2006	Not Reported	Geographic coordinate system (Datum WGS84)	Not Reported	Collated by Mr Nfkolay Dmftrfev, Mr Mohammad Nazarian, Mr Mammad Dafarli and Ms Natalya Ogar		Not Reported	Multiple	None
682	Protected Areas of Guinea-Bissau	Institute of Biodiversity and Protected Areas/Instituto da Biodiversidade e das Areas Protegidas (IBAP), Guiné-Bissau	1988	2020	Not Reported	UTM Zone 28 N (Datum WGS84)	Not Reported	Digital data originally digitised from sketch map but the original data subsequently provided by IBAP in 1988. In 2020 shapefiles were provided.	Not Reported	Not Reported	Portuguese and English	Institute of Biodiversity and Protected Areas/Instituto da Biodiversidade e das Areas Protegidas (IBAP), Guiné-Bissau
699	Protected Areas of Bulgaria	Executive Environmental Agency, Bulgaria	2007	2007	Not Reported	UTM Zone 35 N (Datum WGS84)	Not Reported	Not Reported		Not Reported	English	Executive Environmental Agency, Bulgaria
707	Protected Areas of Brazil	Fundação Nacional do Indio (FUNAI), Brazil	2005	2005	Not Reported	Geographic coordinate system (Datum SAD 69)	Not Reported	FUNAI - Fundação Nacional Do Índio (National Indigenous Foundation of Brazil) dataset (information current to 10/10/2005)		Not Reported	Portuguese	Fundação Nacional do Indio (FUNAI), Brazil
710	Ankasa Game, Bia, Gbele , Mole and Kyabobo protected areas	Protected Areas Development Programme (PAPD II), Ghana	2007	2007	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	None
711	Senegal protected areas	Université Cheikh Anta Diop de Dakar (UCAD), Senegal	2007	2007	Not Reported	UTM Zone 28 N (Datum WGS84)	Not Reported	Senegal protected areas for Cheikh Mbow l'Université Cheikh Anta DIOP de Dakar (UCAD)		Not Reported	English	None

715	Protected areas in the Congo Basin	African Forest Observatory (FORAF), Democratic Republic of Congo	2007	2020	Not Reported	Not Reported	Not Reported	Review of protected areas in the Congo Basin		Not Reported	English	None
724	Protected Areas of the Cross River region	Not Reported	2006	2006	Not Reported	Not Reported	Not Reported	Personal Communication. Polygon dataset from Richard Bergl (Nov. 2007).		Not Reported	Multiple	None
736	Natural parks of Cape Verde	UNDP/GEF Protected Areas Project - Cape Verde	2008	2008	Not Reported	Not Reported	Not Reported	Boundaries for 3 natural parks: Monte Gordo, Serra Malagueta and Fogo (Bordeira, Chp das Caldeiras e Pico Novo)		Not Reported	Not Reported	None
745	Source is currently unknown	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	None
759	Source title is currently unknown	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Various	Not Reported		Not Reported	Multiple	None
811	Wildlife Protected Areas, Costa Rica	Sistema Nacional de Areas de Conservacion (SINAC), Costa Rica	2008	2020	Not Reported	UTM Projection Zone (specifics Not Reported)	50000	Map of Wildlife Protected Areas in 2008. The 6th (sixth) edition.		Not Reported	Spanish	Sistema Nacional de Areas de Conservacion (SINAC), Costa Rica
814	Sistema Guatemalteco de Areas Protegidas (SIGAP)	Dirección de Desarrollo del SIGAP (DDSIGAP), Consejo Nacional de Areas Protegidas (CONAP), Guatemala	2009	2020	Not Reported	Lambert Conformal Conic Projection with one parallel Central Meridian, //, False E, False N, Lat of Orig	20000	Jorge Mario Gomez, Tecnico Sistema de InformaciÃ³n GeogrÃ¡fica, Departamento de Unidades de ConservaciÃ³n, Consejo Nacional de Areas Protegidas, 5 avenida 6-06, zona 1, Edificio IPM, 5to, 6to, 7to Nivel	Not Reported	Not Reported	Spanish	Dirección de Desarrollo del SIGAP (DDSIGAP), Consejo Nacional de Areas Protegidas (CONAP), Guatemala
816	Tanzania Protected Areas	WWF US	2009	2009	UTF8 - 8 bit UCS Transfer Format	Geographic coordinate system (Datum WGS84)	Not Reported	Sites for Tanzania were compiled through Neil Burgess of WWF U.S. and his contacts in Africa from 2007/02 to 2009/06		Not Reported	English	None
820	Sistema Nacional de Areas Protegidas (SINAP) de Nicaragua, Reservas de Biosferas y Sitios RAMSAR	Ministerio del Ambiente y los Recursos Naturales (MARENA), Nicaragua, Dirección General de Patrimonio Natural y Biodiversidad (DGPNyB)	2007	2020	UTF8 - 8 bit UCS Transfer Format	Lambert Conformal Conic Projection with one parallel Central Meridian, //, False E, False N, Lat of Orig	Not Reported	Sistema Nacional de Areas Protegidas (SINAP) de Nicaragua		Not Reported	Spanish	Ministerio del Ambiente y los Recursos Naturales (MARENA), Nicaragua, Dirección General de Patrimonio Natural y Biodiversidad (DGPNyB)
822	Sistema Nacional de Áreas Protegidas (SINAP) de Panamá	Dirección de Áreas Protegidas y Biodiversidad, Dirección de Información Ambiental, Ministerio de Ambiente, Panamá	2009	2021	UTF8 - 8 bit UCS Transfer Format	WGS 1984, UTM Projection, Zone 17N	50000	Not Reported	Sistema Nacional de Áreas Protegidas	Not Reported	Spanish	Dirección de Áreas Protegidas y Biodiversidad, Dirección de Información Ambiental, Ministerio de Ambiente, Panamá

826	Kaya Forests Kenya	Coastal Forest Conservation Unit, National Museums of Kenya	2009	2009	UTF8 - 8 bit UCS Transfer Format	Geographic coordinate system (Datum WGS84)	Not Reported	Not Reported		Not Reported	English	Coastal Forest Conservation Unit, National Museums of Kenya
828	Bolivia Protected Areas	Servicio Nacional de Áreas Protegidas (SERNAP), Bolivia	2007	2007	UTF8 - 8 bit UCS Transfer Format	UTM Projection Zone (specifics Not Reported)	1000000	Coverage of Protected Areas National System of Protected Areas (SNAP) from Bolivia		Not Reported	Spanish	Servicio Nacional de Areas Protegidas (SERNAP) Calle Francisco Bedregal No. 2904, Zona Sopocachi. La Paz - Bolivia.
832	Commission for the Convention on Conservation of Antarctic Marine Living Resources (CCAMLR)	Commission for the Convention on Conservation of Antarctic Marine Living Resources (CCAMLR)	2009	2017	Not Reported	Not Reported	Not Reported	UNEP-WCMC digitized the boundaries from coordinates provided		Not Reported	English	None
845	Tanzanian Protected Areas	GIS Section, Land Use Commission, Division of Forestry and Beekeeping, Ministry of Natural Resources and Tourism, Tanzania	2009	2009	ANSI	UTM Arc1960 Zone 36S	Various	Various Methods, contact Responsible Party for further details.		Not Reported	English	GIS Section, Land Use Commission, Division of Forestry and Beekeeping, Ministry of Natural Resources and Tourism, Tanzania
848	Protected Areas of Afghanistan	National Environmental Protection Agency	2016	2020	ANSI	WGS 84	1:100,000	Not Reported	Not Reported	Not Reported	English and Arabic	National Environmental Protection Agency
855	Protected Areas of Yunnan Province, China	Ecology Conservation & Environment Center (ECEC) Kunming Institute of Zoology, China	2010	2010	UTF-8	WGS 84	Not Reported	Prepared and submitted by Dr. Douglas W. Yu of the Kunming Institute for Zoology with help from a Student		Not Reported	English and Chinese	None
876	Protected Areas of Liberia	Forestry Development Authority, Liberia	2010	2017	Not Reported	WGS 84, UTM Zone 29N	Not Reported	The Forestry Development Authority(FDA) provided the most recent dataset of protected areas in Liberia, which includes 2 gazetted sites and 13 proposed sites	Forestry Development Authority (2010) Protected Areas of Liberia	Not Reported	English	Forestry Development Authority, Liberia
878	Protect Planet Ocean Reconciliation	UNEP-WCMC and IUCN	2010	2010	UTF-8	WGS 84	Various	Where the WDPA had obtained updates for countries more recent than PPO, those sites were not updated. 14787 attributes were updated for polygons, 378 for points, 75 new points were added and 8 new polygons.		Not Reported	English	None
881	Protected Areas of Thailand	Department of National Park, Wildlife and Plant Conservation, Thailand	2010	2010	ANSI	WGS 84	Not Reported	Dataset provided by the Dep. of National Park, Wildlife and Plant Conservation through the WDPA expert review project with IUCN Asia, 2010		Not Reported	English	Department of National Park, Wildlife and Plant Conservation, Thailand
882	Protected areas of Tanzania	WWF's Conservation Science Program (CSP), USA	2010	2010	ANSI	WGS 84	Not Reported	Tanzania Update from WWF USA via Neil Burgess. Contributions from Jessica Forrest, Steve Ball, Cyprian Malima, A.Araman, & K. Clark (PAMS Foundation). Refer to MetadataID 845 for original source.		Not Reported	English	None

883	OSPAR Marine Protected Areas Network	OSPAR Commission, Victoria House, 37-63 Southampton Row, London, WC1B 4DA, UK	2013	2021	UTF-8	WGS 84	Not Reported	OSPAR data platform/website: http://mpa.ospar.org/home_ospar	OSPAR Secretariat (2020) OSPAR Marine Protected Areas	The data sets themselves and/or their presentation may change at regular intervals, immediately and without notice. By accessing www.ospar.org and/or retrieving and/or using presented data sets therein, the user agrees to the following: OSPAR shall not b	English	OSPAR Commission, Victoria House, 37-63 Southampton Row, London, WC1B 4DA, UK	
903	National and Local Marine Protected Areas in Indonesia	Ministry of Marine Affairs and Fisheries, Indonesia	2011	2011	UTF-8	WGS 84	250000 (national) and 50000 (local)	Not Reported		Not Reported	English and Indonesian	Ministry of Marine Affairs and Fisheries, Indonesia	
905	Indigenous Areas of Brazil	Coordenação Geral de Geoprocessamento (CGGEO)/ Fundação Nacional do Índio (FUNAI), Brazil	2011	2011	UTF-8	SAD 69	100000	Not Reported		Not Reported	Portuguese	Coordenação Geral de Geoprocessamento (CGGEO)/ Fundação Nacional do Índio (FUNAI), Brazil	
906	Protected Areas of Guyana	Protected Areas Commission (PAC)	2011	2022	UTF-8	WGS 84/UTM Zone 21N	Not Reported	Not Reported		Not Reported	English	Guyana Lands & Survey Commssion; PAC; Iwokrama	
908	Protected Areas of El Salvador	Ministerio de Medio Ambiente y Recursos Naturales (MARN), El Salvador	2011	2020	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Spanish	Ministerio de Medio Ambiente y Recursos Naturales (MARN), El Salvador	

