

University of Neuchâtel, Switzerland
Institut of Zoology

Ecology of the Black Catbird, *Melanoptila glabrirostris*,
at Shipstern Nature Reserve (Belize),
and distribution in Yucatan.



Annick Morgenthaler
May 2003

Master thesis supervised by Prof. Claude Mermod and Dr. Louis-Félix Bersier

CONTENTS

INTRODUCTION

1. Aim and description of the study
2. Geographic setting
 - 2.1. Yucatan peninsula
 - 2.2. Belize
 - 2.3. Shipstern Nature Reserve
 - 2.3.1. History and previous studies
 - 2.3.2. Climate
 - 2.3.3. Geology and soils
 - 2.3.4. Vegetation
 - 2.3.5. Fauna
3. The Black Catbird
 - 3.1. Taxonomy
 - 3.2. Description
 - 3.3. Breeding
 - 3.4. Ecology and biology
 - 3.5. Distribution and threats
 - 3.6. Current protection measures

FIRST PART: BIOLOGY, HABITAT AND DENSITY AT SHIPSTERN

4. Materials and methods
 - 4.1. Census
 - 4.1.1. Territory mapping
 - 4.1.2. Transect point-count
 - 4.2. Sizing and ringing
 - 4.3. Nest survey (from hide)
5. Results
 - 5.1. Biology
 - 5.1.1. Morphometry
 - 5.1.2. Nesting
 - 5.1.3. Diet
 - 5.1.4. Competition and predation

- 5.2. Habitat use and population density
 - 5.2.1. Population density
 - 5.2.2. Habitat use
 - 5.2.3. Banded individuals monitoring
 - 5.2.4. Distribution through the Reserve
- 6. Discussion
 - 6.1. Biology
 - 6.2. Habitat use and population density

SECOND PART: DISTRIBUTION AND HABITATS THROUGHOUT THE RANGE

- 7. Materials and methods
 - 7.1. Data collection
 - 7.2. Visit to others sites
- 8. Results
 - 8.1. Data compilation
 - 8.2. Visited places
 - 8.2.1. Corozalito (south of Shipstern lagoon)
 - 8.2.2. Little Belize-Progresso lagoon
 - 8.2.3. Crooked tree
 - 8.2.4. Caye Caulker
 - 8.2.5. Bacalar Chico (Ambergris Caye)
 - 8.2.6. Tulum
 - 8.2.7. Rià Lagartos
 - 8.2.8. Chichen Itza
- 9. Discussion

CONCLUSION

ACKNOWLEDGMENTS

BIBLIOGRAPHY

APPENDIX

INTRODUCTION

1. Aim and description of the study

The Black Catbird, from the Mimidae family, is endemic to the Yucatan Peninsula and is listed as « near threatened » on the IUCN red list. It inhabits the scrubby woodland and the forest edge of some areas of Mexico, Belize and Guatemala. In Belize, the bird is mainly found on the cayes (islands) and more rarely on the mainland. It is threatened by tourism development, hurricanes and conversion to coconut plantations, causing habitat fragmentation and loss.

Melanoptila glabrirostris is not well studied. Following my literature research only one study concerning the biology of this bird species has been published; it consists in a four-day study on Caye Caulker in November (Miller B. & Miller C., 1991). A few other published informations about this bird are found in general bird books or checklists of Belize, Mexico or Central America (e.g. Ridgway 1907, Hellmayr 1934, Friedmann and al. 1950, Peters 1960, Russel 1964, Edwards 1972, Howell & Webb 1995, England 2000, Stattersfield and al. 2000, Brewer 2001, Jones & Vallely 2001). The importance of a study on Black Catbirds appears therefore to be evident, as it should improve knowledge about this near threatened and not well-known species and help to propose conservation measures.

The aim of this study is to provide information on **population density estimates** and **habitat occupation**, but also, in association with nests surveys, mist-netting and free observations, about the **biology** of the Black Catbird and especially about breeding behavior and calendar. The Shipstern Nature Reserve, northeastern Belize, constitute an ideal field for the main part of this study, as this mainland Reserve is hosting a nesting population. The census methods consist in a transect point count (one transect) through different habitats and territory mapping (five plots) in favorable habitats, combined with nest searches and color banding.

Another part of the study consists in visiting other populations and compilating data collected towards ornithologists and birdwatchers throughout the Peninsula, in order to clarify the distribution, the status and habitat occupation throughout the range.

2. Geographic setting

2.1 Yucatan Peninsula

As the Black Catbird is endemic to the Yucatan Peninsula (fig.1), it seems important to mention the geographic, climatic and biologic factors that characterize this Peninsula.

The Yucatan Peninsula is a limestone shelf bordered on the north and west by the Gulf of Mexico and on the east by the Caribbean Sea. The southern boundary is not so well delimited. We can draw this fuzzy limit as running from Laguna Terminos (Campeche state, Mexico), through northern Peten state (Guatemala), to Belize City.

Climate and topography are relatively uniform, as it is a dry, rocky, flat, low-lying region without permanent lakes and rivers. The only water bodies are bajos (seasonally inundated dry forest) and cenotes (large sinkholes resulting from the subsidence of limestone, filled with rainwater).

The northwestern part is dry and therefore characterized by scrub vegetation; the thin soil supports some agriculture. Climate is hot, and the rainy season, from May through October, brings little rainfall. Unlike the northwestern part, the east has forests, beaches and coastal vegetation, influenced by the Caribbean Sea; as well as hotels and important tourism buildings. At the southern limit, rainforest and savannas cover the Peninsula; rivers and rainfalls become more abundant.

The Yucatan region is often hit by strong hurricanes. The hurricane season in the Caribbean lasts from July to November, with most of the activity from mid-August to mid-September. Hurricanes are a major factor in determining the structure of the vegetation. Among several of them, two major hurricanes led to heavy human and ecological damages in the region: Janet in 1955 (see 2.3.3) and Mitch in 1988.

The Peninsula has a great biodiversity conservation value, because it hosts numerous endemic plant and animal species. Although its southern limits must be arbitrarily set, the region is fairly well defined in terms of its bird life because it is bounded on three sides by ocean waters and on the other side by large tracts of more humid forest. The birds of the southern humid areas do not penetrate to a great extent into the relatively dry country which is characteristic of the Yucatan Region, and conversely (Edwards, 1985). There is about 14 Yucatan endemic bird species (and approximately 100 subspecies), including the Black Catbird. Most of them are associated to the Yucatan Tropical Dry Forest.



Figure 1. Yucatan Peninsula (modified from www.mayaruins.com/yucmap.html)

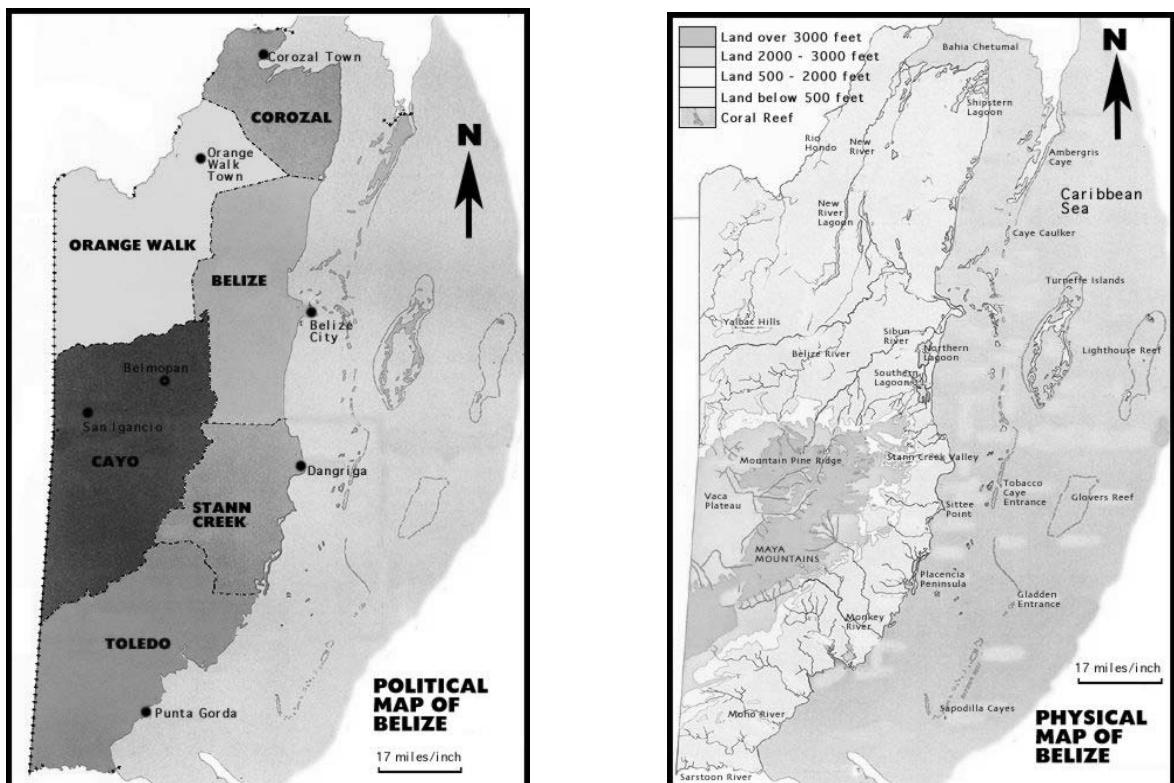


Figure 2 and 3. Political and physical maps of Belize (from www.belize.net)

The Peninsula, as a whole, is a geographic area of endemism, but it even hosts two smaller areas listed as endemic bird areas (Stattersfield & al, 1998). These two regions are the northern scrubby coast of the Peninsula and Cozumel Island. That island hosts several bird species and subspecies found only there, but also an important Black Catbird population. The addition of hurricanes effects and massive tourism development is a threat for the birds' habitats (especially the coastal mangrove forest) on that island.

2.2 Belize

The Central American Country of Belize, formerly known as British Honduras lies roughly between Mexico in the north, Guatemala in the west and south, and the Caribbean Sea in the east. It is a small country of 280 km (174 miles) long and only 120 km (75 miles) wide at its broadest point. It covers 22'800 km² (8860 sq miles), including 689 km² (266 sq miles) of offshore islands, and has a population of approximately 280'000 people, mainly concentrated in six towns. The country is divided into six political districts (fig.2).

Belize lies in the sub-tropical belt due to its latitude (15° to 19° N), which means that there are greater temperature, rainfall, and humidity fluctuations than in more equatorial tropical forests. There are strong differences in the amount of annual rainfall between north and southern Belize. Temperatures (and humidity levels), except at higher elevations in the Maya Mountains, are warmly, moistly, tropical: the average daily temperature in Belize City ranges from 23 °C (73 °F) in December through June to 31 °C (88 °F) in May through September. Hurricanes are frequent (see 2.1).

Belize can be divided into three geographical parts: northern and southern mainland, and offshore island (fig.3). The northern half of the mainland, belonging to the Yucatan Peninsula, consists of coastal swamps, lagoons, flat plains and palm savannas, and some inland flat areas and hills supporting semi-deciduous, broadleaf rainforest. The southern half includes a narrow (about 15 km, or 10 miles, wide), low elevation coastal strip with marshes, savannas, cultures and some rainforest, and higher-elevation areas of evergreen forest and pine savannas associated with the Maya Mountains. These mountains reach a maximum of 1150 m (3770 miles) high. Offshore, the limestone bedrock extends eastward into the Caribbean for several kilometers at a depth of about 5 m. At the eastern extent of this shelf lies the longest barrier reef in the Western Hemisphere. The cayes, situated between mainland and barrier reef, consist of an assortment of tiny, small and mid-sized island fringed or covered with coastal plants, mangrove and palms. There are also three atolls situated after the coral reef.

The Mayan empire, which lasts largely from 1000 BC to 1500 AD, included all of the present Belize, southern Mexico, Guatemala and northern Honduras. The Mayan type of agriculture, like their building abilities, was relatively advanced; Mayan built terraces and presumably cultivated the land successfully despite centuries of use. So at one time or another the entire country was under cultivation. After their decline the country reverted to rainforest type of vegetation. The present forest although not really virgin, is certainly old enough to have reached climax form now (Russel, 1970).

During colonial times (and particularly under the British colony) the principal economy sector was forestry logging, especially tree species such as Mahogany *Swietenia macrophylla*, Logwood *Haematoxylon campechianum* (used for dye) and Chicle *Manilkara zapota* (used to make chewing-gum).

The two main current economy sectors are tourism and agriculture, with large-scale plantation of citrus and banana in the south of Belize and sugar cane cultivation in the north. Marine products (lobsters, shrimps and fishes) and small manufactories provide notable contributions too.

These economic activities are inevitably in conflict with biodiversity and nature conservation. Therefore several sanctuaries have been created, about one third of the country is under some sort of environmental protection (parks, wildlife sanctuaries, nature reserves). However, the government has very little money to manage these lands or enforce environmental regulations there or elsewhere. The result is that rules are widely flouted (Beletsky, 1999).

Although great parts of Belize's territory are covered with nature reserves, there still are numerous globally threatened (or near threatened) plants (32 species) and animals (46 species) (IUCN, 2002).

Among them, are several endangered mammals like the West Indian Manatee, Baird's Tapir, the Howler Monkey, the Spider Monkey and all five wild cat species (see 2.3.4); as well as endangered reptiles (two Crocodiles and four Marine Turtles).

Belize hosts some globally threatened or near threatened bird species. Next to the Black Catbird, there are four other near threatened (NT) birds (Stattersfield & al, 2000), the Harpy Eagle (*Harpia harpyja*), the Great Curassow (*Crax rubra*), the Ocellated Turkey (*Meleagris ocellata*) and the Black Rail (*Laterallus jamaicensis*). The Keel-billed Motmot (*Electron carinatum*) is listed as vulnerable (VU) and the Yellow-headed Parrot (*Amazona oratrix*) is endangered (EN). Next to these globally threatened birds, nine others are threatened with extinction in Belize (Jones & Vallely, 2001), three raptors, four terns, the

Brown Noodly (*Anous stolidus*) and the Scarlet Macaw (*Ara macao*). The main threats for these birds (and other animals too) are hunting (currassow, turkey) and pet trades (parrots and Scarlet Macaw), deforestation (raptors, motmot...) and indiscriminate uses of the cayes (terns, noodly, Black Catbird).

2.3 Shipstern Nature Reserve

2.3.1 History and previous studies

Shipstern area was first owned by a British Ltd. during the eighties and therefore partly managed as a private reserve known as Shipstern Wildlife Preserve. The name Shipstern Nature Reserve was given in 1989, when it became the property of the International Tropical Conservation Foundation (ITCF). That foundation, like its sister-one the Papiliorama-Nocturama Foundation, is based in Switzerland and is actively concerned with the conservation of tropical biodiversity.

Shipstern Nature Reserve plays an important role in Belize, representing one of the very few protected areas of the northern lowlands. Sarteneja, the Shipstern lagoon and its surrounding forested areas have long been fairly isolated from the rest of the country. This is mainly due to the fact that the present bus-served all-weather road was nothing more than a dirty track before 1980. As a consequence, the pressure that was exerted on the area remained relatively low until recently. Shipstern's present habitats and biodiversity were probably covering the whole Corozal district before the expansion of sugar cane fields. Nowadays, the surroundings of Shipstern are concerned with selective logging and a rapid expansion of cultivated lands by villagers of Chunox, but also by the Mennonites of Little Belize's community. As a consequence, the pressure on the forest and on fauna of Shipstern's vicinity is increasing.

Local staff is employed at the reserve, comprising a field manager and three to four wardens. They take part to patrols, guided tours, building maintenance, gardening, reforestation and vehicle maintenance. They also help students in some fieldwork aspects.

Several scientific studies took place in the reserve between 1998 and 2002, thanks to collaboration between the ITCF and the Swiss Universities of Neuchâtel, Bern and Fribourg:

- Bat inventory by Bärtschi (1998)
- Structure and floristic; vegetation study by Bijleveld (1998)
- Freshwater fishes by Bijleveld (1998)
- Phenology; vegetation study by Sayer (2000)

- Small mammal inventory by Bersot (2001)
- Big-eared Climbing Rat (*Ototylomys phyllotis*) by Margnetti (2002)
- Ecology and census of Odonata by Pittet (2003)
- Coleoptera biodiversity survey by Roeder (2003)
- Diptera biodiversity survey by Rapp (2003)
- Bird inventory by Laesser (in prep.)

2.3.2 Location and description

The reserve is located northeast of the country, in the Corozal district (fig.4). It covers an area of approximately 9000 hectares (22000 acres) and consists of three parts. One third is covered by the Shipstern Lagoon, one third by dwarf mangroves and saline wetlands (called savannas) and the last third by tropical forest (see 2.3.3). Shipstern lagoon is very shallow, never exceeding 1 m (3 ft) in depth, and dotted by many mangrove islands, some of which support colonies of various birds' species (see 2.3.4).

By land the only means of access to the area is an all-weather road starting at Orange Walk and ending at the fisherman village of Sarteneja. This road marks the northern boundary of the reserve, which is otherwise delimited by extensive survey lines that are used both as boundaries and trails. Further trails allow an access to most of the areas situated north of the lagoon. The southern part is reachable only by car (to Cowpen) and then by boat (to Iguana Camp and Shipstern Landing). The Headquarter, with the houses, the butterfly center and the botanical trail, is situated close to the road on the northern boundary. South to the lagoon, Iguana Camp hosts an other house. Other buildings within the reserve are two treetops (at Main Trail and Xo-Pol) and a small building at Shipstern old village.

2.3.3 Vegetation

Like in the whole Yucatan peninsula (see 2.2), Mayans were living in the Shipstern lagoon area. Remains of pots and ruins can be found within the borders of the reserve. As their agricultural practices were very advanced, we can suppose that a great part of the forest was cut for cultivating. After their decline, the forest could then again recover the area.

Another present factor of disturbance for Shipstern's vegetation is the frequent effect of hurricanes. As far as the reserve is concerned, one hurricane has led to serious damages. Hurricane Janet, hit Belize in 1955 and greatly affected the northern part of the country. As a result for the reserve, the forests were entirely flattened and burnt by subsequent fires. Because of this, the vegetation can be considered as being 48 years old, and most of its vegetation types have not reached a structural climax yet.

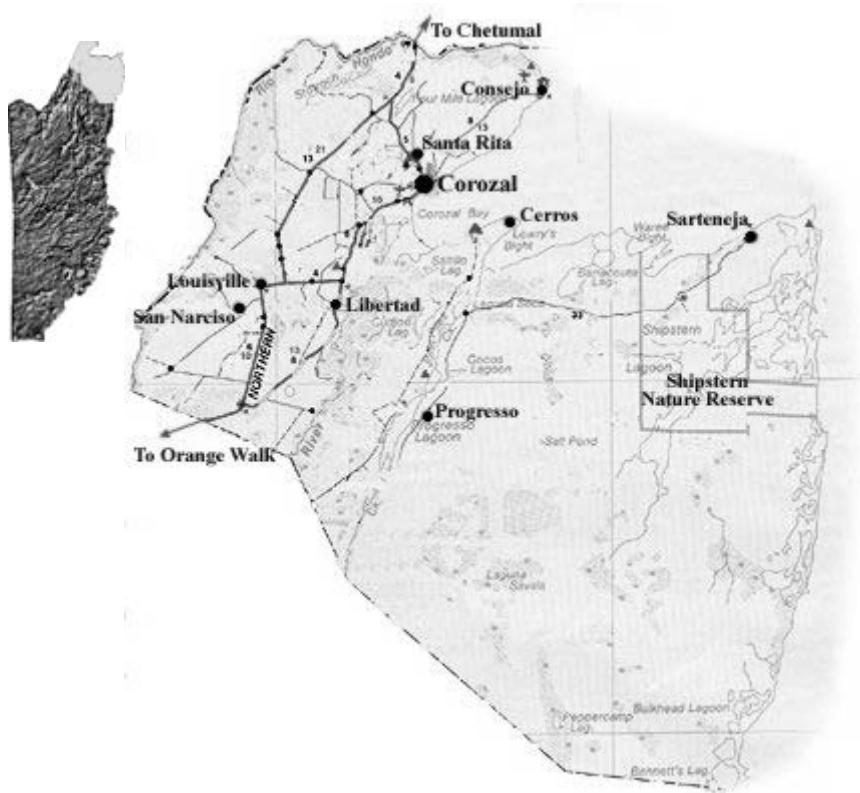


Figure 4. Corozal district, northern Belize (from www.belize.net)

Habitats in the reserve appear to be diverse and patchily distributed. Forests tend to vary considerably in their structural and floristic characteristics, creating a complicated mosaic of various forest types. Bijleveld (1998) listed eight main vegetation types within Shipstern Nature Reserve (fig.5):

1. Yucatecan medium-sized semi-evergreen forest

This forest type of 10-17 m (30-50 ft) of height covers most of the land situated west of the reserve and Xo-Pol area, as well as part of southern region in mosaic with Cohune forest in the latter. Dominant species composing its canopy are: *Brosimum alicastrum*, *Hampea trilobata*, *Coccoloba reflexiflora*, *Bursera simaruba*, *Metopium brownei* and *Manilkara zapota*.

2. Yucatecan medium-sized semi-deciduous forest

This forest type (10-15 m ; 30-45 ft) covers part of the land situated north of the reserve, where it alternates whether with type 1 or with type 3. Dominant species composing its canopy and its understory are similar to the type 1, therefore it is very difficult to differentiate both of them. This type is mainly characterised by the absence of *Brosimum alicastrum*.

3. Low *Pseudophoenix sargentii* deciduous forest

This forest type (7-13 m ; 20-40 ft) covers part of the land situated north of the reserve, where it alternates with type 2. Dominant species composing its canopy and its understory are fairly the same as types 1 and 2, the differential species being *Pseudophoenix sargentii*. It is commonly associated with *Agave angustifolia* and *Diphysa carthagenensis*. This forest type is of high conservation value, as it is unique for mainland Belize and rare elsewhere (Yucatan). As a matter of fact, a small patch of this tropical dry forest, not exceeding 20 km² (12 sq. miles) occurs in Shipstern's area, half of which is to be found within the reserve's boundaries.

4. Low periodically inundated forest

This heterogeneous type of low forest (3-7 m ; 10-20 ft) often grows in a complicated mosaic, locally called "bajo forest", these plant communities are patchily scattered all over the reserve, and only part of them have yet been localized.

5. *Bravaisia tubiflora*-dominated transitional zone

This type of low forest (3-8 m ; 10-25 ft) is mainly found in the surroundings of Shipstern lagoon, where true forest is transitioning to open wetlands, mostly type 6. Such transitional forest zones are inundated at the peak of the rainy season, whereas their soils remain water-saturated for most of the year.

6. *Cladium jamaicense*-dominated herbaceous wetlands

This type of wetland (1-2 m ; 3-5 ft) is found in the surroundings of Shipstern lagoon, where it forms a transitional belt between true forest and mangal flats. Often preceded by type 5, the belt varies in width from nearly nothing to about 350 ft (100 m). It is dominated and differentiated by *Cladium jamaicense*, which is normally found with species such as *Conocarpus erectus*. Assimilated to this vegetation type, another variant of this transitional belt is dominated by *Distichlis spicata*.

7. Discontinuous dwarf mangal interrupted by bare salt flats

This type of mangal association (0-2 m ; 0-6 ft) covers most of the periodically inundated area bordering the lagoon, and extending to zones of transition with true forest. Also along the coast, it represents the dominant vegetation type. It is fairly intermittent, with large patches of ground being completely bare of vegetation, sometimes interrupted by so-called “forest islands” (*Thrinax radiata*-dominated low forest). Dominant species is the red mangrove (*Rhizophora mangle*) and typical associated species are the white (*Laguncularia racemosa*) and black (*Avicennia germinans*) mangroves.

8. Cohune forest

This forest is exclusively found in the deep soils of the land situated south of the lagoon. It alternates with type 1 and patches of type 4. The dominant and differential species composing the canopy is the cohune palm, *Orbignya cohune*. It is not distinct from type 1 on the vegetation map (figure 5).

2.3.4 Fauna

Fauna is particularly rich, not only among invertebrates but also among vertebrates. The reserve hosts for example all of the five wild cats: Jaguar, Puma, Ocelot, Jaguarondi and Margay; as well as Baird’s Tapir. Both the saltwater and freshwater crocodiles (*Crocodylus acutus* and *moreletii*) are present in Shipstern.

Birds’ checklist for the reserve counts 290 species (J. Laesser, pers. com.). Eight of the 14 Yucatan endemic species are found within the boundaries. Numerous Waders nest on the colony islands in the lagoon, including the American Woodstork (*Mycteria americana*).

