

THE RAFOS EXPEDITION TO BELIZE FEB-MAR 1986

GENERAL REPORT

David Counsell

Introduction.

The Society had planned to make a return visit to Oman in January-February 1986 but were thwarted at a late stage. However it was possible to divert the expedition to Belize at short notice. As it had not been possible to send an advanced party and as the team had been preparing for a desert environment, some considerable re-orientation, re-organisation and retraining was required. A team of 12 departed the UK on 26th February for Belize and were joined on arrival by two RAFOS members serving there.

Aims.

The aims of the expedition were:

- a) To provide adventurous expedition training in the form of ornithological studies in the tropical jungle and swamps of Belize.
- b) To identify and study as many species as possible
- c) To net and ring birds in accordance with recognised and licensed procedures.
- d) To photograph birds (especially those in the hand).
- e) To submit reports to ornithological societies in Britain and America.

The team spent the first full day at Airport Camp then on the 28th transferred to Guacamallo in a four tonne truck and a hired 10-12 seat Safari Land Rover. During the stay at Guacamallo, visits were made to Caracol and to the 'Blue Hole' cave. The team returned to Airport Camp on the 11th March. Further visits were then made to Altun Ha and Bermudian Landing, Big Falls, Crooked Tree and to the Oil Terminal, Cay Chapel and Cay Caulker. The team returned to the UK on the 19th-20th March.

Belize has been visited before; by RAFOS in 1981 (Jenkins 1982) and by the Army Bird Watching Society (ABWS) in 1982 (Adjutant 1982). Both of these expeditions had been able to visit several parts of Belize, including Guacamallo and in particular the remote Toledo district in the south. In 1986, as vehicles were more difficult to obtain, RAFOS had to concentrate its studies in one area. It chose Guacamallo for the following reasons.

It has three types of interesting habitat, (jungle, pine forest and river), each with its own bird species.

It is remote and difficult of access and hence has not been well studied apart from the earlier expeditions, which spent only a few days there.

The jungle provides good opportunities for arduous and adventurous training, but has to be explored with skill and patience if its birds are to be discovered.

The river is a good source of water for drinking and provided very welcome bathing facilities after a long day in the heat.

Guacamallo is situated in an uninhabited area on the northern fringe of the Maya Mountains, some 150km by road from Airport Camp and some 15km from the border with Guatemala, where a rough logging track, leading to Millionario, crosses the River Macal. The steep hills are covered with thick jungle on one side of the river and with open pine forest on the other. The team camped under atap and canvas at Guacamallo for eleven nights, spending all of the daylight hours in ringing, observation, photography and exploration of the local area.

Geology and Vegetation of the Guacamallo area.

The Maya Mountains are formed chiefly from hard and ancient sedimentary rock containing granite, porphyrite, silicon and quartzite. The soils lack phosphate, potash and lime and are not good for plant growth. On the other hand limestone occurs in abundance, the soils derived from this are rich in magnesia as well as lime and are the most fertile.

At Guacamallo the soil to the west of the river is composed of calcareous rock with many areas of lime enrichment. On this grows deciduous seasonal broadleaf forest, rich in lime loving species, to a height of 20-30m. The predominant trees are the sapote (or sapodilla) tree and the chiquebul. Breadnut (or ramon) and bullhoof occur on hilly ground and one mahogany is found in about every three hectares. Cherry, copal, cedar and fiddlewood are abundant and ironwood is prominent on deeper soils. Sillon and mylady are also present. Selective logging has made inroads on the trees but much remains untouched. The really large trees number no more than 6-8 per hectare; a slightly lower canopy is formed by trees with slender buttressed trunks. The ground is well shaded and the chief shrubby plants are pipers with low palms such as monkey-tail and give-and-take. Lianes, including the basket tie-tie, are common and vanilla vines are encountered. Epiphytes are less common than in swampy high forest.

To the east of the river lies Mountain Pine Ridge, an extensive region of low fertility. These are granite uplands with large beds of sandstone and shale. The top soils have much coarse sand and are well drained and in the dry season they tend to bake into a crust. The subsoils are heavy and slow to drain. The hills are covered with open oak-pine-floruzul forest with chunnuck, crabboe and sandpaper trees. Silver pimento palms occur in clumps but mahogany is absent. Grass grows long between the trees and as such the area is prone to fire.

Climate.

The climate in the Guacamallo area is generally described as sub-tropical. Humidity is seldom oppressive for long with a mean annual figure of probably less than 75%. Temperatures range from 10 to 35 deg C, with a mean average of 25 deg C. November to January is the coolest period (average 24 deg C). In the mountains the coolest nights seem very cold and several blankets or a sleeping bag are needed. There is a well marked dry season in February-March when easterly trade winds blow, this co-incident with the expeditions in 1981, 1982 and 1986. April sees the start of the rains, when thunderstorms form over the mountains. The mean annual rainfall is in the region of 1.6-1.7m falling mainly during May-

December, the heaviest in May-July. The amount of rainfall is the most significant ecological factor.

The weather in Central America over the period of the expedition, Feb-Mar, was unusually warm and dry. A stable low pressure system remained over Mexico causing warm conditions more appropriate to Apr-May with light winds predominating. The temperatures inland were up to 38 deg C at noon and 24 deg C at night. Corresponding temperatures on the coast were about 32 and 18 deg C. The humidity inland reached about 100% in the mornings decreasing to about 50% in the early afternoons. The low pressure system also produced some low cloud cover which cleared progressively during the day. High humidity in the early morning caused some light dew in sheltered areas. The wind was up to Force 3 and the sea calm with a slight swell. No rain was encountered. During the first week at Guacamallo mist formed at dawn, but as the terrain dried this ceased.

Ornithological Activities.

Airport Camp:

Observation and ringing started at dawn on the first day after arrival in Belize. Mist nets were set at the sewage farm, where a Bare-throated Tiger Heron, Purple Gallinule, Sora and Spotted Rail (rare in Belize) and Plain Chachalacas were seen. From the transmitter building Anhingas, Neotropic Cormorants, Great Egrets, Little Blue Herons, Green Herons, Limpkins and Snail Kites could be seen. Some changes in the habitat were noticed; the pool by the Department of the Environment yard, which used to attract many birds has been filled and vegetation has been cut down around the sewage farm and the transmitter station. The Ruddy Crane, recorded here in 1981 and 1982 by earlier expeditions, was not seen or heard in this area, but in Belize the populations appear to change from year to year. On this occasion fewer Hummingbirds were seen in camp than on previous visits.

Guacamallo:

Nets were set at dawn and in the late afternoon each day. It was found that birds were caught from dawn until midday and for about three hours before dusk. In turn the riverside, the open forest and the jungle were sampled with nets set up in the vicinity of the camp-site and at the junction of the track leading to Caracol, 2km south of Guacamallo bridge.

Throughout the daylight hours small parties regularly explored all the paths and trails around the camp, up and down the river, through the jungle and into the pine forest. Birds which were seen were noted and, when possible, field notes and photographs were taken. A call-over was held each evening after dark.

The Land Rover was used to explore the track south through the jungle to Millionario and to the north into the pine forest. Two major marches were undertaken. The first was a one day visit to the notable Maya ruins at Caracol, some 6km from the border with Guatemala. The second was a two day visit to the Blue Hole, a cave on the Raspaculo River some 15km south-east of Guacamallo, to assess the status of the Scarlet Macaw.