909	Protected Areas of Jamaica	National Environment and Planning Agency, Jamaica	2010	2022	UTF-8	WGS 84 (The original datasets were created using the JAD 69 AND 2001 Coordinate Reference System)	50000	The boundaries of the various protected areas were created between 1963 and 2021 [1945-Wild Life Protection Act; 1992- A Plan for a System of Protected Areas in Jamaica first developed; 1997- the Policy for Jamaica's System of Protected Areas developed revised 2004	Jamaica's System of Protected Areas (2010) National Environment and Planning Agency (NEPA), Jamaica.	Not Reported	English	Protected Areas, National Environment and Planning Agency, Jamaica
913	Protected Areas of Egypt	Egyptian Environmental Affairs Agency, Ministry of Environment	2011	2011	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English and Arabic	Egyptian Environmental Affairs Agency
916	HELCOM Baltic Sea Protected Areas (BSPA)	Helsinki Commission (HELCOM) (Baltic Marine Environment Protection Commission), Katajanokanlaituri 6 B, FI-00160, Helsinki, Finland	2010	2020	UTF-8	WGS 84 (The original data sets were created using ETRS89 LAEA)	100000	This dataset is compiled from data submitted by HELCOM Contracting States and was updated for the Implementation report on the status and ecological coherence of the HELCOM BSPA network. (2010) Balt. Sea Environ. Proc. No. 124B.	HELCOM (2016)	Not Reported	English	Helsinki Commission (HELCOM) (Baltic Marine Environment Protection Commission), Katajanokanlaituri 6 B, FI-00160, Helsinki, Finland
921	Marine Protected Areas with No Take	MPA Global, UNEP-WCMC & WWF	2008	2008	UTF-8	WGS 84	Not Reported	MPAs with no-take areas were integrated from the MPA Global dataset	Wood, L. J. (2008). MPA Global: A database of the world's marine protected areas. Sea Around Us Project, UNEP-WCMC & WWF	Not Reported	English	None
923	Protected areas of China	International Cooperation Department, Ministry of Construction, China	1990	1990	Not Reported	Not Reported	Not Reported	In litteris - in a letter or other documented correspondence		Not Reported	Not Reported	International Cooperation Department, Ministry of Construction, China
926	Global system of marine protected areas	IUCN, the World Bank and Great Barrier Reef Marine Park Authority	1995	1995	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Not Reported
928	UNESCO-MAB Biosphere Reserves	UNESCO-MAB	2003	2003	Not Reported	Not Reported	Not Reported	MAB UNESCO Biosphere Directory. http://www2.unesco.org/mab/br/brdir/directory/biores.asp?mode=all&code=CAN+12\fs17. Accessed Jan & March 2003.		Not Reported	English	UNESCO-MAB
929	National Parks of Indonesia	WWF Indonesia & UNEP-WCMC	2004	2004	Not Reported	Not Reported	Not Reported	WWF Press Release entitled "Protection boost for elephants, tigers and orang-utans in Indonesian rainforests" dated 12 Feb 2004, and BirdLife Press Release, 11th Nov. 2004 entitled "Historic national park declaration on Halmahera".		Not Reported	English	None

930	Protected areas in Nantu Forest, Indonesia	UNEP-WCMC	2003	2003	Not Reported	Not Reported	Not Reported	Information from article by Mustari, A.H. et al. (2003). Accessed 11th Feb. 2005.	Mustari, A.H. et al. (2003) Environmental Education in Nantu Wildlife Reserve, Gorontalo, Issue 6 - 21.	Not Reported	English	None
932	Forest Reserves of Kenya	Kenya Indigenous Forest Conservation Programme (KIFCON)	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
933	Protected areas of Kenya	Kenya Wildlife Service (KWS)	1993	2022	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	Kenya Wildlife Service (KWS)
941	Forest reserves of Zambia	Forestry Department (FD), Zambia	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	Forestry Department (FD), Zambia
942	Natural monuments of Zambia	National Heritage Conservation Commission (NHCC), Zambia	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	National Heritage Conservation Commission (NHCC), Zambia
943	Protected Areas of Zambia	Department of National Parks and Wildlife	2003	2021	Not Reported	WGS 84	Not Reported	This agency used to be called the Zambian Wildlife Authority (ZAWA)	Not Reported	Not Reported	English	Department of National Parks and Wildlife
946	UNESCO World Heritage Sites	IUCN World Heritage Programme	2012	2021	UTF-8	WGS 84	Various	Geometry provided by States Parties or digitised from UNESCO nominations, evaluation reports, and retrospective inventory process maps. Original GIS boundaries for wdpaid 555697866 provided by Pimachiowin Aki Corporation and for wdpaid 555698178 provided by CONANP		Not Reported	English	IUCN World Heritage Programme
949	Diawling National Park	UNEP-WCMC	2005	2005	Not Reported	Not Reported	Not Reported	Diawling National Park website (accessed October 2005), http://www.pnd.mr		Not Reported	English	None
958	Cape Royds, Ross Island	UNEP-WCMC	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Committee for Environmental Protection (CEP) website, http://www.cep.aq/apa/aspa/sites/aspa121/ASPA121RoydsPlan.htm		Not Reported	English	None
964	Collaborative Australian Protected Areas Database (CAPAD)	Environment Australia (EA)	2002	2002	Not Reported	Not Reported	Not Reported	CAPAD 2002 supplied by Environment Australia (EA) for UN List 2003, July 2003. Checked against CAPAD web (website dated 23 Sep 2003), October 2003. Checked using CAPAD web (website updated 23 Sept 2003), Oct 2003.		Not Reported	English	None
967	Protected Areas of Vanuatu	Director, Vanuatu Protected Areas Initiative, Wan Tok Environment Centre, Santo, Vanuatu	2003	2003	Not Reported	Not Reported	Not Reported	Updated attribute information used for UN List 2003 update, July 2003		Not Reported	English	None

970	Protected Areas of Samoa	Ministry of Natural Resources & Environment for Samoa	2003	2003	Not Reported	Not Reported	Not Reported	UN List 2003 reply. April 2003		Not Reported	English	Ministry of Natural Resources & Environment for Samoa
982	Pacific region protected areas	University of Queensland, Australia	2003	2003	Not Reported	Not Reported	Not Reported	Research on Pacific region protected areas by Joanna Axford, December 2003		Not Reported	English	None
983	Pacific region protected areas	University of Queensland, Australia	2004	2004	Not Reported	Not Reported	Not Reported	Research on Pacific region protected areas by Joanna Axford, 2004		Not Reported	English	None
984	Pacific region protected areas	University of Queensland, Australia	2005	2005	Not Reported	Not Reported	Not Reported	Research on Pacific region PAs by J. Axford, Nov 2005. Other sources: Ministère de l`écologie et du développement durable de France 2004. Les réponses en Nouvelle Calédonie; La réglementation de l`environnement en Province Sud, Nouvelle-Calédonie		Not Reported	English	None
986	Protected Areas of Vietnam	BirdLife International	2001	2001	Not Reported	Not Reported	Not Reported	Sourcebook of Existing & Proposed Protected Areas in Vietnam - BirdLife Int. (19/02/01), accessed 04/04/2005		Not Reported	English	None
988	UNESCO-MAB Biosphere Reserve	UNESCO-MAB	2004	2020	Not Reported	Not Reported	Not Reported	Updated using MAB website (updated 3rd June 2004), accessed June 2004 .Also: World Heritage Sites that are also Biosphere Reserves, July 2003		Not Reported	English	UNESCO-MAB
996	Protected Areas of Nigeria	Federal Ministry of Environment, Nigeria.	2007	2007	Not Reported	Not Reported	Not Reported	Personal communication. Matthew P.O. Dore, Director, Federal Ministry of Environment, Nigeria. (16/01/2007)		Not Reported	English	Federal Ministry of Environment, Nigeria.
1025	Protected Areas of Bahrain	Government - Supreme Council for Environment	2003	2022	Not Reported	World Geodetic Survey (WGS) 1984	Not Reported	Not Reported	Protected Areas of Bahrain, The Supreme Council for Environment, The Kingdom of Bahrain	Not Reported	English	Government - Supreme Council for Environment
1026	Protected Areas of Thailand	Not Reported	1996	1996	Not Reported	Not Reported	Not Reported	Previous Source: Official Agency reply to UN List 1996 request.		Not Reported	English	None
1028	Protected Areas of Antarctica	Not Reported	1992	1992	Not Reported	Not Reported	Not Reported	Previous Source: P. Dingwall, 1992.		Not Reported	English	None
1041	Protected areas of the Caribbean	UNEP Caribbean Environment Programme (CEP)	2002	2002	Not Reported	Not Reported	Not Reported	Technical reports for Puerto Rico No. 36 dated 1996, October 2002.	UNEP Caribbean Environment Programme (CEP) tech reports for Puerto Rico No. 36 dated 1996 (see doc link), October 2002.	Not Reported	English	None
1042	Pakistan Protected Areas	UNEP/IUCN	1988	1988	Not Reported	Not Reported	Not Reported	UNEP/IUCN, 1988.		Not Reported	English	None

1057	Protected Areas of Falkland Islands	Falkland Islands Government. If data are re-used, please acknowledge the Falkland Islands Government (data source) and the IMS-GIS data centre (data custodian)	1993	2016	Not Reported	Not Reported	Not Reported	Agency response to UN List 1993 data request		Not Reported	English	Falkland Islands Government. If data are re-used, please acknowledge the Falkland Islands Government (data source) and the IMS-GIS data centre (data custodian)
1061	Protected Areas of New Zealand	Department of Conservation (DOC), Te Papa Atawhai, Wellington, New Zealand	2005	2005	Not Reported	Not Reported	Not Reported	2003 UN List Updates		Not Reported	English	Department of Conservation (DOC), Te Papa Atawhai, Wellington, New Zealand
1110	Ile Pam	Not Reported	2005	2005	Not Reported	Not Reported	Not Reported	Personal communication. Simple formatting of the name		Not Reported	English	None
1251	UNESCO-MAB Biosphere Reserve	Bureau of the International Co-ordinating Council of the MAB Programme (MAB-ICC) (18th Sesssion), UNESCO HQ Paris	2004	2004	Not Reported	Not Reported	Not Reported	25-29 October 2004		Not Reported	English	None
1111	Marine Protected Areas in South East Asia	Ass. of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC), Univ. of Philippines Marine Science Institute (UP-MSI), Asian Bureau for Conservation (ABC), Dept. of Environment and Nat. Resources - Philippines (DENR)	2002	2002	Not Reported	Not Reported	Not Reported	Available at http://arcbc.defined.net/BIS	ASEAN, UP-MSI, ABC, ARCBC, DENR (2002) Marine Protected Areas in Southeast Asia. Los Banos, Philippines., ASEAN Regional Centre for Biodiversity Conservation, Dept. of Environment and Natural Resources,.142pp.	Not Reported	English	Ass. of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC),University of the Philippines Marine Science Institute (UP-MSI),Asian Bureau for Conservation (ABC), Dep. of Environment and Nat. Resources - Philippines (DENR)
1113	Mediterranean Marine Protected Areas	Not Reported	2005	2005	Not Reported	Not Reported	Not Reported	Available at http://www.wwf.fr/pdf/RepertoireAMP.pdf	Mabile, S. and Piante, C. (2005) Global Directory of Mediterranean Marine Protected Areas. WWF-France, Paris, France. xii + 132pp.	Not Reported	English	None
1115	Protected Areas of Hong Kong	Environmental Protection Department, Hong Kong	1999	1999	Not Reported	Not Reported	Not Reported	http://www.epd.gov.hk/epd/english/environmentinhk/eia_planning/sea/baseline.html	Environmental Protection Department (1999) Environmental Baseline Report Annex B - Sites of Special	Not Reported	English	Environmental Protection Department, Hong Kong

									Scientific Interest.			
1117	Protected Areas of Anguilla	Joint Nature Conservation Committee	2007	2022	Not Reported	World Geodetic System 1984 (EPSG:4326)	Not Reported	Boundary and attribute data prepared and finalised for submission in 2020	Contains information from Department of Natural Resources, Government of Anguilla	These data should not be distributed or used for any commercial purposes without due consent from the Government of Anguilla, Department of Natural Resources. The Government of Anguilla wish to be alerted when the data are used for official purposes.	English	Department of Natural Resources, Government of Anguilla
1120	Marine Protected Areas Iran	Department of Natural Resources, Isfahan University of Technology, Iran	2005	2005	Not Reported	Not Reported	Not Reported	Personal communication. Iran MPA data. Received by Yousefi, R. via Email.		Not Reported	English	None
1121	Marine protected areas in the Red Sea and Gulf of Aden	The Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden (PERSGA) & Global Environmental Facility (GEF)	2002	2002	Not Reported	Not Reported	Not Reported	Available at http://www.persga.org/Publications/Technical/Technical.asp	PERSGA and GEF 2002. The Red Sea and Gulf of Aden Regional Network of Marine Protected Areas. Regional Master Plan. PERSGA Technical Series No.1. PERSGA, Jeddah, Saudi Arabia	Not Reported	English	None