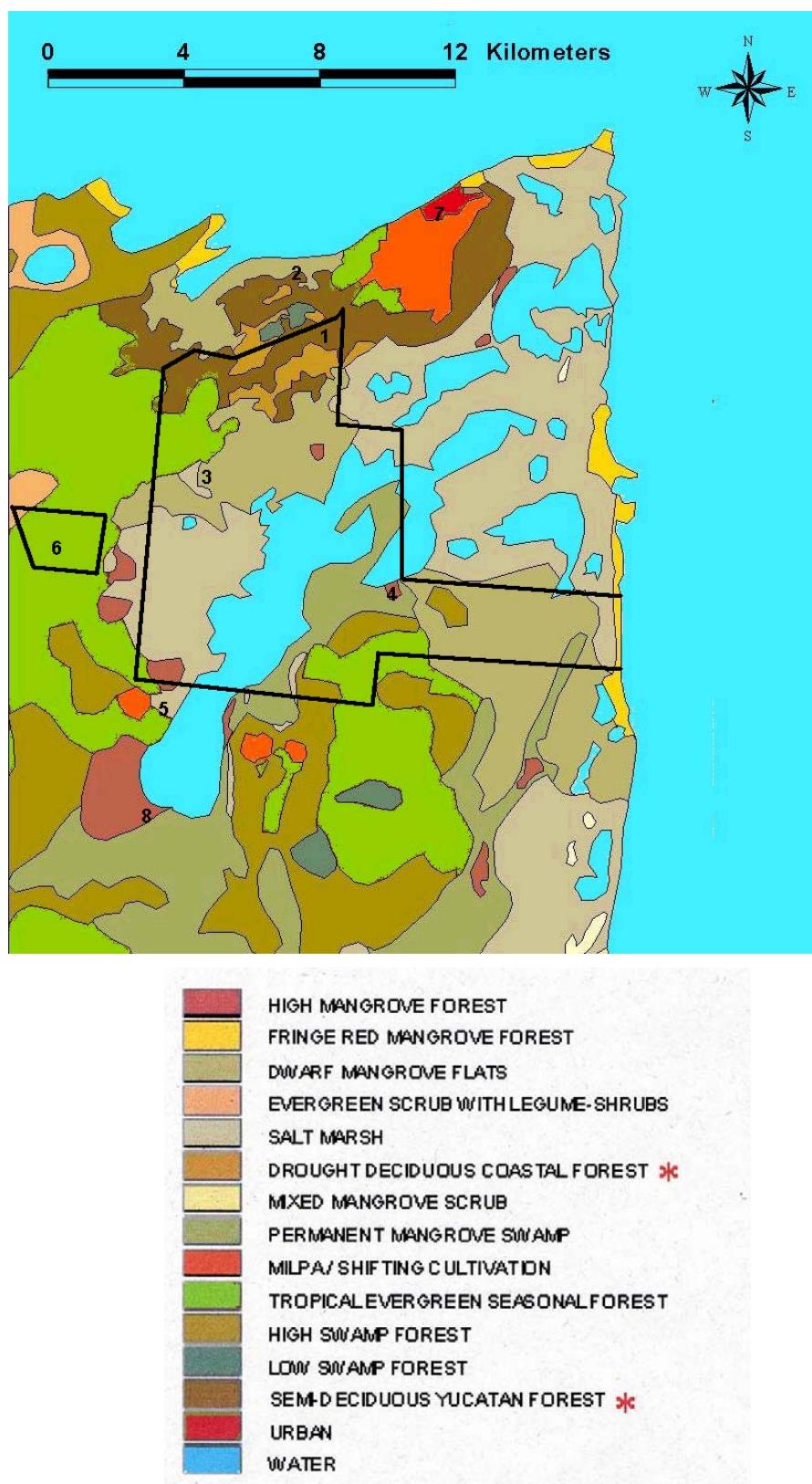


Figure 5. Vegetation map of Shipstern Area (Bijleveld), 1. HeadQuarter 2. Robin's land 3. Main Trail treetop 4. Iguana Camp 5. Cowpen 6. Xo-Pol 7. Sarteneja village 8. Corozalito

3. The Black Catbird

3.1 Taxonomy

The Black Catbird belongs to the order of Passeriformes, family Mimidae, genus *Melanoptila* or *Dumetella* (depending on authors) and species *glabrirostris*. It has been described by Sclater in 1858, the type is now stored at the British Museum, London. Paynter, in 1954, described Cozumel Island Black Catbirds (Quintana Roo, Mexico) as being an endemic subspecies, *Dumetella glabrirostris cozumelana* (Peters, 1960). Recent authors do not recognize this subspecies.

Concerning the genus, Friedmann (1950) expresses its disagreement with Paynter that *Melanoptila* is congeneric with *Dumetella* “its relationships are by no means clearly demonstrated and it shows structural coloration of a type otherwise unrepresented in the family Mimidae”. A majority of authors are using the monotypic *Melanoptila* genus. The other birds from the Mimidae family present in Black Catbird’s range are the wintering Gray Catbird, *Dumetella carolinensis*, the resident Tropical Mockingbird, *Mimus gilvus* and the critically endangered Cozumel Thrasher *Toxostoma guttatum* localized in Cozumel Island.

3.2 Description

The Black Catbird is a small Mimidae (length about 200 mm) entirely glossy black and with broad rectrices (fig. 6). The bill is much shorter than the head, with a culmen nearly straight for most of its length; the terminal portion is gradually but decidedly decurved. Wings are moderate, much rounded. Tail is about as long as wing, decidedly rounded, with very broad rectrices. Tarsus is moderate in length, rather slender. (Ridgway, 1907).

The plumage is glossy black, with violet reflections on head and body plumage and blue-green reflections on wings and tail (Edwards, 1972). Eyes are dark reddish, bill and legs blackish (Howell & Webb, 1995). Size and shape are the same as the Gray Catbird (*Dumetella carolinensis*). Differs from other all-black birds found within its range by slender bill (Howell & Webb, 1995).

Male and female are frequently indistinguishable, but the female is usually slightly duller in colour and averaging smaller (Ridgway, 1907) (see 5.1.1.). Ages differ slightly (?); juveniles are duller (?) (Howell & Webb, 1995).

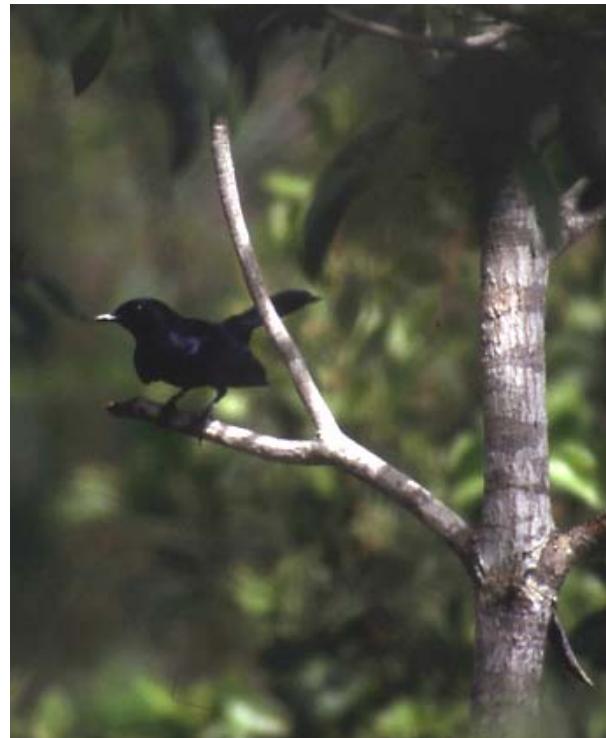


Figure 6. The Black Catbird, *Melanoptila glabrirostris*

3.3 Breeding

Catbirds and mockingbirds are monogamous. Cup nests are built of sticks and leaves by both sexes or by the female alone; she incubates the two to five eggs for about 12 days. Youngs are fed in the nest by both sexes for 11 to 14 days until they fledge (Beletsky, 1999).

Black Catbird's nest is a bulky cup of grass, twigs, etc., at low to mid-levels in thicket, low tree, etc., where two greenish blue, unmarked eggs are laid (Howell & Webb, 1995) (see 5.1.2).

The nesting period of the Black Catbird takes place in late spring according to Barbara McKinnon (pers. com.); she found their cup nests low down in small white mangrove bushes (Isla Cancun, 1977-78).

3.4 Ecology and behaviour

Mockingbirds and catbirds are found on the ground, in shrubs and low trees. They forage on the ground in open areas and gardens for insects and other small invertebrate animals, and also take some fruits. These birds are known for their highly intriguing ability to closely mimic the songs of other species, and their aggressive territoriality during breeding seasons (Beletsky, 1999).

Melanoptila glabrirostris lives in scrubby woodland or forest edge, or in relatively open areas in dense, humid forest, moving about in the lower and middle levels, often perching in conspicuous places to sing, but otherwise rather secretive (Edwards, 1972).

These birds feed on fruits of the chit palm, wild oregano and many others of plants found in the low coastal forest. They also feed on insects in the black and red mangrove (B. MacKinnon, pers. com.).

3.5 Distribution, status and threats

The Black Catbird is rather local in its distribution in Yucatan Peninsula (Russell, 1964).

It is common to fairly common resident on Cozumel Island and from east Quintana Roo, Mexico, to Ambergris Caye, Belize; common to uncommon on Caye Caulker, Lighthouse Reef and Glover's Reef, Belize; and perhaps seasonal (mainly November-May) in much of Yucatan Peninsula, west to Campeche, Mexico, south to Belize and into Peten, north

Guatemala. There are no records from Honduras since the type specimen was purportedly collected at Omoa in 1855 or 1856, leading to speculation that the specimen may have been mislabeled. (Stattersfield & al, 2000).

This species belongs to the IUCN Red List in the “near threatened” (LR/nt) category. It joined the List at year 2000, assessed by BirdLife International because it nearly qualifies for listing under criteria B1+2abce. This criteria refers to “small range and fragmented, declining or fluctuating”, and more precisely to **severe fragmentation** (B1) and **continuing decline of the extent of occurrence** (B2a), of the **area of occupancy** (B2b), of the **area, extent and/or the quality of habitat** (B2c) and of the **number of mature individuals** (B2e) (IUCN, 2002).

Tourism development and conversion to coconut plantations are causing habitat loss and fragmentation in the core of its range on the Quintana Roo coast, Cozumel, and the cayes in Belize (Stattersfield & al, 2000).

Hurricanes are a threat too, in combination with other factors. Although hurricanes are part of natural cycles on islands and cayes, the recent disturbance of coastal habitats in Mexico and Belize by man eliminate refuges from which the Black Catbird population could rebound (Miller & Miller, 1991).

3.6 Current protection measures

In Belize, the Siwa-Ban Reserve was designated in 1998 expressly to protect the population on Caye Caulker but it is unclear whether this has provided adequate protection (Stattersfield & al, 2000). In Mexico, no conservation effort has been undertaken specifically for the Black Catbird, but the Sian Ka'an Biosphere Reserve (Quintana Roo) offers an important refuge for that bird.

FIRST PART

4. Materials and methods

4.1 Census

4.1.1 Territory mapping

Five plots have been used for territory mapping. They were chosen because Catbirds were known to occur there (fig. 7). The prospected areas of the territory mapping plots vary from 11,4 ha (Cowpen) to 23,5 ha (Robin's land). Their vegetation and geographical features were plotted on millimetric paper with the help of a GPS, and then reported on the computer with GIS (Geographic Information System).

Survey started the 5th of April and finished the 22nd of August 2002. The number of visits lies between 4 to 11 for each plots and the period varies from 3 to 25 days between two dates. The frequency and number of visits was dependant on

- birds activity: the survey was more intense at the peak of reproductive period in May and June
- the weather: heavy rain and strong wind were avoided
- wardens and vehicles availability: three of the five plots were reachable only by car (Cowpen) or by car and boat (Iguana Camp East and West) driven by a warden of the Reserve.

All the singing males contacts were reported on map at each visit, as well as nests, colour-banded individuals and any informations related to territoriality. Two and a half to three hours were taken at each visit to cover a plot, starting in the morning between 6.30 a.m. and 7.30 a.m.

4.1.2 Transect point-count

A transect, with 12 point-counts every 200 meters, was made north of the reserve along a path (fig. 7), through different habitats. It has been visited 6 times, about once a week, between 2nd June and 10th July 2002, starting at 7-7.30 a.m. and beginning each time at the other extremity. Five minutes were spent at each point, and the number of visual and auditive Black Catbird contacts, as well as the habitat, were noted.

4.1.3 Sizing and ringing

In order to improve informations collected for the territory mapping (see 4.1.1.), color ringing has been used. In each of the five plots, birds were captured during one day. Nets were placed the day before and then immediately closed. They have various length (6m,

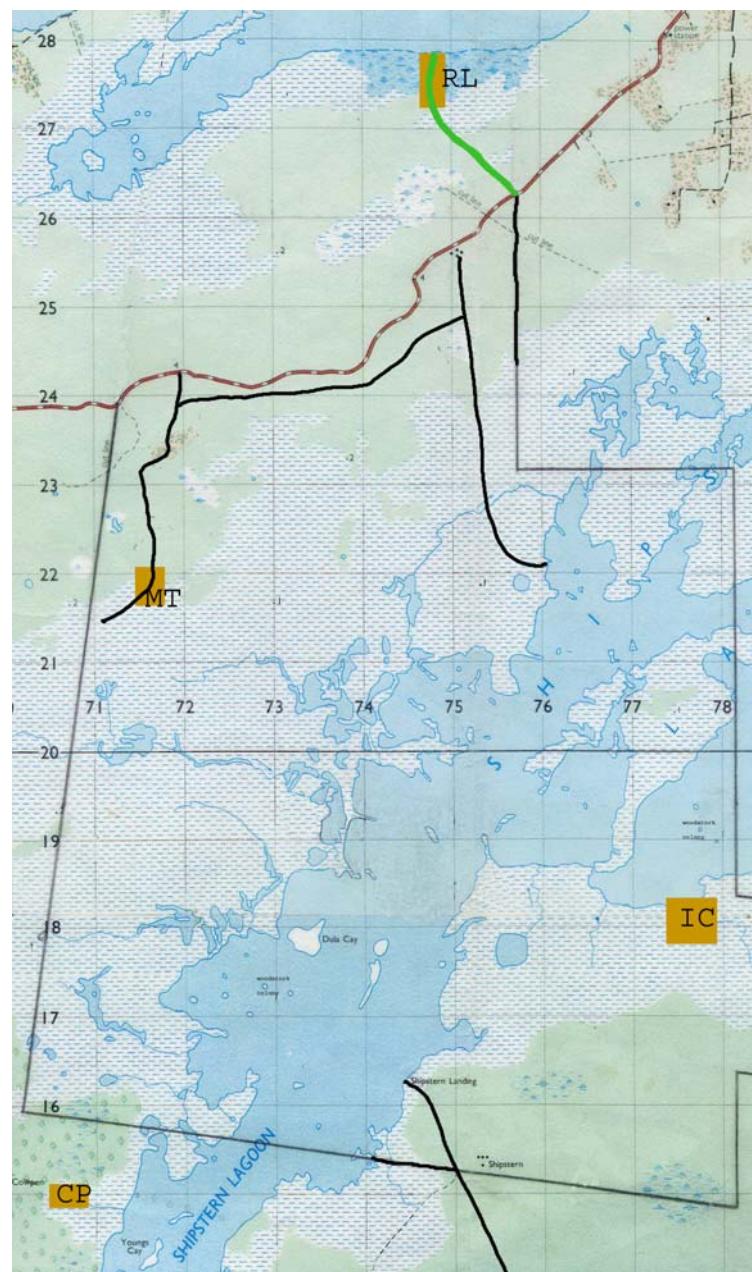


Figure 7. Position of territory mapping plots (orange), transect (green) and trails (black)

9m, and 12m) and various mesh size (19-30 mm). Their combination on the fields had a total length varying between 70 and 100 m and they have been positioned where birds used to occur according to previous observations (fig.8).

Nets were controlled every 30 minutes. The birds caught were kept in cotton bags, quickly handled and released immediately after. Birds were ringed with color bands allowing an individual recognition.. Five colors (white, orange, red, violet and green) of DARVIC plastic rings of 3.1 mm internal diameter (symbol XCL), ordered in Poland (www.ecotone.pl), have been used. The first 15 birds (adults) were ringed with one ring on each leg, the others with two rings on each leg (fig.9).

Several morphometric measures (described in Svensson, 1992) were taken:

- the length of the third primary (counting from outside), measured with a ringer rule
- the length of bill to skull, measured with a calliper
- the weight, measured with a 100 g Pesola and a ringers plastic cone

Finally, the condition of the body has been inspected, especially the possible presence of an incubation patch, the molt of feathers and any abnormal signs.

Juveniles in the nest have been ringed too (7 juveniles from nests C2, C7 and C9). They have been carefully taken from the nest at age of around one week, when they were big enough to be ringed but not yet ready to fly. Three rings were used for juveniles, two for the right leg and one for the left. No morphometric measures have been taken (only photographs) to avoid disturbances. Juveniles were immediately replaced in the nest.

4.2 Nest survey

Nests searching and monitoring have been made during territory mapping survey, and sometimes outside the sampling period. Nests have been found while adults were carrying material or food, and also by observing pairs or singing males. The main nesting activities have been observed: building, sitting on the nest and feeding of juveniles and fledglings.

In order to learn more about the feeding of nestlings, a hide has been positioned in front of a 2 meters high nest, in the littoral forest of Robin's land. The hide was built with three main large wood sticks covered with gray/green sheets, the observer could sit at 2,5 meters high (fig.10). It has been progressively approached in 3 steps from 12 to 5 meters from the nest.

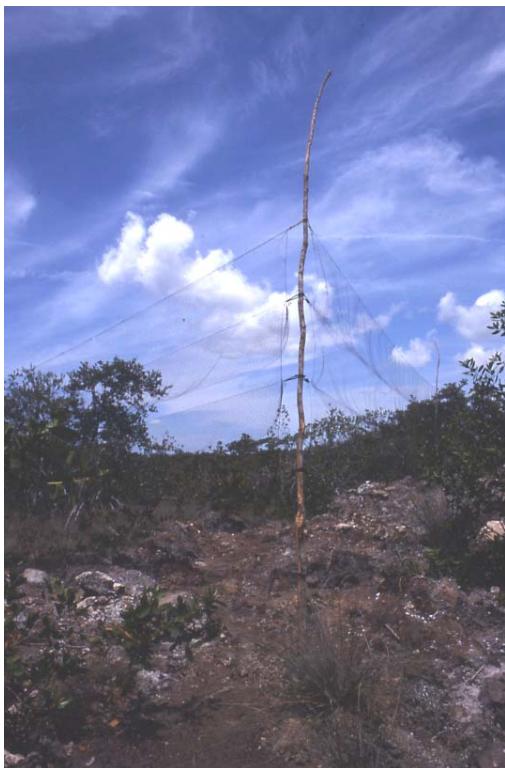


Figure 8. Mist-nets at Cowpen.



Figure 9. Adult bird with two color rings



Figure 10. Nest survey hide, in the littoral forest (photo J. Laesser)

5. Results

5.1 Biology

5.1.1 Morphometry

A total of 21 adults have been ringed. On only nine of them the sex was possible to identify. Four females had an incubation patch, and five males have been seen singing afterwards (appendix 1a).

The morphometric measures (the length of the 3rd primary, the bill length and the weight) are not significantly different between male and female for these characters (Mann-Whitney U test, appendix 1a, fig.11).

	Third primary length (cm)	Bill length (cm)	Weight (g)
Male	7.00		32.5
	6.90	2.20	37.0
	7.15	2.35	34.0
	6.85	2.29	35.0
mean	6.98	2.28	34.6
Female	6.90	2.27	40.0
	7.10	2.26	36.0
	7.00	2.23	36.0
	6.25	2.21	34.0
mean	6.81	2.24	36.5

Figure 11. Morphometric measures

The figures 12-14 present box-plots (median, quarter percentiles, minimal-maximal data and outliers) based on all the available data for the 21 individuals (appendix 1a), for the three characters.

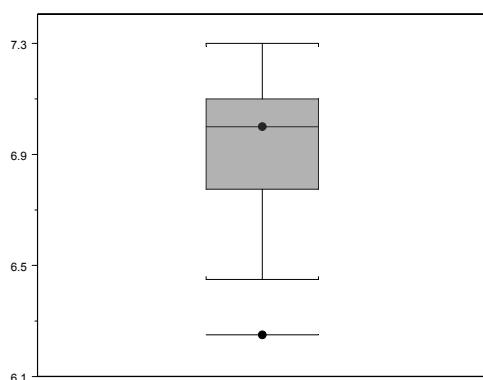


Figure 12. Third primary length (cm)

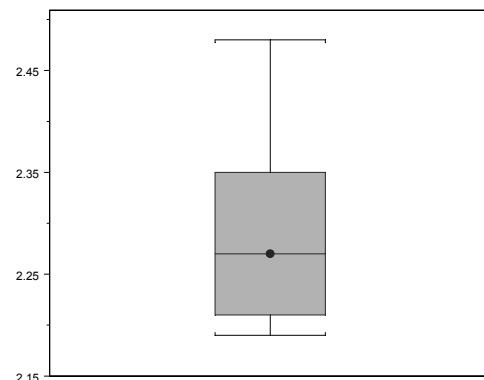


Figure 13. Bill length (cm)

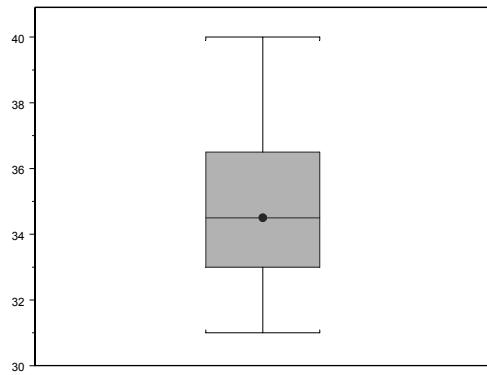


Figure 14. Weight (g)

All trapped adults had an old plumage except some new isolated feathers (e.g. rectrices). Visual observations allowed seeing, at two different places, adults without tails (16th of May in Bacalar Chico and 11th of July and 1st September at Shipstern: Robin's land). Among the abnormal morphological observations, we can notice the presence of an excrescence on the forearm on an individual (fig.15). Most of the ringed adults had acarian parasites around the eyes (fig.16). No partial albinism has been seen on Shipstern's Black Catbirds, as seen at Caye Caulker (see 8.2.4).

5.1.2 Nesting

23 nests have been found on two of the five territory mapping fields (16 at Cowpen and 7 at Robin's land) (appendix 2b). Two values are given for the presence of eggs and nestlings. The first one are certain values, i.e., from direct observations ; the second are probable values, i.e., from indirect observations (female on nest, parents at nest during nestling period, fledgling not observed). We found that between 39 % and 87 % of the nests hosted eggs. 30 % to 39 % were occupied by nestlings. And only 4 to 26 % did completely reach final stage: fledglings (fig.19). Actually there is only one (4 %) attested observation of fledglings (two fledglings from the same nest). The data for the five other nests are uncertain, as on the last visit to these nests the lack of nestlings or fledglings could either mean that they already left the area or that they get predated before.

The few data for which the number of eggs or juveniles was measured, shows that this number varies between 2 and 3. Two active nests had 3 eggs (and one abandoned nest has been found with one egg). One nest hosted 3 juveniles, three nests 2 juveniles and one first 3 then 2 juveniles. And finally a 3-eggs-nest gave 2 fledglings.



Figure 15. Abnormal excrecence (photo J. Laesser)



Figure 16. Acarian parasites

A calendar has been constituted with the different stages of nesting activities (fig.17), from the 10th of May (building activities) to the 29th of July (sitting in an empty nest). By extrapolating with last building and sitting activities, the last fledglings could have left around mid-august (see also 8.2.5). Maximum activity appears during the month of June at Shipstern. No multiple broods have been recorded.

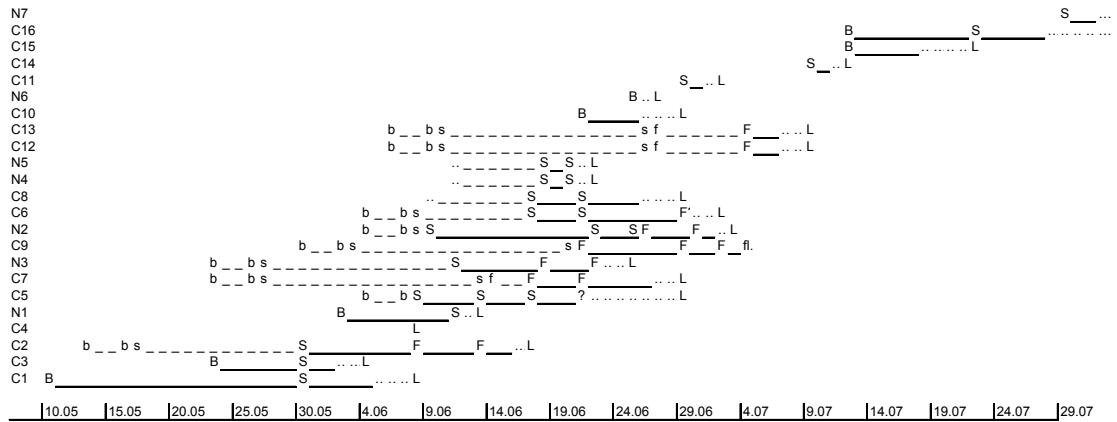


Figure 17. Nests' calendar (B building, S sitting, F feeding, fl fledgling, L nest left; lower case: extrapolated data)

Incubation and nestlings period have been evaluated. The incubation period lasts at least 17 days, according to nest N2 (the one with the hide). This nest has been found on 9th June with the female sitting on it (without evident proof of eggs at this date) and eggs hatched the 26th June. Nestlings appear to need 12-13 days to fledge: in nest C9, on day 11 after hatching there was still nestlings, on day 13 fledglings were fed in the bushes surrounding the nest (fig.18-19).

According to median data for nests measures (fig.20-25), nests are built at 2 m above the ground, in 3,75 m high trees. Tree species mostly used are Black Mangrove (*Avicennia germinans*), Sapote (*Manilkara zapota*), Buttonwood (*Conocarpus erecta*) and an undetermined Rhamnaceae tree. At Cowpen (appendix 5b), most of the nests are situated in isolated Black Mangrove scrubs or in the riparian scrubs along the channel. At Robin's land (appendix 6b), vegetation in which nests are found is denser and belongs to coastal forest or scrubs. The nests are built with small branches, wood sticks and some dry leaves; the material is rough on the external part and thinner inside. Both male and female took part to the building. Nests have a 7,75 cm internal diameter (median) and a 13 cm external diameter. The thickness (i.e. total height) of the nest is 8,25 cm, with 5 cm deepness of the cup. Distances between nests have been evaluated too (see 5.2.1).