At dusk on the first day at Guacamallo, 24 Montezuma Oropendolas landed in a tree by the camp and later three pairs were watched while building nests by the river on the south bank some 300m downstream from the bridge. No trace could be found of the colony reported in 1981 (Jenkins 1982) on the northern bank 800m upstream from the bridge. A major colony beside the road to Millionario at BP849599 was visited. Here 47 nests were counted and construction was still in progress. Storms had removed most nests after the previous breeding season (Lt.Col.M G Hodges pers. comm.). Male birds were calling and displaying by the nests, making an extraordinary gurgling call and performing a very low bow until it seemed inevitable that they would fall.

One species was recorded for the first time in Belize, a Northern Pygmy Owl netted and photographed at Guacamallo on 8th March. This species is normally resident in western North America and western Central America including Guatemala and Honduras. It differs from the Ferruginous Pygmy Owl, a pair of which were also netted nearby and which is a moderately common resident of the Mountain Pine Ridge, in having light spots on the crown (not streaks) and white spots on the sides of the breast. It also is usually found at higher elevations.

The status of the Scarlet Macaw was investigated at the Blue Hole at the suggestion of the Belize Audubon Society and the CO Force Troops. Sightings there indicated that up to 12 birds may have been present. To see these large, brilliantly coloured birds in flight over the jungle in bright sunshine was unforgettable. Regrettably it seems that some have recently been killed in the area, as the skins command a very high price. There is nothing to suggest that British troops were responsible, but the area, which had been used for survival training, has been put out of bounds.

Hartshorn (1984) states that in Belize this species has been reduced to ten breeding pairs "in the Chiquibul Forest near Millionario" (12km south of Guacamallo). This may be a pessimistic view. In October 1983 at Bordel Camp, 20km south of Millionario, up to ten birds were seen daily between 21st and 24th and at Quam Bank in the Coxcomb Basin, 60km east of Millionario, two or three pairs were seen on 5th and 6th (Lt.Col. P J Hubert in litt). This appears to indicate that the population is well dispersed over a wide area of inaccessible country, making a comprehensive survey of its numbers a very difficult task. The species was not recorded by RAFOS in 1981 nor by ABWS in 1982 although both expeditions travelled extensively throughout Belize. However the population in the wild of this attractive cagebird is dangerously low and it will suffer from any further destruction of the jungle, hunting or other human pressure.

The nest of a pair of Rufous-tailed Hummingbirds was found while on the way to the Blue Hole. It measured 8cm high by 5cm wide and had been constructed from dried grass woven horizontally and interspersed with fragments of green leaf about 1mm square. The female was feeding at least two young in the nest.

Other Wildlife.

At Guacamallo other wildlife of note included a puma which crossed the path of one member at dawn as it made its way to the river to drink, a five and a half foot snake which swam past another man in the river, a large scorpion found near the team leader's bed and a tarantula spider near another. Bats, but not vampires, were caught in the mist nets at dusk. A pair of Geoffroy's spider monkeys made an aggressive display at the team from the tree tops on the way to the Blue Hole and Lawrence's howler monkeys were heard in the distance.

Coastal Region.

The team returned to Airport Camp on 11th March. The remaining five full days were occupied as follows:

12th March; A visit was made to the Maya ruins at Altun Ha and to the "Baboon" reserve (Lawrence's howler monkeys) at Bermudian Landing.

13th March; A visit was made to the Big Falls rice farm. This had been visited in both 1981 and 1982 but had subsequently been placed in the hands of a receiver. Vast areas of padi had become dry and considerably less attractive to wildlife, but one area some 750m by 250m was still flooded and held a very large number of herons, egrets, ducks and waders. Two Jabiru were seen. It is said that there are now no more than 40 of these birds in the country. Some 650 Indigo Buntings were caught and ringed, three of those caught had previously been ringed at Big Falls by the ABWS in 1982. Muscovy Duck were also recorded.

14th March; A party took a boat from Airport Camp along the Belize River, Haulover Creek and the Burden Canal to Northern Lagoon. This provided good practice in handling a small boat and outboard motor but was disappointing in that very few birds were seen. Manatees, an endangered species found in the adjoining Southern Lagoon, were not recorded here.

15th March; The seafront at Belize City was visited in order to see Magnificent Frigatebirds, Brown Pelicans, Royal Terns and other shorebirds. This was followed by a return to Big Falls.

16th-17th March; Two visits were made to Crooked Tree, a village now accessible by road, some 40km north-west of Airport Camp. There a boat was hired to take the team to the southern part of Crooked Tree Lagoon. This area is proposed by the Government of Belize as a waterbird reserve. Thousands of birds congregate here in March, April and May. Some 800 Neotropic Cormorants, over 100 Green Herons, more than 100 Northern Jacanas, 25 Boat-billed Herons, about 50 Limpkins and a Sungrebe were seen as the boat passed along the waterway. 23 Caspian Terns (uncommon in Belize) were seen resting on the causeway.

18th March; At dawn a visit was made to the oil terminal at the southern end of the Belize City waterfront. Here a lake attracts a large number of waterbirds and many herons, egrets and ducks were seen including 87 Tricolor Herons and 110 Great Egrets. A speedboat was hired to take the team to Cay Chapel and Cay Caulker, two offshore islands on the barrier reef some 30km north-east of Belize City. The reef is Belize's most spectacular feature, the second longest in the world and the longest in the northern hemisphere at 220km. The visit enabled the team to appreciate the importance of the reef and its conservation and to see species it would otherwise have missed, eg, a Great White Heron, rare in Belize and two Reddish Egrets of which only about 24 pairs are known in Belize.

Recovery.

Two members, who were required to return to duty early, flew back to the UK on 5th-6th March after only one week in Belize. The remainder of the team returned on 19th-20th March after three weeks in Belize. It is considered that this is a suitable duration for such an expedition.

Summary.

A most successful expedition to Belize replaced the planned expedition to Oman at short notice. The team studied the birds of the country, especially those of the remote jungle, in greater detail than had been possible before. Useful training in expedition planning and in living and working in sub-tropical jungle was provided.

Recommendations.

It is strongly recommended that RAFOS should return to Belize in future years. The Cockscomb Basin at the eastern end of the Maya Mountains, an area under consideration as a wildlife reserve and as a sanctuary for Jaguars, requires to be surveyed in support of the Belize Audubon Society. Other areas, visited by RAFOS in 1981 or by ABWS in 1982 and which deserve further detailed study include Salamanca, Union Camp and Blue Creek in Toledo District and Big Falls in Cayo District.

Acknowledgements.

Administration and logistics ran smoothly and no serious medical problems were encountered. The team received enormous help and support and nothing but friendliness and co-operation from all concerned. Without this the expedition would not have been possible and it is a pleasure to thank them heartily. In particular the Physical Education and Movements Staff at the Ministry of Defence and at RAF Brampton; in Belize, the Commander British Forces, CO Force Troops and RAF Belize; the US Fish and Wildlife Service and the Belize Audubon Society deserve special mention. The expedition received a grant from the Hawker Siddeley RAF 50th Anniversary Award Trust.