1125	Protected Areas of Hong Kong	Agriculture Fisheries and Conservation Department Country and Marine Parks Authority, Hong Kong	2004	2004	Not Reported	Not Reported	Not Reported	http://parks.afcd.gov.hk/newmarine/eng/0parks_info/p2.htm		Not Reported	English	Agriculture Fisheries and Conservation Department Country and Marine Parks Authority, Hong Kong
1127	Protected Areas of Hong Kong	UNEP-WCMC	2005	2005	Not Reported	Not Reported	Not Reported	Marine Parks Ordinance 1995. 37 (www.legislation.gov.hk/blis_export.nsf/CurAllEngDocAgent?OpenAgent&Chapter=476); Agriculture Fisheries and Conservation Department Country & Marine Parks Authority Management Plan (parks.afcd.gov.hk/newmarine/eng/Oparks_i		Not Reported	English	None
1142	Phoenix Islands Protected Area	Ministry of Environment, Lands and Agricultural Development, Kiribati	2008	2017	Not Reported	WGS 84	Not Reported	Original 2008 boundary from Phoenix Islands Protected Area Information Factsheet, Republic of Kiribati - Min. of Environment, Lands and Agricultural Development, CI and New England Aquarium. approx. date February 2008 from www.phoenixislands.org		Not Reported	English	Ministry of Environment, Lands and Agricultural Development, Kiribati
1146	Association pour le Sauvegarde de la Nature Caladonienne	Association pour le Sauvegarde de la Nature Caladonienne, Noumea	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1174	Krymskoye	IUCN	1977	1977	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1175	Teluk Ambon	Not Reported	1991	1991	Not Reported	Not Reported	Not Reported	Personal communication		Not Reported	English	None
1196	Segara Anakan, Indonesia	World Nat. Parks Con., Indonesia	1982	1982	Not Reported	Not Reported	Not Reported	Cons. and Manag. of Man.' 1982		Not Reported	English	None
1201	Protected areas of Saint Kitts and Nevis	Department of Environment	1986	2020	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Department of Environment
1202	Protected Areas Pakistan	IUCN/WCMC	1988	1988	Not Reported	Not Reported	Not Reported	Baluchistan Report		Not Reported	English	None
1208	Protected Areas Montserrat	Sarita Francis. Montserrat National Trust	1996	2020	Not Reported	Not Reported	Not Reported	In litteris - in a letter or other documented correspondence		Not Reported	English	Sarita Francis. Montserrat National Trust
1209	Protected areas Yemen	UNEP/IUCN	1988	1988	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1218	Hawkes Bay/Sandspit Beaches	Not Reported	1981	1981	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None

1223	Protected Areas of Kuwait	Environmental Monitoring Information System of Kuwait (eMISK), Environmental Inspection, Monitoring and Emergency Department (EIMED), Biodiversity and Living Resources Department, Environment Public Authority (EPA), Kuwait	2012	2016	UTF-8	WGS 84	100000	Provided by eMISK	Environmental Monitoring Information System of Kuwait (eMISK), Kuwait Environment Public Authority, 2012 [www.beatona.net and www.emisk.org].	Not Reported	English and Arabic	Environmental Monitoring Information System of Kuwait (eMISK), Environmental Inspection, Monitoring and Emergency Department (EIMED), Biodiversity and Living Resources Department, Environment Public Authority (EPA), Kuwait
1245	Indigenous areas Brazil	BGE e Diretoria do Serviço Geográfico (DSG), Sistema de Terras Indígenas (STI) da Fundação Nacional do Índio (FUNAI) /DAF, Brazil	2005	2005	Not Reported	Not Reported	Not Reported	Base cartográfica do IBGE e DSG, escalas 1:25.000; 1:50.000; 1:100.000; 1: 250.000; 1:1.000.000. Dados literais extraídos do STI (Sistema de Terras Indígenas) da FUNAI/DAF, 10/10/2005.		Not Reported	English	BGE e Diretoria do Serviço Geográfico (DSG), Sistema de Terras Indígenas (STI) da Fundação Nacional do Índio (FUNAI) /DAF, Brazil
1246	Protected Areas	Projet Conseiller Forestier (PCF), Guinea	2000	2000	Not Reported	Not Reported	Not Reported	Basic map supplied by Chris Duvall and attributes taken from Projet Conseiller Forestier (PCF) - Sur la Diffusion de la Législation Forestière Guinéenne (21-23 Nov 2000) Report, accessed 10/03/2005.		Not Reported	English	None
1252	UNESCO-MAB Biosphere Reserve	Bureau of the International Co-ordinating Council of the MAB Programme (MAB-ICC) (19th Sesssion), UNESCO HQ Paris	2005	2005	Not Reported	Not Reported	Not Reported	27-29 June 2005		Not Reported	English	None
1254	Mai Po Marshes (Inner Deep Bay)	Not Reported	1998	1998	Not Reported	Not Reported	Not Reported	In litteris - in a letter or other documented correspondence		Not Reported	English	None
1279	Belarus Protected Areas Map	Not Reported	1996	1996	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1345	UNESCO-MAB Biosphere Reserve	UNESCO-MAB	2006	2006	Not Reported	Not Reported	Not Reported	Updated using MAB website (updated 9th June 2006), accessed 9th June 2006.		Not Reported	English	UNESCO-MAB
1347	Protected Areas of Iran	Department of Environment (DOE), Bureau of Habitats and Protected Areas, Iran	2003	2003	Not Reported	Not Reported	Not Reported	Bureau of habitats and protected areas as of 31/07/2002. UN List 2003 reply, May 2003		Not Reported	English	Department of Environment (DOE), Bureau of Habitats and Protected Areas, Iran
1349	UNESCO-MAB Biosphere Reserve	Dept of G & W	2007	2007	Not Reported	Not Reported	Not Reported	MAB website (updated 28th December 2006), and Environment News Service http://www.ens-newswire.com/ens/oct2006/2006-10-30-05.asp, both accessed 2nd January 2007.		Not Reported	English	Dept of G & W

1352	Sri Lanka Sanctuaries	Sri Lanka Wildlife Conservation Society (SLWCS) & Department of Wildlife Conservation (DWLC)	2005	2005	Not Reported	Not Reported	Not Reported	Accessed 19/04/2005.		Not Reported	English	Sri Lanka Wildlife Conservation Society (SLWCS) & Department of Wildlife Conservation (DWLC)
1356	Protected Areas of Belarus	Department of Environment and Protection, Belarus	1996	1996	Not Reported	Not Reported	Not Reported	Reply to UN List 1996 request, 16/7/96.		Not Reported	English	Ministry of the Environmental Protection, Belarus
1359	Forest reserves Nigeria	Federal Department of Forestry, Nigeria	1978	1978	Not Reported	Not Reported	Not Reported	NIRAD Vegetation and Land Use Maps (1978) (Services Ltd)		Not Reported	English	Federal Department of Forestry, Nigeria
1360	Other Protected Areas of Samoa	Environment Planning for Tourism Secretariat of the Pacific Regional Environment Programme (SPREP)	1988	1988	Not Reported	Not Reported	Not Reported	Environment Planning for Tourism. Protected Areas data taken from Firth, N. and Darby, C..	Firth, N. and Darby, C. "Environmental Planning for Tourism in Western Samoa", Environment Planning for Tourism Secretariat of the Pacific Regional Environment Programme (SPREP)	Not Reported	English	None
1371	Game Reserves in Nigeria	Nigerian Conservation Foundation	1991	1991	Not Reported	Not Reported	Not Reported	Mackinnon, 1986 and Nigerian Conservation Foundation, 1991.		Not Reported	English	None
1377	Kuyambana	National Parks Service, Nigeria	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	National Parks Service, Nigeria
1381	Protected Areas of St Helena	Environment Planning & Development Section, St Helena	2005	2005	Not Reported	Not Reported	Not Reported	Official Agency (Environment Planning & Development Section, St Helena) reply to UN List 2003 Request, April 2003. Reviewed using existing source, June 2005.		Not Reported	English	Environment Planning & Development Section, St Helena
1385	Conservation Areas in Nepal	Department of National Parks and Wildlife Conservation (DNPCWC), Ministry of Forests and Soil Conservation, Nepal	2003	2003	Not Reported	Not Reported	Not Reported	Government focal point received via D. Joshi (IUCN Nepal). Official reply UN List 2003 request, June 2003.		Not Reported	English	Department of National Parks and Wildlife Conservation, Nepal
1387	Malawi - Zambia Transfrontier (Malawi section)	Peace Parks Foundation	2004	2004	Not Reported	Not Reported	Not Reported	News Article entitled "Malawi/Zambia MoU signed" dated 16/08/2004, accessed 04/05/2005.		Not Reported	English	None
1393	Protected Areas Brunei Darussalam	Forestry Department, Brunei Darussalam	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Forestry Dept. National Report, unknown date.		Not Reported	English	Forestry Department, Brunei Darussalam
1394	Protected Areas Brunei Darussalam	Not Reported	1991	1991	Not Reported	Not Reported	Not Reported	Othman and Ramos, 1991 & Wong, unknown date.		Not Reported	English	None

1405	Protected Areas Andorra	Department of Environment, Andorra	1993	2017	Not Reported	Not Reported	Not Reported	From Department of Environment, Andorra		Not Reported	English	Department of Environment, Andorra
1414	Protected Areas ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2004	2004	Not Reported	Not Reported	Not Reported	ASEAN Dataset supplied by ARCBC (dataset date 2004), April 2005 Other source: Sourcebook of Existing & Proposed Protected Areas in Vietnam - BirdLife Int. (19/02/01), accessed 04/04/2005.		Not Reported	English	None
1428	Nguna Pele Marine Reserve	UNEP-WCMC	2007	2007	Not Reported	Not Reported	Not Reported	Nguna-Pele Marine Protected Areas website, accessed 15th May 2007.; Previous Info: Director, Vanuatu Protected Areas Initiative, Wan Tok Environment Centre, Santo, Vanuatu supplied updated attributes for UN List 2003 update, July 2003.		Not Reported	English	None
1429	UNESCO-MAB Biosphere Reserve	UNESCO-MAB	2006	2006	Not Reported	Not Reported	Not Reported	MAB website (updated 28th December 2006), accessed 2nd January 2007.		Not Reported	English	UNESCO-MAB
1442	Uganda Wildlife Authority's protected areas	Uganda Wildlife Authority	1993	2020	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Uganda Wildlife Authority
1443	Chad Basin	National Parks Service, Nigeria	2003	2003	Not Reported	Not Reported	Not Reported	Reply to UN List 2003 request, July 2003. Previous Source: National Parks Service, 1993.		Not Reported	English	Nigeria National Park Service
1450	Other Areas of Benin	Not Reported	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1451	Protected areas of Lao	IUCN	1993	1993	Not Reported	Not Reported	Not Reported	Protected area system planning		Not Reported	English	None
1454	UNESCO-MAB Biosphere Reserve	UNESCO-MAB	2006	2006	Not Reported	Not Reported	Not Reported	Accessed 01/06/2006. Previous Source: RAMSAR website, accessed 6th Aug 2003.		Not Reported	English	UNESCO-MAB
1457	UNESCO-MAB Biosphere Reserve	UNESCO-MAB	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	UNESCO-MAB
1487	Huang Shan	Not Reported	1988	1988	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1861	National PA Registry of Colombia- RUNAP	Parques Nacionales Naturales de Colombia	2014	2022	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English and Spanish	Parques Nationales Naturales de Colombia
1496	Fort George	Department of Environment, Heritage and Park, Ministry of Natural Resources, Turks and Caicos Islands	1992	1992	Not Reported	Not Reported	Not Reported	In litteris - in a letter or other documented correspondence		Not Reported	English	Department of Environment, Heritage and Park, Ministry of Natural Resources, Turks and Caicos Islands