Figure 18. Nestling of nest C10, 29th June



Figure 19. Fledgling of nest C10, 4th July



Figure 26. Female sitting on nest N2, 18th June



Figure 27. Feeding of nestlings (N2), 30th June



Figure 28. Social Flycatcher nest built above a Black Catbird nest (C6)

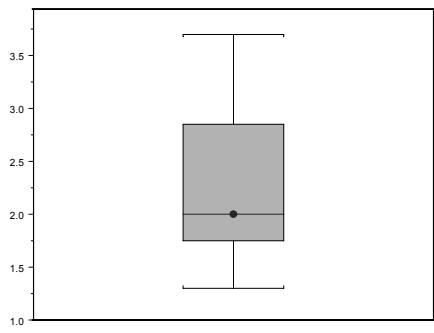


Figure 20. Height of nests (m)

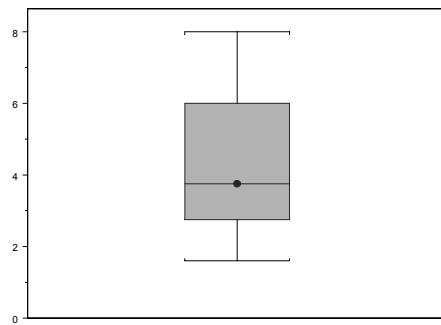


Figure 21. Height of trees (m)

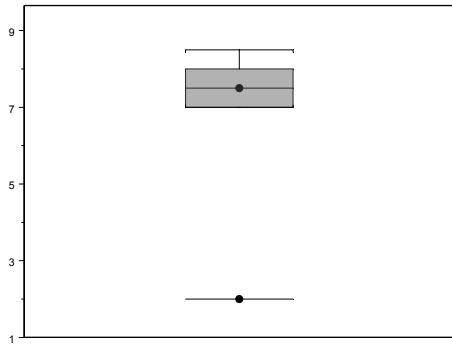


Figure 22. Nests inside diameter (cm)

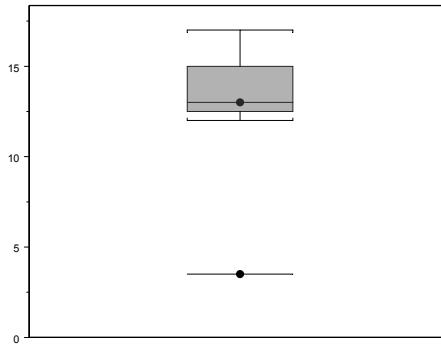


Figure 23. Nests outside diameter (cm)

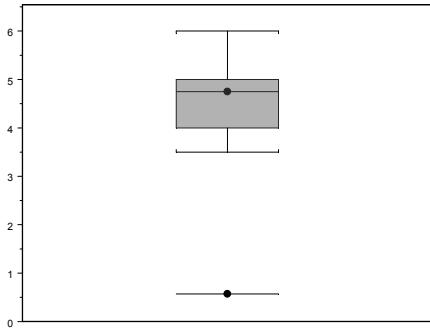


Figure 24. Nests deepness (cm)

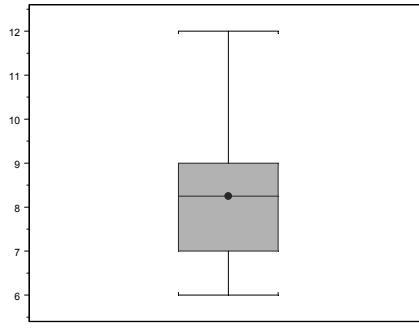


Figure 25. Nests thickness (cm)

The incubating period has been observed from the hide. The female is sitting on the nest most of the time (appendix 2c), (fig.26). When she leaves to go feeding herself, the male often stays not far from the nest and sometimes sings a secretive song. When the female comes back, the male sometimes accompanies her to the nest. She regularly turns the eggs.

On six hours of feeding observations (at day 1, 2 and 4 after hatching), the parents fed their two nestlings at a mean rate of six times per hour (fig.27). Both female (21/36) and male (15/36) took part to the feeding (appendix 2c).

5.1.3 Diet

Observations made during territory mapping, transects counts, from the hide and at any time allowed to see that Black Catbirds are eating both Arthropods and fruits. There could be a difference between seasons. During the reproductive period (May-August) they have often been seen feeding themselves and especially their nestlings with Arthropods, while they seem to feed more on fruits out of that period (observations in March, April, September).

Fruits eaten and places of feeding are (pictures on appendix 3):

- Sapote, *Manilkara zapota*: forest on main trail
- Black Poisonwood, *Metopium brownei*: forests of Robin's land, Bacalar Chico and Caye Caulker
- Fig Tree, *Ficus hemisleyana*: forest along the road
- Silver-thatch Palm, *Thrinax radiata*: Caye Caulker
- Sea Grape, *Coccoloba uvifera*: Robin's land coast
- Small white berries of undetermined riparian scrubs : Cowpen (Appendix 3a)
- *Solanum sp.*: Robin's land
- Fire Bush, *Hamelia patens*: Bacalar Chico (Ambergris Caye)
- *Erithralis fruticosa*: Caye Caulker
- Small violet berries of undetermined plant : Caye Caulker (Appendix 3a)

Black Catbirds have also been seen at Cowpen and Robin's land drinking water in Bromeliad epiphytes.

Insects and other arthropods are part of Black Catbird's diet, at least during breeding period. Feeding of nestlings observed from the hide was mainly (but not totally) composed of arthropods, among them spiders, ants, cockroaches, crickets, larvae, etc. Part of them was found on the ground under the leaves, others on stems or leaves of trees. Preys, as well as nestlings' droppings taken away, were not always apparent in the parent bill, but often completely inside the bill. Insects' hunting by Black Catbirds has also been observed at Bacalar Chico (see 8.2.5).

5.1.4 Competition and predation

The Tropical Mockingbird (*Mimus gilvus*) appears to be the main competitor of *Melanoptila glabrirostris*. It has often been seen chasing it. The Mockingbird is more generalist in its ecology. Nests of Tropical Mockingbird have been found in Black

Catbird's habitat; shape, material, tree species and situation of these nests were similar. *Melanoptila*'s breeding period falls inside *Mimus* one, which is longer (starts earlier). Other bird species that were seen nesting in the same habitat at the same period (at Cowpen), are the Tropical and/or Couch's Kingbird (*Tyrannus melancholicus* and/or *couchii*) and the Social Flycatcher (*Myiozetetes similis*). The latter has built a nest atop a Black Catbird's active nest (C6) in Cowpen (fig.28).

No predation act has been directly observed on Black Catbirds or on their eggs / juveniles. Potential predators are numerous in the Reserve. Some of them have been seen, by daytime, on the study fields. They represent only a very small part of all the potential predators of Shipstern. The Gray Fox (*Urocyon cinereoargenteus*) is very common, it is found on the ground and in the trees (Beletzky, 1999). The Raccoon (*Procyon lotor*) has been seen climbing in a tree not far from a Black Catbird's nest, while an adult bird was calling intensively. The Yucatan Squirrel (*Sciurus yucatanensis*) is common too. The Brown Jay (*Cyanocorax morio*) has been seen attacking a nest of Social Flycatcher (Jacques Laesser, pers. com.). A Tropical Rat Snake (*Spilotes pullatus*) entered a Yucatan Woodpecker occupied cavity (Jacques Laesser, pers. com.). According to Skutch (1985), snakes probably destroy more nests in tropical America than all other predators together. He mentions also that the snake that he has most frequently caught pillaging nests is *Spilotes pullatus*, which attacks nests both during day and night.

5.2 Habitat use and population density

5.2.1 Population density

Plots sizes and dates of each visit can be found on appendix 4a. Maps of each field with landuse information are found on appendix 5a, 6a, 7a and 8a.

From the territory mapping analyses without nests data, 10 clusters are found at Cowpen (CP), 13 at RobinsLand (RL), 1 at MainTrail (MT), 5 at IguanaCamp- East (IC-E) and 6.5 at IguanaCamp-West (IC-W) (appendix 4c, 5c, 6c, 7b and 8b). At CP and RL, nests have been found, resulting in increased density compared to standard analyses (18 clusters on both fields). Corresponding densities are found in the histogram (fig.29) (appendix 4c).

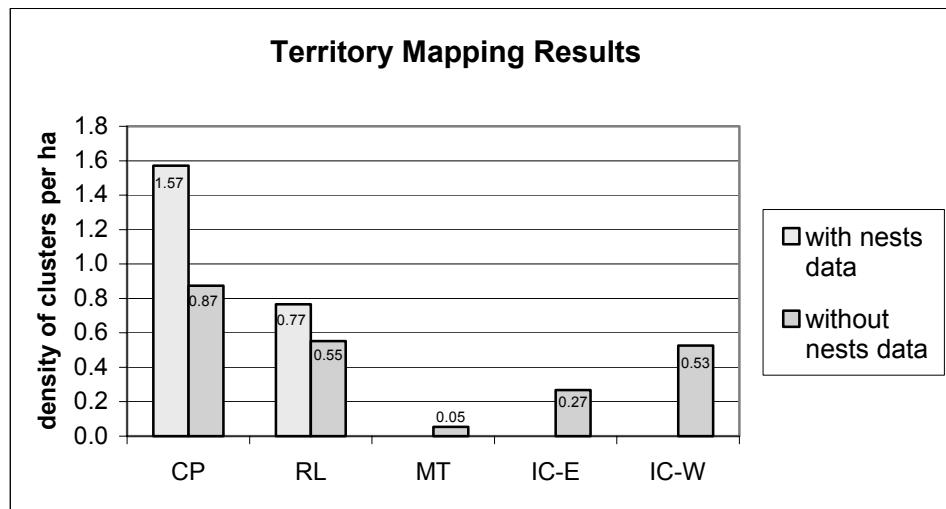


Figure 29. Territory mapping results

Data resulting from the day(s) with maximum number of records, allow obtaining results of possible and certain simultaneous breeding. Possible breeding data include the minimum number of different singing male contacts and other nesting indications. Certain breeding data are only based on evident nesting proof, in this case found occupied nests. These results are expressed in the histogram as densities (fig.30).

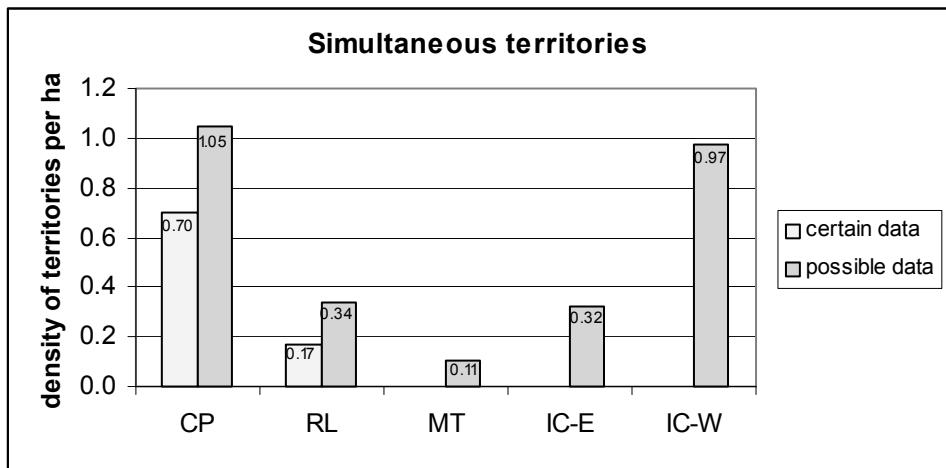


Figure 30. Simultaneous territories

Results of the field with highest density (Cowpen) vary between 0.7 and 1.6 clusters/territories per hectare. In order to complement densities data, figure 31 shows the distances for each nest with the closest nest, by frequency classes, for the days with maximal data for each field (see also appendix 2d, 5e, 6e, 7c and 8c).

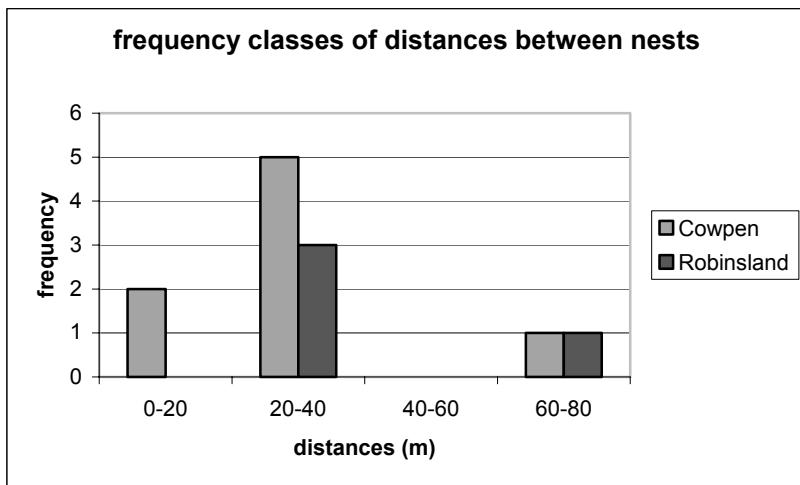


Figure 31. Distances for each nest with the closest nest, by frequency classes

Results show that most of the nests are distanced from the closest neighboring nest by 20 to 40 meters. Only two nests are particularly close to each other (4m apart).

5.2.2 Habitat occupation

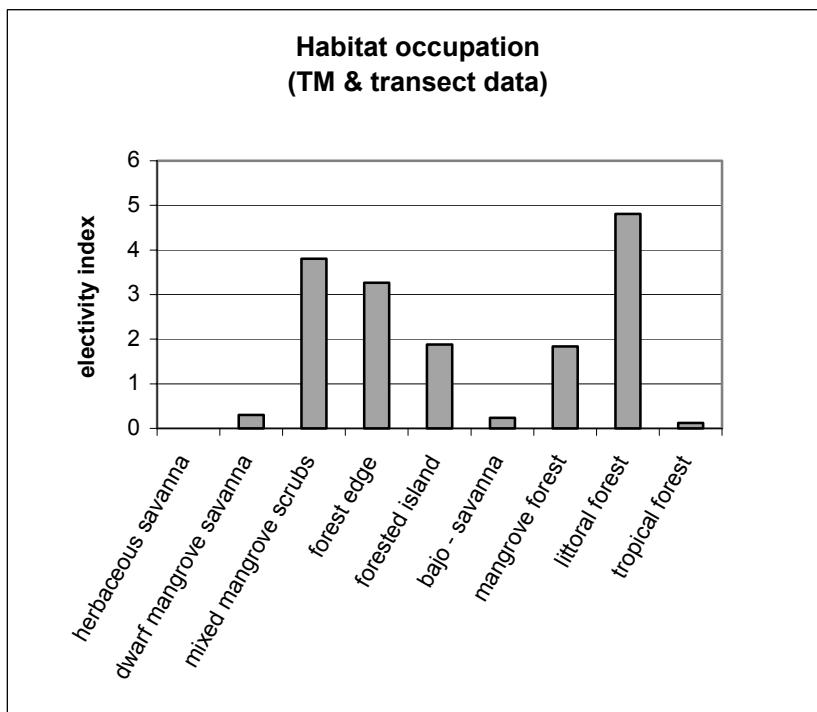


Figure 32. Habitat occupation (territory mapping and transect data)

This histogram of electivity index represents habitat occupation of the Black Catbird at Shipstern, based on all the territory mapping and transect data (fig.32). The electivity index is the ratio of percentage of all singing male contacts per habitat on the percentage of corresponding habitat surfaces (appendix 9a). The different habitats of the territory



Figure 33. Littoral forest at Robin's land.



Figure 34. Mixed mangrove scrubs at Cowpen.



Figure 35. Forest edge at Robin's land.

mapping fields and the transect have been grouped in nine main types (appendix 9b). Results show that the three preferred habitats of singing males are the littoral forest, mixed mangrove scrubs and forest edge (fig.33-35).

5.2.3 Ringed individuals

On 21 ringed adults, 10 have been seen afterwards (appendix 10a).

In Cowpen most of the caught birds were males. This can be explained by the date (30th May) at which the netting took place. Indeed, several pairs were already nesting at this date and females were sitting on their nest.

Ringed individuals, for whom the nest has been found, were mostly seen singing very close to the nest and silent at distance from it. At the end of season, they have been found singing in other places, like for example in forested island where they were only silently looking for food before (appendix 5f). A ringed bird, for which no nest has been found (ww), was seen singing in different places through the field (appendix 5g).

5.2.4 Distribution through the Reserve

Places where observations have been made during breeding period are compiled in figure 36. These data come from transect point counts through the reserve by Jacques Laesser (in prep.) and from personal observations, excluding territory mapping data. Places occupied during that period in the reserve are mostly forest edges, costal and semi-open scrubby areas.

Data out of the breeding period have been collected through transect point counts (J. Laesser, in prep.). Almost no Black Catbird has been recorded between end-August to beginning-October. From October to January, there was no data in semi-open habitats and most of the observations were in dry forest edge. A bird has been seen in the forest of Xo-Pol (fig.5). After the breeding period, the breeding site of Robin's land has been completely abandoned, and the one of Cowpen almost completely.

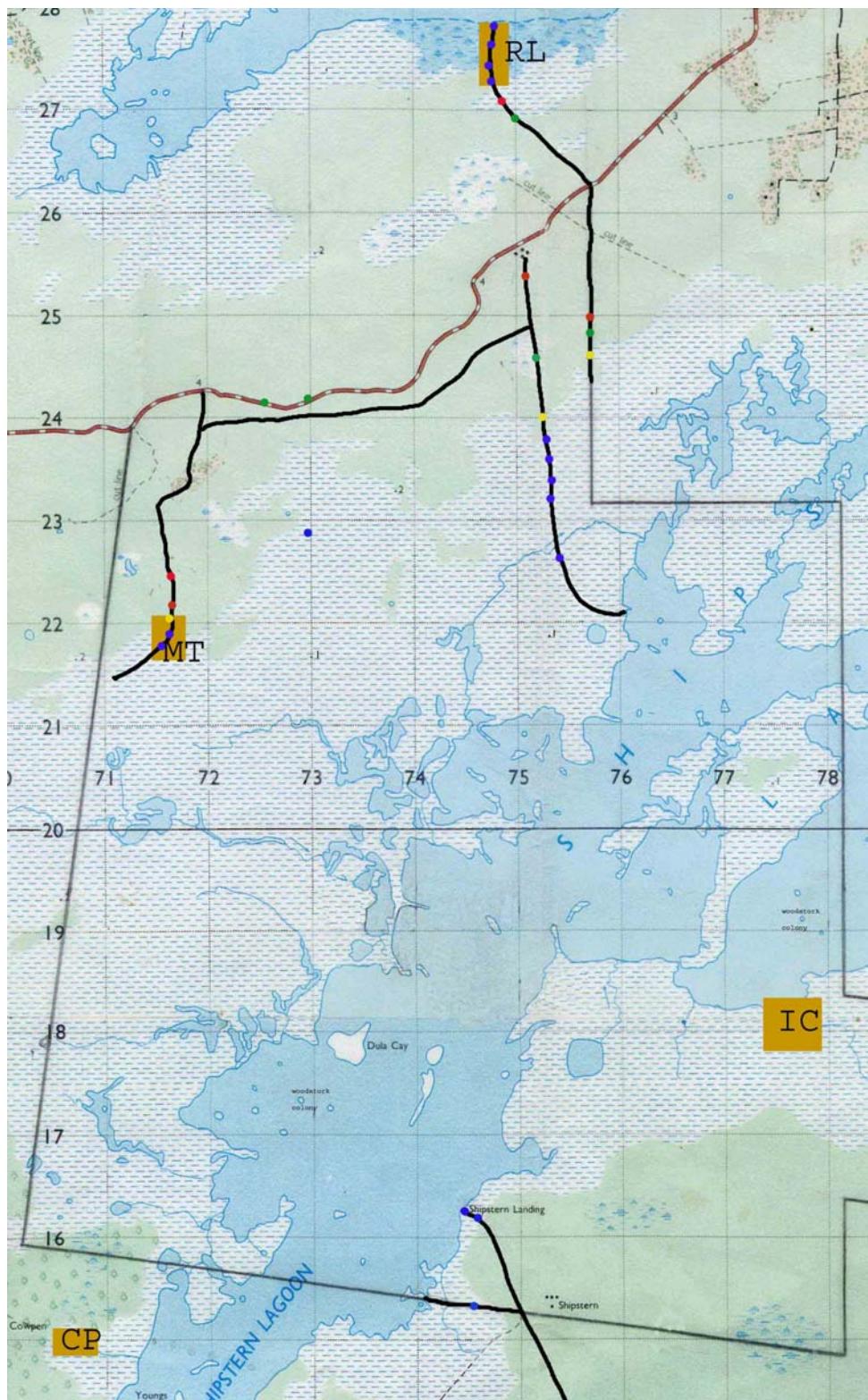


Figure 36. Observations during breeding period (blue : mangrove, scrubs ; yellow : forest edge ; red : bajos, savanna ; green : forest)

6. Discussion

6.1 Biology

Morphometry

Although females, on average, have shorter third primary and bill length and are heavier, there is no significant difference between males and females for these three criteria. This lack of significance may however be due to the small sample size, and more data are needed. We can also imagine that other criteria could be more pertinent to reveal differences between females and males (cloacae shape, tibia length...).

Nesting

Some results are new concerning the breeding habits of this bird species. With the pair followed from the hide, we learned that during the whole reproduction period the pair stays together. Both male and female take part to the building of the nest and to the feeding of juveniles. And when the female is sitting on the eggs, the male is never far away. The breeding period lasts between mid-May to mid-August. The incubation of eggs lasts **at least** 17 days. And juveniles need 12-13 days to fledge. The female lays 3 or 2 blue-green eggs. The question of multiple broods has not been answered, but nesting period would leave time for two successive broods or at least a replacement brood after a failed one.

Reproductive success data are not very precise. This can be explained by inextensive data collection to avoid disturbances on nesting birds and therefore also to avoid errors in territory mapping data, the main part of this study. It appears that this reproductive success is very low. According to literature, this does not seem to be an exception in the tropics. Skutch (1985) indicates that, on average, birds of the humid neotropics loose about two-third or more of their open nests, whereas in the north temperate zone, loss of only one half is more usual. Among the causes of nest failure of neotropical birds, Skutch (1985) mentions predation, hatching failure, fall and finally other minor causes of failure including left parents or parasitic birds. He also questions the effect of human visits.

In our case, several pairs left their nest before laying, reasons could be disturbances (man or animal) or intra or interspecific competition. For nests with eggs or juveniles, the most probable cause of failure is due to predation.

Predation

By far the greatest cause of nesting failures in the humid tropics is predation (Skutch, 1985). Although no predation act has been directly observed on Black Catbirds or on their

eggs / juveniles, nests survey allow us to think that predation could be the main reason for the high failure rate (see above). Predation on eggs is probably not due to mammals has no shell fragments has been found. Unlike mammalian predators, which often leave fragments of shell in a nest, snakes swallow eggs whole (Skutch, 1985). Predation on nestlings could be the fact of numerous predators including snakes, birds (raptors, jays...) and mammals (rodents, opossums, foxes, mustelids, procyonids).

6.2 Habitat use and population density

Population density

When comparing the results of territory mapping methods for Cowpen and Robin's land and the nests found, one can wonder if territory mapping is an adequate method for this species. Indeed, the difference between the number of clusters found with and without nests data is strong and is mainly due to the fact that nests are sometimes very close of each other, and birds seems to tolerate their close neighboring as they do not express a very strong territoriality. The given values for density is cumulative, it considers the number of clusters over the whole observation period. This may include broods that do not cooccur temporally. In order to allow an instantaneous view of simultaneous territories, the results with the maximum breeding data (possible and certain) for one day might be closer to reality. Even if the territory mapping results do not exactly reflect territories reality, this method is certainly adequate for relative density estimates.

Habitat use

The three preferred habitats of singing Black Catbirds at Shipstern during breeding period are the littoral forest, the mixed mangrove scrubs and the forest edge. It is important to mention that these results come from singing males contact and are therefore not representative of all individuals, at any period. These habitats are preferred for the breeding, and more precisely for the location of nests. Even during breeding period, Black Catbirds are using other habitats, mainly for foraging. It was common to see adults leaving nesting habitats (at Cowpen: Black mangrove scrubs and at Robin's land: littoral forest-scrubs) to go foraging at 100-400 m away (respectively in forested island and in forest). One can therefore imagine that diversity of vegetation types is important for the distribution of this bird at Shipstern.

Ringed individuals

Thanks to color ringing, we could follow individuals through the fields and through the season. We learned that the territory of a nesting Black Catbird consists in a small area surrounding the nest, where the male sings and occasionally chase other individuals. Feeding grounds are not defended and mostly not contiguous to the nest.

Distribution through the reserve

The data of figure 36 for breeding period, excluding territory mapping and transect data, seem to correspond to the habitat occupation results of territory mapping and transect data (5.2.2). Preferred habitats are forest edge, scrubby semi-open areas and coastal vegetation.

Black Catbirds are much more secretive out of the reproduction period and especially between end-August to beginning-October, period corresponding to the molting (J. Laesser, pers. com.).

A difference of habitat occupation according to seasons appeared at Shipstern, with the desertion of semi-open and scrubby area out of the breeding season. This fact points out the importance of the diversity of vegetation types in Black Catbird's distribution through the Reserve.

SECOND PART

The aim of this part is to clarify the distribution, the status and habitat use throughout the range.

7. Materials and methods

7.1 Data collection

In addition to literature, informations have been collected first by searching on internet (trip report, bird lists, mention of bird studies) and then by writing to and corresponding with ornithologists and birdwatchers by e-mail; and finally by meeting some of them.

7.2 Visit to other sites

Visits to other places have been made in order to compare habitat occupation with Shipstern's populations. The choice of these places was made according to 1) location of known observations or populations and 2) a choice of favourable and diverse geographic locations (island, coast and inland). Local transportation and tourist accommodations have been used, except at Bacalar Chico (see 8.2.5). Time spent on each location was usually half a day, except at Caye Caulker and Bacalar Chico.

8. Results

8.1 Data compilation

Locations 1 to 37 are positioned on figure 37.

CAYES (Belize):

Listed as “ I ” (uncommon or even common locally, but absent or scarce in most of the district) in the checklist; it is common on Ambergris Caye and Caye Caulker, but it is no longer found on Lighthouse Reef and Grovers Reef where it formerly occurred (Jones and Vallely, 2001).