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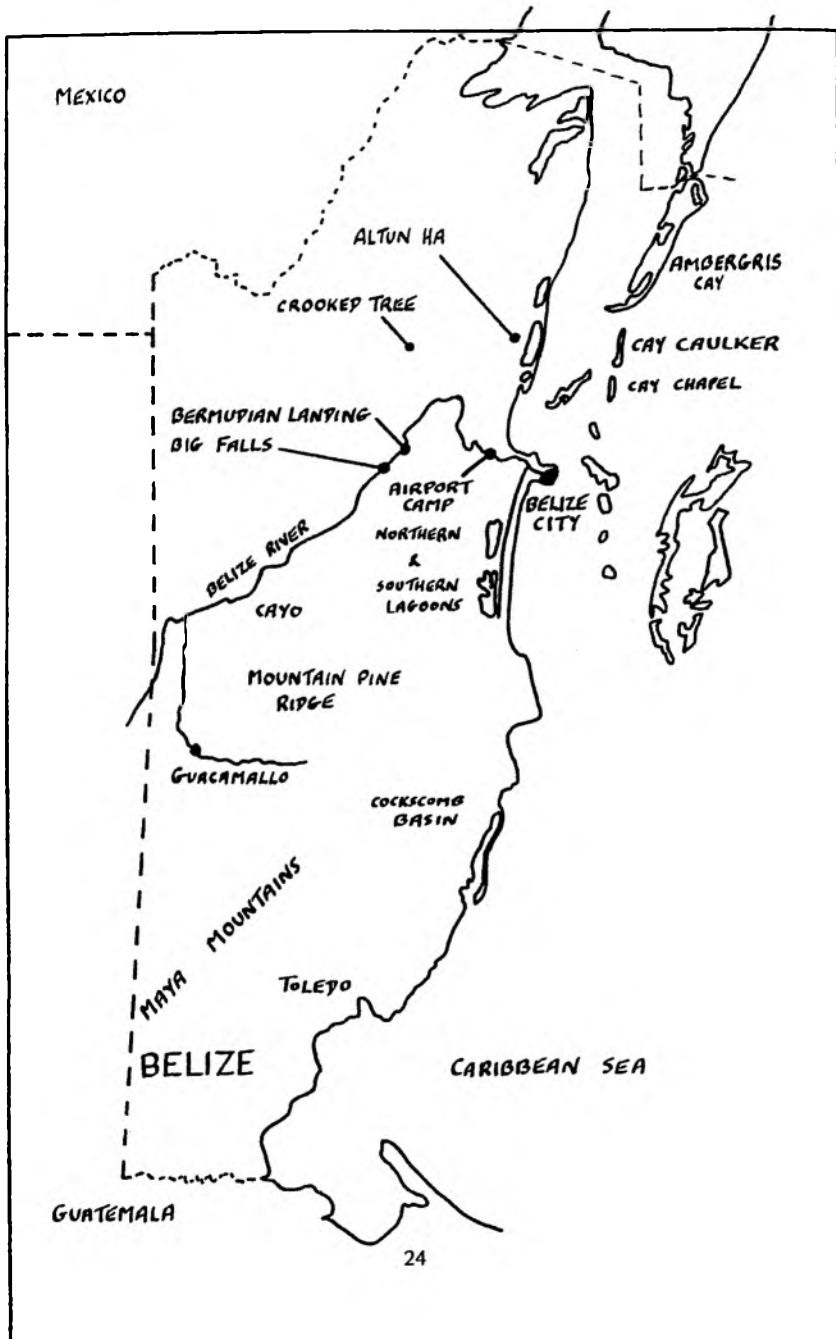
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Composition of the Team:

Major	D J R	Counsell	MOD(PE)MWGT1
Flt Lt	S J	Lumby	RAF Henlow
Flt Lt	N A	Smith (1st week only)	RAF Leuchars
Chf Tech	B	Etheridge	RAF Kinloss
Chf Tech	B J	Hancock	RAF Wittering
Sgt	D	Eustace	RAF Digby
Sgt	W G	Taylor (1st week only)	RAF Lossiemouth
Sgt	P J	Dargue	RAF Hereford
Cpl	S	Jones	RAF Hereford
Jnr Tech	J P	Curtis	RAF Brize Norton
Jnr Tech	P F	Wyer	RAF Cottesmore
Cpl	P	Triggs	RAF Belize
Cpl	P	Olesen (2nd week only)	RAF Belize

BELIZE



ANNOTATED SYSTEMATIC LIST

The names and sequence of birds follows that of the Checklist of Northern American Birds, 6th Edition and Supplement (American Ornithologists Union 1983 and 1985) as given in the revised Checklist of the Birds of Belize (Wood, Leberman and Weyer 1986).

The status of each species has been taken from the latter publication, with grateful acknowledgement, using the following code:

PR Permanent Resident: Present throughout the year, abundance of most species showing little variation. Includes partial migrants.

WR Winter Resident: Present through the winter (generally October to March) but absent at other times.

SR Summer Resident: Present through the summer (generally April to September) but absent at other times.

T Transient: Present during migration periods (generally March to May and August to October).

WV Winter Visitor: Sometimes present in very few numbers during the winter (generally October to March) but where Belize is not part of the normal winter range.

A Accidental: Very few records, Belize is not part of the normal range of these species.

- Great Tinamou Tinamus major PR
One was seen at Guacamallo
- Little Tinamou Crypturellus soui PR
Single birds seen on three occasions at Guacamallo
- Slaty-Breasted Tinamou Crypturellus boucardi PR
Single birds seen on three occasions at Guacamallo
- Least Grebe Tachybaptus dominicus PR
Four birds were seen together at Bermudian Landing, where they are known to breed.
- Pied-billed Grebe Podilymbus podiceps PR
Seen at Crooked Tree during three visits, with a maximum of ten birds.
- Brown Pelican Pelecanus occidentalis PR
This species is common along the coast and offshore at the cays.
- Double-crested Cormorant Phalacrocorax auritus PR
This species is common at offshore cays and it was noted that they breed among the mangrove there.

Olivaceous Cormorant Phalacrocorax olivaceus PR
 Small numbers were seen at most inland wetlands. Large numbers at Crooked Tree, with a maximum of count of 900.

Anhinga Anhinga anhinga PR
 Up to 12 were seen at most inland wetlands.

Magnificent Frigatebird Fregata magnificens PR
 Common at offshore cays and also seen in small numbers at Belize harbour and at Northern Lagoon.

Pinnated Bittern Botaurus pinnatus PR
 Three birds were seen, two at Airport Camp and one at Big Falls.

American Bittern Botaurus lentiginosus WV
 One at Airport Camp (near the transmitters) on the 28th February.

Least Bittern Ixobrychus exilis PR
 One at Airport Camp (near the transmitters) on the 16th March.

Bare-throated Tiger Heron Tigrisoma mexicanum PR
 Two at Airport Camp (sewage farm) on the 27th February and one at Big Falls on the 13th March.

Great Blue Heron Ardea herodias PR
 Small numbers (maximum of eight) were seen at Big Falls, Crooked Tree and at the Belize City oil terminal. The white morph, Great White Heron, Ardea herodias ssp., which occurs in Southern Florida was seen at Cay Caulker on 19th March

Great Egret Casmerodius albus PR
 Seen in most wetlands with a maximum of 300 at Crooked Tree and 100 at the oil terminal.

Snowy Egret Egretta thula PR
 Up to ten were seen at most inland wetlands but 197 were counted at the oil terminal and 87 at Crooked Tree.

Little Blue Heron Egretta caerulea WR
 This species is widespread. The largest numbers (maximum of 200) were seen at Big Falls.

Tricolored Heron Egretta tricolor PR
 Up to six birds were seen at all wetlands, 87 were counted at the oil terminal.

Reddish Egret Egretta rufescens PR
 Two birds were seen at Cay Chapel on the 18th March. The only known populations in Belize are ten to 12 pairs which nest at Shipstern Cay in the north and perhaps the same number at Cayos Pajaros behind Ambergris Cay (Hartshorn 1984).

Cattle Egret Bulbulcus ibis PR
 A recent arrival from the Old World, this species is now widespread and numerous in the company of grazing livestock. Over 200 were seen at Big Falls.