1513	Protected Areas of Saudi Arabia	National Commission for Wildlife Conservation and Development (NCWCD), Saudi Arabia	2003	2017	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	National Commission for Wildlife Conservation and Development (NCWCD), Saudi Arabia
1516	Brunei Forest Resources and Strategic Planning Study	Forest Department, Brunei	1988	1988	Not Reported	Not Reported	Not Reported	Distribution and areas of forest types obtained from Brunei Forest Resources and Strategic Planning Study, prepared by Anderson and Marsden (1988), consultants to the Forest Department.		Not Reported	English	Forest Department, Brunei
1526	Protected Areas ASEAN (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam)	Association of Southeast Asian Nations (ASEAN) Regional Centre for Nature Conservation (ARCBC)	2003	2003	Not Reported	Not Reported	Not Reported	Dataset supplied by ARCBC (Asean Regional Centre for Nature Conservation) to be used for UN List 2003 updates, June 2003.		Not Reported	English	None
1629	Cape Shirreff, Livingston I., S. Shetland Is.	Not Reported	1989	1989	Not Reported	Not Reported	Not Reported	Antarctica Treaty Consultative Meeting XV Paris, 9-20 Oct 1989.		Not Reported	English	None
1630	Soufriere Marine Management Association Website	UNEP-WCMC	2004	2004	Not Reported	Not Reported	Not Reported	Soufriere Marine Management Association Website, accessed 10/08/2004.		Not Reported	English	None
1631	Hertenrits	Natuurbeschermingscommissie - Nature Protection Commission, c/o Nature Conservation Div. of the Forest Service, Suriname	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Natuurbescherming Commissie - Nature Protection Commission, c/o Nature Conservation Div. of the Forest Service, Suriname
1634	Protected Areas of Thailand	Not Reported	1996	1996	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1637	Cholistan	Not Reported	1986	1986	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1639	Protected Areas	Not Reported	1976	1976	Not Reported	Not Reported	Not Reported	State Committee of Forestry of Uzbekistan, Tashkent.		Not Reported	English	None
1640	Protected areas of Haiti	Fondation pour la Protection de la Biodiversité Marine (FoProBiM) - Haiti	1986	2021	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Ministère de l'Environnement
1643	Protected areas of Iran	Not Reported	1975	1975	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1647	Protected areas of Yemen	Not Reported	1990	1990	Not Reported	Not Reported	Not Reported	Environmental report of Yemen		Not Reported	English	None
1648	Baturiya Wetlands	Not Reported	1991	1991	Not Reported	Not Reported	Not Reported	Personal communication		Not Reported	English	None

1649	Game reserves of Nigeria	Ministry of Agriculture and Natural Resources (MANR), Nigeria	1986	1986	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Ministry of Agriculture and Natural Resources (MANR), Nigeria
1657	Jabal Bura valley forest	Not Reported	1985	1985	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1666	Tamba	Not Reported	1991	1991	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	None
1675	Specially Protected Areas of Mediterranean Importance	Regional Activity Centre for Specially Protected Areas (RAC/SPA)	2012	2020	UTF-8	WGS 84	Various	Information based on List of Specially Protected Areas of Mediterranean Importance, March 2012, and website http://www.rac-spa.org/spami		Not Reported	English	None
1676	Forest Reserves of Malawi	Department of Forestry, Malawi	1993	1993	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	Not Reported	Department of Forestry, Malawi
1678	Protected Areas of the British Indian Ocean Territory	British Indian Ocean Territory (BIOT) Section, Overseas Territories Directorate, Foreign & Commonwealth Office, London	1998	2017	UTF-8	WGS 84	Not Reported	Coordinates provided by the Foreign and Commonwealth Office converted into polygon format		Not Reported	English	British Indian Ocean Territory (BIOT) Section, Overseas Territories Directorate, Foreign & Commonwealth Office, London
1679	South Georgia and South Sandwich Islands Marine Protected Area	Government of South Georgia & South Sandwich Islands, Government House, Stanley, Falkland Islands	2012	2019	UTF-8	South_Georgia_Lambert_Conformal_Conic	Not Reported	Information provided by Government of South Georgia & South Sandwich Islands and from management plan, with polygon provided via the British Antarctic Survey		Not Reported	English	Government of South Georgia & South Sandwich Islands, Government House, Stanley, Falkland Islands
1682	Haut Niger National Park - Kouya Core Area	Bissau Guinea Transboundary Proposed Park (under Appui à la Gestion Intégrée des Ressources (Programme Régional) - AGIR- Project)	2004	2004	Not Reported	Not Reported	Not Reported	Personal communication. David Brugiere, Principal Technical Advisor of Guinea - Bissau Guinea Transboundary Proposed Park (under AGIR Project), January 2004.		Not Reported	English	None
1686	Marine Managed Areas (MMAs) in the Pacific	The WorldFish Center, ReefBase Project, Penang, Malaysia	2008	2008	UTF-8	WGS 84	Not Reported	Dataset compiled by Govan et al 2009 in a SPREP/WWF/WorldFish ReefBase Project. Co-authors worked with communities & national country agencies to obtain data & approved by them for public release - publicly available on pacificgis.reefbase.org since 2009	World Database on Protected Areas (WDPA), Govan et al. 2009, & ReefBase (2008) Marine Managed Areas (MMAs). http://www.sprep.org/att/publication/000646_LMMA_report.pdf and http://reefgis.reefbase.org	Not Reported	English	None
1687	Myanmar Protected Areas	Ministry of Natural Resources and Environmental Conservation	2011	2020	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English	Ministry of Natural Resources and Environmental Conservation

1700	LMMAs of the Western Indian Ocean Database	Blue Ventures, London, UK	2012	2012	Not Reported	WGS 84	Not Reported	Produced using Google Earth and exported to ArcGIS	Blue Ventures Conservation (2012), LMMAs of the Western Indian Ocean Database. Toliara, Madagascar: Blue Ventures Conservation. 23 August 2012	Protected areas are accurate to the best of our knowledge, but specific locations for LMMAs less than 50 km in size may vary from true values.	English	None
1706	Protected Areas of Israel	Nature and National Parks Protection Authority, Israel (INPA)	2011	2020	ANSI	GCS Israel	Not Reported	GIS shapefiles and attribute information provided		Not Reported	English	Nature and National Parks Protection Authority, Israel (INPA)
1707	Protected Areas of Armenia, Azerbaijan, Georgia and Turkey	WWF Caucasus Office, 11 Alkesidze Street, 0193 Tbilise, Georgia	2011	2011	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English	WWF Caucasus Office, 11 Alkesidze Street, 0193 Tbilise, Georgia
1708	Forest Reserves of Uganda	National Forestry Authority, Plot 10/20, Spring Road, P.O. Box 70863, Kampala, Uganda	2011	2021	ANSI	WGS 84	Not Reported	Status Year, Reported Area and Names were reviewed and ammended as necessary. Boundaries were not updated but restored from a previous version of the WDPA (2007).	Not Reported	Not Reported	English	National Forestry Authority, Plot 10/20, Spring Road, P.O. Box 70863, Kampala, Uganda
1709	Protected Areas of Uruguay	Sistema Nacional de Areas Protegidas (SNAP), Ministerio de Vivienda y Ordenamiento Territorial y Medio Ambiente	2016	2021	UTF-8	WGS 84	50000	Spatial data provided by SNAP in September 2016		Not Reported	English	Sistema Nacional de Areas Protegidas (SNAP), Ministerio de Vivienda y Ordenamiento Territorial y Medio Ambiente
1714	Protected areas and community conservation areas in Kenya	African Wildlife Foundation (AWF)	2012	2012	ANSI	WGS 84 and GCS_Arc_1960	Not Reported	Data for Samburu (Kenya), Kilimanajro (Kenya/Tanzania) and Maasai Mara (Kenya) regions derived from various sources (topographic maps, partners, GPS).		Not Reported	English	None
1715	Community-owned conservancies in Kenya	Northern Rangelands Trust (NRT), Kenya	2012	2012	ANSI	WGS 84	Not Reported	These conservancies, under the umbrella of NRT, are autonomous institutions that represent a constituent/resident community over defined geog. area (community have legal/traditional land ownership) for purposes of wildlife cons. & rangeland management		Not Reported	English	None

1738	Protected Areas of Botswana	Department of Wildlife and National Parks, Botswana	2013	2013	GCS GRS 1980	WGS 84	Not Reported	Not Reported		Not Reported	English	Department of Wildlife and National Parks, Botswana
1744	National Parks of Tanzania	Tanzania National Parks (TANAPA)	2013	2016	UTF-8	UTM Arc1960 Zone 36S	Not Reported	Not Reported	Not Reported	Not Reported	English	Tanzania National Parks (TANAPA)
1747	Forest Reserves of Tanzania	Tanzania Forest Services (TFS) Agency	2013	2021	UTF-8	UTM Arc1960 Zone 36S	Not Reported	Spatial data on 555556107, 31762 and 31764 originally from GIS Section, Land Use Commission, Division of Forestry and Beekeeping, Ministry of Natural Resources and Tourism, Tanzania	Not Reported	Not Reported	English	Tanzania Forest Services (TFS) Agency
1773	Protected Areas of New Zealand	Department of Conservation (DOC), Te Papa Atawhai, Wellington, New Zealand	2014	2018	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English	Department of Conservation (DOC), Te Papa Atawhai, Wellington, New Zealand
1775	Privately protected areas of Kenya	Zeitz Foundation, Kenya	2014	2014	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	None
1777	Protected Areas of Singapore	National Biodiversity Centre, National Parks Board, Singapore	2014	2014	Not Reported	Not Reported	Not Reported	Reply to 2014 UN List Request		Not Reported	English	National Biodiversity Centre, National Parks Board, Singapore
1778	Protected Areas of Nepal	Department of National Parks and Wildlife Conservation (DNPCWC), Ministry of Forests and Soil Conservation, Nepal	2014	2014	Not Reported	Not Reported	Not Reported	Reply to 2014 UN List Request and WDPA expert review in Asia Project		Not Reported	English and Nepalese	Department of National Parks and Wildlife Conservation (DNPCWC), Ministry of Forests and Soil Conservation, Nepal
1779	Protected Areas and OECMs of Morocco	Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification (HCEFLCD)	2014	2021	Not Reported	GCS_Merchich_Degree, Clarke_1880_IGN	Not Reported	Not Reported	Not Reported	Not Reported	English and French	Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification (HCEFLCD)
1780	Protected Areas of Georgia	Agency of Protected Areas; Ministry of Environmental Protection and Agriculture	2014	2022	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English	Agency of Protected Areas; Ministry of Environment and Natural Resources Protection of Georgia
1797	Protected Areas of Bangladesh	Bangladesh Forest Department	2014	2014	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English and Bengali	Bangladesh Forest Department
1798	Protected Areas of The Gambia	Department of Parks and Wildlife Management and National Environment Agency, Banjul, The Gambia	2014	2020	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English and Bengali	Department of Parks and Wildlife Management, The Gambia