1. Caye Caulker

See 8.2.4

Yucatan Peninsula data compilation

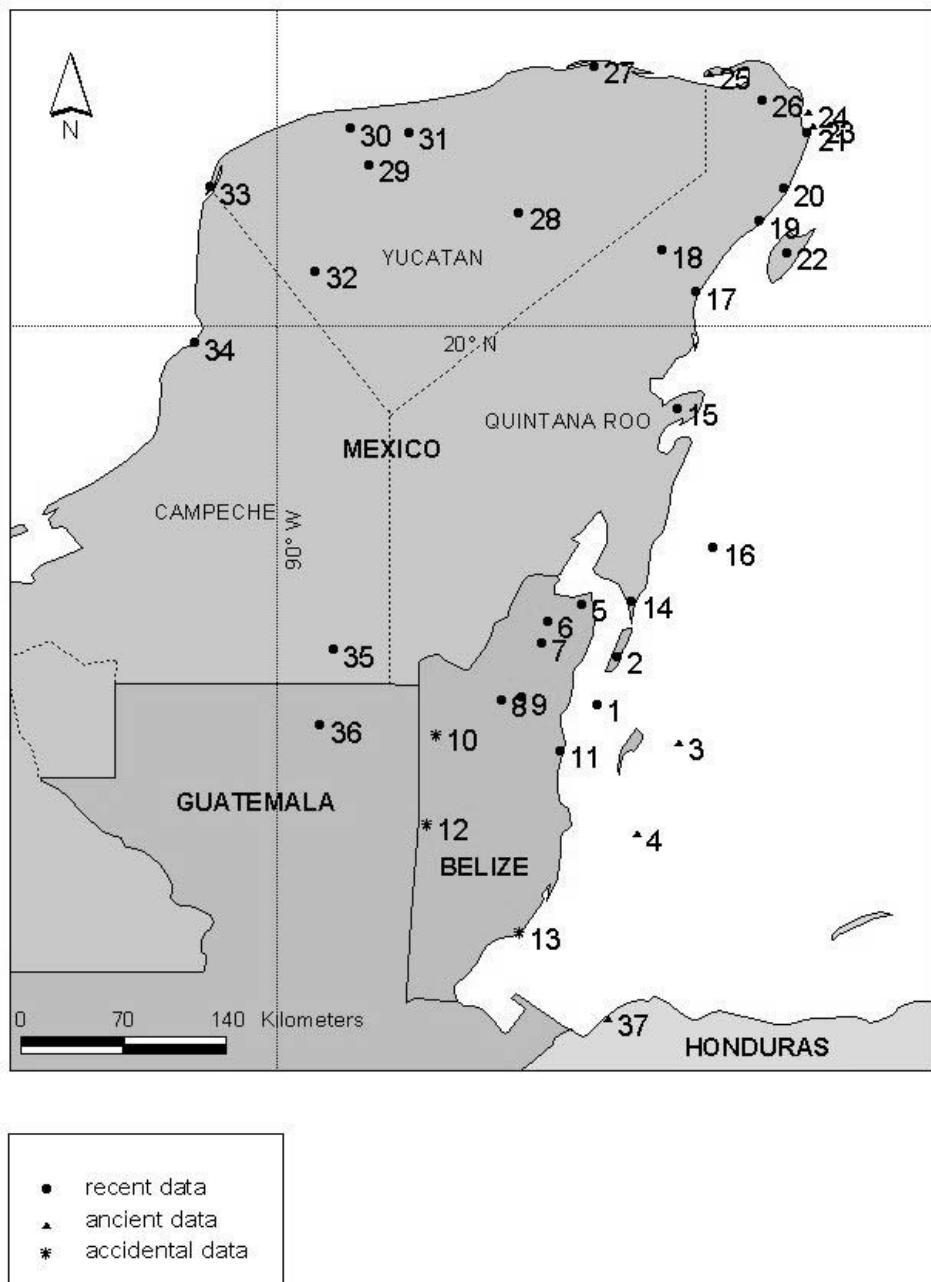


Figure 37. Yucatan Peninsula data compilation

2. Ambergris Caye

Common to fairly common resident from Eastern Q. Roo to Ambergris Caye (Howell & Webb, 1995).

Common on Ambergris Caye (Jones and Vallely, 2001).

Because of San Pedro town and San Pablo resort community development, the remaining southern small population faces increasing pressure due to additional loss of habitat and may be extirpated from southern Ambergris Caye by the end of the present decade (Miller& Miller, 1991).

The Black Catbird belongs to the birds frequently seen from the “people perch” of the private bird sanctuary of the Caribbean Villas. This sanctuary is located in the narrow but rich littoral forest region south of San Pedro.

(www.caribbeanvillashotel.com/birds/cvbirds.html).

For Bacalar Chico National Park and Marine Reserve, northern Ambergris Caye see 8.2.5.

3-4. Lighthouse Reef (3) and Glover's Reef (4) Atolls

Perhaps the species was once more widely distributed, for Salvin and Godman in the *Biologia* (1879:27) mention Northern Two Cays, Long Cay and Middle Cay among the localities at which the species was seen or collected. The species is possibly no longer present on the keys since extensive recent investigations have failed to reveal it (Russell, 1964). He cites published records from Glovers Reef.

Mentioned as “resident” on the bird list of Longcaye Island’s website (source: Pelzel 1969, on www.longcayebelize.com).

Common to uncommon on Cay Caulker, Lighthouse Reef and Glover’s Reef (Howell & Webb, 1995).

No longer found on Lighthouse Reef and Glover’s Reef (Jones and Vallely, 2001).

COROZAL DISTRICT (Belize):

Listed as “ I ” (uncommon or even common locally, but absent or scarce in most of the district) in Jones and Vallely, 2001

Russell (1964) cites published records from Corozal.

5. Sarteneja and Shipstern lagoon

Personal observations the 14th June 2002, east of Sarteneja, in mangrove scrubs.

Common at Sarteneja (Jones, in England 2000).

Present at Fireburn (Z.Walker and E. McRae, pers. com.).

Present at Baracouda Pond (E. McRae, pers. com.)

Corozalito: see 8.2.1

Shipstern Nature Reserve: see 5.2.

6. Little Belize-Progresso

See 8.2.2

7. Freshwater Creek Forest Reserve

Mentioned in that area by Z.Walker and E. McRae (pers. com.) and by Miller & Miller (BBIS).

ORANGE WALK DISTRICT (Belize):

Listed as “ I ” (uncommon or even common locally, but absent or scarce in most of the district) in the checklist; found locally on the mainland west to eastern OW district (Jones & Vallely, 2001).

8. Lamanai

Present at Lamanai according to Ruben Arevalo, tour guide (pers. com.).

The highest single morning count is of nine along Dawson Creek, between the New River Lagoon and the boat landing, in November 1998 (D. McRae, in England 2000).

9. Crooked Tree

See 8.2.3

10. Chan Chich

Mentioned in a trip report on the web: seen at Lamanai and Chan Chich on 18th, 19th and 20th February 1999 (www.naturalist.co.uk/reports1999/belize.htm).

BELIZE DISTRICT (Belize):

Listed as “ I ” (uncommon or even common locally, but absent or scarce in most of the district) in the checklist; found locally on the mainland south to central Belize district (Jones & Vallely, 2001).

11. South of Belize City

Observed in that area by E. McRae (pers. com.).

Two birds were noted on the coast of the mainland during 1990 Belize City Christmas Bird Count (Miller & Miller, 1991).

Common at scattered mainland locations south to Belize City (Jones, in England 2000).

CAYO DISTRICT (Belize):

Not present in the district according to the checklist (Jones & Vallely, 2001).

12. Chaa Creek

Mentioned in the 1997-1998 Bird Count from ChaaCreek. According to staff naturalists (M. Green, pers. comm.), the Black Catbird is considered to be a very rare species to the immediate area of the Chaa Creek Natural History Center in the Cayo District. Only one actual sighting has been recorded without information concerning the habitat of the sighting.

STANN CREEK DISTRICT (Belize):

Not present in the district according to the checklist (Jones & Vallely, 2001).

TOLEDO DISTRICT (Belize):

Known from only one or two records in the district (Jones & Vallely, 2001).

13. Monkey River

One Black Catbird record by a keen observer who lives there, probably a stray, not part of a small population (L. Jones, pers. com.).

QUINTANA ROO STATE (Mexico):

Common to fairly common resident from Eastern Q. Roo to Ambergris Caye (Howell & Webb, 1995).

14. X'calak peninsula (Barb)

BC are abundant along the coast of Sian Ka'an and the X'calak peninsula (B. McKinnon, pers. com.).

15. Sian Ka'an Biosphere Reserve and area

It is possible to see Black Catbird on the coast at Sian Ka'an, the vegetation there is characteristic of the Caribbean and plant species are similar along the Mexican Belizean coast (J. Acosta, pers. com.).

According to Ismael Caamal Angulo (pers.com.) the area with the highest Black Catbird density is a littoral strip between the sea and a lagoon, in the northern part of the reserve (habitat: littoral forest and mangrove). There is also another place out of the reserve near Chumpon (habitat: tropical dry forest, no permanent water).

At the central entrance of Sian Ka'an, south of Chunyaxché and north of Felipe Carrillo Puerto, Barbara McKinnon (pers. com), Steve Howell and Sophie Webb found several pairs that may have been nesting in and around an Orange Oriole nesting colony in a seasonally inundated area on both sides of the road, full of thorny vegetation.

Observation of 2-3 individuals the 15th November 2002 at Felipe Carrillo Puerto (R. Mavor & K. Yuill, pers.com.).

Mentioned close to Felipe Carrillo Puerto in badly degraded forest (<http://www.camacdonald.com/birding/birdmexico-YucatanTripReport.htm>).

Abundant along the coast of Sian Ka'an and the X'calak peninsula (B. McKinnon, pers. com.).

16. Banco Chinchorro

Present on Banco Chinchorro (Friedmann & al, 1950).

B. McKinnon (pers. com.) netted one individual in 26 Sept of 2001 in coastal forest growing along a narrow berm between red mangroves.

17. Tulum

See 8.2.6.

18. Coba

Mentioned in a trip report between 21st November and 5th December 1999: 2 individuals (www.birdtours.co.uk).

19. Playa del Carmen

Mentioned in a trip report between 21st November and 5th December 1999: 2 individuals (www.birdtours.co.uk).

20. Puerto Morelos Botanical Garden (mid-way between Cancun and Playa del Carmen)

According to a website (www.ecoyuc.com/birding.html), the Black Catbird belongs to the local birds that can be seen at Puerto Morelos Botanical Garden. This Garden protects over 60 acres of jungles and marshland vegetation.

21. Isla Cancun

On Isla Cancún, (circa 1977 & '78) B. McKinnon (pers. com.) found their cup nests low down in small white mangrove bushes between the beach and the coastal lagoon system .

22-25. Isla Cozumel (22), Mujeres (23), Contoy (24), Holbox (25)

Ridgway (1907) mentioned collected individuals from Mujeres and Cozumel islands.

Present on Cozumel, Holbox, Mujeres (Peters, 1960).

Present on Holbox, Mujeres and Contoy ; abundant on Cozumel (Friedmann & al, 1950).

Reports from Isla Holbox (Salvin 1888) are based on Gaumer specs and require verification (Howell & Webb, 1995).

Philips (1986) questions records from Holbox, Contoy and Mujeres islands (Miller & Miller, 1991).

Common on Cozumel Island (Edwards, 1972).

Common to fairly common resident on Cozumel Island (Howell & Webb, 1995).

Very abundant on Cozumel Island (at least in 1997), tropical dry forest mainly (P. Escalante, pers. com.).

In September 1988, Hurricane Gilbert slammed into Cozumel and a portion of the Black Catbird population was blown inland and shortly thereafter frequently seen along the coast in the Sian Ka'an Biosphere Reserve. The status of the Cozumel population has now stabilized, but is thought to have been reduced by the impact of Hurricane Gilbert (McKinnon, in Miller & Miller, 1991).

26. El Eden Ecological Reserve (30 miles north-west of Cancun)

Few Black Catbirds trapped in the Reserve out of the nesting period; where it is supposed to nest, without evident proof at the time for now (J. Rotenberg, pers. com.).

YUCATAN STATE (Mexico):

27. Rià Lagartos

See 8.2.7.

28. Chichen Itza and Piste

See 8.2.8.

29. Conkal (18 km N-E Merida)

An observation the 22nd of November 2002 during the bird race, in a destroyed (by hurricane Isidore) dry forest (J. Laesser and al.)

30. Komchen Nature Sanctuary (35 km, 22 miles north of Merida)

Mentioned in the list of frequently seen birds from Komchén's nature sanctuary (www.earthfoot.org).

31. Hobonil (Rancho de)

Bird studies have been undertaken at Rancho de Hobonil by the Universidad Autonoma de Yucatan in secondary vegetation (acahuales). Between the 11th November 2001 and the 28th June 2002, 8 individuals have been caught at Ferraez, an area formerly cultivated which consists now of small (less than 5 meters high) trees and scrubs (L. Gonsalez, pers. com.).

32. Uxmal

Peter Scott (B. McKinnon, pers. com.) found a nesting pair in 1985.

An observation the 22nd November 2002 during the bird race (I.Caamal Angulo and H. Gomez, pers. com.).

33. Celestun

This bird is not common around Celestun, but it is here (D. Bacab, pers. com.)

CAMPECHE STATE (Mexico):

Uncommon to rare on western Campeche (Howell & Webb, 1995).

According to Javier Salgado Ortiz (pers. com.), who conducted a two year (1996-97) bird inventory at state level for University of Campeche, Black Catbird are more commonly found towards the north of the state. He considers Black Catbird at state level as a non-common species confined largely to tropical dry forest (selva baja caducifolia) and seasonal flooded forest (selva baja inundable or bajos), with less preference for mangrove forest.

34. Campeche City and northern state

In the north, they were mostly observed in forest (tropical dry forest and bajos) edges and edges of forest gap where they forage on seasonal fruits. Near Campeche City, they have

been observed eating fruit within mango, orange and zapote orchards that were surrounded by scrub or bajos. Some individuals were seen in edges of mangrove forest, but close to the ecotone with savanna and dry scrub forest (J. Salgado Ortiz, pers. com.).

35. Calakmul area and southern state

Fewer individuals than in the northern portion. Associated again with edges of bajos and second growth vegetation (acahuales). Records from Zoh-Laguna and Nuevo-Becal, communities located at the eastern central section of Calakmul biosphere reserve (J. Salgado Ortiz, pers. com.).

PETEN STATE (Guatemala):

36. Peten area

Present in Peten (Peters, 1960).

Uncommon to rare south to Northern Guatemala (Van Tyne 1935 in Howell & Webb, 1995).

CORTES STATE (Honduras):

Present in the northern coast of Honduras (Peters, 1960).

No record from Honduras since the type was purportedly collected at Omoa in 1855 or 1856 (Howell & Webb, 1995).

37. Omoa

The type specimen (now in British Museum) has been collected at Omoa, Honduras in 1857-'58 (Hellmayr, 1934).

Philips (1986) maintains that the Omoa, Honduras, location is in error; Ridgely and Gwynne (1989) corroborate this and suggest that the Honduras specimen may have been mislabelled and was actually taken in Belize (Miller & Miller, 1991).

TEXAS STATE (USA):

38. Brownsville

There is one documented record of Black Catbird for Texas; confirmed by the Texan commission, but not by the national commission of USA. An individual was collected near Brownsville, Cameron County, on 21st June 1892 by Frank W. Armstrong. The specimen is housed at the Academy of Natural Sciences in Philadelphia (M. Lockwood, pers. com.).

8.2 Visited places

8.2.1 Corozalito (Corozal district, Belize)

Location and habitat

Corozalito is the area situated south of Shipstern lagoon (fig.5). It is composed of a shallow and narrow channels' net (bellowing to the lagoon), bordered by mixed mangrove and other scrubs (Sapote, Black and White Poisonwood, Black and White mangrove) and dwarf Red Mangrove scrubs (fig.38). That area is only accessible with a small boat.

Personal observations

2 hours on this site during the breeding period (17th June 2002) allowed to hear and see several (~10) individuals.

Other data

According to Zoe Walker and on her personal inspections (pers. com.), Corozalito hosts an important population of Black Catbird, as it is not uncommon to see several individuals in a single visit.

Expected status

The Black Catbird could be considered as common at Corozalito, at least during the breeding season.

8.2.2 Little Belize-Progresso lagoon (Corozal district, Belize)

Location and habitat

The visited area is a vegetation patch situated between Progresso lagoon and the Orange Walk-Sarteneja all-weather road, bordered with the cattle fields of Little Belize's Mennonite community. Vegetation consists of coastal forest and scrubs (fig.39).

Personal observations

On a 30 minutes inspection period on the 25th June 2002, about 3 to 4 individuals have been seen and/or heard in this vegetation patch.

Other data

Black Catbirds have already been seen in that area, during a bird survey (Zoe Walker, pers. com.).

Expected status

Black Catbirds might be common in that vegetation type around Progresso lagoon.



Figure 38. Corozalito, south of Shipstern lagoon



Figure 39. Progresso lagoon



Figure 40. Black Catbird's habitat destruction at Caye Caulker



Figure 41. A Caye Caulker's partial albinos ?

8.2.3 Crooked Tree (Orange Walk district, Belize)

Location

Crooked Tree Wildlife Sanctuary consists of a network of inland lagoons, swamps and waterways, with a main island. Numerous vegetation types are found within the sanctuary.

Personal observations and habitats

Half a day (25th June 2002) has been spent at Crooked Tree. Black Catbirds were heard at two places. The first place is situated on the northern tip of the island and is covered by coastal scrubs (*Chrysobalanus icaco*, *Thrinax radiata*...). The second place, situated just after the bridge (in direction of Northern highway) is an herbaceous wetland with mixed scrubs

Other data

According to Robert Crawford (pers. com.), Black Catbirds are regularly observed on the northern tip of the island (see first place described).

Expected status

Could be considered as fairly common to uncommon.

8.2.4 Caye Caulker (Belize)

Location

Caye Caulker is an island situated south to Ambergris Caye, along the barrier reef of Belize. That island is split in two parts by a small channel. The northern part is almost inhabited. The southern part has a high tourism development. Caye Caulker hosts the Siwa-Ban Reserve, Siwa-Ban being the local Mayan name for the Black Catbird (Siwa-Ban Foundation, Ellen McRae).

Habitat

The northern island is mainly covered by low dry forest and bordered with Red Mangrove (*Rhizophora mangle*). Where there are no buildings and Coconut tree, the southern island is also bordered with Red Mangrove. But, the main vegetation types of that island are mixed mangrove and coastal scrubs (*Avicennia germinans*, *Laguncularia racemosa*, *Conocarpus erecta*, *Chrysobalanus icaco*, *Thrinax radiata* *Coccoloba uvifera*, *Erithralis fruticosa*...). These habitats are mainly found at the southern tip of the island. They are disappearing at an incredible rate due to tourism development (fig.40). Hurricanes cause damages too.

Personal observations

Three visits have been made to Cay Caulker, first on 17th- 21st March, second on 5th-8th July and finally 30th July-2nd August. On all these three visits Black Catbirds were very active, singing away. On the third visit a fledgling has been observed.

Observation of feeding behaviour has been made. *Erithralis fruticosa*'s small black fruits and *Thrinax radiata*'s white bays are eaten by Black Catbirds.

One bird with white spots, probably due to partial albinism, has been seen (fig.41).

Between first and second visit, both unique small favourable areas have been partially destroyed!

Other data

"The population appears viable and constitutes a large percentage of the land-based birds on the caye, and that its preferred habitat is restricted to a relatively small portion of the island". "It appears that the largest known population of the Black Catbird in Belize is healthy, but the future degradation of habitat by land speculators and probable losses due to predation by introduced species (especially feral cats) need to be considered now." "Development pressures are real and accelerating: the situation merits urgent action. " (Miller & Miller, 1991)

Ellen McRae (pers. com.) from the Siwa Ban Foundation observes year round Black Catbirds' population, whose littoral forest habitat is under threat from runaway development.

A fledgling has been observed by Martin Reid (pers. com.), the 28th June 1994.

Expected status

Still common at the southern top end of the island , but highly threatened!

The Siwa-ban Reserve was designated in 1998 expressly to protect the population on Caye Caulker but it is unclear whether this has provided adequate protection (STATTERSFIELD A.J., & al, 2000.)

8.2.5 Bacalar Chico (Ambergris Caye, Belize)

Location

Bacalar Chico National Park and Marine Reserve is situated on the northern tip of Ambergris Caye. The northern limit of the actual park, a channel dug by Mayans, constitutes the boundary with Mexico (X'calak peninsula, Quintana Roo). Bacalar Chico was created in 1996 with the help of the ITCF (see 2.3.1). Less than a year later, it has been included in the Belizean network of the UNESCO World Heritage Site.

Habitat

There are several vegetation types at Bacalar Chico. The prospected areas during two visits, were Punta San Juan (fig.42, point 1) and two places with littoral forest (2 and 3).

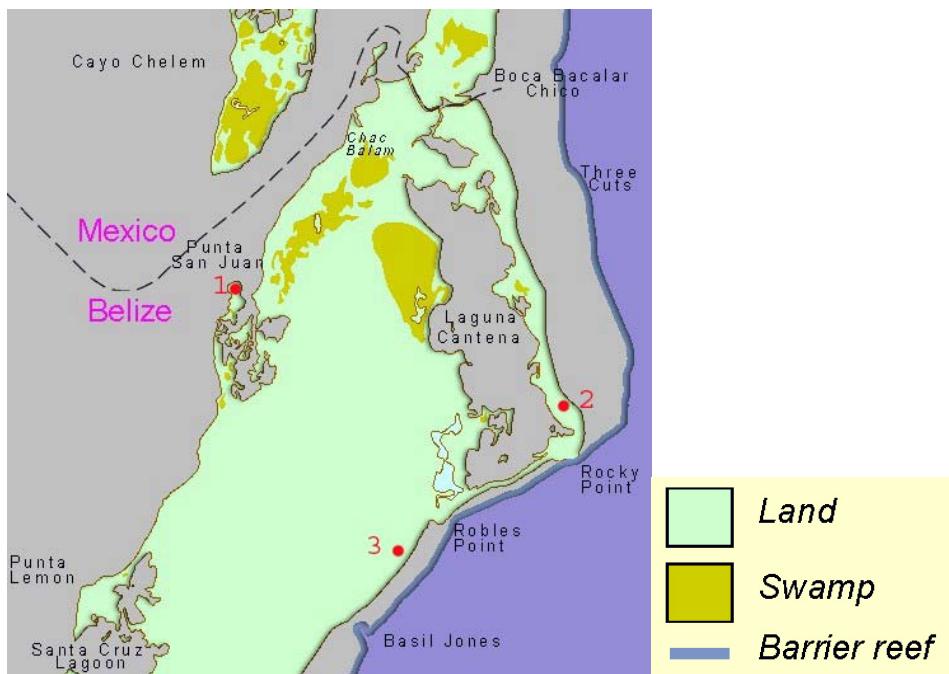


Figure 42. Northern Ambergris Caye modified from Mazzullo (1999)



Figure 43. San Juan, Bacalar Chico, Ambergris Caye



Figure 44. Chichen Itza, Yucatan

Punta San Juan is the headquarter of the park, with a building lying in the grass, surrounded by a small tropical forest patch (fig.43). The littoral forest of point 2 is quite low (between 1,5 to 5 m high) and open (due to numerous trails) and very rich with coastal scrubs/trees (*Coccoloba uvifera*, *Thrinax radiata*, *Erithralis fruticosa*,...). Comparing point 2, the littoral forest of point 3 is higher and denser. The vegetation seems poorer in fruiting coastal scrubs.

Personal observations

Two visits (the first on 14th-19th May 2002 and the second on 26th-29th July 2002) at Bacalar Chico allowed seeing numerous Black Catbirds.

The most prospected area was San Juan (1). On both visits the Black Catbirds were very active. On first visit, they all have been seen or heard inside or at the edge of this little forest patch. A pair building a nest has been found. On second visit, they were still found in the forest patch, but several individuals were looking for insects on the ground in the grass between the house and the forest edge, before leaving with their prey inside the forest patch likely to go feeding their nestlings or fledglings. Fledglings have been observed, an adult with Black Poisonwood fruits fed one of them.

On one hour walk (the 17th May) trough the littoral forest-scrubs of point 2, about 10 individuals have been seen or heard.

On one hour walk (the 18th May) through the littoral forest of point 3, about 3 individuals have been seen or heard.

Other data

Auriol Samos (pers. com.) employee of the park, frequently observes that species at Bacalar Chico. He mentions that the species (like almost all the other bird species) has not been seen during a few month after hurricane Keith (2000).

Expected status

One could consider the status of Bacalar Chico's Black Catbirds has being common to very common. Ambergris Caye's population being threatened by tourist development, Bacalar Chico National Park could serve as a refuge for this species.

8.2.6 Tulum (Quintana Roo state, Mexico)

Location and habitat

Tulum is situated in the middle of Peninsula's Caribbean coast. The vegetation consists (where there are no hotels or cabanas) of coastal scrubs (*Thrinax*...) and tropical dry forest.

Personal observations

No Black Catbird has been heard or seen in the morning of 16th of July 2002.

Other data

Black Catbirds are regularly seen in Tulum. Jacques Laesser (pers. com.) mentions an observation in February 2001, on the forest edge.

Expected status

Uncommon to fairly common ?

8.2.7 Ria Lagartos (Yucatan state, Mexico)

Location and habitat

Ria Lagartos Biosphere Reserve is situated on the northern coast of the Yucatan Peninsula. Habitats are (from sea to inland) low coastal scrubs, black mangrove scrubs, inland lagoon and finally dry mixed scrubs.

Personal observations

No Black Catbird has been seen or heard within the black mangrove and low coastal scrubs, during the morning of 10th September.

Other data

According to Melgar Tabasco and Ismael Navarro (pers. com.), the species can be found in the dry mixed scrubs vegetation type.

Expected status

Black Catbirds are much less common on the Gulf Coast at Rià Lagartos and Celestun (Barbara McKinnon, pers. com.). They might be considered as uncommon in that area.

8.2.8 Chichen Itza (Yucatan state, Mexico)

Location and habitat

The Mayan archaeological site of Chichen Itza is situated in the Yucatan State. The vegetation consists of tropical dry forest. There are several open areas around the Mayan buildings. This important Mayan site can be very crowded.

Personal observations

During the morning of 19th of July 2002, one nesting pair has been observed within the archaeological site. The female was sitting in the nest and the male singing around. Their nest was situated at about 6-7 meters high on the edge of the forest, along the trail leaving the cenote of sacrifices to the central plaza (fig. 44).

Other data

Chichen Itza is mentioned by Friedmann (1950). An observation on the evening of the 25th November 2002 at Piste (village 2 km away from Chichen Itza): a Black Catbird “roosting” on a building (R. Mavor & K. Yuill, pers.com.).

Expected status

Uncommon to rare ?