Green-backed Heron Butorides striatus PR
 (Formerly Green Heron).
 Up to 15 were seen at most wetlands, 50 at Big Falls and over 100 at Crooked Tree.

Black-crowned Night Heron Nycticorax nycticorax PR
 Up to 12 birds were seen at Big Falls, Crooked Tree and at the oil terminal.

Yellow-crowned Night Heron Nycticorax violaceus PR
 One seen on the coast at the municipal airport in Belize City, one at Crooked Tree and three on the cays.

Boat-billed Heron Cochlearius cochlearius PR
 25 birds were seen in a tree beside the waterway a short distance south of Crooked Tree Lagoon.

White Ibis Eudocimus albus PR
 90 were seen at the oil terminal, 35 at Big Falls and smaller numbers at Airport Camp, Bermudian Landing and Crooked Tree.

Glossy Ibis Plegadis falcinellus PR
 (Formerly Dark Ibis)
 Three birds were seen at Crooked Tree on two days and a bird seen in the company of Eudocimus albus at Big Falls on the 13th March is considered most likely to be this species.

Roseate Spoonbill Ajaja ajaja PR
 Three birds were seen at Big Falls. There are no longer any known breeding populations in Belize (Hartshorn 1984).

Jabiru Jabiru mycteria PR
 One was seen at Airport Camp on the 12th and two at Big Falls on the 13th March. There are now only about ten breeding pairs in Belize (Hartshorn 1984).

Wood Stork Mycteria americana PR
 Eight were seen at Crooked Tree and 50 at Big Falls. Numbers in Belize have been reduced in the last ten years and, if they still breed in Belize, their colony has not been identified (Hartshorn 1984).

Muscovy Duck Cairina moschata PR
 11 were seen at Crooked Tree and one at Big falls. Although protected, populations are low (Hartshorn 1984).

Blue-winged Teal Anas discors T-WR
 About 1500 were seen at Big Falls, 300 at Crooked Tree, 55 at the oil terminal and 15 on the cays.

Cinnamon Teal Anas cyanoptera T
A male was present at Big Falls 13th to 15th March

Black Vulture Coragyps atratus PR
Widespread, not as numerous as Cathartes aura but large flocks were found, eg, 45 at Big Falls on the 13th and 100 at Ladyville (near Airport Camp) on 17th March.

Turkey Vulture Cathartes aura PR
Widespread and abundant in all habitats.

King Vulture Sarcoramphus papa PR
Encountered only at Guacamallo, maximum of nine.

Osprey Pandion haliaetus PR
Three were seen on the cays, one of which was carrying nesting material.

American Swallow-tailed Kite Elanoides forficatus SR
Encountered only at Guacamallo where it was numerous, with a maximum of 12 together. Courtship and display flights were performed and a bird was seen to drink from the river in flight.

Black-shouldered Kite Elanus caeruleus PR
Single birds were seen at Guacamallo on 11 and 13 March, two at Big Falls on 13 March and two at Airport Camp on 17 March.

Snail Kite Rostrhamus sociabilis PR
Two or three daily at Airport Camp, up to six at Crooked Tree and one at Big Falls.

Plumbeous Kite Ictinia plumbea PR
This species is rare in winter and was encountered only at Guacamallo where up to ten together were seen daily moving north on migration. Mating took place and nesting is known to occur in this area.

Sharp-shinned Hawk Accipiter striatus WV
A first year male was netted and photographed at Guacamallo on 2 March.

White Hawk Leucopternis albicollis PR
Encountered only at Guacamallo where one or two were seen daily.

Common Black Hawk Buteogallus anthracinus PR
Three were seen at Airport Camp on 17 March.

Black-collared Hawk Busarellus nigricollis PR
One was seen at Crooked Tree on 14 and 17 March.

Gray Hawk Buteo nitidus PR
One or two were seen daily at Guacamallo and one at Big Falls on 15 March

Roadside Hawk Buteo magnirostris PR
Widespread in all habitats; up to four encountered in a day.

Swainson's Hawk Buteo swainsonii T-WR
 On bird was seen at Guacamallo on 18 March.

White-tailed Hawk Buteo albicaudatus PR
 One on the Western Highway on 28 February and one at Airport Camp on 15 March.

Black Hawk Eagle Spizaetus tyrannus PR
 One was seen at Guacamallo on 10 March. The population is dangerously low (Hartshorn 1984).

Laughing Falcon Herpetotheres cachinnans PR
 One at Crooked Tree and two at Big Falls.

Collared Forest-Falcon Micrastur semitorquatus PR
 One at Guacamallo and one at Caracol.

American Kestrel Falco sparverius WR
 On the Western Highway two were seen on the 28 February and one on 11 March.

Bat Falcon Falco ruficularis PR
 Single birds were seen at Airport Camp and and at Guacamallo. One was netted and photographed at Big Falls.

Orange-breasted Falcon Falco deiroleucus PR
 One was seen at Guacamallo on three days.

Peregrine Falcon Falco peregrinus WR
 A female was seen at Big Falls.

Plain Chachalaca Oreortyx vetula PR
 This noisy species was recorded daily at Airport Camp and at Guacamallo where it is numerous. Netted.

Crested Guan Penelope purpurascens PR
 Two birds, probably a pair, were seen at Guacamallo on 8 March.

Great Curasow Crax rubra PR
 A bird was seen at Caracol on 2 March, where they are said to be hunted, and a pair at Guacamallo on 8 March.

Spotted Wood-quail Odontophorus guttatus PR
 Two at Guacamallo on 8 March.

Ruddy Crake Laterallus ruber PR
 Two were seen at Big Falls on 15 March.

Gray-necked Wood Rail Aramides cajanea PR
 Single birds seen daily at Guacamallo, at Airport Camp on 15 March and at Crooked Tree on 17 March. Two were seen at Bermudian Landing on 12 March.

Uniform Crake Amaurolimnas concolor PR
 One at Guacamallo on 7 March.

Sora Porzana carolina T-WV
 On at Airport Camp (by the 25 yd range) on 27 February and 15 March.

Spotted Rail Rallus maculatus PR
 One was seen at Airport Camp on 28 February.

Purple Gallinule Gallinula martinica PR
 One was seen at Airport Camp on many days.

Common Gallinule (Moorhen) Gallinula chloropus PR
 Two or three seen daily at Airport Camp, Small numbers at Big Falls and at the oil terminal and 25 at Crooked Tree on 17 March.

American Coot Fulica americana WR
 The largest counts were of 50 at Big Falls and 72 at Crooked Tree. There were also three at Airport Camp on 12 March and one at the oil terminal on 17 March.

Sungrebe Heliconia fulca PR
 Hartshorn (1984) states that, although rare in surrounding countries this species is common in lowland rivers in Belize. Its population seems to be stable but dangerously low. One or two were seen in typical habitat at Crooked Tree on 14 and 17th March. An adult was also seen on 10th March at Guacamallo and the presence of young was reported. The habitat here is less obviously typical, but the species was seen here on 27 February 1982 by the ABWS.

Limpkin Aramus guarauna PR
 Regularly seen in all wetlands, eg 50 at Crooked Tree on 17 March. A single bird seen on two days at Guacamallo, was in untypical habitat but where freshwater snails (its staple food) were abundant.

Black-bellied Plover Pluvialis squatarola T-WR
 One at Belize City harbour, two at the oil terminal and six at Cay Chapel.

Wilson's plover Charadrius wilsonia PR
 Eight at Cay Chapel

Semipalmated Plover Charadrius semipalmatus T-WV
 12 at Belize City harbour on 15th and one at the oil terminal on 17th March.