1800	Protected Areas of Bhutan	Nature Conservation Division, Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Govt of Bhutan	2014	2022	Not Reported	GCS_DRUKREF_03	Not Reported	Not Reported	DoFPS 2020. Protected Areas of Bhutan, Department of Forests and Park Services, Royal Government of Bhutan, Thimphu.	Not Reported	English	Nature Conservation Division
1801	Protected Areas of the Comoros	Ministry of Agriculture, Fisheries and the Environment	2014	2022	Not Reported	UTM/WGS1984/ZONE 38°S	Not Reported	Les données cartographiées prises sur la base de données géographique du département sig du ministère de la production, mise à jour des données à partir des relevés gps de terrain	Direction de l'environement et des forets et Autorite Compentente pour les Comores, 2014	Not Reported	English	Ministry of Agriculture, Fisheries and the Environment
1802	Protected Areas of Brazil	Departamento de Áreas Protegidas, Secretaria de Biodiversidade e Florestas, Ministério do Meio Ambiente	2014	2020	UTF-8	GCS_SIRGAS_2000	Not Reported	Not Reported		Not Reported	English and Portuguese	Ministério do Meio Ambiente
1803	Protected Areas of Mongolia	Ministry of Environment and Tourism of Mongolia	2014	2020	Not Reported	WGS 84	Not Reported	Ministry of Environment and Tourism of Mongolia		Not Reported	English	Ministry of Environment and Tourism of Mongolia
1804	Protected Areas of Australia	Department of Agriculture, Water and the Environment	2014	2021	Not Reported	Geocentric Datum of Australia 1994	Not Reported	Not Reported		Not Reported	English	Department of Agriculture, Water and the Environment
1805	Protected Areas of United Arab Emirates	Director, Biodiversity Department, Environment Affair and Nature Conservation Sector, Ministry of Climate Change and Environment	2014	2020	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English	Director, Biodiversity Department, Environment Affair and Nature Conservation Sector, Ministry of Climate Change and Environment
1806	Protected Areas of Sierra Leone	Ministry of the Environment	2014	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Ministry of the Environment
1807	Protected Areas of Antigua and Barbuda	Chief Environment Officer, The Environment Division, Ministry of Environment, Government of Antigua and Barbuda	2014	2021	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English	Chief Environment Officer, The Environment Division, Ministry of Environment, Government of Antigua and Barbuda
1808	Protected Areas System of Chile	Ministerio del Medio Ambiente, Division de Recursos Naturales, Renovables y Biodiversidad	2016	2020	ANSI	WGS_1984_UTM_Zone_19S	Not Reported	Not Reported		Not Reported	English and Spanish	Ministerio del Medio Ambiente, Division de Recursos Naturales, Renovables y Biodiversidad
1809	Protected Areas of Saint Vincent and the Grenadines	Permanent Secretary, Ministry of Health, Wellness and the Environment	2014	2014	ANSI	WGS_1984_UTM_Zone_20N	Not Reported	Not Reported		Not Reported	English	Permanent Secretary, Ministry of Health, Wellness and the Environment

1811	Protected Areas of Peru	Operativa Funcional de Gestion de la Informacion del SERNANP; Responsable de la Gestión del Información Espacial del SERNANP	2016	2022	ANSI	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Spanish	Operativa Funcional de Gestion de la Informacion del SERNANP; Responsable de la Gestión del Información Espacial del SERNANP
1812	Protected Areas of Tajikistan	National Center for Biodiversity and Biosafety	2014	2014	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	National Center for Biodiversity and Biosafety
1813	Protected Areas of Algeria	Algeria NPF and PoWPA FP	2014	2020	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English and French	Algeria NPF and PoWPA FP
1814	Protected Areas of Egypt	Egyptian Environmental Affairs Agency, Ministry of Environment	2014	2014	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Egyptian Environmental Affairs Agency, Ministry of Environment
1815	Protected Areas of Kyrgyzstan	Department of International Cooperation. State Agency on Environment Protection and Forestry of the Kyrgyz Republic	2014	2014	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Department of International Cooperation. State Agency on Environment Protection and Forestry of the Kyrgyz Republic
1816	Protected Areas of Lebanon	Department of Ecosystems, Ministry of Environment	2014	2021	Not Reported	WGS 1984 UTM Zone 36N; Deir ez Zor Levant Zone; Deir ez Zor Levant Stereographic; no spatial reference	Not Reported	Not Reported		Not Reported	English	Department of Ecosystems, Ministry of Environment
1818	Protected Areas of Niger	Niger NPF and PoWPA FP	2014	2020	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	French	Ministère de l'Environnement, de la Salubrité Urbaine et du Développement Durable (MESU/DD), Niger
1819	Protected Areas of Mauritius	National Parks and Conservation Service, Ministry of Agro Industry and Food Security	2014	2014	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	National Parks and Conservation Service, Ministry of Agro Industry and Food Security
1820	Protected Areas of Sudan	Sudan NPF and PoWPA FP	2014	2014	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Sudan NPF and PoWPA FP
1821	Protected Areas of Namibia	Directorate of Wildlife and National Parks (DWNP), Ministry of Environment and Tourism	2014	2014	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Directorate of Wildlife and National Parks (DWNP), Ministry of Environment and Tourism
1822	Protected Areas of Angola	Ministério do Ambiente	2014	2014	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English and Portuguese	Ministério do Ambiente
1824	Protected Areas of Togo	Direction des ressources forestieres	2014	2018	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English and French	Direction des ressources forestieres

1825	Protected Areas of Azerbaijan	Ministry of Ecology and Natural Resources; Azerbaijan NFP and PoWPA FP	2014	2019	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Ministry of Ecology and Natural Resources; Azerbaijan NFP and PoWPA FP
1826	Protected Areas of Cote d'Ivoire	Office Ivoirien des Parcs et Reserves	2014	2020	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English and French	Office Ivoirien des Parcs et Reserves
1828	Protected Areas of Mozambique	National Administration of Conservation Areas (ANAC)	2014	2021	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	National Administration of Conservation Areas (ANAC)
1829	Protected Areas of Zimbabwe	Zimbabwe Parks and Wildlife Management Authority	2014	2020	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English	Zimbabwe Parks and Wildlife Management Authority
1832	Natura 2000	Directorate-General for Environment (EU) via EEA	2014	2022	UTF-8	EPSG:3035	16667:40:00	http://www.eea.europa.eu/data-and-maps/data/natura-7	Natura 2000 data - the European network of protected sites	There are specific terms and conditions relating to the use of downloaded boundary data within the United Kingdom. If you intend to use the UK data you must first agree to the end user licence http://www.jncc.gov.uk/page-5232.	English	European Environment Agency (EEA)
1833	Protected Areas of Jordan	The Royal Society for the Conservation of Nature, Jordan	2014	2022	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Arabic	The Royal Society for the Conservation of Nature, Jordan
1834	Natural Park of the Coral Sea, New Caledonia	Direction des affaires maritimes de la Nouvelle-Calédonie	2014	2014	Not Reported	RGNC_1991_93_Lambert_New_Caledonia	Not Reported	Not Reported		http://ec.europa.eu/environment/nature/natura2000/db_gis/index_en.htm#sites	English and French	Direction des affaires maritimes de la Nouvelle-Calédonie

1835	Protected Areas of Djibouti	Direction de l'Aménagement du Territoire et de l'Environnement/ Ministère de l'Habitat, de l'Urbanisme et de l'Environnement	2014	2014	Not Reported	Not Reported	Not Reported	Polygons created from latitudes & longitudes from documents submitted by the Ministry of the Environment		Not Reported	French	Direction de l'Aménagement du Territoire et de l'Environnement/ Ministère de l'Habitat, de l'Urbanisme et de l'Environnement
1836	Protected Areas and OECMs of Eswatini	Swaziland National Trust Commission	2014	2021	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Swaziland National Trust Commission
1838	Protected Areas of Armenia	Ministry of Nature Protection, Armenia	2014	2022	Not Reported	WGS 84	Not Reported	Attribute data provided by the Ministry of Nature Protection, Armenia, 2014. Spatial data from metadata IDs 1707 and 1711 (WWF Caucasus office, Georgia), 2011/2012		Not Reported	English	Ministry of Nature Protection, Armenia
1862	Protected Areas of Marshall Islands	Marshall Islands Marine Resources Authority (MIMRA)	2015	2015	Not Reported	WGS 84	Not Reported	Point data previously from metadata IDs 758 and 984		Not Reported	English	Marshall Islands Marine Resources Authority (MIMRA)
1864	Protected Areas of Czech Republic	Not Reported	2015	2015	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	Not Reported
1865	Protected Areas of Fiji	National Trust of Fiji	2015	2015	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	National Trust of Fiji
1839	Common Database on Designated Areas as provided by the European Environment Agency (EEA)	European Environment Agency (EEA)	2014	2020	ANSI	EPSG:3035 converted to WGS 84	Various	Submitted by National Reference Centres to the European Environment Agency's ReportNet then collated by the European Topic Centre on Biological Diversity and formatted for the WDPA including only records with dissemination code '01'.	The Common Database on Designated Areas (CDDA) https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-12#tab-metadata	Unless otherwise indicated, re-use of content for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged. Copyright holder: EEA, Estonian Environmental Register 01.01.2017, ©Finnish Environm	Multiple	European Environment Agency (EEA)

										ent Institute, 2017		
1840	South Africa Protected Areas Database (SAPAD) and South Africa Conservation Area Database (SACAD)	Department of Environment, Forestry and Fisheries	2014	2022	US-ASCII	GCS_WGS_1984	1/5000	Was Department of Environmental Affairs until 2019. We recieve quarterly updates in line with the updates to SAPAD.		Not Reported	English	Department of Environment, Forestry and Fisheries
1841	Protected Areas and OECMS of the Philippines	Biodiversity Management Bureau, Department of Environment and Natural Resources	2014	2021	Not Reported	Not Reported	Not Reported	Data first provided as an output of WDPA expert review in Asia project	Not Reported	Not Reported	English	Biodiversity Management Bureau, Department of Environment and Natural Resources
1844	Protected Areas of Belize	National Biodiversity Office	2014	2020	ANSI	NAD_1927_UTM_Zone_16N	Not Reported	Not Reported		Not Reported	English	National Biodiversity Office
1845	Protected Areas of Ascension Island	Conservation Office, Ascension Island Government	2014	2021	Not Reported	WGS_1984_UTM_Zone_28S	Not Reported	Not Reported		Not Reported	English	Conservation Office, Ascension Island Government
1846	Privately protected areas of the UK	Putting Nature on the Map, IUCN	2014	2017	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English	IUCN WCPA UK Assessment Panel
1847	Protected Areas of South Sudan	South Sudan National Wildlife Service (SSWS); Wildlife Conservation Society (WCS) South Sudan Program	2014	2014	Not Reported	WGS 84	Not Reported	Various historical conservation documents (inc. GoS. 1982. Wildlife Information Booklet, MWCT, Dept' of Wildlife Management, Southern Region). Adjustments and expansions based on ecological and socioeconomic research conducted by WCS/SSWS, 2007 - 2014.	SSWS and WCS (2014) Protected Areas of South Sudan (version 2).	Protected area boundaries and designations are indicative and may be subject to adjustment and revision based on gap assessment and ground truthing processes. Changes might	English	South Sudan National Wildlife Service (SSWS); Wildlife Conservation Society (WCS) South Sudan Program

										include adjusted boundaries, new PAs and extensions.		
1848	Protected Areas Database of the United States (PADUS 2.1)	U.S. Geological Survey | Science Analytics and Synthesis | Gap Analysis Project (GAP) | Protected Areas Database of the United States 2.1	2014	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	U.S. Geological Survey | Science Analytics and Synthesis | Gap Analysis Project (GAP) | Protected Areas Database of the United States 2.1
1849	L'Agence des aires marines protégées	L'Agence des aires marines protégées	2014	2014	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	French	None
1850	Base de Datos Geográfica de Áreas Naturales Protegidas Federales, Sitios Ramsar, UNESCO-MAB, Patrimonio Mundial de México	Comisión Nacional de Áreas Naturales Protegidas (CONANP)	2014	2022	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English and Spanish	Comisión Nacional de Áreas Naturales Protegidas(CONANP)
1851	Protected Areas of Iraq	Ministry of Environment of Iraq	2014	2020	ANSI	WGS 84	Not Reported	No database for storing the currently available information on PAs in Iraq exists. We provide a shp in ESRI format with information concerning: the name, coordinates, brief description, status, type of designation, reported area		Not Reported	English and Arabic	Ministry of Health and Environment of Iraq, Department of International Environmental Relations
1852	Areas Protegidas Provinciales, Reservas de Biosfera MaB-UNESCO, Sitios RAMSAR and Bienes de Patrimonio Mundial Natural y Cultural de Argentina	Grupo de Trabajo sobre Áreas Protegidas Subsecretaría de Planificación y Política Ambiental Secretaría de Ambiente y Desarrollo Sustentable	2018	2018	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English and Spanish	Grupo de Trabajo sobre Áreas Protegidas Subsecretaría de Planificación y Política Ambiental Secretaría de Ambiente y Desarrollo Sustentable
1853	Protected areas of Indonesia	Ministry of Forestry(MoF) Ministry of Marine Affairs & Fisheries (MMAF)	2014	2018	Not Reported	WGS 84	Not Reported	Data provided as an output of WDPA expert review in Asia project. For MPAs Indonesian MPA database was used for cross checking of the data provided. (http://kkji.kp3k.kkp.go.id/index.php/en/m		Not Reported	English	Ministry of Forestry(MoF) Ministry of Marine Affairs & Fisheries (MMAF)