9. Discussion

Distribution throughout the range shows that Black Catbirds are mostly common along the Caribbean coast and islands of the Yucatan Peninsula (fig.45). McKinnon (2002) described seven different geographical zones in Yucatan. Black Catbird's important populations can be associated to one of these zones: the north and east of Quintana Roo including island and coastal forests influenced by Antillean species, as found in the Sian Ka'an Biosphere Reserve and along the entire coast of the mainland to Xcalak. By extension towards southern Mexican border this description can be applied to northern Belize too. The smaller and more inland known populations often seems to be in relation with lagoons or seasonally inundated forests (bajos), therefore the presence of water seems important for the establishment of the Black Catbird. This factor in combination with climatic-geographic factors (Caribbean) has an influence on the vegetation. Low coastal forest is the dominant habitat for *Melanoptila glabrirostris*.

On islands (Caye Caulker and Bacalar Chico), Black Catbirds are nesting and foraging in the same habitat, the low coastal forest. Both vegetation structure (for building nests) and composition (fruiting trees) are found in this habitat.

At Shipstern, movements between grounds have been observed (see 6.2), letting think that there is not a unique habitat offering both nesting and foraging places. This could be a reason why the distribution in Shipstern area is fragmented, and the mainland populations so localized. Coastal vegetation being not as well developed as on the islands, offering less fruiting scrubs, birds need to forage in surrounding forested island or forest (edge). Favourable conditions on the mainland being coastal scrubs or mixed mangrove scrubs associated to forest or forested island, this habitat combination could limit Black Catbird's distribution.

Status of Black Catbird's populations

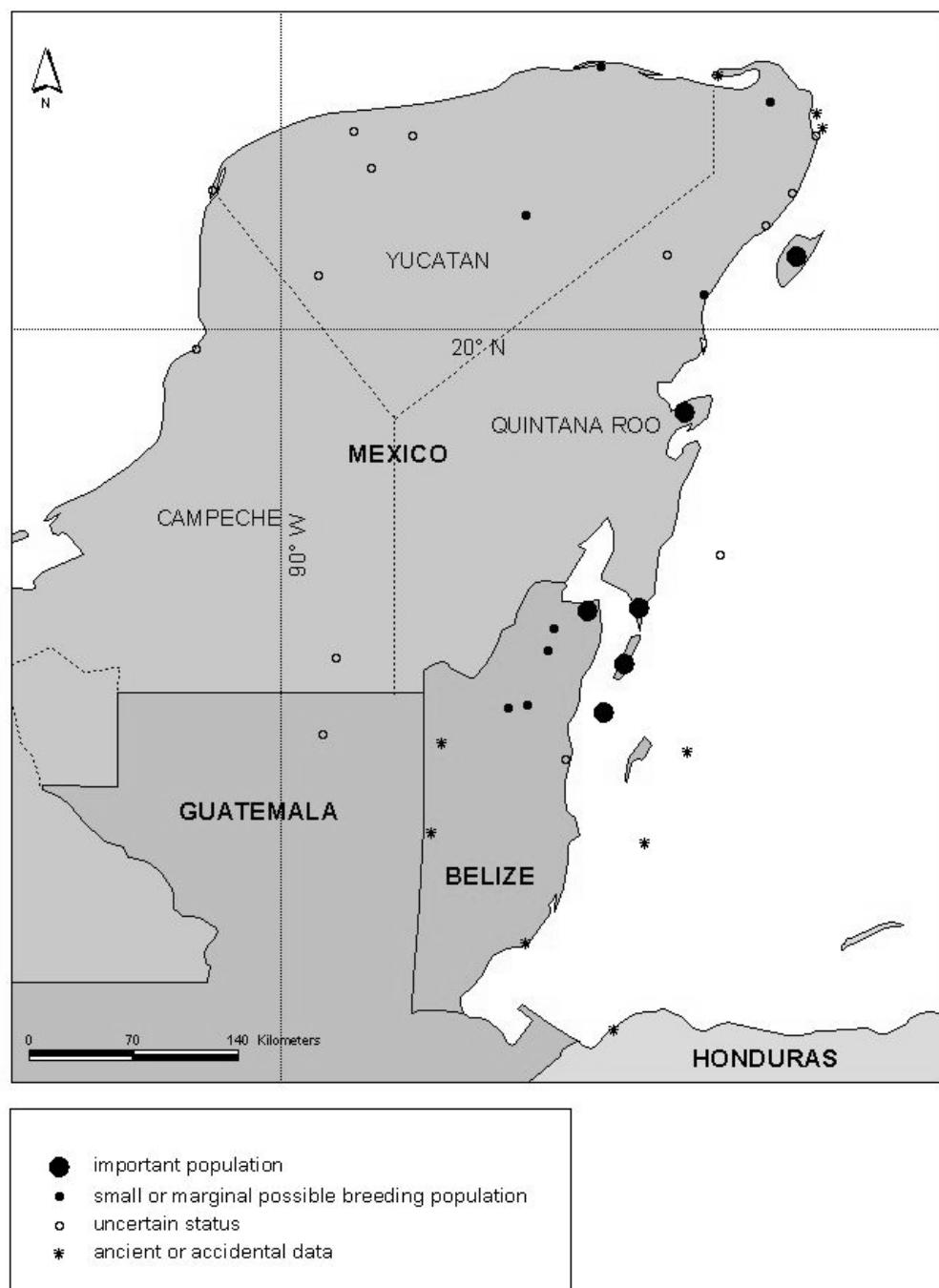


Figure 45. Status of Black Catbird's populations

CONCLUSION

The distribution of Black Catbird shows that it is only common on the eastern coast of the Yucatan Peninsula (eastern Quintana Roo and northern Belize) and that the population is very fragmented, this is why threats on *Melanoptila glabrirostris* are still present and inevitably increasing, as these coastal areas are almost completely (with exception of some reserves like Sian Ka'an) under threat of unrestricted tourism development. The Black Catbird could maintain itself in spite of hurricanes, but in addition of its habitat destruction because of tourism development and conversion to coconut plantation, the population is already declining and will inevitably fall drastically. Although there are some mainland nesting populations (Shipstern lagoon, Progresso lagoon, Crooked tree...), some of which were not really attested prior to this study, and that these mainland populations do not seem to be particularly threatened, it does not change anything to the global threat on the species.

Like mentioned in Chapter 3.5, criteria nearly met by the Black Catbird, justifying its “near threatened” status on the Red List, are severe fragmentation (B1) and continuing decline of the extent of occurrence (B2a), of the area of occupancy (B2b), of the area, extent and/or the quality of habitat (B2c) and of the number of mature individuals (B2e) (IUCN, 2002). After this study, we can confirm that, at least, criteria concerning severe fragmentation (B1) and continuing decline of the area of occupancy (B2b) and the area and quality of habitat (B2c) are clearly met. Population on islands inevitably lead to a fragmented distribution. This is also the case for mainland population because of habitat destruction. Favourable habitats being mostly distributed very patchily and not continuous. In the meantime, isolated breeding observations (like for example at Chichen Itza), could suspect movements and exchanges between some populations. Attested large-scale movements are due to hurricane (Miller & Miller, 1991). Large-scale seasonal movements have not been demonstrated since now.

Actual protection measures favourable to the Black Catbird are the presence of reserves or parks on the eastern Yucatan Peninsula, prohibiting coastal forest destruction. Two preserved areas are hosting important populations, Sian Ka'an Biosphere Reserve (Quintana Roo, Mexico) and Bacalar Chico National Park and Marine Reserve (Ambergris Caye, Belize). In Shipstern lagoon area, the most significant breeding sites (Cowpen, Robin's land and Corozalito) are unfortunately not situated within Shipstern Nature Reserve's boundaries. Caye Caulker's southern population needs urgent protection measures as the already small area of coastal scrubs is being destroyed at an incredible rate. It is essential to note that numerous birdwatchers come to Caye Caulker to see mainly the Black Catbird, as Caye Caulker is known to host an important population. The country of Belize, known for its engagement in ecotourism, can play a central role in the protection of this redlisted bird.

ACKNOWLEDGMENTS

I am particularly grateful to Prof. Claude Mermod and my former supervisor Dr. Louis-Felix Bersier, for accepting me in the laboratory of Eco-ethology, Institute of Zoology, University of Neuchâtel, Switzerland.

Thanks to Caspar Bijleveld, head of the Papiliorama-Nocturama and ITCF, and to the Shipstern Nature Reserve wardens team for their hospitality, friendship and help in the field.

Special thanks to Jacques Laesser for his precious and plentiful support in each step of this study.

Many thanks to:

Luis Fuste, for his help in the field.

Barbara MacKinnon, Ellen McRae and Zoe Walker for sharing their knowledge about the Black Catbird, in Yucatan, Caye Caulker and Sarteneja area respectively.

Auriol Samos for his hospitality and for the visits of Bacalar Chico National Park and Marine Reserve.

The ornithologists and birdwatchers contacted by e-mail, especially Ruben Arevalo, Javier Salgado Ortiz and François Vuilleminier.

Mahmoud Bouzelboudjen for the GIS support.

My friends and field colleagues Mireille Pittet, Mathieu Rapp and Gregory Roeder.

My family and friends for their long distance encouragement.

This study would not have been possible without the financial support of Fonds Wüthrich et Mathey-Dupraz.

BIBLIOGRAPHY

* cited in text

*BELETSKY, L., 1999. The ecotravellers' wildlife guide Belize and Northern Guatemala. *Natural world, Academic Press.* 487 pp.

BERSOT, V., 2001. Small mammal inventory in the Shipstern Nature Reserve, a preliminary assessment. *Unpublished report.*

BIBBY, C.J., BURGESS, N. D. & HILL, D. A., 1992. Bird Census Techniques. *BTO & RSPB.*

BIBBY, C., JONES, M. & MARSDEN, S., 2000. Bird surveys, expedition field techniques. *BirdLife International, Cambridge.* 133 pp.

*BIJLEVELD, C.F.A., 1990. The vegetation of Shipstern Nature Reserve. *ITCF Publ., Marin/NE, Switzerland.* 136 pp.

BIRDLIFE INTERNATIONAL, 2001. BirdLife's online World Bird Database: the site for bird conservation. *Version 1.0. Cambridge, UK: BirdLife International. Available: <http://www.birdlife.net> (accessed February 27, 2003)*

*BBIS, Belize Biodiversity Information System, <http://fwie.fw.vt.edu/wcs/044090.HTM>

BREWER, D., 2001. Wrens, Dippers and Thrashers, Helm.

*EDWARDS, E.P., 1972. Field Guide to the birds of Mexico. First Edition. *Edwards.*

*EDWARDS, E.P., 1985. Supplement to finding birds in Mexico. A guide to bird-finding. *Edwards.*

EDWARDS, E.P., 1998. A Field Guide to the Birds of Mexico and Adjacent Areas. Belize, Guatemala, and El Salvador. Third Edition. *University of Texas Press, Austin.*

*ENGLAND, M.C., 2000. The Landbird Monitoring Programme at Lamanai, Belize: a preliminary assessment. *Cotinga* 13: 32-43

*FRIEDMANN, H. & al., 1950. Distributional Check-List of the Birds of Mexico, Part I. *Cooper ornithological club, Berkeley, California.*

- *HELLMAYR, C.E., 1934. Catalogue of birds of the Americas, part 7., *Chicago*.
- *IUCN, 2002. 2002 IUCN Red List of Threatened Species. *Downloaded on 26 February 2003.*
- *HOWELL, S.N.G., & WEBB, S.W., 1995. A guide to the birds of Mexico and Northern Central America. *Oxford University Press*. 851 pp.
- *JONES, H. L. & VALLEY, A.C., 2001. Annotated Checklist of the Birds of Belize. *Lynx edicions, Barcelona*. 71 pp.
- KAPLAN, E. H., 1998. Southeastern and Caribbean Seashores. *Peterson Field guides, Boston*.
- MACKINNON, B. H., 2002. Check-List of the Birds of the Yucatan Peninsula. *Amigos de Sian Ka'an, A.C. Secretaria de Turismo de Yucatan*.
- MASKELL, L. Key to coastal plants found in mangroves and on beaches around Shipstern Lagoon, North East Belize. *Unpublished*.
- MASON, C. T. & MASON, P. B., 1987. A Handbook of Mexican Roadside Flora. *Arizona Press, Tucson*.
- *MILLER, B. & MILLER, C., 1991. The status of the Black Catbird *Melanoptila glabrirostris* on Caye Caulker, Belize. *Bird Conservation International* 1:283-292.
- MURRAY, B.G., 1985. Evolution of clutch size in tropical species of birds. *Neotropical ornithology, ornithological monographs n° 36. AOU, Washington DC*.
- *PETERS, J.L., 1960. Birds of the World IX.
- *RIDGWAY, R., 1907. The birds of North and Middle America, part 4. *Governement printing office, Washington*. 973 pp.
- *RUSSELL, S.M., 1964. A distributional study of the birds of British Honduras. *Ornithological monographs no.1, American Ornithological Union*.
- *RUSSELL, S.M., 1970. Avifauna in British Honduras, *in the Avifauna of Northern Latin America, Smithsonian contribution to zoology nr.26*

*SKUTCH, A.F., 1985. Cluth size, nesting success, and predation on nests of neotropical birds, reviewed. *Neotropical ornithology, ornithological monographs n° 36. AOU, Washington.*

*STATTERSFIELD A.J., & al, 1998. Endemic bird areas of the world. *Birdlife international, Lynx edicions.*

*STATTERSFIELD A.J., & al, 2000. Threatened Birds of the World. *Birdlife international, Lynx edicions.*

*SVENSSON, L., 1992. Identification Guide to European Passerines, 4th Edition, Stockholm.

APPENDIX

Appendix 1 : Morphometry

- 1a. Morphometric measures, male-female test

Appendix 2: Breeding

- 2a. Nests measures
- 2b. Nests content
- 2c. Incubating and nestlings feeding's information
- 2d. Nesting calendar

Appendix 3: Nutrition

- 3a. Fruits

Appendix 4: Population density

- 4a. Territory mapping dates, code and plot size
- 4b. Population density results

Appendix 5: Cowpen (maps)

- 5a. Landuse
- 5b. Nests
- 5c. Territory mapping results, without nests data
- 5d. Territory mapping results, with nests data
- 5e. Possible breeding results (21st June)
- 5f. White-green
- 5g. White-white

Appendix 6: Robin's land (maps)

- 6a. Landuse
- 6b. Nests
- 6c. Territory mapping results, without nests data
- 6d. Territory mapping results, with nests data
- 6e. Possible breeding results (11th June)

Appendix 7: Iguana Camp (maps)

- 7a. Landuse
- 7b. Territory mapping results, without nests data
- 7c. Possible breeding results, IC west (6th June)
- 7d. Possible breeding results, IC east (3rd June)

Appendix 8: Main Trail (maps)

- 8a. Landuse
- 8b. Territory mapping results, without nests data
- 8c. Possible breeding results (28th June)

Appendix 9: Habitat occupation

- 9a. Electivity results
- 9b. Habitat description

Appendix 10: Ringed individuals

- 10a. Ringed individuals followed

Appendix 1a. Morphometric measures, male-female test.

rings (left)	rings (right)	sex	3rd prim.length (cm)	bill lenght (cm)	weight (g)	date	field net
w	o		6.45		31.5	26.04	MT 2
g	o		7.05		36.0	26.04	MT 2
r	o		6.75		34.0	26.04	MT 6
v	v	M (sing)	7.00		32.5	29.05	CP 3
o	v	M (sing)	6.90	2.20	37.0	30.05	CP 1
w	v	M (sing)	7.15	2.35	34.0	30.05	CP 1
g	v	M ?	7.10	2.36	38.0	30.05	CP 3
r	v	M ?	7.10	2.34	38.0	30.05	CP 3
w	w	M (sing)	6.85	2.29	35.0	30.05	CP 2
g	w	M (sing)				30.05	CP 3
r	w	M ?	7.15		33.0	30.05	CP 3
r	r	M ?	6.80	2.19	31.0	5.06	IC
g	r	M ?	7.05	2.48	38.0	5.06	IC
g	g	M ?	7.30	2.27	34.0	5.06	IC
o	o	M ?	6.60	2.20	33.0	5.06	IC
ow	rg	F (inc patch)	6.90	2.27	40.0	5.06	IC
og	rw	F (inc patch)	7.10	2.26	36.0	23.06	RL 1
ow	rw	F (inc patch)	7.00	2.23	36.0	23.06	RL 2
vw	rw	M ?	6.75	2.41	35.5	23.06	RL 2
wg	rw	F (inc patch)	6.25	2.21	34.0	23.06	RL 1
or	rw	M ?	7.10	2.21	33.0	23.06	RL 1
mean			6.92	2.28	35.0		

rings (left)	rings (right)	sex	3rd prim. lenght (cm)	bill lenght (cm)	weight (g)	date	field net
g	w	M (sing)				30.05	CP 3
v	v	M (sing)	7.00		32.5	29.05	CP 3
o	v	M (sing)	6.90	2.20	37.0	30.05	CP 1
w	v	M (sing)	7.15	2.35	34.0	30.05	CP 1
w	w	M (sing)	6.85	2.29	35.0	30.05	CP 2
mean M			6.98	2.28	34.6		
ow	rg	F (inc patch)	6.90	2.27	40.0	5.06	IC
og	rw	F (inc patch)	7.10	2.26	36.0	23.06	RL 1
ow	rw	F (inc patch)	7.00	2.23	36.0	23.06	RL 2
wg	rw	F (inc patch)	6.25	2.21	34.0	23.06	RL 1
mean F			6.81	2.24	36.5		
mean M+F			6.89	2.26	35.6		

U Mann Whitney test:

feather lenght (cm)		bill lenght (cm)		weight (g)		
6.25	1.0	2.20	1.0	32.5	1.0	
6.85	2.0	2.21	2.0	34.0	2.5	
6.90	3.5	2.23	3.0	34.0	2.5	
6.90	3.5	2.26	4.0	35.0	4.0	
7.00	5.5	2.27	5.0	36.0	5.5	
7.00	5.5	2.29	6.0	36.0	5.5	
7.10	7.0	2.35	7.0	37.0	7.0	
7.15	8.0			40.0	8.0	

R1 (M)	19.0	14.0	14.5
R2 (F)	17.0	14.0	21.5
n1	4.0	3.0	4.0
n2	4.0	4.0	4.0
U1	9.0	8.0	4.5
U2	7.0	4.0	11.5

tableC2 value: 0.443
 p value: 0.05

0.314

0.171

Appendix 2a. Nests measures

nest number	tree species	height of nest (m)	height of tree (m) *	int. diam (cm)	ext. diam (cm)	int. thickness (cm)	ext. thickness (cm)
C1	buttonwood ; liane	2	3.5	7.5	12	5	8
C2	black mangr.	2.35	7				
C3	black mangr.	1.4	4	8.5	17		
C4	sapote	1.75	3	7.5	13	5	8.5
C5	black mangr.	2.85	6	7	13	4.5	9
C6	black mangr.	1.85	8		14		8
C7	black mangr.	2.2	3.5	7	15	4	10
C8	black mangr.	2.7	6	7	14	5	7
C9	black mangr.	1.5	3	8	16	4	6
C10	black mangr.	1.45	2				
C11	black mangr.	2.95	6.5	8	16	5.5	9
C12	sapodilla ; poisonw.	1.85	2.5	7.5	15	4	9
C13	sapodilla ; poisonw. ; liane ?	2.9	3.5	8	13	6	12
C14	black mangr.						
C15	black mangr.	2.85	6				
C16	black mangr.						
mean		2.19	4.61	7.60	14.36	4.78	8.65
N1	bullet tree	3.7	4.5				
N2	buttonwood	2	6	8	13	3.5	6
N3	buttonwood	1.3	1.6	8	12	5	7
N4	sapodilla						
N5	sapodilla	3.55	4.8				
N6	bullet tree	1.75	2.25	7	12	4.5	8
N7	buttonwood ; liane	1.8	2.2	8.5	13	6	9
mean		2.35	3.56	7.88	12.50	4.75	7.50
mean C+N		2.24	4.20	7.68	13.87	4.77	8.32

*rem:C12-13 poisonwood higher (resp.3.5 - 4.5)

median	2.00	3.75	7.75	13.00	5	8.25
--------	------	------	------	-------	---	------

Appendix 2b. Nests content

nest number	ringed individuals	nbr eggs	nbr nestlings	nbr fledglings	hypothesis
C1		? -> 0			giving up:man disturbance ?
C2	M:w-g, juv:o-wg,r-wg,v-wg	?	3	?	taking flight or predation
C3		?	0		giving up:?
C4		? -> 1	0		giving up:? Or unfertile egg
C5	M:w-v	?	0		giving up:?
C6	M:o-v	3	? -> 0		flycatcher parasitism or predation
C7	juv:o-og, g-og	?	3 -> 2	?	taking flight (or predation)
C8		min 1	0		giving up:predation ?
C9	juv: o-or, w-or	3	2	2	taking flight
C10	M:v-v	0			no laying : disturbance ?
C11		? ->0			no laying : disturbance ?
C12		?	min 2	?	taking flight or predation
C13		?	min 1	?	taking flight or predation
C14		? ->0			probably no laying : disturbance ?
C15		?	0		giving up:?
C16		?	?	?	sitting on egg, then no data !
nbr nest occupied		min7, max12	min5, max6	min1, max6	
N1		? -> 0			giving up:?
N2	F:wr-wo, M:wr-wv	?	2		predation ?
N3		?	2		predation ?
N4		?			probably no laying : disturbance ?
N5		?			probably no laying : disturbance ?
N6		0			no laying : disturbance ?
N7		0			no laying : disturbance ?
nbr nest occupied		min2, max4	2	0	

Appendix 2c. Brooding and nestling's feeding informations

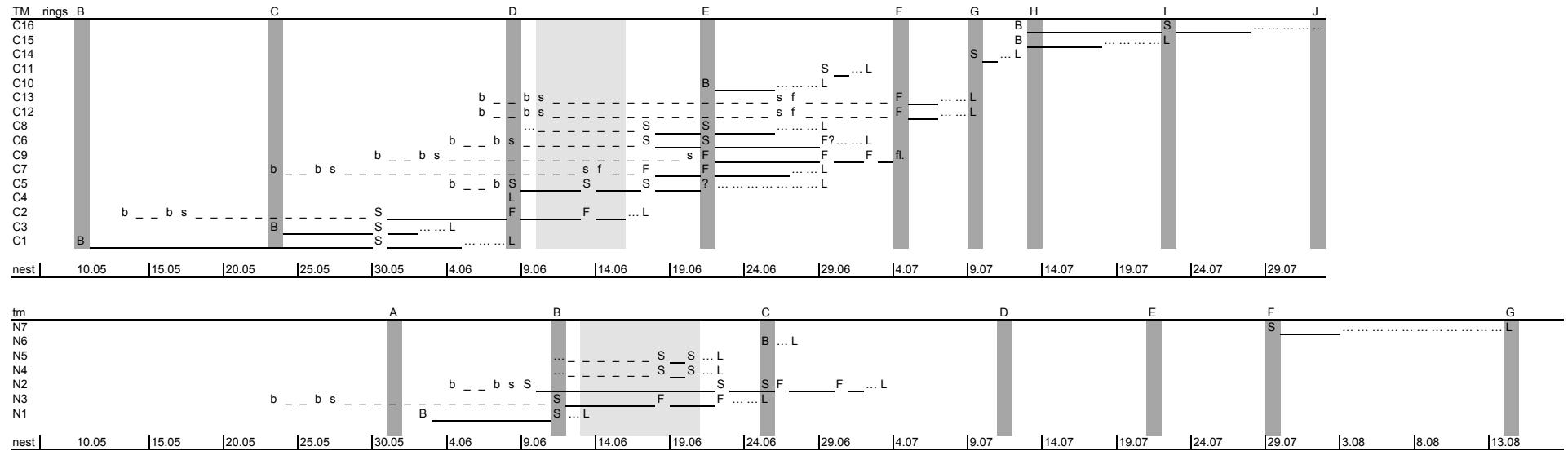
brooding

obs. period (min)	nbr of absence		time of absence		mean time of 1 absence	time of sitting		
	per obs. period	per hour	per obs. period	per hour		per obs. period	per hour	percent
90	4	2.7	16.67	11.11	4.17	73.33	48.89	81.5
120	8	4.0	63.33	31.67	7.92	56.67	28.33	47.2
		3.3		21.39	6.04		38.61	64.4

nestlings' feeding

	26.06.						total 6 hours	mean per hour
	8h30 - 9h30	9h30 - 10h30	11h20-12h20	12h20 -13h30	15h30 -16h30	16h30 -17h30		
FEMALE	6	4	2	2	4	3	21	3.5
MALE	2	4	3	2	2	2	15	2.5
total	8	8	5	4	6	5	36	6

Appendix 2d. Nesting calendar



Appendix 3a. Fruits eaten by Black Catbirds



Thrinax radiata (fruits)



Hamelia patens (flowers and fruits)



Unidentified riparian scrub (fruits)

Appendix 3a. Fruits eaten by Black Catbirds



Metopium brownei, Black Poisonwood (fruits).