Killdeer Charadrius vociferus T-WR
 One at Airport Camp on 27th February, two at St Luis (near Guacamallo) on 28th February and one at Bermudian Landing on 12th March.

Black-necked Stilt Himantopus mexicanus PR
 Generally up to ten were seen at Big Falls, Crooked Tree and Cay Chapel and 15 at the oil terminal. However 150 were seen at Big Falls on 15th March.

Northern Jacana Jacana spinosa PR
 Common in all wetlands. Over 100 were seen at Crooked Tree lagoon on 17th March and a bird was flushed from a nest containing one egg.

Greater Yellowlegs Tringa melanoleuca WR
 Small numbers were seen at lowland wetlands and on the cays with a maximum of 30 at Big Falls on 15th March.

Lesser Yellowlegs Tringa flavipes WR
 Less widespread than T. melanoleuca; maximum count was of 30 at Big Falls on 13th March.

Solitary Sandpiper Tringa solitaria WR
 Up to five occurred at all the lowland wetland sites that were visited. This species was netted and photographed in the hand.

Willet Catoptrophorus semipalmatus T-WV
 Two at Belize City waterfront on 15th March and one at Cay Chapel on 18th March.

Spotted Sandpiper Actitis macularia T-WR
 Seen daily at Guacamallo; more widespread at lowland water edges than T. solitaria but not so numerous.

Whimbrel Numenius phaeopus T
 Two at Cay Chapel

Ruddy Turnstone Arenaria interpres PR
 41 at Cay Chapel on 18th March

Sanderling Calidris alba T
 Nine at Cay Chapel

Western Sandpiper Calidris mauri T
 One at Big Falls, four at Cay Chapel and 12 at Belize City harbour.

Least Sandpiper Calidris minutilla T-WV
 Seen at all lowland wetlands with the highest count of 30 at Big Falls on 13th and 15th March.

Pectoral Sandpiper Calidris melanotos T
 One was present at Bermudian Landing on 12th March and ten at Big Falls on 15th March.

Dowitcher Limnodromus sp. T
 70 at Big Falls on 15th March and 16 at Cay Chapel on 18th March. As they were in winter plumage and were not calling, it was not considered safe to distinguish between Long-billed L. scolopaceus and Short-billed L. griseus.

Laughing Gull Larus atricilla PR
 Common at the coast and on the cays.

Gull-billed Tern Sterna nilotica T
 At Crooked Tree four were seen on 16th and three on 17th March.

Caspian Tern *Sterna caspia* PR
This species was seen only at Crooked Tree with a maximum count of 23 on 17th March.

Royal Tern *Sterna maxima* PR
Common at the coast and on the cays

Sandwich Tern *Sterna sandvicensis* PR
14 at Belize City harbour and two at Cay Caulker

Pale-vented Pigeon *Columba cayennensis* PR
One was seen at Guacamallo and one or two daily at Airport Camp

Scaled Pigeon *Columba speciosa* PR
This species was recorded only in the secondary jungle near Guacamallo. Netted and photographed.

Red-billed Pigeon *Columba flavirostris* PR
Single birds recorded at Guacamallo on three dates. Netted and photographed

Short-billed Pigeon *Columba nigrirostris* PR
Recorded at Caracol, at Airport Camp on 26th February and at Guacamallo on 9th March.

White-winged Dove *Zenaida asiatica* PR
One was seen at Cay Caulker. This species is only found in the north-east of Belize.

Common Ground-dove *Columbina passerina* PR
Two recorded at Cay Caulker

Ruddy Ground-dove *Columbina talpacoti* PR
Widespread and often numerous in all lowland areas with a maximum count of 80 at Big Falls. Netted and photographed.

Blue Ground-dove *Claravis pretiosa* PR
One at Guacamallo on 7th March and up to ten daily at Big Falls. Netted and photographed.

White-tipped Dove *Leptotila verreauxi* PR
Two were seen at Airport Camp on 16th and one on 17th March.

Gray-fronted Dove *Leptotila rufaxilla* PR
(Formerly Gray-headed Dove)
One or two on several days at Guacamallo. Netted and photographed.

Ruddy Quail-dove *Geotrygon montana* PR
Found only in secondary jungle with a maximum of nine on 9th March. Netted and photographed.

- Olive-throated Parakeet Aratinga nana PR
 (Formerly Aztec Parakeet).
 Seen in all areas visited, except the cays, with the largest count being 20 at Altun Ha.
- Scarlet Macaw Ara macao PR
 A few birds were seen in flight at the Blue Hole cave on 6th and 7th March; three birds were seen twice, two birds were seen twice and a single bird was seen twice indicating that between three and 12 birds were present. This species, once common, has been reduced to ten breeding pairs in Chiquibul Forest near Millionario (Hartshorn 1984).
- White-crowned Parrot Pionus senilis PR
 This species is common at Guacamallo, up to ten being seen daily.
- Red-lored Parrot Amazona autumnalis PR
 Up to five were seen daily at Guacamallo.
- Mealy Parrot Amazona farinosa PR
 Two at Caracol on 2 March and two at Big Falls on 14th March.
- Yellow-crowned Parrot Amazona ochrocephala PR
 (Formerly Yellow-headed Parrot).
 Two were seen at Airport Camp on 12th March. This is the best talking parrot species in the New World and its population is dangerously low (Hartshorn 1984).
- Mangrove Cuckoo Coccyzus minor PR
 One at Crooked Tree on 16th March. Photographed.
- Squirrel Cuckoo Piaya cayana PR
 One at Big Falls, one at Crooked Tree and one daily at Guacamallo.
- Groove-billed Ani Crotophaga sulcirostris PR
 Up to 12 were seen daily at Guacamallo and smaller numbers regularly elsewhere.
- Vermiculated Screech-owl Otus guatemalae PR
 One was netted and photographed in the pine forest at Guacamallo on 5th March.
- Ferruginous Pygmy-owl Glaucidium brasilianum PR
 One was netted and photographed at Guacamallo.
- Northern Pygmy-owl Glaucidium gnoma
 One was netted and photographed in secondary jungle at Guacamallo on 8th March. This is the first record of this species in Belize. It ranges from western North America to Guatemala.
- Mottled Owl Cicciba virgata PR
 Two birds were present in secondary jungle at Guacamallo on 6th March and one on 8th March. Netted and photographed.

Nighthawk Chordeiles sp.

Up to three birds which were seen on several evenings at Airport Camp were likely to be either Common Nighthawk C. minor or Lesser Nighthawk C. acutipennis. Both species were recorded here in 1982 by the ABWS. C. minor, a permanent resident, is the more likely.

Common Pauraque Nyctidromus albicollis

PR

Common in clearings and on jungle trails at Guacamallo, the Blue Hole and at Airport Camp. Netted and photographed.

Vaux's Swift Chaetura vauxi

PR

There were several small groups at Guacamallo on 8th March and six at Big Falls on 15th March.

Swift sp.

Three large flocks of up to 75 birds were seen flying north at high level over Guacamallo on 3rd and 7th March. They may have been White-collared Swift Streptoprocne zonaris.

W Craig (pers.comm.) who has recorded large flocks of S. zonaris feeding on the wing at Mountain Pine Ridge, suggests that the birds on the 3rd and 7th March may have been migratory whereas S. zonaris is not.

Long-tailed Hermit Phaethornis superciliosus

PR

Single birds were recorded on three dates at Guacamallo. Netted and photographed.

Little Hermit Phaethornis longuemareus

PR

Small numbers were seen daily at Guacamallo. One bird was seen to immerse itself in a pool, presumably in order to drink. Netted and photographed.