								arine-protected-area-data)				
1854	Protected areas in Sri Lanka	Forest Department of Sri Lanka	2015	2015	Not Reported	GCS_Kandawala	Not Reported	Data provided as an output of WDPA expert review in Asia project.		Not Reported	English	Forest Department of Sri Lanka
1856	Ramsar Wetlands of International Importance	Ramsar Secretariat, on behalf of Ramsar Contracting Parties	2015	2020	ANSI	WGS 84	Various	Contracting Parties create the original shapefiles used for the official maps and send these to Ramsar Secretariat. Sites are retrieved from: https://rsis.ramsar.org/	Ramsar Convention and Wetlands International (2016), Ramsar Sites Information Service [On-line]	Not Reported	Multiple	Ramsar Secretariat, on behalf of Ramsar Contracting Parties
1857	Protected Areas of the Maldives	"Ministry of Environment and Energy, Environment Protection Agency"	2014	2020	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	Ministry of Environment and Energy Environment Protection Agency
1858	Protected Area for Terres Australes et Antarctiques Françaises	Direction de la Conservation du Patrimoine Naturel, Terres Australes et Antarctiques Françaises	2015	2017	UTF-8	WGS 84	Not Reported	http://www.reserves-naturelles.org/terres-australes-francaises		Not Reported	French	Direction de la Conservation du Patrimoine Naturel, Terres Australes et Antarctiques Françaises
1859	Protected Areas of the Bahamas	Bahamas National Trust	2014	2020	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Government of the Bahamas, Bahamas National Trust
1860	Protected Areas of Bolivia; Sistema de Información Geográfica del Servicio Nacional de Áreas Protegidas	Servicio Nacional de Áreas Protegidas (SERNAP), Bolivia	2014	2015	ANSI	WGS 84	Not Reported	Not Reported		Not Reported	English and Spanish	Ministerio De Medio Ambiente Y Agua
1866	National System of Protected Areas, Ecuador	Dirección de Áreas Protegidas y Otras Formas de Conservación, Ministerio del Ambiente, Agua y Transición Ecológica	2014	2022	Not Reported	WGS 84	250000	Not Reported		Not Reported	Spanish	Dirección de Áreas Protegidas y Otras Formas de Conservación, Ministerio del Ambiente, Agua y Transición Ecológica
1867	Insular Caribbean Protected Area Database	The Nature Conservancy and Collaborating Governments	Not Reported	2015	Not Reported	WGS 84	Various	Not Reported		Not Reported	English and Spanish	None
1868	Canadian Protected and Conserved Areas Database	Environment and Climate Change Canada	2014	2022	ANSI	Lambert Conformal Conic, GCS North American 1983	Various	Individually created jurisdictional submissions merged	Canadian Protected and Conserved Areas Database, 2020. Environment and Climate Change Canada. https://www.canada.ca/en/enviro	Not Reported	English, French and Inuktitut	Environment and Climate Change Canada

									nment-climate-change/services/national-wildlife-areas/protected-conserved-areas-database.html			
1873	Lapa Rios Reserve, Costa Rica	The Long Run	2015	2015	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English	World Commission on Protected Areas
1874	Vietnam protected areas	Department of Nature Conservation Vietnam Administration of Forestry	2015	2015	Not Reported	Not Reported	Not Reported	Not Reported		Not Reported	English and Vietnamese	Department of Nature Conservation Vietnam Administration of Forestry
1875	Protected Areas of Republic of Srpska, Bosnia and Herzegovina	Institute for the Protection of cultural, Historical and Natural Heritag Ministry of Education and Culture	2015	2015	UTF-8	GCS_Bessel_1841	Not Reported	Not Reported		Not Reported	English and Serbian	Institute for the Protection of cultural, Historical and Natural Heritage Ministry of Education and Culture
1877	Protected areas in Taiwan	School of Forestry & Resource Conservation, NTU	2015	2015	Not Reported	WGS 84	Not Reported	Not Reported		Not Reported	English and Chinese	School of Forestry & Resource Conservation, NTU
1887	Protected Areas of Guernsey	States of Guernsey Environment Department & Alderney Wildlife Trust	2015	2016	UTF-8	WGS 84	Not Reported	Not Reported		Not Reported	English	Guernsey Ramsar Consultant
1888	Protected Areas of Kiribati	Environment and Conservation Division, Ministry of Environment, Lands and Agricultural Development	2016	2016	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Environment and Conservation Division, Ministry of Environment, Lands adn Agricultural Development
1889	Protected Areas of the Isle of Man	Isle of Man Government	2016	2018	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Isle of Man Government
1891	Protected Areas of Palau	Palau National Marine Sanctuary Office via Secretariat of the Pacific Regional Environment Programme (SPREP)	2016	2019	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Palau National Marine Sanctuary Office
1892	Protected Areas of Korea	Ministry of Environment, Korea National Park Service and Korea Protected Areas Forum on behalf of Ministry of Oceans and Fisheries, Cultural Heritage Administration, Korea Forest Service & MAB National Committee of the Republic of Korea	2010	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Korean	Ministry of Environment, National Institute of Cultural Heritage, Korea Forest Research Institute, Korea Marine Environment Management Corporation, KNPS

1896	Protected Areas of Pitcairn	JNCC	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Government of Pitcairn Islands
1897	Protected Areas of Tunisia	Ministère de l'Agriculture des ressources hydrauliques et de la pêche	Various	2016	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	French	Ministère de l'Agriculture des ressources hydrauliques et de la pêche
1899	Protected Areas of the Dutch Caribbean	Dutch Caribbean Nature Alliance	2004	2020	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Dutch Caribbean Nature Alliance
1900	Cartagena Convention	UNEP-CEP	2017	2017	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	SPAW-RAC
1901	Protected Areas of the State of Palestine	Environmental Resources Directorate-Environment Quality Authority Environment Quality Authority	2017	2019	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Environmental Resources Directorate-Environment Quality Authority
1902	Außengrenzen der Ramsargebiete in Niederösterreich	Niederösterreich government	2017	2017	UTF-8	WGS 84	Not Reported	http://www.noe.gv.at/Land-Zukunft/Open-Government-Data/Bestandsliste/Ramsargebiete.html	Außengrenzen der Ramsargebiete in Niederösterreich	Not Reported	German	Niederösterreich government
1903	Naturschutz - RAMSAR-Gebiet	Land Oberösterreich	2017	2017	UTF-8	WGS 84	Not Reported	http://www.land-oberoesterreich.gv.at/124104.htm	Naturschutz - RAMSAR-Gebiet	Not Reported	German	Land Oberösterreich
1904	Site Ramsar (France)	Inventaire National du Patrimoine Naturel	2017	2017	UTF-8	ETRS-89	Not Reported	https://inpn.mnhn.fr/telechargement/cartes-et-information-geographique/ep/ramsar	Site Ramsar (France)	Not Reported	French	Inventaire National du Patrimoine Naturel
1905	Zonas Húmidas RAMSAR (Portugal)	Informação Geográfica Portugal	2017	2017	UTF-8	ETRS-89	Not Reported	http://www.igeo.pt/DadosAbertos/Listagem.aspx	Zonas Húmidas RAMSAR (Portugal)	Not Reported	Portuguese	Informação Geográfica Portugal
1906	Skyddade områden, RAMSAR	Naturvårdsverket	2017	2017	UTF-8	Not Reported	Not Reported	Not Reported	Naturvårdsverket	Not Reported	Swedish	Naturvårdsverket
1907	Protected Areas of the British Virgin Islands	National Parks Trust of the Virgin Islands	1980	2020	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	National Parks Trust of the Virgin Islands
1908	UNESCO-MAB Biosphere Reserves	Ministry of Environment and Energy, Baa Atoll UNESCO Biosphere Reserve Office	2012	2020	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Ministry of Environment and Energy, Baa Atoll UNESCO Biosphere Reserve Office
1909	Chumbe Island Coral Park (CHICOP)	Chumbe Island Coral Park (CHICOP)	2017	2022	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Tanzania Forest Services (TFS) Agency
1914	Comunidade do Monte Veciñal en Man Común de Froxán	Secretary of the Comunidade do Monte Veciñal en Man Común de Froxán	2017	2017	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Galician	Iniciativa Comunales

1915	Comunidade de Montes Veciñais en Man Común de Santiago de Covelo	Comunidade de Montes Veciñais en Man Común de Santiago de Covelo	2017	2017	UTF-8	ETRS89_UTM_zone_29N	Not Reported	Not Reported	Not Reported	Not Reported	English and Galician	Iniciativa Comunales
1916	Protected Areas of Lesotho	Ministry of Tourism, Environment and Culture, Department of Environment	2017	2020	UTF-8	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Ministry of Tourism, Environment and Culture, Department of Environment
1917	Malawi-Zambia Transfrontier Conservation Area (Malawi section), and National Parks and Wildlife Reserves of Malawi	Department of National Parks and Wildlife	2018	2018	UTF-8	WGS 84	Not Reported	Spatial data from Department of Surveys	Not Reported	Not Reported	English	Department of National Parks and Wildlife
1918	UNESCO-MAB Biosphere Reserves (Croatia)	Hrvatska agencija za okoliš i prirodu	2017	2017	UTF-8	WGS 84	Not Reported	Spatial data from relevant government department	Not Reported	Not Reported	English	Hrvatska agencija za okoliš i prirodu
1921	ICCAs, Finland	Snowchange Cooperative	2018	2021	UTF-8	ETRS_1989_ETRS-GK30FIN	Not Reported	Not Reported	Not Reported	Not Reported	English	Snowchange Cooperative
1925	Protected Areas of Somalia	Somali Wildlife and natural history society (SWNHS)	2018	2018	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Somali Wildlife and natural history society (SWNHS)
1926	Protected Areas of Paraguay	Secretaria del Ambiente, Paraguay	2018	2018	UTF-9	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Spanish	Secretaria del Ambiente, Paraguay
1927	Protected Areas of Honduras	Departamento de Áreas Protegidas / Instituto de Conservación Forestal	2018	2020	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	Spanish	Departamento de Áreas Protegidas / Instituto de Conservación Forestal
1928	Protected Areas of Indonesia	Director of Nature Conservation Planning and Information, MoEF	2018	2018	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Director of Nature Conservation Planning and Information, MoEF
1930	Protected Areas of Ethiopia	Ethiopian Wildlife Conservation Authority	2018	2021	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Ethiopian Wildlife Conservation Authority
1932	Protected Areas of Solomon Islands	Environmental and Conservation Division, Ministry of Environment, Climate Change, Disaster Management & Meteorology via Secretariat of the Pacific Regional Environment Programme (SPREP)	2019	2022	UTF-8	Not Reported	Not Reported	Spatial data originally sourced from The WorldFish Center and University of Queensland	Not Reported	Not Reported	English	Environmental and Conservation Division, Ministry of Environment, Climate Change, Disaster Management & Meteorology
1933	Wilderness Area Sulzbachtäler	Federal Ministry for Sustainability and Tourism	2019	2019	UTF-8	MGI_Austria_GK_M31	Not Reported	Not Reported	Not Reported	Not Reported	English and German	Federal Ministry for Sustainability and Tourism