Erithralis fruticosa (fruits)



Erithralis fruticosa (flowers)



unidentified (flowers and fruits)

Appendix 4a. Territory mapping date, code and plot size

field	day month	results	code date
Main Trail	5 April	map	A
Main Trail	30 April	map	B
Main Trail	1 May	map	C
Main Trail	21 May	no data	
Main Trail	1 June	map	D
Main Trail	12 June	no data	
Main Trail	28 June	map	E
Cowpen	7 May	map	A
Cowpen	10 May	map	B
Cowpen	23 May	map	C
Cowpen	8 June	map	D
Cowpen	21 June	map	E
Cowpen	4 July	map	F
Cowpen	9 July	map	G
Cowpen	13 July	map	H
Cowpen	22 July	map	I
Cowpen	1 August	map	J
Cowpen	22 August	map	K
Robins Land	31 May	map	A
Robins Land	11 June	map	B
Robins Land	25 June	map	C
Robins Land	11 July	map	D
Robins Land	21 July	map	E
Robins Land	29 July	map	F
Robins Land	14 August	map	G
Iguana camp W	15 April	map	A
Iguana camp W	8 May	map	B
Iguana camp W	24 May	map	D
Iguana camp W	3 June	map	F
Iguana camp W	7 June	map	H
Iguana camp W	1 July	no data	
Iguana camp E	9 May	map	C
Iguana camp E	25 May	map	E
Iguana camp E	6 June	map	G
Iguana camp E	2 July	map	I

	field size (m2)	field size (ha)	prospected area (m2)	prospected area (ha)
MT	245532	24.6	188642	18.9
CP	121765	12.2	114494	11.4
RL	264040	26.4	235084	23.5
IC-W	132600	13.3	123398	12.3
IC-E	201676	20.2	186424	18.6

Appendix 4b. Population density results

CP

	data nbr	total prosp surface	density per ha
TM total without nest (clusters)	10	11.4	0.9
TM total with nest (clusters)	18	11.4	1.6
possible simult. nidification (singing males and nests) 21 June	12	11.4	1.0
certain simult. nidification (nests) 10-15 June	8	11.4	0.7

RL

	data nbr	total prosp surface	density per ha
TM total without nest (clusters)	13	23.5	0.55
TM total with nest (clusters)	18	23.5	0.77
possible simult. nidification (singing males and nests) 11 July	8	23.5	0.34
certain simult. nidification (nests) 13-20 June	4	23.5	0.17

MT

	data nbr	total prosp surface	density per ha
TM total without nest (clusters)	1	18.9	0.05
possible simult. nidification (singing males) 28 June	2	18.9	0.11

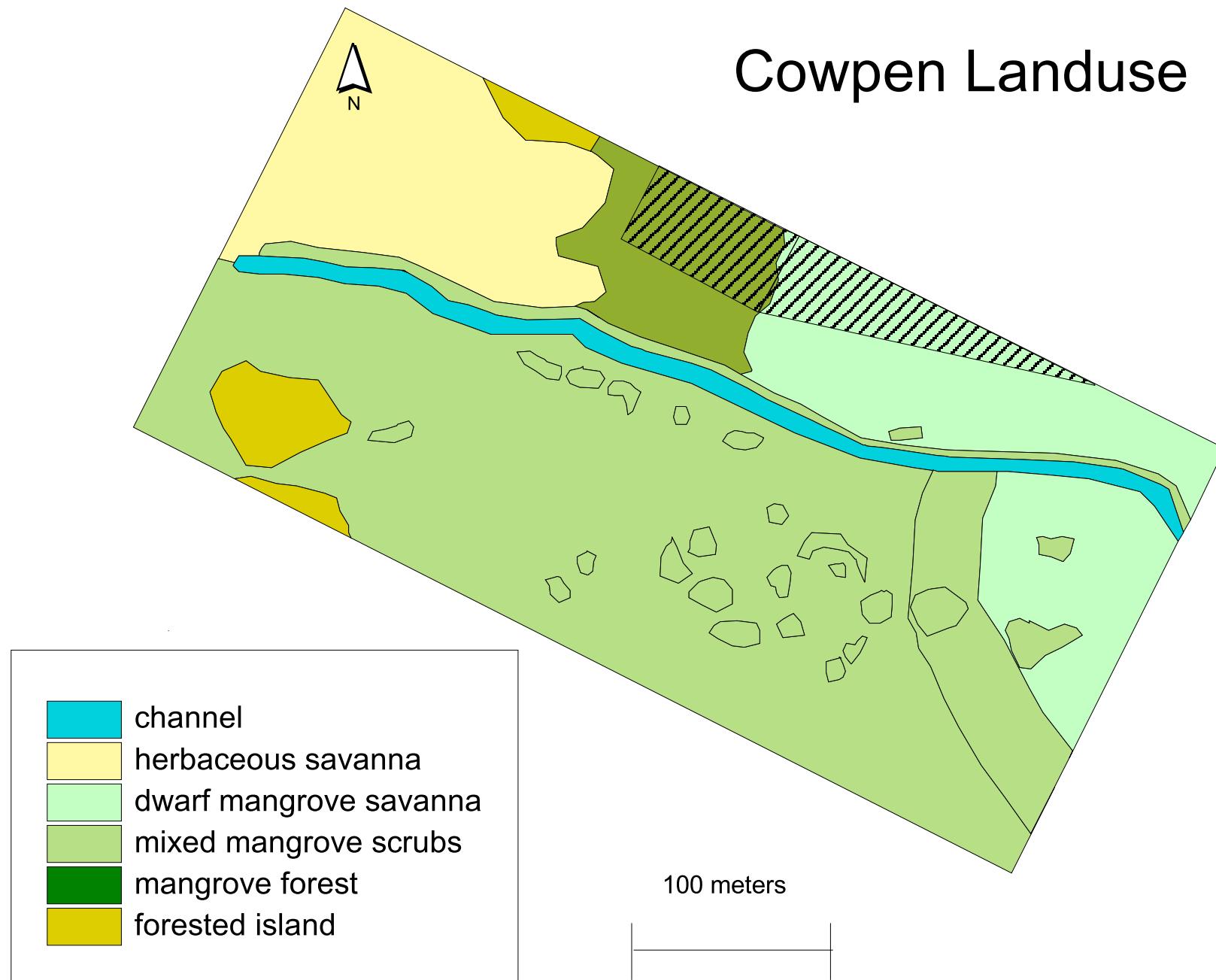
IC_E

	data nbr	total prosp surface	density per ha
TM total without nest (clusters)	5	18.6	0.27
possible simult. nidification (singing males) 3 June	6	18.6	0.32

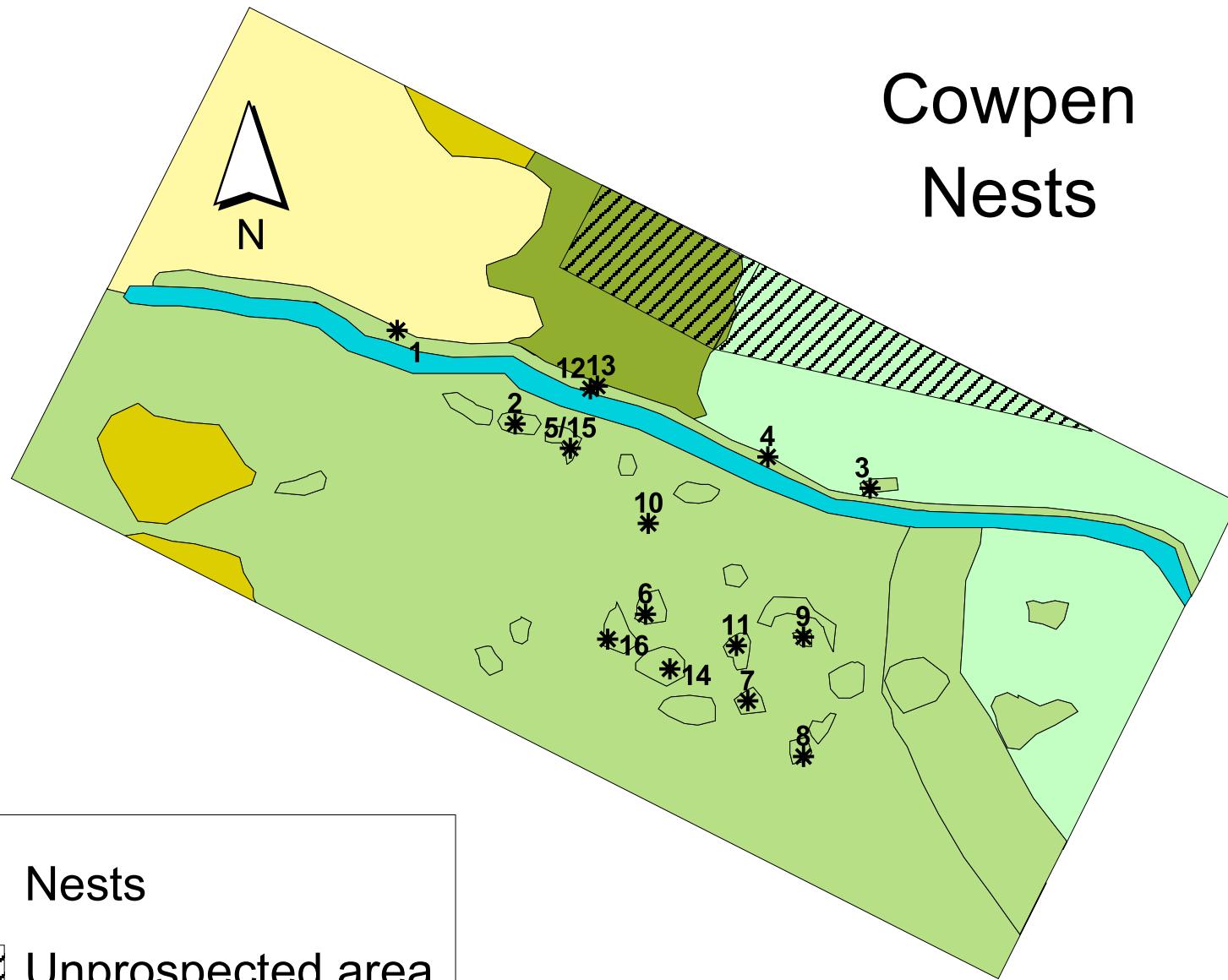
IC_W

	data nbr	total prosp surface	density per ha
TM total without nest (clusters)	6.5	12.3	0.53
possible simult. nidification (singing males) 6 June	12	12.3	0.97

Appendix 5a



Cowpen Nests

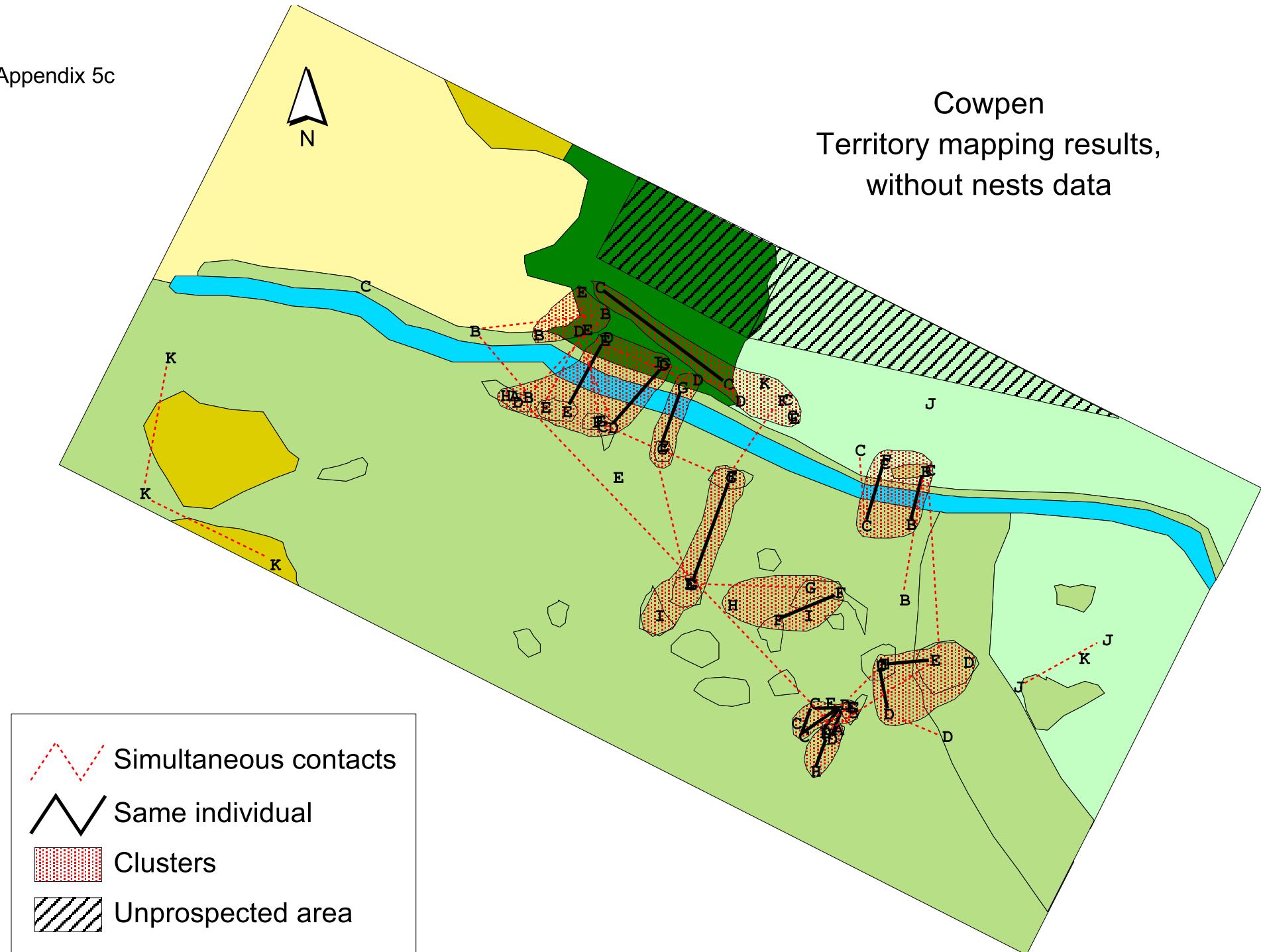


* Nests

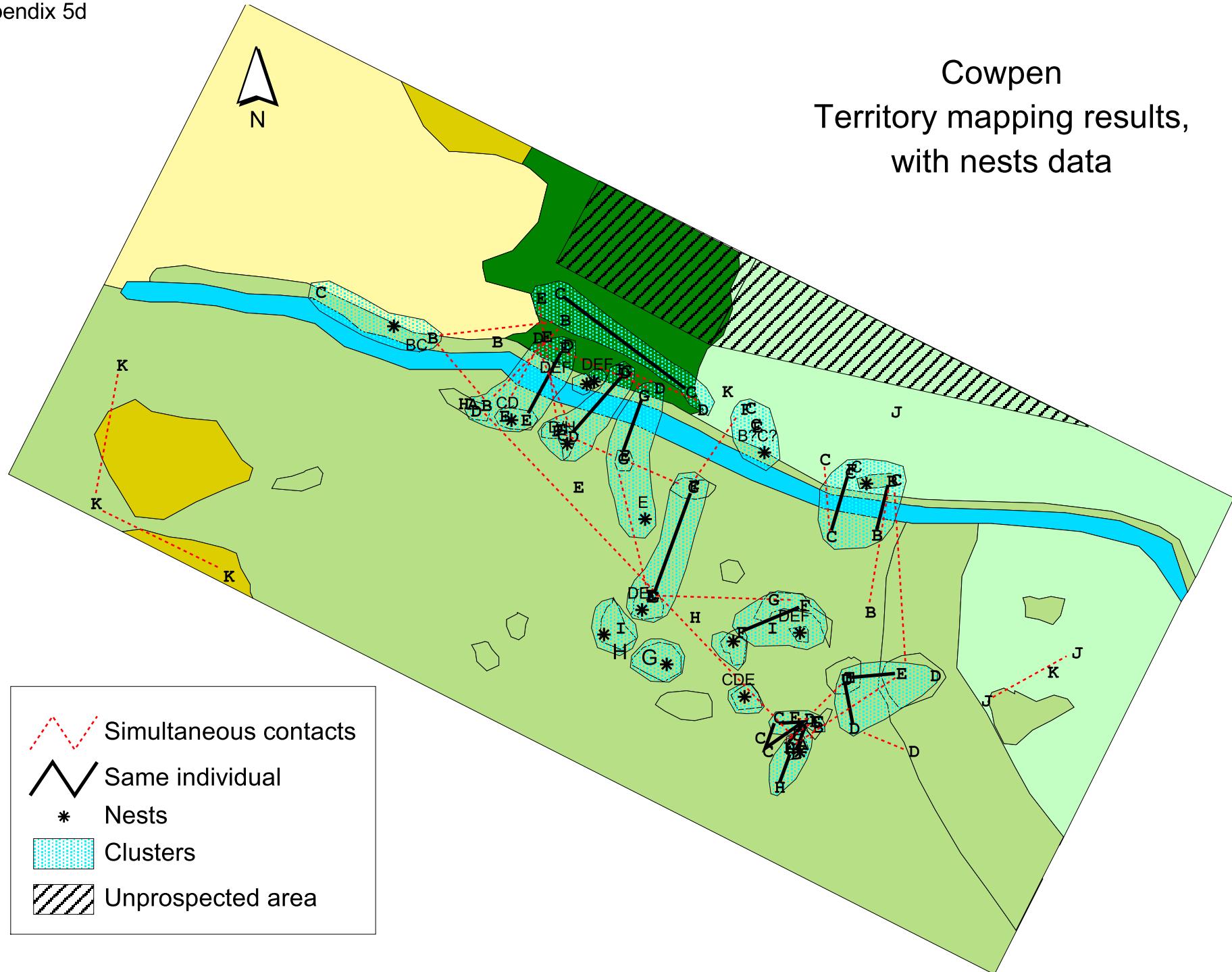
Unprospected area

Appendix 5c

Cowpen
Territory mapping results,
without nests data

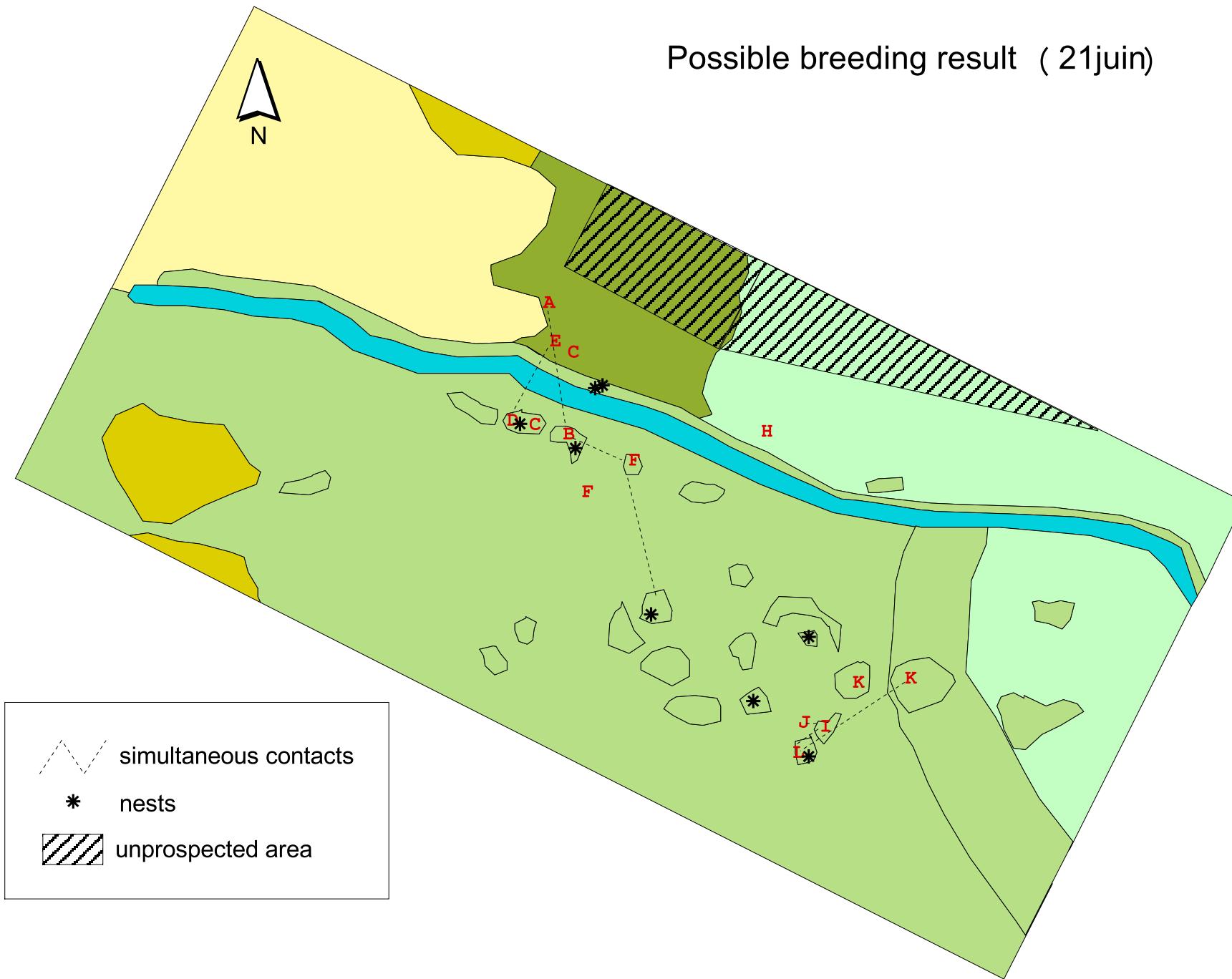


Cowpen
Territory mapping results,
with nests data



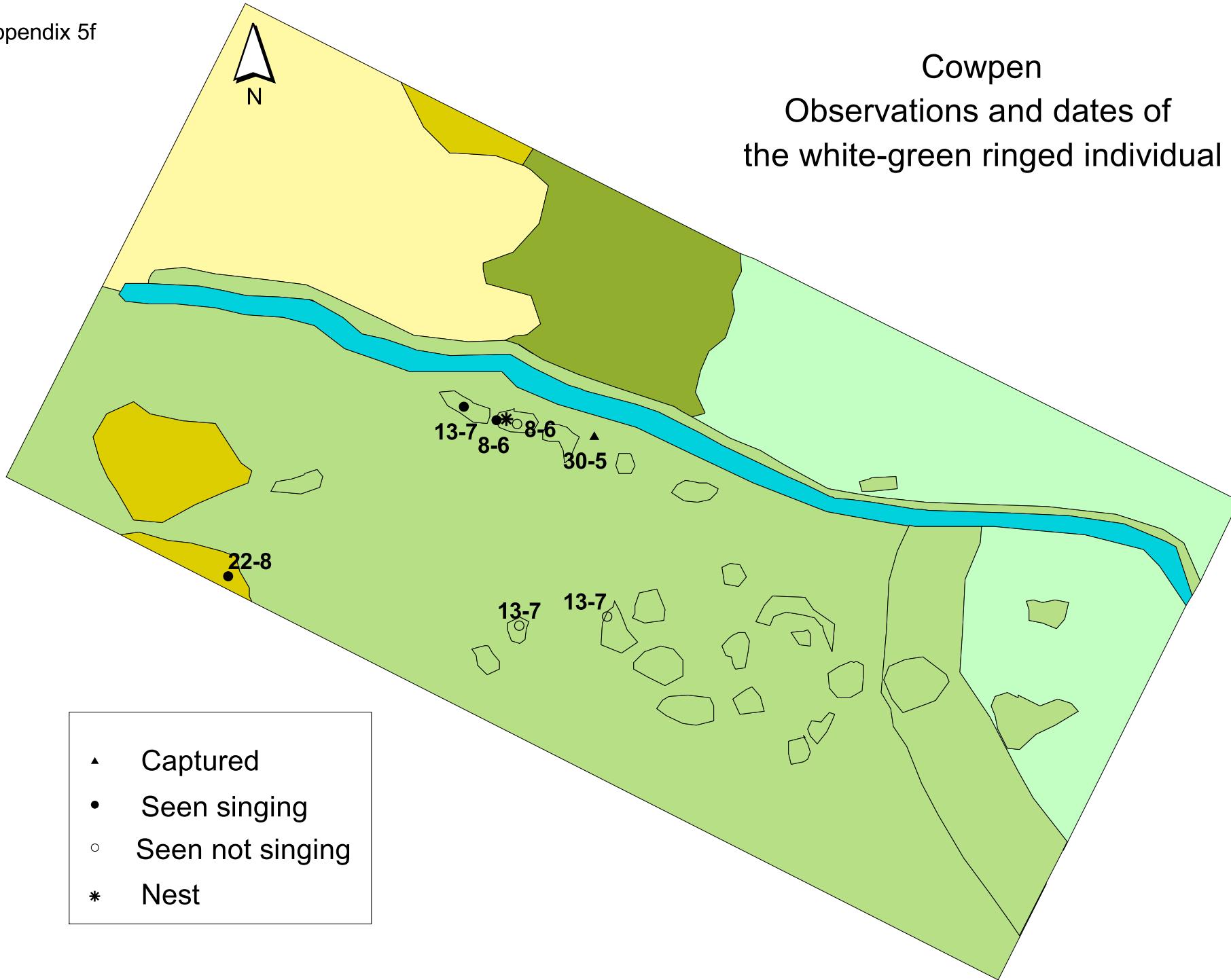
Appendix 5e

Possible breeding result (21juin)