Wedge-tailed Sabrewing Campylopterus curvipennis

PR

Single birds were recorded at Guacamallo on 5th and 7th March. Four were netted and photographed.

Green-breasted Mango Anthracothorax prevostii

PR

One was seen at Altun Ha.

Fork-tailed Emerald Chlorostilbon canivetii

PR

Occurred in small numbers at Airport Camp and at Guacamallo. Netted and photographed.

White-bellied Emerald Amazilia candida

PR

Common locally at Guacamallo. Netted and photographed.

Azure-crowned Hummingbird Amazilia cyanocephala

PR

(Formerly Red-billed Azurecrown).

Small numbers occurred at Caracol and Guacamallo. Netted and photographed.

Rufous-tailed Hummingbird Amazilia tzacati

PR

This was the most numerous Hummingbird at Guacamallo, occurring in all habitats there. Young were being fed in the nest. This species was also netted and photographed at Big Falls.

Buff-bellied Hummingbird Amazilia yucatanensis PR
 (Formerly Fawn-breasted Hummingbird).
 Three birds were recorded at Guacamallo. Netted and photographed.

Cinnamon Hummingbird Amazilia rutila PR
 This bird, a coastal species, was seen daily at Airport Camp and was present on the cays. Netted and photographed.

Ruby-throated Hummingbird Archilocus colubris T-WR
 One at Guacamallo on 2 March and two at Big Falls on 15 March. Netted and photographed.

Black-headed Trogon Trogon melanocephalus PR
 (Formerly Citreoline Trogon).
 Two were seen at Guacamallo on 5 March and one on 10 March one was at Big Falls on 15 March.

Violaceous Trogon Trogon violaceus PR
 One or two were seen daily at Guacamallo and one at Altun Ha.

Collared Trogon Trogon collaris PR
 A male was netted and photographed at Guacamallo on 7 March. This species is normally only found west of the Maya Mountains.

Slaty-tailed Trogon Trogon massena PR
 One was seen at Guacamallo on 2 March.

Tody Motmot Hylomanes momotula PR
 One was seen at Guacamallo on 2 March.

Blue-crowned Motmot Momotus momota PR
 One seen at Caracol and at the Blue Hole

Ringed Kingfisher Ceryle torquata PR
 Two were recorded on several days at Airport Camp and single birds were seen at most lowland wetlands. 12 were counted at Crooked Tree.

Belted Kingfisher Ceryle alcyon T-WR
 Up to three were recorded daily at lowland wetlands and on the cays.

Amazon Kingfisher Chloroceryle amazona PR
 This bird was common along the Macal River at Guacamallo. Single birds were also seen at Altun Ha and at the Northern Lagoon.

Green Kingfisher Chloroceryle americana PR
 Also common along the Macal River at Guacamallo and young were being fed in a nest at the Blue Hole. Small numbers were also seen at the Northern Lagoon and at Crooked Tree.

White-necked Puffbird Bucco macrorhynchos PR
 One at Caracol on 2 March and at Guacamallo on 11 March.

White-whiskered Puffbird Malacoptila panamensis PR
 Up to three were seen daily at Guacamallo.

Rufous-tailed Jacamar Galbula ruficauda PR
 Seen regularly in secondary jungle at Guacamallo with up to seven recorded daily.

Emerald Toucanet Aulacorhynchus prasinus PR
 One at the Guacamallo bridge on 1 March in the company of a flock of Ramphastos sulfuratus.

Collared Aracari Pteroglossus torquatus PR
 Seen daily at Guacamallo, often in a flock, with the largest count being 12.

Keel-billed Toucan Ramphastos sulfuratus PR
 Seen daily at Guacamallo, often in a flock, with the largest count being 17. This is the national bird of Belize.

Acorn Woodpecker Melanerpes formicivorus PR
 At Guacamallo this bird was seen daily but only in the pine and oak forest. It was numerous at Airport Camp.

Black-cheeked Woodpecker Melanerpes pucherani PR
 One at Guacamallo on 4 March.

Golden-fronted Woodpecker Melanerpes aurifrons PR
 Two were seen at Guacamallo and one at Crooked Tree. It is only found in the northern two thirds of Belize.

Yellow-bellied Sapsucker Sphyrapicus varius T-WR
 A bird was netted and photographed at Airport Camp on 28 February and retrapped on 7 March.

Smoky-Brown Woodpecker Veniliornis fumigatus PR
 Six were seen at Altun Ha.

Lineated Woodpecker Dryocopus lineatus PR
 Up to four were present at Guacamallo, Big Falls and at Crooked Tree.

Pale-billed Woodpecker Campephilus guatemalensis PR
 Up to three were seen regularly at Guacamallo.

Rufous-breasted Spinetail Synallaxis erythrothorax PR
 Up to three were seen on three days at Guacamallo. Netted and photographed.

Plain Xenops Xenops minutus PR
 One was netted and photographed at Guacamallo.

Scaly-throated Leaf-tosser Sclerurus guatemalensis PR
 One was netted and photographed at Guacamallo.

Tawny-winged Woodcreeper Dendrocincia anabatina PR
 Seven were seen at Caracol and a single bird at Guacamallo on two dates. Netted and photographed.

Ruddy Woodcreeper Dendrocincia homochroa PR
Single birds were seen on two days at Guacamallo. Netted and photographed.

Olivaceous Woodcreeper Sittasomus griseicapillus PR
Four birds were seen at Guacamallo.

Barred Woodcreeper Dendrocolaptes certhia PR
One bird was seen on three days at Guacamallo.

Ivory-billed Woodcreeper Xiphorhynchus flavigaster PR
A bird was seen on three days at Guacamallo.

Streak-headed Woodcreeper Lepidocolaptes souleyetii PR
Single birds recorded at Guacamallo and at Altun Ha.

Great Antshrike Taraba major PR
One recorded at Guacamallo on 9 March.

Barred Antshrike Thamnophilus doliatus PR
Six birds recorded at Guacamallo. Netted and photographed.

Dot-winged Antwren Microhropias quixensis PR
One or two were recorded on three dates at Guacamallo. Netted and photographed.

Dusky Antbird Cercomacra tyrannina PR
Up to three were recorded on three dates at Guacamallo. Netted and photographed.

Black-faced Antthrush Formicarius analis PR
Two birds were recorded at Guacamallo. Netted and photographed.

Yellow-bellied Elaenia Elaenia flavogaster PR
One was netted and photographed at Airport Camp.

Ochre-bellied Flycatcher Mionectes oleagineus PR
Up to eight were seen daily at Guacamallo and one at Big Falls. Netted and photographed.

Sepia-capped Flycatcher Leptopogon amaurocephalus PR
Two birds recorded at Guacamallo. Netted and photographed.

Northern Bentbill Oncostoma cinereigulare PR
Nine birds were recorded at Guacamallo. Netted and photographed.

Common Tody-flycatcher Todirostrum cinereum PR
Up to six were recorded daily at Airport Camp. Three were netted and photographed at Guacamallo.

Yellow-olive Flycatcher Tolmomyias sulphurescens PR
Eight birds were recorded at Guacamallo. Netted and photographed.

White-throated Spadebill Platyrinchus cancrominus PR
Five birds recorded at Guacamallo. Netted and photographed.

Royal Flycatcher Onychorhynchus coronatus PR
Two birds were seen at Guacamallo. Netted and photographed.

Eastern Wood-pewee Contopus virens T-WR
One bird was netted and photographed at Airport Camp on 16 and 17 March.