1934	Mara North Conservancy	Mara North Conservancy	2019	2019	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Mara North Conservancy
1941	Dublin Bay UNESCO-MAB	Dublin City Council	2019	2019	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Dublin City Council
1942	Protected Areas of Tonga	Department of Environment, MEIDECC via Secretariat of the Pacific Regional Environment Programme (SPREP)	2019	2019	UTF-8	Tonga Geodetic Datum 2005	Not Reported	Not Reported	Not Reported	Not Reported	English	Department of Environment, MEIDECC
1943	ICCAs of the Philippines	Philippine Association for Intercultural Development, Inc. (PAFID)	2019	2019	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Data not for use by or on behalf of a commercial entity	English	Philippine ICCA Consortium (BUKLURAN)
1946	Protected areas of Niue	Niue Department of Environment via Secretariat of the Pacific Regional Environment Programme (SPREP)	2019	2019	UTF-8	WGS_1984_UTM_Zone_2S	Not Reported	Not Reported	Not Reported	Not Reported	English	Niue Department of Environment
1940	Protected areas of Timor-Leste	Directorate General of Forestry, Coffee, and Industrial Plants, Government of Timor-Leste and Conservation International Timor-Leste	2019	2019	UTF-8	WGS_1984_UTM_Zone_51S	Not reported	Not reported	Not reported	The boundaries of some protected areas are not yet formally defined by the Ministry of Justice. Boundaries should therefore be considered indicative.	English	Directorate General of Forestry, Coffee, and Industrial Plants, Government of Timor-Leste
1947	Protected areas of Tuvalu	Department of Environment, Tuvalu via Secretariat of the Pacific Regional Environment Programme (SPREP)	2019	2019	UTF-8	WGS_1984_UTM_Zone_60S; GCS_WGS_1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Department of Environment, Tuvalu
1935	Áreas Protegidas Nacionales de Argentina administradas por la Administración de Parques Nacionales	Administración de Parques Nacionales (APN)	2019	2022	ANSI	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Spanish	Administración de Parques Nacionales (APN)

	(APN)												
1952	Caucasus Wildlife Refuge, Armenia	Foundation for the Preservation of Wildlife and Cultural Assets	2019	2019	UTF-8	EPSG:4326 - WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	World Commission on Protected Areas
1945	Protected areas of New Caledonia (Southern Province)	Direction du service de l'Etat de l'Agriculture, de la Forêt et de l'Environnement	2019	2019	UTF-8	GCS_RGNC91-93	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Direction du service de l'Etat de l'Agriculture, de la Forêt et de l'Environnement
1951	Protected areas of Papua New Guinea	Conservation and Environment Protection Authority	2019	2019	UTF-8	Albers Equal Area; WGS84	Not Reported	Not Reported	Not Reported	Not Reported	English	Conservation and Environment Protection Authority
1956	Protected areas of Burundi	Office Burundais pour la Protection de l'Environnement' via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Office Burundais pour la Protection de l'Environnement'
1961	Protected areas of Central African Republic	Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Central African Forests Commission (COMIFAC)
1957	Protected areas of Cameroon	Ministry of Forestry and Wildlife, Cameroon via Central African Forests Commission (COMIFAC)	2020	2021	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Ministry of Forestry and Wildlife, Cameroon
1958	Protected areas of Congo	Agence Congolaise de la Faune et des Aires Protégées (ACFAP) via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Agence Congolaise de la Faune et des Aires Protégées (ACFAP)
1959	Protected areas of Gabon	Agence Nationale des Parcs Nationaux via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Agence Nationale des Parcs Nationaux
1960	Protected areas of Equatorial Guinea	El Ministro de Estado Encargado de Bosques, Pesca y Medio Ambiente and Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial (CUREF) via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	El Ministro de Estado Encargado de Bosques, Pesca y Medio Ambiente and Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial (CUREF)

1966	Protected Areas of Guinea	Office Guinéen des Parcs et Réserves (OGPR) via the Observatory for Biodiversity and Protected Areas in West Africa (OBAPAO)	2020	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French	Office Guinéen des Parcs et Réserves (OGPR)
1953	Marine Protected Area of Malaysia	Reef Guardian Sdn. Bhd.	2020	2020	Not Reported	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Sabah Wildlife Department
1963	Protected areas of Rwanda	Ministry of Environment and Lands, Rwanda via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Ministry of Environment and Lands, Rwanda
1964	Protected areas of Sao Tome and Principe	Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Central African Forests Commission (COMIFAC)
1965	Protected areas of Chad	Direction des Parcs Nationaux et Reserves de Faune via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Direction des Parcs Nationaux et Reserves de Faune
1962	Protected areas of the Democratic Republic of Congo	ICCN via Central African Forests Commission (COMIFAC)	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French and English	ICCN
1955	Protected areas of Samoa	Ministry of Natural Resources and Environment, Samoa via Secretariat of the Pacific Regional Environment Programme (SPREP)	2020	2020	Not Reported	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Ministry of Natural Resources and Environment, Samoa
1983	Protected areas of the Commonwealth of Dominica	The Nature Conservancy - Insular Caribbean Protected Area Database	2015	2020	UTF-8	WGS 84	Not Reported	Data originally from TNC's Caribnode data - Verified at BIOPAMA Workshop 2019	Protected areas of The Commonwealth of Dominica 1975	Information is available for onward release but not for use by or on behalf of a commercial entity.	English	Fisheries Division & Forestry Wildlife and Parks Division
1970	Protected Areas of Algeria	Algérie Direction Générale des Forêts	2020	2020	UTF-8	GCS WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	French	Algérie Direction Générale des Forêts
1971	West of Scotland Marine Protected Area	Joint Nature Conservation Committee	2020	2020	UTF-8	World Geodetic System 1984 (EPSG:4326)	Not Reported	Boundary and attribute data prepared and finalised for submission 31/03/2020	Contains information from the Scottish Government (Marine Scotland) and		English	Scottish Government

									the United Kingdom Hydrographic Office. Licensed under the Open Government Licence v3.0. Re-use of the data is subject to the terms of the Open Government Licence including attribution			
1972	Protected Areas of Ghana	The Forestry Commission of Ghana	2020	2020	UTF-8	WGS 1984 UTM Zone 30N	Not Reported	Not Reported	Not Reported	Not Reported	English	The Forestry Commission of Ghana
1973	Protected Areas of Togo	Ministère de l'environnement, du développement durable et de la protection de la nature	2020	2020	UTF-8	WGS 1984 UTM Zone 31N	Not Reported	Not Reported	Not Reported	Not Reported	French and English	Ministère de l'environnement, du développement durable et de la protection de la nature
1974	Protected Areas of Uzbekistan	Protected Areas Department	2020	2020	windows-1251, Unicode for character encoding: UTF-8.	Projection coordinate systems Pulkovo 1942 GK Zone 12N. The projection coordinate system uses mathematical transformations to coordinate latitude and longitude into a two-dimensional linear system.	10 000 , 25 000 , 100 000 , 200 000	Not Reported	Not Reported	Not Reported	English	The State Committee of the Republic of Uzbekistan for Ecology and Environment Protection
1975	Aqaba Marine Reserve	Aqaba Special Economic Zone Authority (ASEZA)	2020	2022	UTF-8	Jordan JTM	Not Reported	Not Reported	Not Reported	Not Reported	English	The Royal Society for the Conservation of Nature, Jordan
1944	QEII National Trust Protected Open Spaces of New Zealand	Queen Elizabeth II National Trust (Ngā Kairauhi Papa), Wellington, New Zealand	2020	2020	UTF-16	New Zealand Transverse Mercator 2000 (NZTM2000)	Not Reported	Not Reported	Not Reported	Not Reported	English	Department of Conservation (DOC), Te Papa Atawhai, Wellington, New Zealand
1976	Protected Areas of Cambodia	Department of Geospatial Information Services (DGIS), Ministry of Environment (MOE), Cambodia	2010	2020	Not Reported	WGS1984	Not Reported	Dataset under management of Ministry of Environment	Not Reported	Not Reported	English	Ministry of Environment (MOE), Department of Geospatial Information Services (DGIS), Cambodia
1977	Pueblo Originario Kichwa de Sarayaku	Pueblo Originario Kichwa de Sarayaku	2020	2020	UTF-8	WGS1984	Not Reported	Not Reported	Not Reported	Informatio n is not for use by or on behalf of a commerci	Spanish	Pueblo Shuar Arutam

										al entity.		
1980	ICCAs in Bénin	AMAF-BENIN	2020	2020	Not Reported	WGS1984	Not Reported	Not Reported	Not Reported	Not Reported	French	ICCA Consortium; Town Hall representative
1969	Protected areas of Qatar	Ministry of Municipality and Environment of Qatar	2020	2020	UTF-8	QND 1995 Qatar National Grid	Not Reported	Not Reported	Not Reported	Not Reported	English and Arabic	Ministry of Municipality and Environment of Qatar
1979	Protected Areas of Grenada	Grenada Fisheries Division, Government of Grenada	2020	2020	Not Reported	WGS1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Grenada Fisheries Division, Government of Grenada
1986	Protected Areas of Cook Islands	National Environment Service (NES) via Secretariat of the Pacific Regional Environment Programme (SPREP)	2020	2020	UTF-8	WGS 1984 UTM Zone 4S	Not Reported	Not Reported	Not Reported	Not Reported	English	National Environment Service (NES)
1989	Cultural Sites of Algeria	Ministère de la Culture et des Arts, Direction Nationale du Projet des Parcs Culturels	2020	2020	UTF-8	WGS1984	Not Reported	Not Reported	Not Reported	Not Reported	French	Ministère de la Culture et des Arts, Direction Nationale du Projet des Parcs Culturels
2001	ICCAs in Brazil	TICCA Brazil Network	2021	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	Portugue se	Representative of the TICCA Brazil Network and State Coordinator of Unified Black Movement - MNU of Corumbá MS
1994	UK Marine Protected Areas	Joint Nature Conservation Committee	2020	2020	UTF-8	Projected Coordinate System: British National Grid (EPSG: 27700), datum: OSGB 1936	Not Reported	Boundary and attribute data prepared and finalised for submission November 2020	Contains information from Natural England and the United Kingdom Hydrographic Office.	Contains informatio n from Natural England and the United Kingdom Hydrograp hic Office. Licensed under the Open Governme nt Licence v3.0. Re-use of the data is subject to the terms of the Open Governme nt Licence including attribution of the relevant copyright	English	Department for Environment, Food & Rural Affairs

										holders		
1995	UK UNESCO-MAB Biosphere Reserves	Joint Nature Conservation Committee	2020	2020	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Department for Environment, Food & Rural Affairs
1997	Protected areas of Kazakhstan	Forestry and Wildlife Committee of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan	2020	2020	English and Russian/Kazakh	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English and Russian/ Kazakh	Forestry and Wildlife Committee of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan
1982	Protected Areas of LAO PDR	Ministry of Agriculture and Forestry (MAF)	2020	2020	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	English	Division of Protected Area Management
1990	Protected areas of Libya	Environment General Authority, Libya	2020	2020	Not Reported	Not Reported	Not Reported	Point data originally provided by Nature Conservation Dept, Environment General Authority	Not Reported	Not Reported	English	Environment General Authority, Libya
1984	Protected Areas of Mali	Ministère de l'Environnement, de l'Assainissement et du Développement Durable, Direction Nationale des Eaux et Forêts	2020	2020	Not Reported	WGS1984	Not Reported	Not Reported	Not Reported	Not Reported	French	Ministère de l'Environnement, de l'Assainissement et du Développement Durable, Direction Nationale des Eaux et Forêts
1998	Protected Areas of Malaysia	Ministry of Energy and Natural Resources (KeTSA)	2020	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Biodiversity Management Division of the Ministry of Energy and Natural Resources
1991	Moana Mahu Marine Protected Area, Niue	Ministry of Natural Resource via Secretariat of the Pacific Regional Environment Programme (SPREP)	2020	2020	UTF-8	GCS_GRS 1980(IUGG, 1980)	Not Reported	Not Reported	Not Reported	Not Reported	Niuean and English	Ministry of Natural Resource
1992	Gishwati-Mukura Protected Area	Rwanda Development Board	2020	2020	Not Reported	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Rwanda Development Board
1987	Marine Protected Areas of Thailand	Department of Marine and Coastal Resources (Ministry of Natural Resources and Environment)	2020	2021	Not Reported	WGS_1984_UTM _Zone_47N	Not Reported	Not Reported	Not Reported	Not Reported	English	Department of Fisheries; Department of Marine and Coastal Resources; Department of National Park, Wildlife and Plant Conservation ; Office of Natural Resources and Environmental Policy and Planning