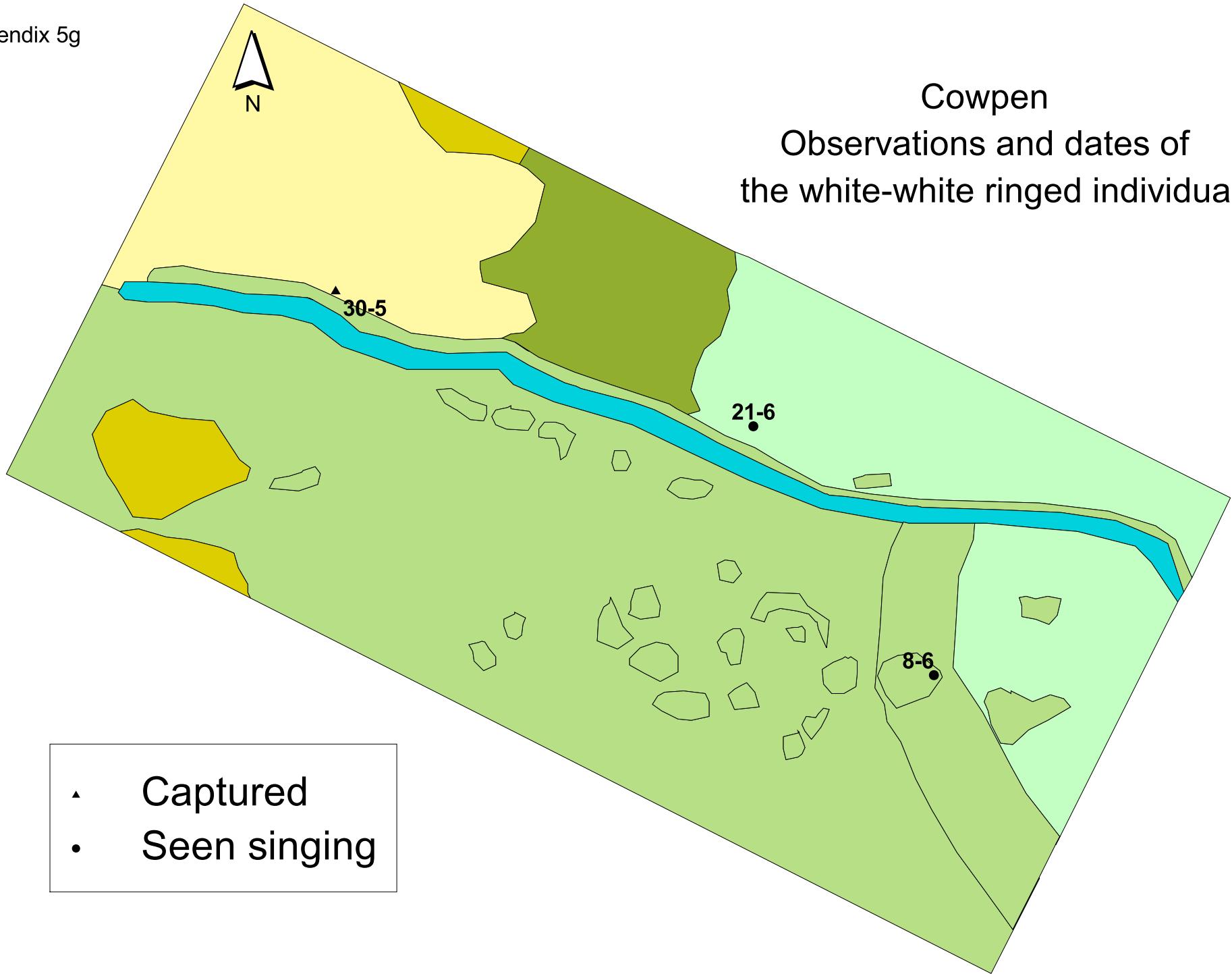
Cowpen

Observations and dates of the white-green ringed individual



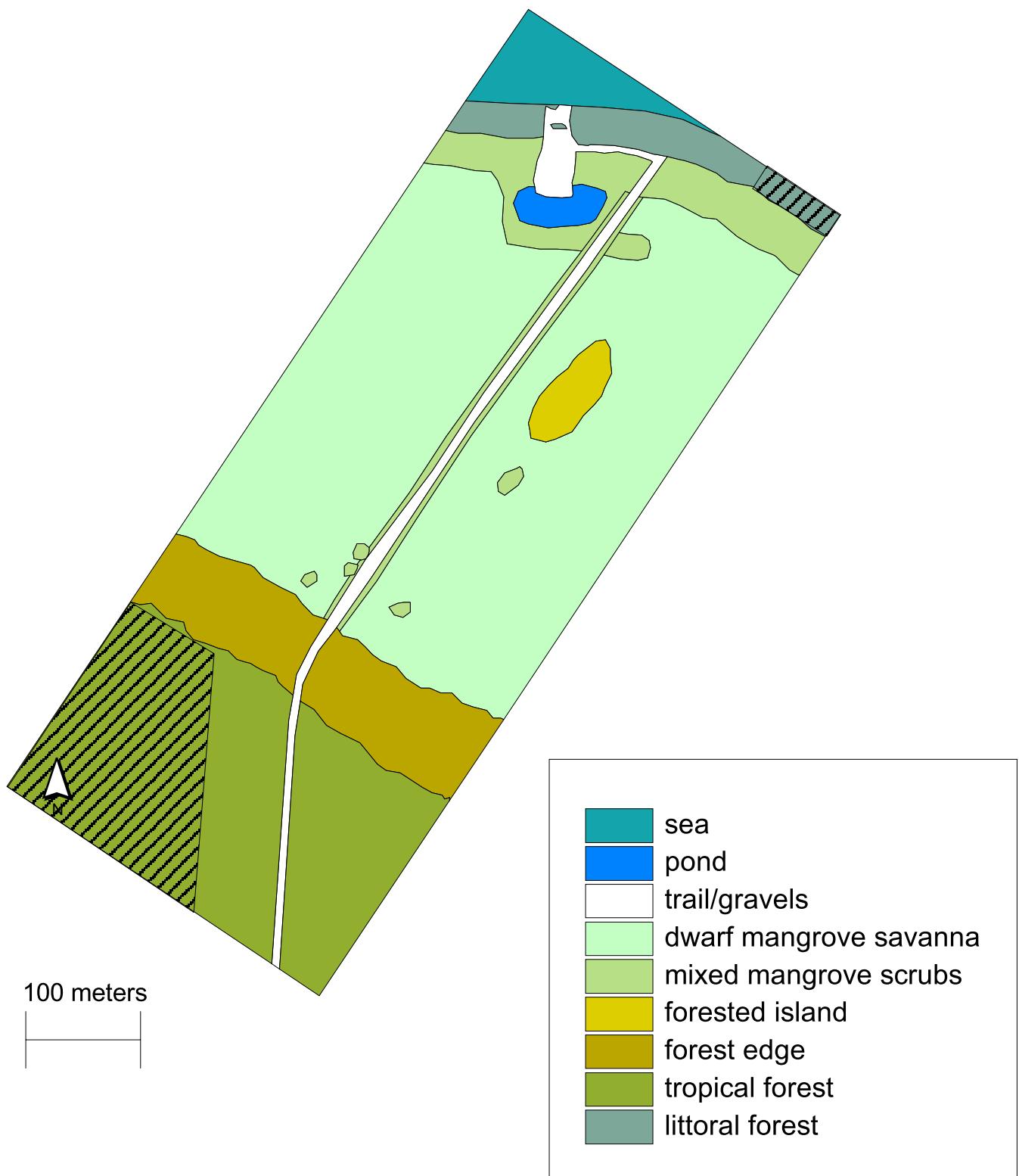
Cowpen

Observations and dates of
the white-white ringed individual

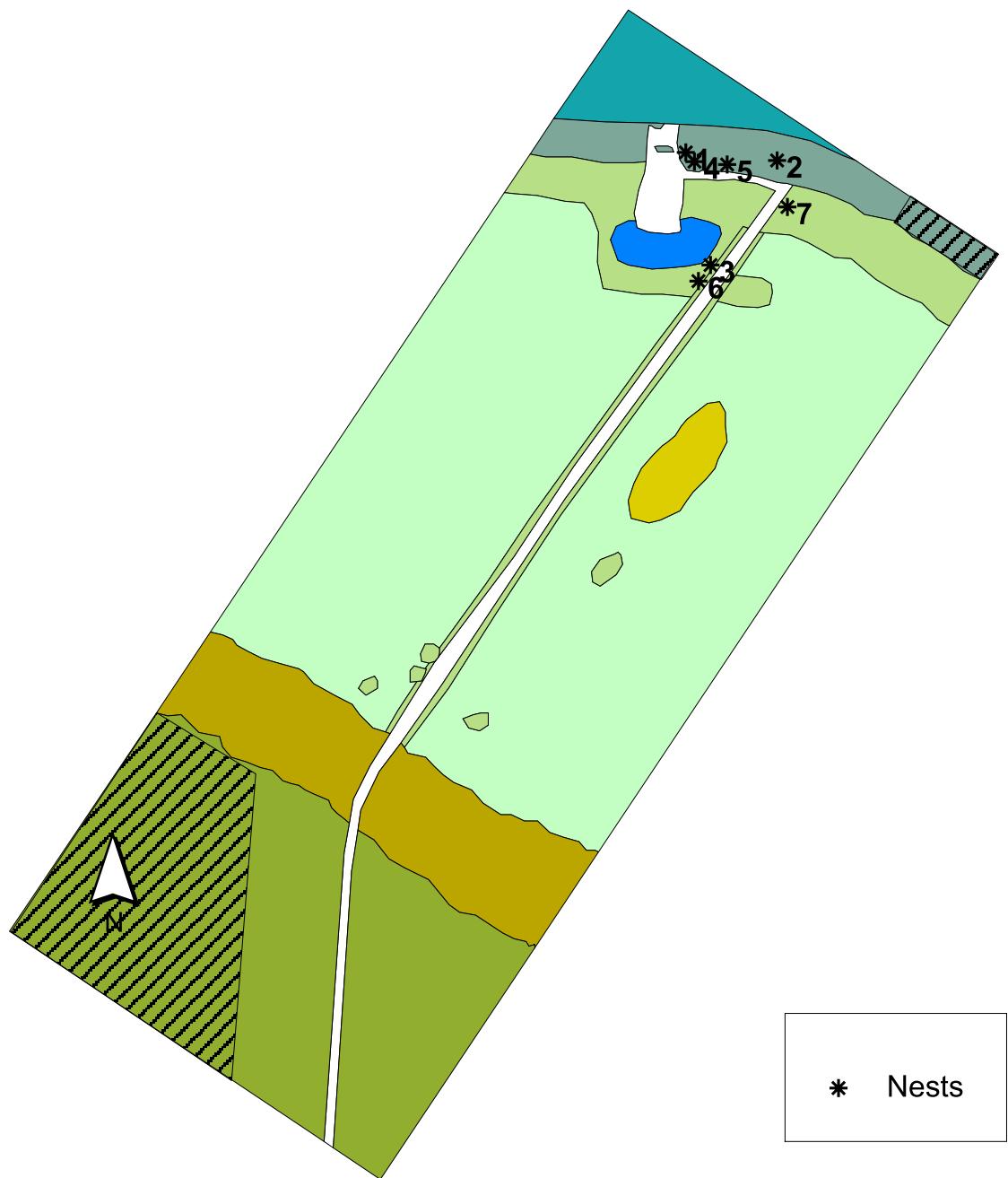


Robin's land

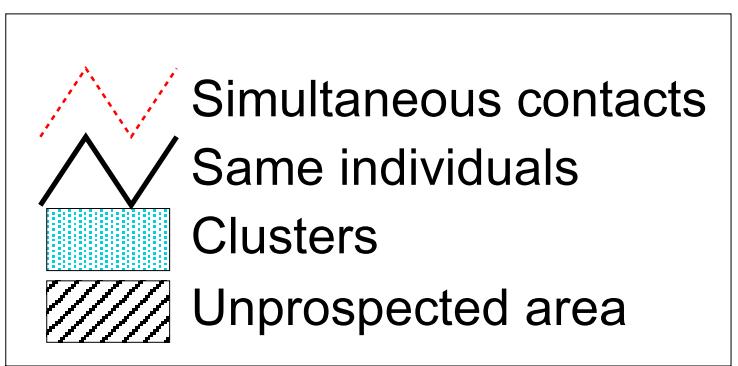
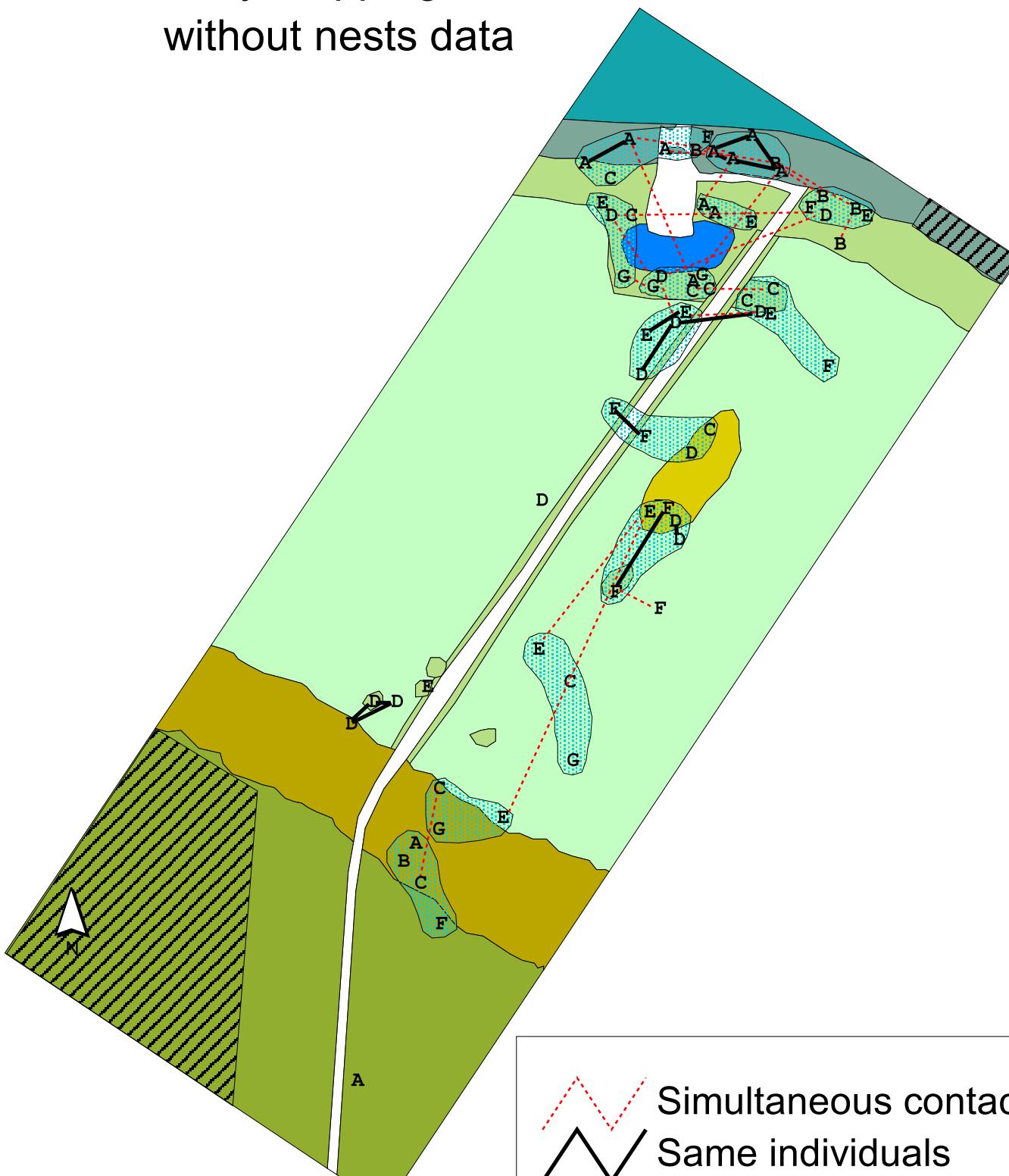
Landuse



Robin's land Nests

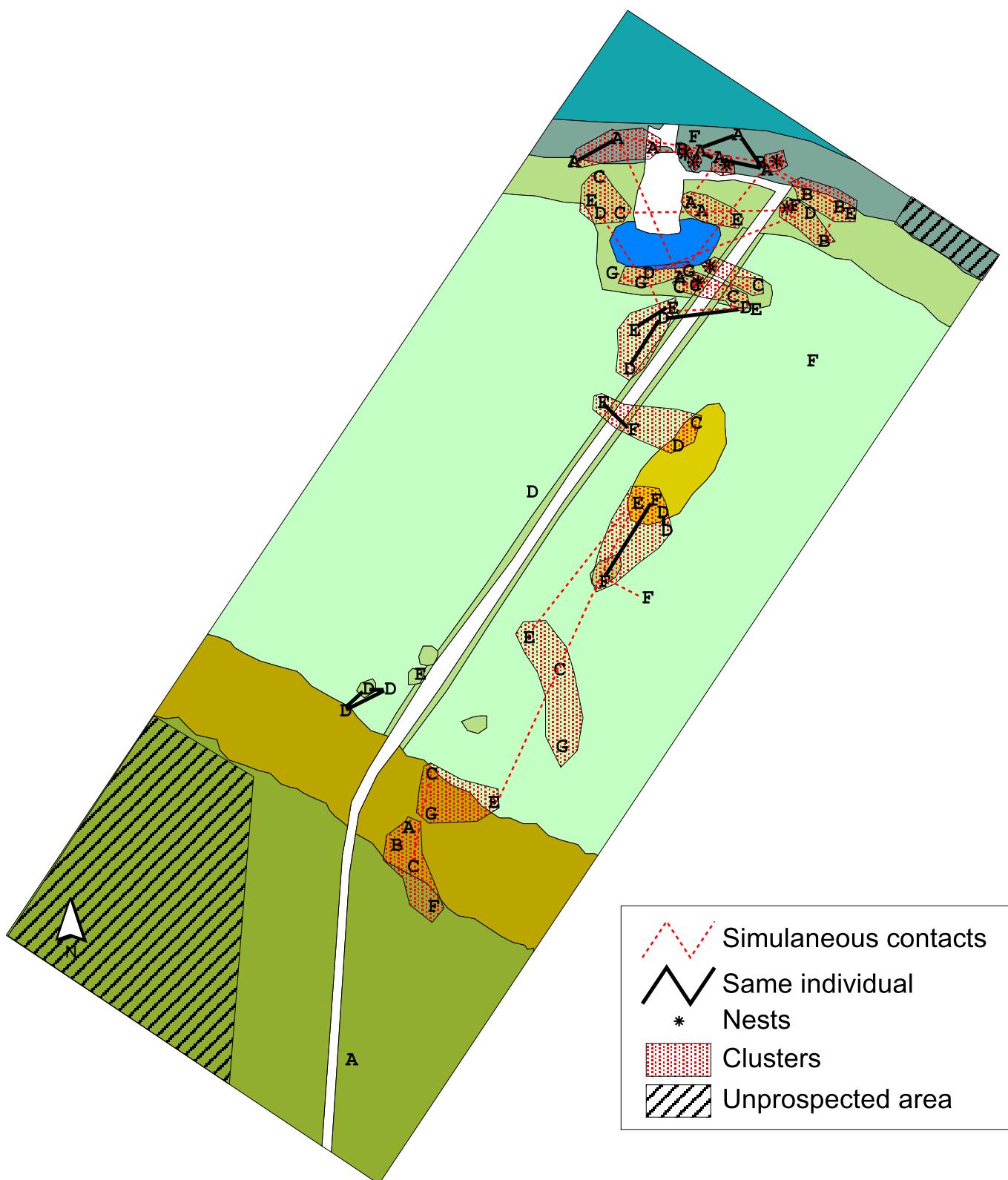


Robin's land Territory mapping results without nests data

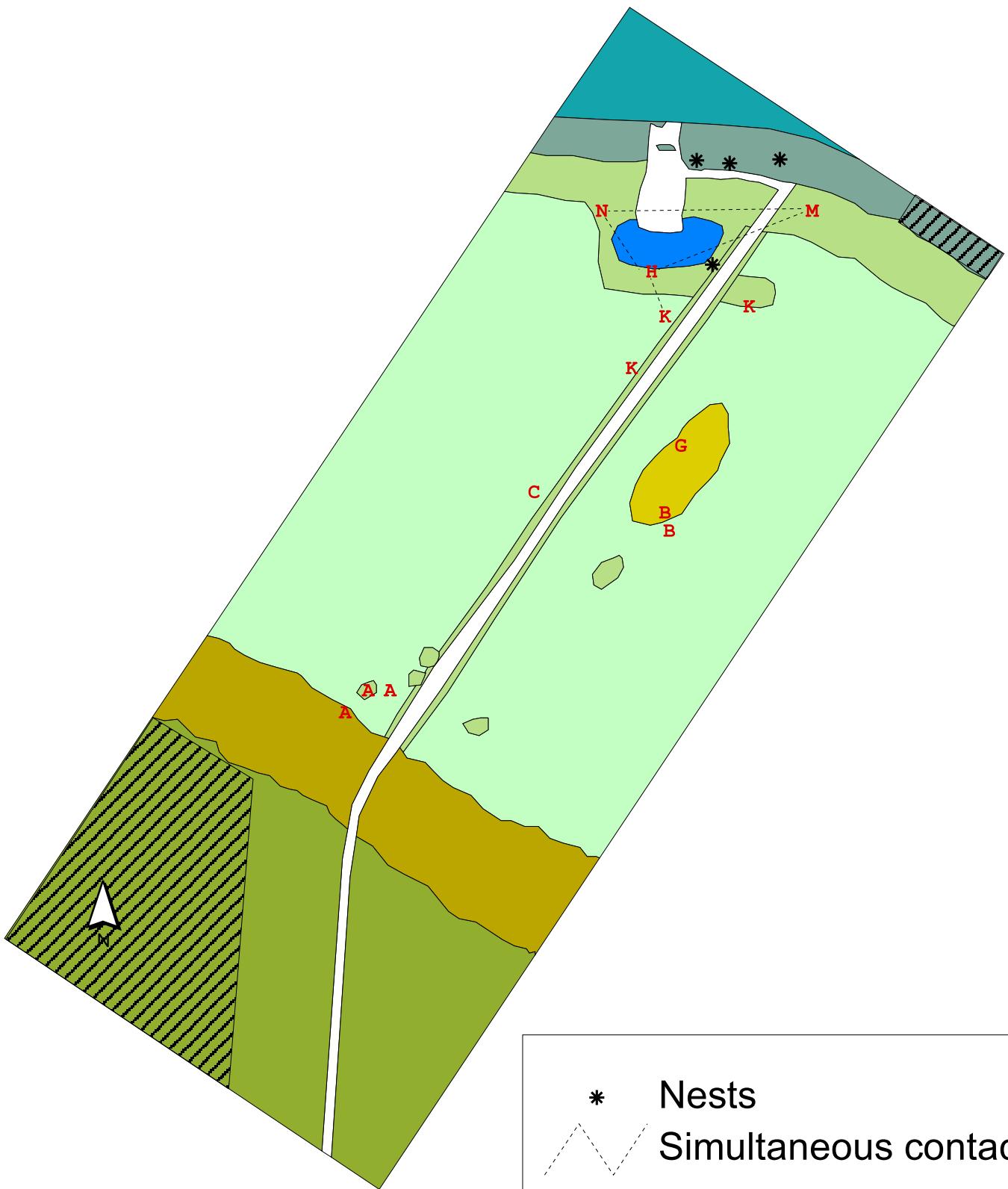


Robin's land

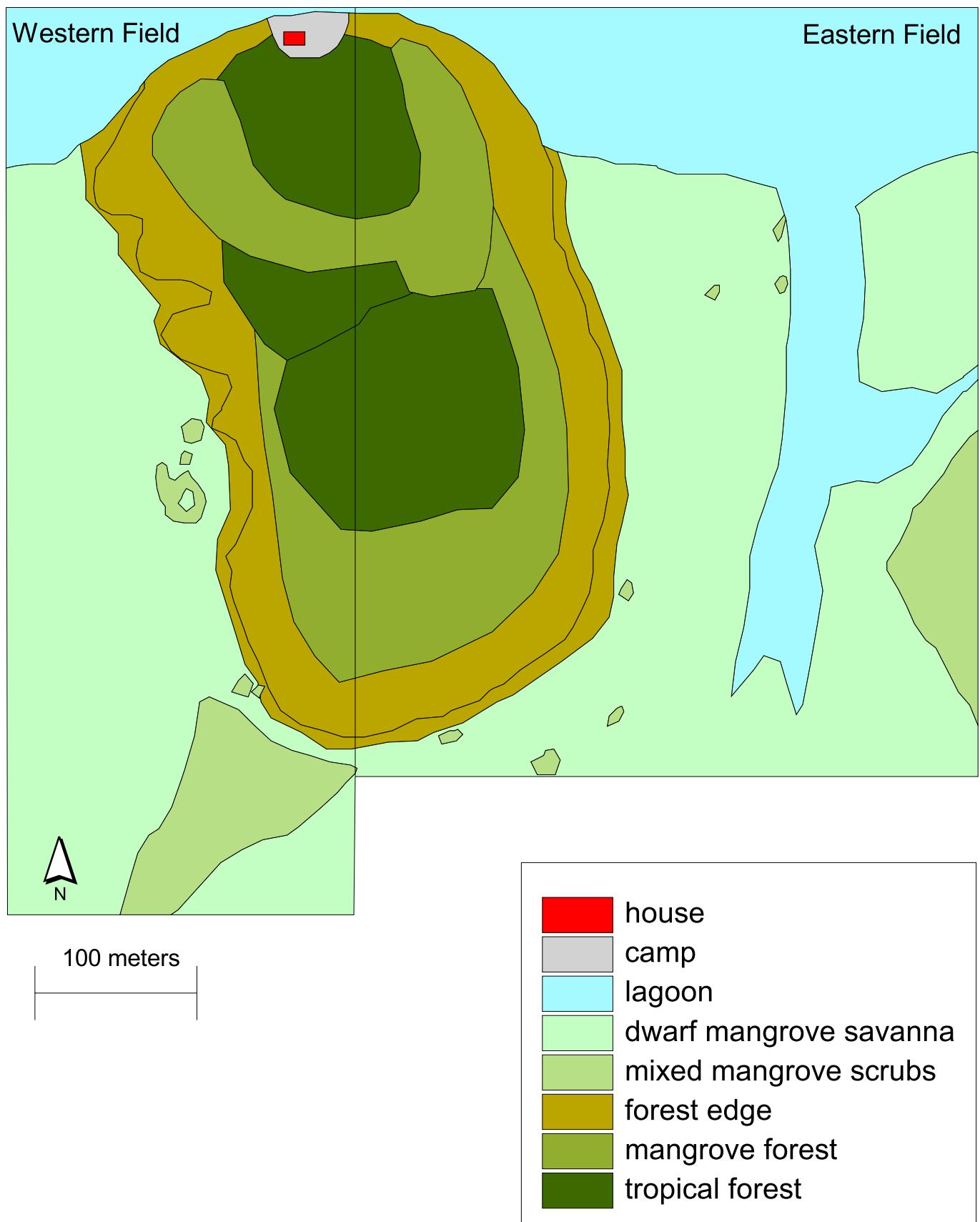
Territory mapping results with nests data