Yellow-bellied Flycatcher Empidonax flaviventris T-WR
One was netted and photographed at Guacamallo on 7 March.

White-throated Flycatcher Empidonax albigularis PR
Two birds were recorded at Guacamallo and two at Airport Camp. Netted and photographed.

Least Flycatcher Empidonax minimus T-WR
Five birds were seen at Guacamallo. Netted and photographed.

Black Phoebe Sayornis nigricans PR
There were three pairs on the Macal River at Guacamallo bridge and one pair is known to nest there.

Vermilion Flycatcher Pyrocephalus rubinus PR
Five birds were present at Airport Camp and birds were also seen at Crooked Tree and Big Falls. Netted and photographed.

Bright-rumped Attila Attila spadiceus PR
One was netted and photographed at Guacamallo.

Yucatan Flycatcher Myiarchus yucatanensis PR
One or two birds were seen daily at Guacamallo. It is normally found only in the northern third of Belize. Netted and photographed.

Dusky-capped Flycatcher Myiarchus tuberculifer PR
Up to five birds were recorded at Airport Camp on two days. Netted and photographed.

Brown-crested Flycatcher Myiarchus tyrannulus PR
One or two were seen at Altun Ha, Crooked Tree, Airport Camp and at Guacamallo. Netted and photographed.

Great Kiskadee Pitangus sulphuratus PR
Found to be widespread in lowland habitats but was not seen at Guacamallo.

Boat-billed Flycatcher Megarynchus pitangua PR
Up to four were seen daily at Guacamallo.

Social Flycatcher Myiozetetes similis PR
This widespread and fairly common species was seen in most of the places visited by the expedition.

Tropical Kingbird Tyrannus melancholicus PR
This species is common and widespread and may be the most common bird in Belize. It was seen in all the areas visited by the expedition and was netted and photographed.

- Fork-tailed Flycatcher Tyrannus savanna PR
Up to six a day were seen at Big Falls, Crooked Tree and at Airport Camp.
- Masked Tityra Tityra semifasciata PR
Up to four were seen daily at Guacamallo.
- Lovely Cotinga Cotinga amabilis PR
A female was photographed at the Blue Hole.
- Thrushlike Manakin Schiffornis turdinus PR
Three birds were recorded at Guacamallo. Netted and photographed.
- White-collared Manakin Manacus candei PR
Four birds were recorded at Guacamallo. Netted and photographed.
- Red-capped Manakin Pipra mentalis PR
Up to three were recorded at Guacamallo on five dates. Netted and photographed
- Grey-breasted Martin Proge chalybea PR
About one hundred roosted under the eaves of the Garrison Church at Airport Camp and ten were seen at Big Falls. This species was netted.
- Mangrove Swallow Tachycineta albilinear PR
Up to thirty were seen regularly at all of the lowland areas visited by the team, including the cays.
- Northern Rough-winged Swallow Stelgidopteryx serripennis PR
Up to one hundred birds, possibly on passage, were seen at Guacamallo, Big Falls, Crooked Tree and Airport Camp.
- Barn Swallow Hirundo rustica T-WR
Up to fifty birds, probably on passage, were seen at Big Falls, Airport Camp and at Ladyville (near the camp).
- Green Jay Cyanocorax yncas PR
Up to three a day were seen at Guacamallo on four days, but only in the pine forest. Netted and photographed.
- Brown Jay Cyanocorax morio PR
Very common in all inland areas, particularly at Guacamallo. Flocks of up to 18 were counted.
- Yucatan Jay Cyanocorax yucatanicus PR
Five were seen together at Airport Camp on 16 March. Two were seen in the same area on 14 March 1982 by the ABWS. This species is normally found only in the northeast of Belize.
- Band-backed Wren Campylorhynchus zonatus PR
Up to six were recorded daily in the secondary jungle at Guacamallo.

Spot-breasted Wren Thyothorus maculipectus PR
This species is common in all habitats except secondary jungle, where it appears to be replaced by Henicorhina leucosticta. Young were being fed in the nest. Netted and photographed.

House Wren Troglodytes aedon PR
Three birds were recorded at Big Falls. Netted and photographed.

White-breasted Wood-wren Henicorhina leucosticta PR
Recorded only in secondary jungle at Guacamallo, where it was often numerous. Netted and photographed.

Long-billed Gnatwren Ramphocaenus melanurus PR
Up to four a day were recorded at Guacamallo. Netted and photographed.

Blue-gray Gnatcatcher Polioptila caerulea PR
At Guacamallo this species was found only in the pine forest and down to the river, not in jungle. It was also present at Crooked Tree, where 12 were seen in one day, and at Airport Camp.

Wood Thrush Hylocichla mustelina T-WR
Fairly common in all habitats at Guacamallo. Two were also seen at Crooked Tree. Netted and photographed.

Clay-colored Robin Turdus grayi PR
Up to 11 daily at Airport Camp, less numerous at Crooked Tree and at Guacamallo. Netted and photographed.

White-throated Robin Turdus assimilis PR
One was netted and photographed at Guacamallo on 5 March.

Gray Catbird Dumetella carolinensis T-WR
Up to five were seen daily at Airport Camp and one or two daily at Guacamallo. Netted and photographed.

Tropical Mockingbird Mimus gilvus PR
Very common and widespread throughout the lowlands and the cays, but was not common at Guacamallo. Netted and photographed.

White-eyed Vireo Vireo griseus T-WR
Single birds were recorded on several days at Airport Camp and at Guacamallo. Netted and photographed.

Mangrove Vireo Vireo pallens PR
Two or three birds were seen on three days at Airport Camp and at Crooked Tree. Netted and photographed.

Yellow-throated Vireo Vireo flavifrons T-WR
One bird was netted and photographed at Guacamallo on 2 March and retrapped the following day.

Tawny-crowned Greenlet Hylophilus ochraceiceps PR
Four birds were recorded in secondary jungle at Guacamallo. Netted and photographed.

Lesser Greenlet Hylophilus decurtatus PR
 One or two were seen on several dates at Guacamallo.

Blue-winged Warbler Vermivora pinus T-WR
 Single birds were recorded at Altun Ha, Crooked Tree and on several dates at Guacamallo. Netted and photographed.

Golden-winged Warbler Vermivora chrysoptera T-WR
 A male was seen from a logging track about one mile SW of Guacamallo bridge on 3 March.

Tennessee Warbler Vermivora peregrina T-WR
 Regularly seen in very small numbers at Altun Ha, Airport Camp and at Guacamallo. Netted and photographed.

Orange-crowned Warbler Vermivora celata T
 One bird was seen at Crooked Tree on 16 March.

Northern Parula Parula americana T-WR
 One was netted and photographed at Airport Camp on 27 February.

Yellow Warbler Dendroica petechia PR
 Up to three a day were seen in most areas. Netted and photographed. The Mangrove Warbler, four of which were seen on Cay Caulker, is now considered to be a sub-species of D. petechia.

Chestnut-sided Warbler Dendroica pensylvanica T
 Up to three were seen on several days at Guacamallo. Netted and photographed.

Magnolia Warbler Dendroica magnolia T-WR
 Up to four a day were seen at Guacamallo and a few at Altun Ha, Airport Camp and at Crooked Tree. Netted and photographed.

Yellow-rumped Warbler Dendroica coronata T-WR
 Small numbers were seen in most localities, but 26 were recorded at Big Falls, over 50 at Cay Chapel and ten at the oil terminal. Netted and photographed.

Black-throated Green Warbler Dendroica virens T-WR
 One or two were seen daily at Guacamallo, one at Altun Ha and two at Cay Caulker.