1985	Chernobyl Radiation and Ecological Biosphere Reserve	Chornobyl Radiation and Ecological Biosphere Reserve	2020	2020	UTF-8	EPSG4326 WGS-84	Not Reported	Not Reported	Chornobyl Radiation and Ecological Biosphere Reserve	Not Reported	English, Ukrainian	Ministry of Environmental Protection and Natural Resources of Ukraine (Міністерство захисту довкілля та природних ресурсів України)
1981	Protected areas of Venezuela	Ministerio del Poder Popular para el Ecosocialismo (MINEC); Instituto Nacional de Parques (INPARQUES), Venezuela	2020	2020	Not Reported	Proyección Cónica Conforme de Lambert, Datum Sirgas – Regven , Elipsoide GRS 80.	Dependiendo de las dimensiones del área, se utilizaron distintas escalas de captura, siendo las más frecuentes 1;250.000, 1;100.000; 1:25.000 y en casos muy particulares a 1:5.000	Oficio N° 062 de fecha 4/6/2020 enviado por la República Bolivariana de Venezuela, mediante el Ministerio del Poder Popular para el Ecosocialismo - Dirección General de Políticas de Gestión y Conservación de Ecosistema, miembro del Grupo de la REDPARQUES Venezuela	Ministerio del Poder Popular para el Ecosocialismo. (2020, 29 de julio). Base de Datos de las Áreas Bajo Régimen de Administración Especial (ABRAE). Coordinación: Lic. en Geóg. MSc. Abigail Castillo C. e Ing. For. Luby Echeverria. Despacho del Viceministro de G	Not Reported	Español	Ministerio del Poder Popular para el Ecosocialismo (MINEC); Instituto Nacional de Parques (INPARQUES), Venezuela
626	World Heritage Nomination of Valley of Flowers National Park	Ministry of Environment and Forests, India	2004	2004	Not Reported	Not Reported	Not Reported	Polygons boundaries digitised for Nanda Devi NP, Valley of Flowers NP and Nanda Devi MAB from Valley of Flowers NP WHS Nomination Pack. Boundaries for NP's, MAB and WHS (inscribed in July 2005) digitized from maps within nomination report.	Not Reported	Not Reported	English	Ministry of Environment and Forests, India
1688	UNESCO-MAB Biosphere Reserves	UNESCO-MAB and UNEP-WCMC	2012	2020	UTF-8	WGS 84	Not Reported	Point locations generated from latitudes & longitudes provided by UNESCO, along with attribute information. Areas taken from the Directory of the World Network of Biosphere Reserves online.	Not Reported	Not Reported	English	UNESCO-MAB and UNEP-WCMC
758	Source is currently unknown	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Various	Not Reported	Not Reported	Not Reported	Not Reported	None
626	World Heritage Nomination of Valley of Flowers National Park	Ministry of Environment and Forests, India	2004	2004	Not Reported	Not Reported	Not Reported	Polygons boundaries digitized for Nanda Devi NP, Valley of Flowers NP and Nanda Devi MAB from Valley of Flowers NP WHS Nomination Pack. Boundaries for NP's, MAB and WHS (inscribed in July 2005) digitized from maps within nomination report.		Not Reported	English	Ministry of Environment and Forests, India

758	Source is currently unknown	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported	Various	Not Reported		Not Reported	Not Reported	None
1999	Protected Areas of the Russian Federation	Ministry of Natural Resources and Environment of the Russian Federation	2020	2021	Not Reported	Not Reported	Not Reported	Collected in cooperation with CBD Secretariat, IUCN ECARO and WWF Russia.	Not Reported	Not Reported	Russian	Ministry of Natural Resources and Environment of the Russian Federation
1988	Protected Areas of Burkina Faso	Ministère de l'environnement de l'économie verte et du changement climatique	2020	2021	UTF-8	WGS 1984 UTM Zone 30 Nord	Not Reported	Not Reported	Not Reported	Not Reported	French	Ministère de l'environnement de l'économie verte et du changement climatique
2000	The SW/Niger Delta Forest Project protected areas	The SW/Niger Delta Forest Project	2021	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Department of Forestry, Federal Ministry of Environment
1948	Parcs Réservés et Aires Marines Protégées du Sénégal	Ministère de l'Environnement et du Développement Durable	2021	2021	Not Reported	WGS 1984 UTM Zone 28N; GCS_WGS_1984	Not Reported	Not Reported	Not Reported	Not Reported	French	Ministère de l'Environnement et du Développement Durable
2002	Gashaka Gumti National Park, Nigeria	Africa Nature Investors Foundation	2021	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Nigeria National Park Service
2003	Tristan da Cunha Marine Protection Zone	Tristan da Cunha Government	2021	2021	UTF-8	World Geodetic System 1984 (EPSG:4326)	Not Reported	Boundary and attribute data prepared and finalised for submission in 2020. The outer boundary comprises the UKHO's EEZ limit (obtained in July 2020) and inner boundaries comprise the limits of inshore and seamount fishing zones.	Not Reported	Contains data from the UK Hydrograp hic Office	English	Tristan da Cunha Government
2004	Emerald Network	Council of Europe	2021	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English	Marc Rockaerts
729	Designated and proposed protected areas of Madagascar	WWF Madagascar and West Indian Ocean Programme Office, Madagascar	2007	2018	Not Reported	Laborde - Madagascar	Not Reported	National protected areas including proposed parks from WWF Madagascar and West Indian Ocean Programme Office. Projection for Madagascar is Laborde Projection (an Oblique Mercator projection) - projection parameters imported and then reprojected to WGS84.	Not Reported	Not Reported	Not Reported	WWF Madagascar and West Indian Ocean Programme Office, Madagascar
2005	Protected areas of Oman	Environment Authority, Planning & Studies Department, Sultinate of Oman	2021	2021	Not Reported	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English and Arabic	Environment Authority, Planning & Studies Department, Sultinate of Oman
2006	Protected areas of Oman	Office for Conservation of the Environment, Diwan of Royal Court	2021	2021	Not Reported	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English and Arabic	Office for Conservation of the Environment, Diwan of Royal Court

2010	Al Ansab Wetland	Oman Water and Wastewater Services Company	2021	2021	Not Reported	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English and Arabic	Environment Authority, Planning & Studies Department, Sultinate of Oman
2012	ICCAs of Colombia	Centro de Estudios Médicos Interculturales (CEMI)	2021	2021	UTF-8	WGS 1984	Not Reported	Not Reported	Not Reported	Not Reported	English and Spanish	Red Ticca Colombia - Territories of life
2011	Protected Areas of Eritrea	Ministry of Land, Water and Environment	2021	2021	UTF-8	WGS 1984	Not Reported	BIOPAMA	Not Reported	Not Reported	English	Ministry of Land, Water and Environment
1782	National Park of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2013	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1783	Quasi National Park of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2011	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1784	Prefectural Natural Park of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2010	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1785	Wilderness Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2011	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1786	Nature Conservation Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2011	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1787	Prefectural Nature Conservation Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2011	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1788	National Wildlife Protection Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2012	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1789	Prefectural Wildlife Protection Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	200000	Not Reported	Ministry of the Environment, Government of Japan, 2013	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1790	Natural Habitat Conservation Area of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	50000	Not Reported	Ministry of the Environment, Government of Japan, 2010	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1792	UNESCO-MAB Biosphere Reserve of Japan	Ministry of the Environment, Government of Japan	2014	2021	UTF-8	WGS 84	Not Reported	Not Reported	Ministry of the Environment, Government of Japan, 2006	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan

1881	Forest Ecosystem Reserve of Japan	Forestry Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1882	Green Corridor of Japan	Forestry Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1883	Protected Water Surface of Japan	Fishery Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1884	Coastline Marine Resource Development Area of Japan	Fishery Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1885	Common fishery right area of Japan	Fishery Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
1886	Area designated by prefecture of Japan	Fishery Agency, Government of Japan	2016	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
2007	Rare Population Protected Forest of Japan	Forestry Agency, Government of Japan	2021	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	For conservation purposes, if the protected area name contains "species name", it is masked with "XXX"	English and Japanese	Ministry of the Environment, Government of Japan
2008	Biocenosis Protected Forest of Japan	Forestry Agency, Government of Japan	2021	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
2009	Offshore Seabed Nature Conservation Area of Japan	Ministry of the Environment, Government of Japan	2021	2021	UTF-8	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English and Japanese	Ministry of the Environment, Government of Japan
2019	Espoir Pour Tous ONG, ICCAs	Espoir Pour Tous ONG, ICCAs	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	Mayor of the Municipality of Djidja and Mayor of the Municipality of Aplahoué
2016	PJUD BENIN, ICCAs	PJUD BENIN	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	Mayor of the Municipality Bembéréké

2021	VIVIA MIEL ONG, ICCAs	VIVIA MIEL ONG	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	Mayor of the Municipality of Bassila
2020	ERAD-ONG, ICCAs	ERAD-ONG	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	Mayors of the Municipalities of Djougou and Tanguiéta
2017	Benin Environment and Education Society (BEES NGO), ICCAs	Benin Environment and Education Society (BEES NGO)	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	The Municipality of Kétou
2014	OECMs Colombia	Ministry of Environment	2021	2022	Not Reported	Colombia National Origin CTM12 Projected Coordinate System	Not Reported	Not Reported	OMECs de Colombia	Not Reported	Spanish	Ministry of Environment
2024	Wampis Territory	Gobierno Territorial Autónomo Nación Wampis (GTANW)	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not for use by a commercial entity	Spanish	Chief of the Comunidad Nativa Matses; Pueblo Shuar Arutum; Presidente de Aidesep; Feceracion de pueblos Indigenas Kechwas de la region San Martin; Nacion Arakbut
2023	Forest Reserves and Forest Management Areas of Jamaica	Forestry Department	2021	2021	Not Reported	GCS_JAD_2001	Not Reported	Not Reported	Not Reported	Not Reported	English	Forestry Department
2013	Common Database on Designated Areas as provided by the European Environment Agency (EEA)	European Environment Agency (EEA)	2014	2021	ANSI	EPSG:3035 converted to WGS 84	Various	Submitted by National Reference Centres to the European Environment Agency's ReportNet then collated by the European Topic Centre on Biological Diversity and formatted for the WDPA including only records with dissemination code '01'.	The Common Database on Designated Areas (CDDA) https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-12#tab-metadata	Unless otherwise indicated, re-use of content for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged. Copyright holder: EEA, Estonian Environmental Register 01.01.2017, ©Finnish	Multiple	European Environment Agency (EEA)

										Environment Institute, 2017		
2026	Pueblo Shuar Arutam	Pueblo Shuar Arutam	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not for commercial use	Spanish	Pueblo Originario Kichwa de Sarayaku
2018	ONG Education Service International (ESI), ICCAs	ONG Education Service International (ESI)	2021	2021	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	French	Mayor of the municipality of Lokossa, Mayor of the Municipality Dogbo and Mayor of the Municipality of Djakotomey
2027	Sacred sites of the Boé	Chimbo Foundation	2022	2022	UTF-8	WGS-84	Not Reported	ICCA Registry	Not Reported	Not Reported	English and French	Chimbo Foundation
2025	Village Land Forest Reserves	Tanzania Forest Conservation Group (TFCG)	2022	2022	UTF-8	WGS84	Not Reported	Not Reported	Not Reported	Not Reported	English	Ministry of Natural Resources and Tourism
2030	Integración de la Reserva Biológica Bosque Nuboso Monteverde, Costa Rica a WDPA.	Reserva Biológica Bosque Nuboso Monteverde, Costa Rica.	2022	2022	Not Reported	CRTM05	150000	Not Reported	Integración de la Reserva Biológica Bosque Nuboso Monteverde, Costa Rica a WDPA.	Not Reported	Spanish	Sistema Nacional de Areas de Conservacion (SINAC), Costa Rica
2029	ABC RCEB	Amis des Bonobos du Congo (ABC)	2022	2022	Not Reported	WGS 84	Not Reported	Not Reported	Not Reported	Not Reported	English	Equateur Province ICCN
2031	Serranía el Pinche	Asociación Agroambiental Santa Clara Serranía el Pinche	2022	2022	UTF-8	WGS 84	Not Reported	ICCA Registry	Not Reported	Not Reported	Spanish	Members of the Red Ticca Colombia peer review network