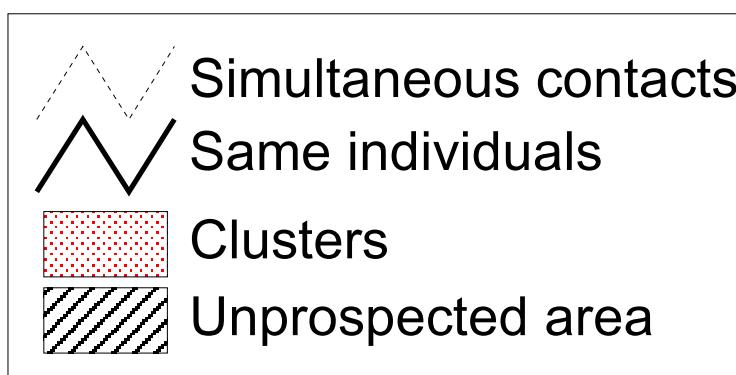
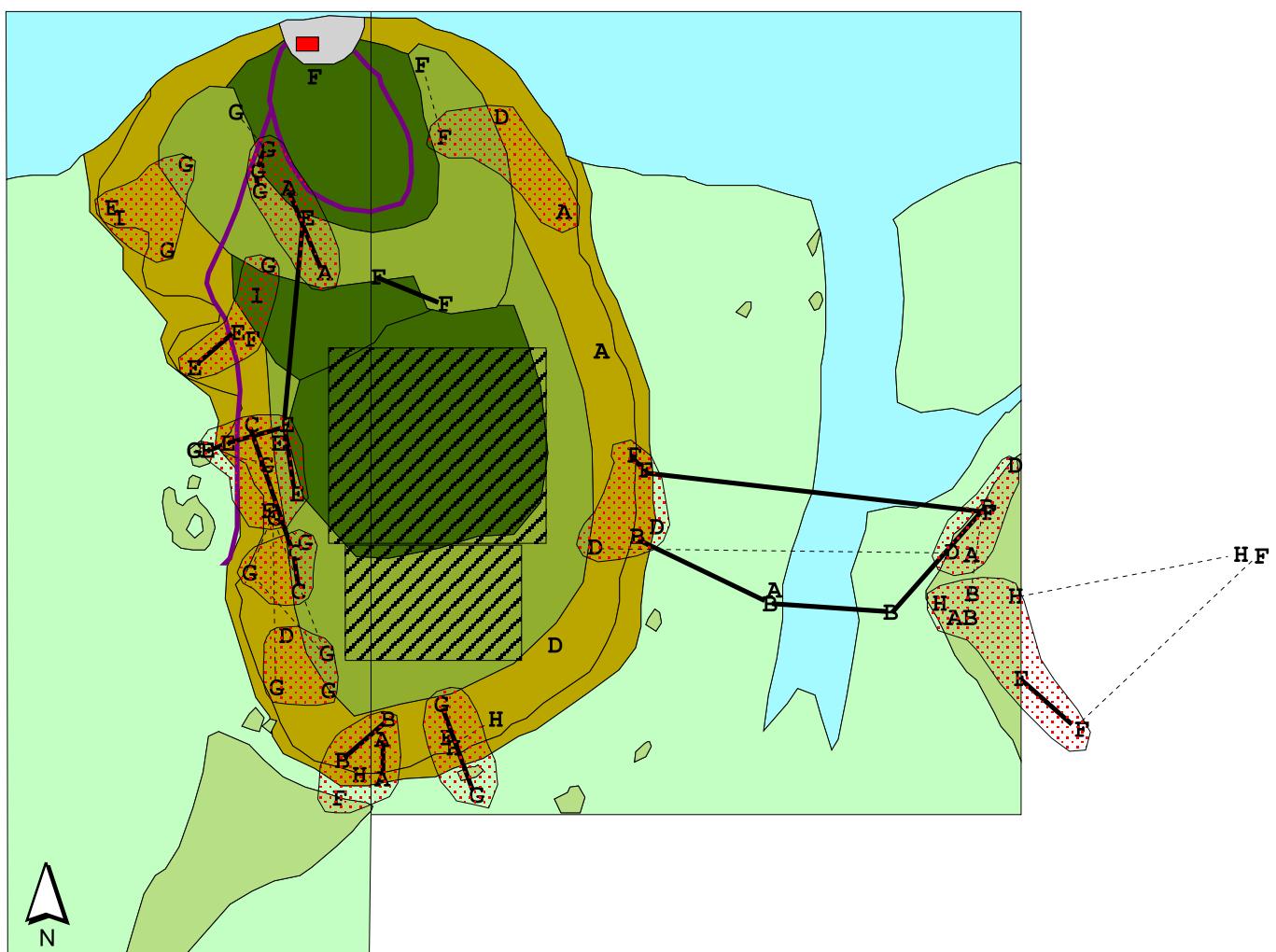
Robin's land , possible breeding results (11th July)



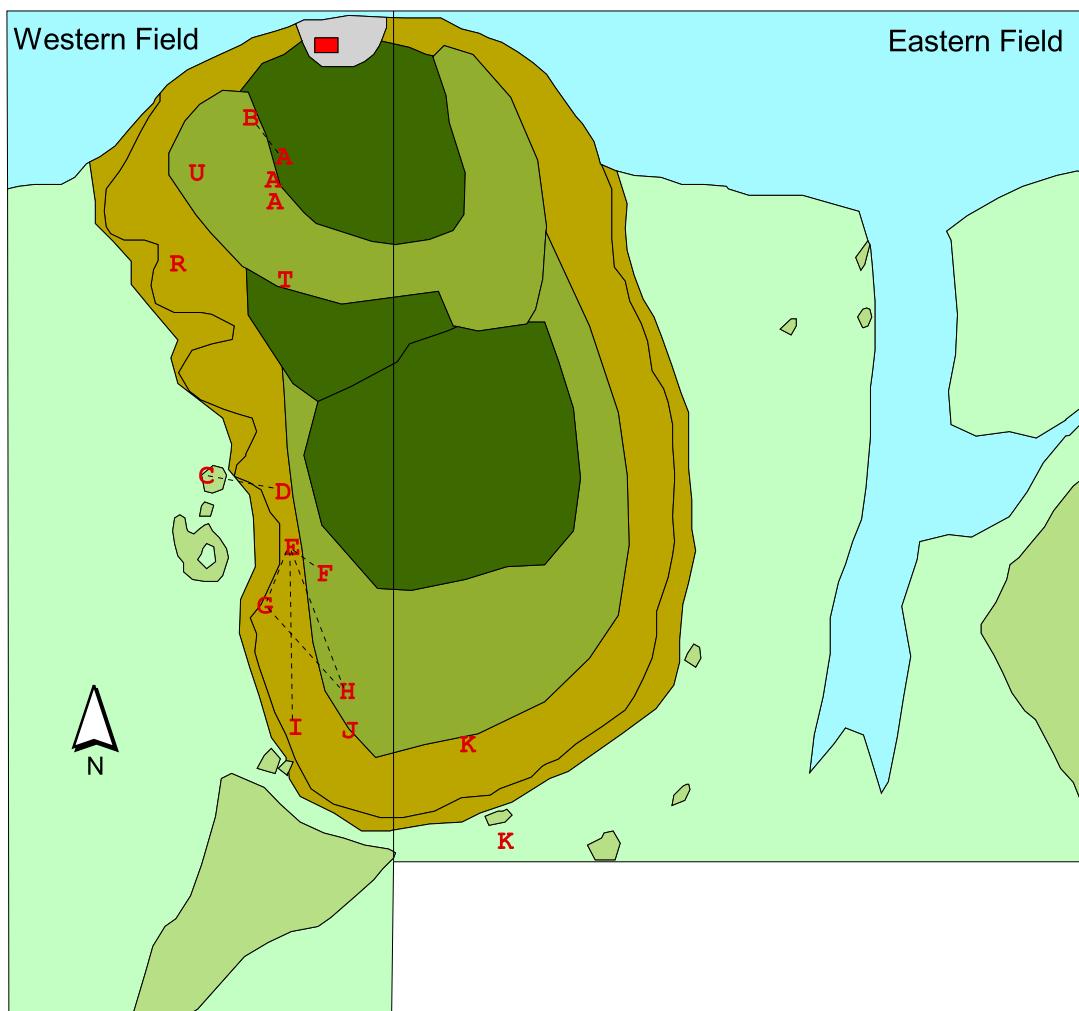
Iguana Camp Landuse



Iguana Camp Territory mapping results without nests data

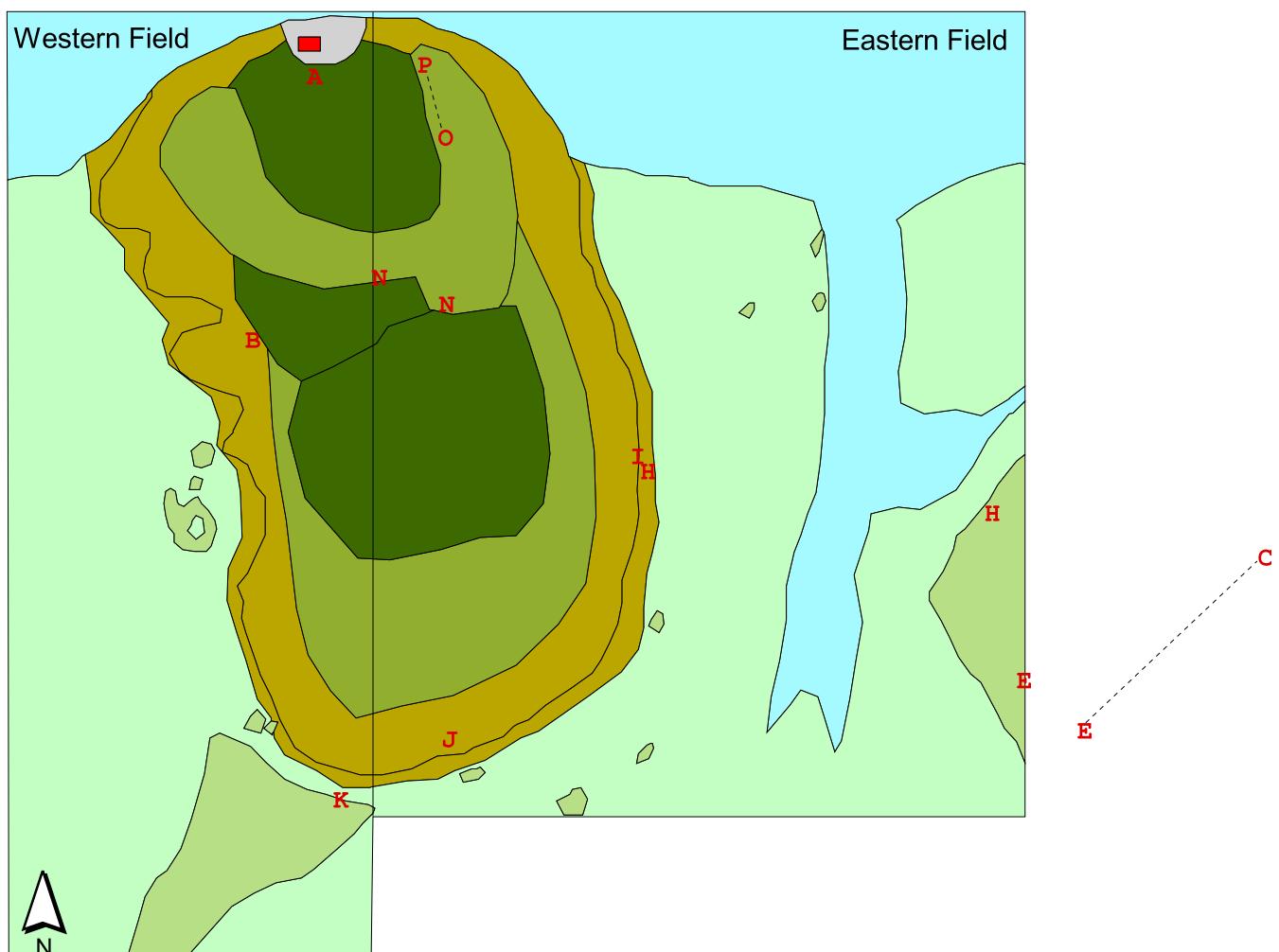


Iguana Camp West,
possible breeding results,
6th June

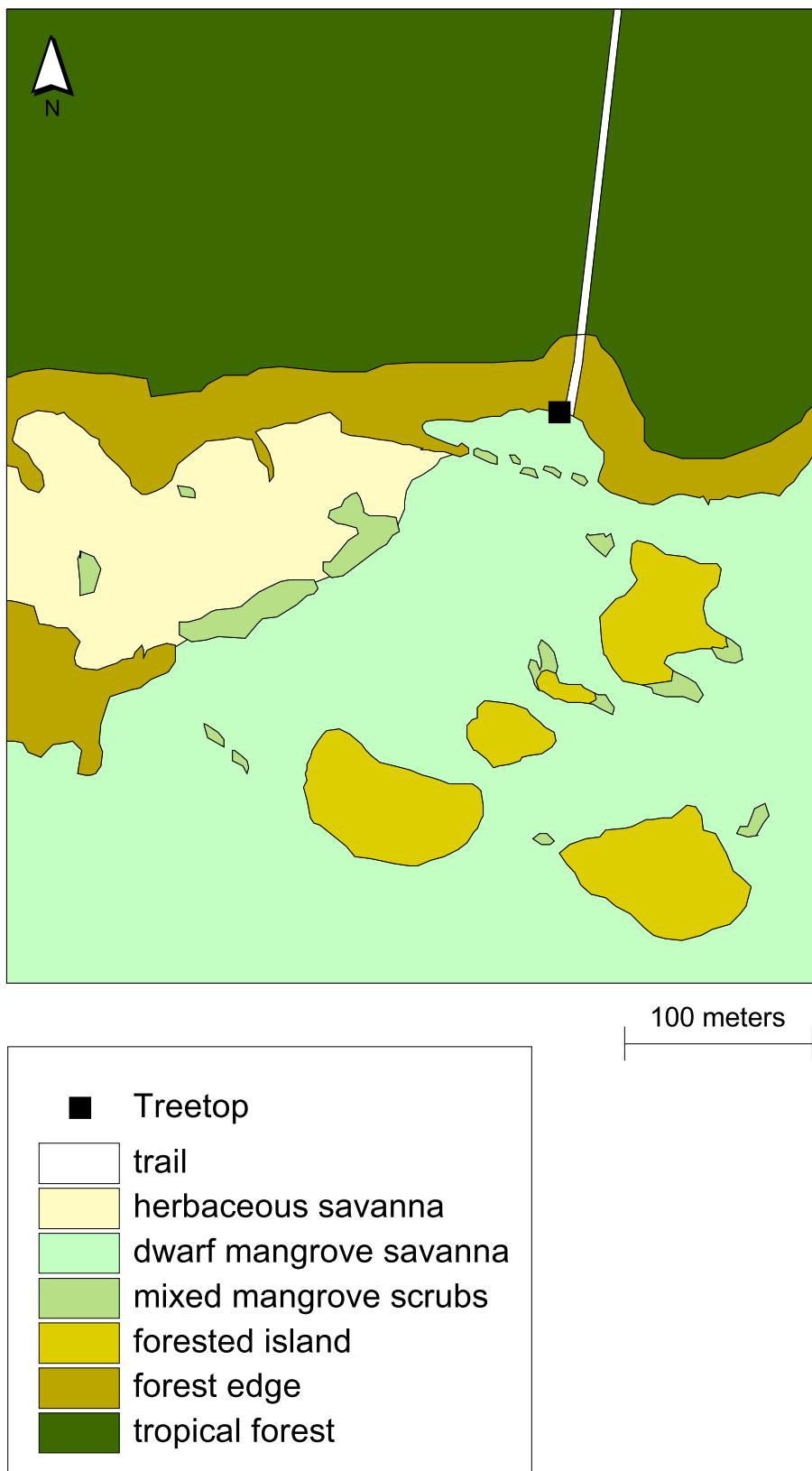


Simultaneous contacts

Iguana Camp East, possible breeding results, 3rd June

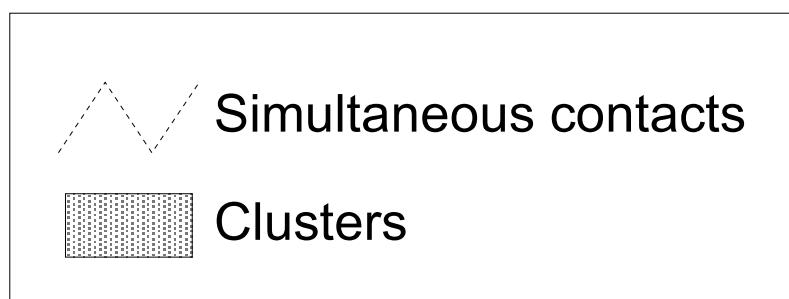
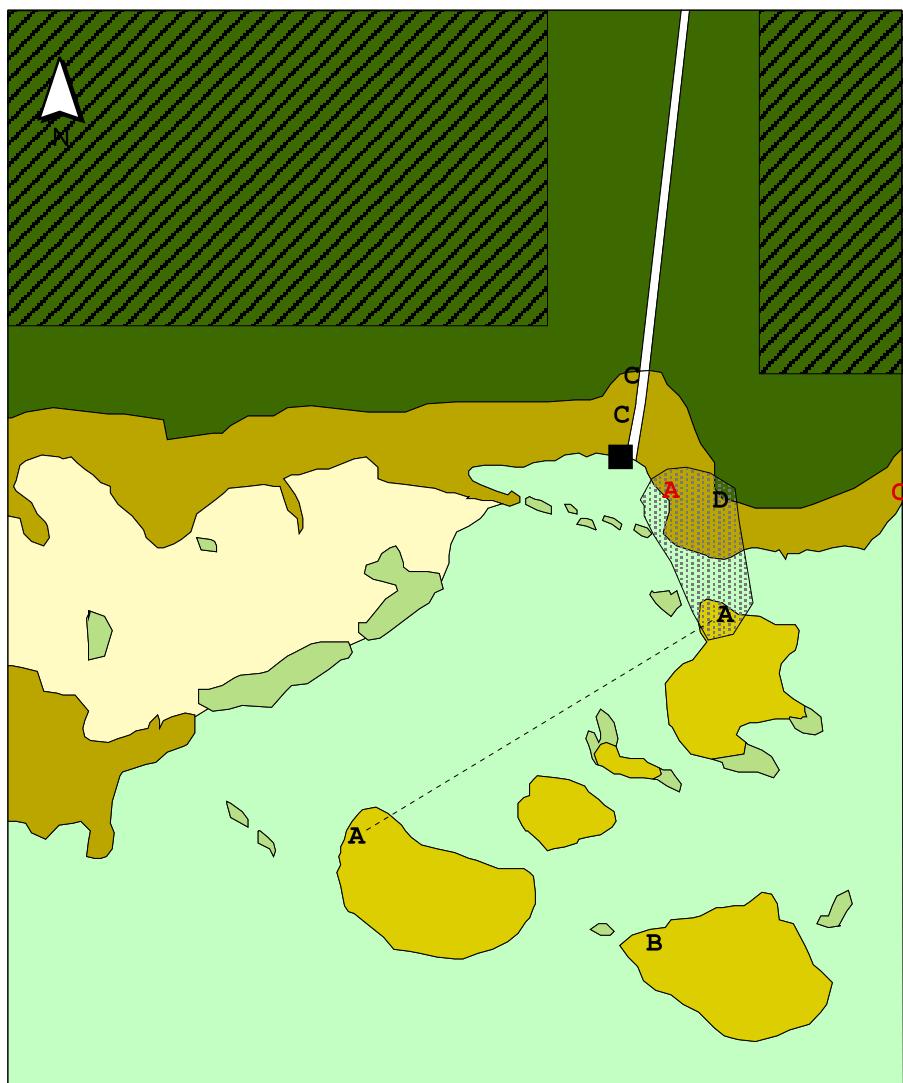


Main trail Landuse

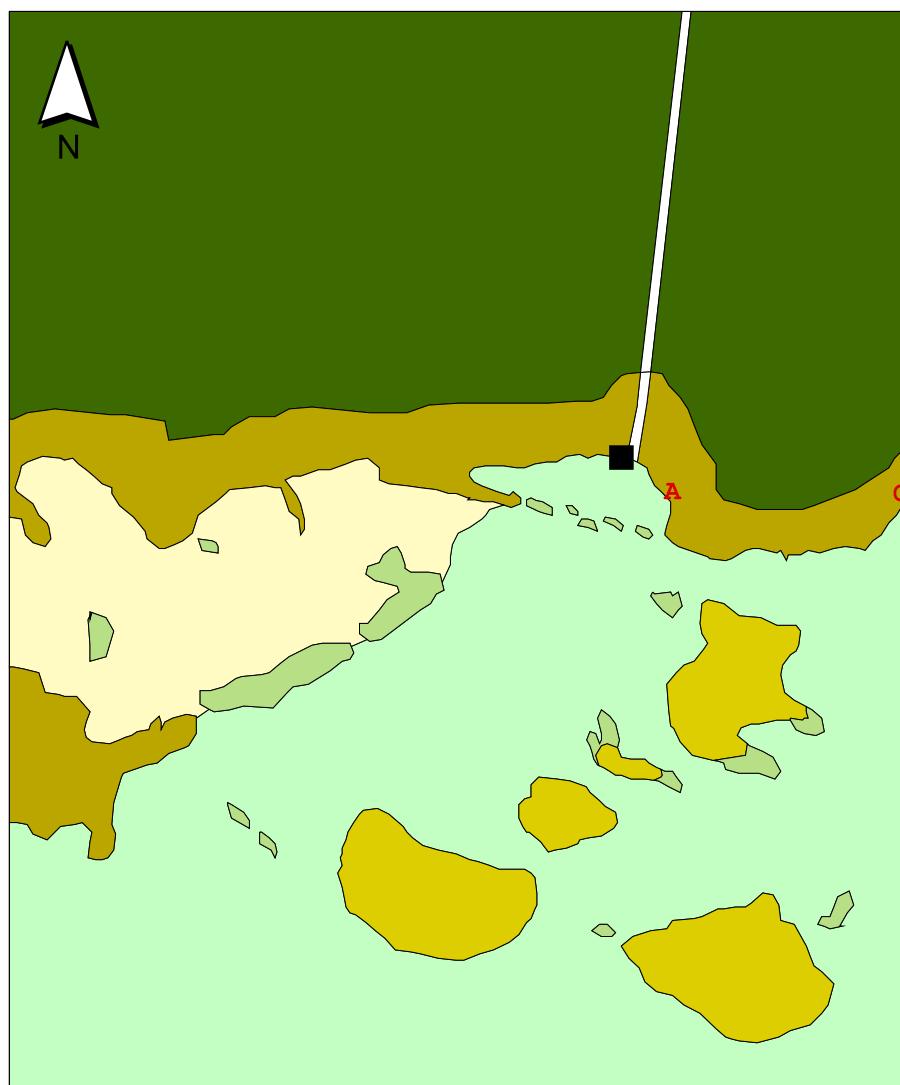


Main Trail

Territory mapping results without nests data



Main Trail,
possible breeding results,
28th June



Appendix 9a. Electivity results

	tot TM	tot transect	total	% contact	surf TM (m2)	surf transect	total surfaces	% surfaces	% contact / % surf
herbaceous savanna	0		0	0.0	36639		36639	3.7	0.00
dwarf mangrove savanna	30	1	31	12.4	373788	34500	408288	40.8	0.30
mixed mangrove scrubs	98	7	105	41.8	105086	5000	110086	11.0	3.80
forest edge	44	5	49	19.5	53777	6000	59777	6.0	3.27
forested island	9	4	13	5.2	23057	4500	27557	2.8	1.88
bajo - savanna		1	1	0.4		17000	17000	1.7	0.23
mangrove forest	31		31	12.4	67344		67344	6.7	1.83
littoral forest	9	4	13	5.2	7765	3000	10765	1.1	4.81
tropical forest	6	2	8	3.2	92739	170000	262739	26.3	0.12
	227	24	251	100.0	760194	240000	1000194	100.0	16.25

Appendix 9b. Habitat description

habitat	strata	dominant species: latin name	dominant species: common name	max height (m)
dwarf mangrove savanna		<i>Rhizophora mangle</i> (Rhizophoraceae)	red mangrove	1.2
mixed mangrove scrub		<i>Avicennia germinans</i> (Avicenniaceae) <i>Conocarpus erecta</i> (Combretaceae) <i>Rhizophora mangle</i> (Rhizophoraceae) unidentified (Rhamnaceae)	black mangrove buttonwood red mangrove	4
bajo-savanna	1	<i>Distichlis spicata</i> (Gramineae) <i>Cladium jamaicense</i> (Cyperaceae)	salt-grass saw-grass	0.8
	2	<i>Rhizophora mangle</i> (Rhizophoraceae) <i>Conocarpus erecta</i> (Combretaceae) <i>Avicennia germinans</i> (Avicenniaceae)	red mangrove buttonwood black mangrove	1.5
forested island		<i>Thrinax radiata</i> (Arecaceae) <i>Laguncularia racemosa</i> (Combretaceae) <i>Manilkara zapota</i> (Sapotaceae)	silver-thatch palm white mangrove sapote, sapodilla	12
forest edge		<i>Conocarpus erecta</i> (Combretaceae) unidentified (Rhamnaceae) <i>Manilkara zapota</i> (Sapotaceae)	buttonwood sapote, sapodilla	10
tropical forest		<i>Manilkara zapota</i> (Sapotaceae) <i>Thrinax radiata</i> (Arecaceae) <i>Metopium brownei</i> (Anacardiaceae) <i>Bursera simarouba</i> (Burceraceae)	sapote, sapodilla silver-thatch palm black poisonwood gumbo limbo	15
littoral forest		<i>Conocarpus erecta</i> (Combretaceae) <i>Manilkara zapota</i> (Sapotaceae) unidentified (Rhamnaceae) <i>Casuarina equisetifolia</i> (Casuarinaceae)	buttonwood sapote, sapodilla australian pine	15

Appendix 10a. Ringed individuals followed.

Cowpen

On eight ringed birds, five have been followed:

V-v was seen building a nest (C10) with an unringed individual and singing in a tree not far from the nest. They gave up before the nest was completely built.

W-w was seen three times at different places, first caught in the net, then seen singing alone at the other side of the field, and finally seen singing with the presence of another unringed bird (see [map](#)).

V-w and **w-g** were first seen several times singing close to their respective nests (C5, C2), and finally farther away at the end of the breeding period (see [map](#)).

V-o was always seen, singing or not, close to its nest (C6).

Robinsland

On five ringed individuals, three have been observed afterwards.

Wr-wo (female) and **wr-wv** (male) is the pair, which is occupying the nest N2. They are regularly observed around the nest from the hide.

Wr-or was seen at two different dates (11th and 25th July) frequently singing in what it seems to be its territory, no pairing or nesting has been proved.

Iguanacamp

On five ringed birds, only one has been seen afterwards, and it was not possible to see the colours of the rings.

Maintrail

On three ringed individuals, only **o-g** has been seen once afterwards. This bird was captured simultaneously with **o-w**, but has then been seen flying with an other (unringed) individual.