Yellow-throated Warbler Dendroica dominica T-WR
 Two birds were seen at Airport Camp on 15 and 17 March.

Grace's Warbler Dendroica graciae PR
 Up to five a day were recorded in the pine forest at Guacamallo

Palm Warbler Dendroica palmarum T-WR
 Two were seen on the cays.

Black-and-White Warbler Mniotilta varia T-WR
Up to six a day were seen at all inland localities. Netted and photographed.

American Redstart Setophaga ruticilla T-WR
Recorded in small numbers daily at most localities. Netted and photographed.

Worm-eating Warbler Helmitheros vermivorus T-WR
Three birds were recorded at Guacamallo. Netted and photographed.

Swainson's Warbler Limnothlypis swainsonii WR
One was netted and photographed at Airport camp on 27 February.

Ovenbird Seiurus aurocapillus T-WR
Up to four were seen daily at Guacamallo and one or two daily at Airport Camp. Netted and photographed.

Northern Waterthrush Seiurus noveboracensis T-WR
Up to five a day were seen regularly at Guacamallo and at Airport Camp and three were at Big Falls. Netted and photographed.

Kentucky Warbler Dporornis formosus T-WR
One or two were seen daily at Guacamallo and one at Airport Camp. Netted and photographed.

Common Yellowthroat Geothlypis trichas T-WR
Small numbers were seen at daily at Guacamallo and Airport Camp, it was found to be abundant at Big Falls. Netted and photographed.

Gray-crowned Yellowthroat Geothlypis poliocephala PR
One was netted and photographed in the pine forest at Guacamallo on 6 March.

Hooded Warbler Wilsonia citrina T-WR
One or two recorded each day at Guacamallo, two at Airport Camp and one at Crooked Tree. Netted and photographed.

Wilson's Warbler Wilsonia pusilla T-WR
Up to three were recorded on several dates at Guacamallo. Netted and photographed.

Golden-crowned Warbler Basileuterus culicivorus PR
One or two were seen on several days at Guacamallo. Netted and photographed.

Rufous-capped Warbler Basileuterus rufifrons PR
Up to six were seen each day at Guacamallo. Netted and photographed.

Yellow-breasted Chat Icteria virens T-WR
One or two were seen daily at Guacamallo, Airport Camp and at Big Falls. Netted and photographed.

Gray-throated Chat Granatellus sallaei PR
 Three were recorded at Guacamallo on 4 March. Netted and photographed.

Golden-masked Tanager Tangara larvata PR
 (Formerly Masked Tanager).
 Up to six were seen on three days at Guacamallo. Netted and photographed.

Red-legged Honeycreeper Cyanerpes cyaneus PR
 Six birds were seen together high in the forest canopy at Guacamallo on 10 March.

Scrub Euphonia Euphonia affinis PR
 One was netted and photographed at Guacamallo on 3 March.

Yellow-throated Euphonia Euphonia hirundinacea PR
 Up to six were seen on four days at Guacamallo and two at Altun Ha. Netted and photographed.

Olive-backed Euphonia Euphonia gouldi PR
 One was seen at Guacamallo on 1 March.

Blue-gray Tanager Thraupis episcopus PR
 Up to eight were recorded at Airport Camp, one at Big Falls and three at Crooked Tree. Netted and photographed.

Yellow-winged Tanager Thraupis abbas PR
 Four birds were recorded at Guacamallo.

Red-throated Ant-tanager Habia fuscicauda PR
 Small flocks were common in all types of habitat at Guacamallo. Netted and photographed.

Hepatic Tanager Piranga flava PR
 Small numbers were seen in the pine forest at Guacamallo.

Summer Tanager Piranga rubra T-WR
 A female was netted and photographed at Airport Camp.

Crimson-collared Tanager Ramphocelus sanguinolentus PR
 Four birds were seen at Guacamallo.

Grayish Saltator Saltator coerulescens PR
 One was seen at Airport Camp on 27 February.

Buff-throated Saltator Saltator maximus PR
 Four birds were recorded at Guacamallo. Netted and photographed.

Black-headed Saltator Saltator atriceps PR
 Up to 14 a day were seen at Guacamallo. Netted and photographed.

Black-faced Grosbeak Caryothraustes poliogaster PR
 This bird was frequently encountered at Guacamallo, the largest flock contained 35 birds. Netted and photographed.

Northern Cardinal Cardinalis cardinalis PR
 Four were seen at Ladyville, near Airport Camp and one on two days at Airport Camp. Netted and photographed.

Rose-breasted Grosbeak Pheucticus ludovicianus T-WR
 Three were seen at Airport Camp on 27 February and one on 15 March.

Blue Black Grosbeak Cyanocompsa cyanoides PR
 Up to four were seen on five days at Guacamallo. Netted and photographed.

Blue Bunting Cyanocompsa parellina PR
 Up to 12 were seen daily at Guacamallo. Netted and photographed.

Blue Grosbeak Guiraca caerulea T-WR
 Single birds were recorded at Guacamallo and at Big Falls. Netted and photographed.

Indigo Bunting Passerina cyanea T-WR
 Up to six were seen at Guacamallo and the species was also present at Airport Camp and Altun Ha. It was abundant at Big Falls, where 2000 may have been present. Netted and photographed.

Orange-billed Sparrow Arremon aurantifrostris PR
 Up to four birds were recorded daily in secondary jungle at Guacamallo. Netted and photographed.

Green-backed Sparrow Arremonops chloronotus PR
 Up to six a day were seen at Guacamallo and one was also seen at Altun Ha. Netted and photographed.

Blue-black Grassquit Volatinia jacarina PR
 This bird was recorded only at Big Falls where it was locally abundant around the rice-drying plant. Netted and photographed.

Variable Seedeater Sporophila aurita PR
 One at Guacamallo, two at Airport Camp and three at Big Falls.

White-collared Seedeater Sporophila torqueola PR
 This very common species was recorded in all open spaces. About 200 were noted going to roost at Airport Camp on 12 March. Netted and photographed.

Thick-billed Seed-finch Oryzoborus funereus PR
 Four birds were recorded at Guacamallo on two days. Netted and photographed.

Rusty Sparrow Aimophila rufescens PR
 Two or three were recorded at Guacamallo but not in the jungle. Three were also recorded at Altun Ha. Netted and photographed.

Chipping Sparrow Spizella passerina PR
 About five birds were present at Airport Camp.

Red-winged Blackbird Agelaius phoeniceus PR
Up to 30 were to be found at the entrance to Airport Camp and a flock of over 1000 at Big Falls. More than 30 were also seen in a flock while en route to Crooked Tree.

Eastern Meadowlark Sturnella magna PR
One at Airport Camp on 27 February.

Melodious Blackbird Gives gives FR
Up to seven were seen daily at most localities.

Great-tailed Grackle Quiscalus mexicanus PR
This species is abundant around all human habitation and cultivation. About 3500 birds were counted going to roost at Airport Camp (north of the transmitter site). A male was also reported at Guacamallo. This species was netted and photographed.

Giant Cowbird Scaphidura oryzivora PR
One bird was present at the large colony of Psarocolius montezuma on 8 March.

Black-cowled Oriole Icterus dominicensis PR
Up to four birds were seen daily at Guacamallo and single birds at Crooked Tree and at Airport Camp.

Orchard Oriole Icterus spurius T-WR
Up to 12 were feeding in a flowering tree at Big Falls, up to six were seen daily at Airport Camp and one or two at Guacamallo.

Hooded Oriole Icterus cucullatus PR
Widespread in small numbers through coastal lowlands and on the cays.

Yellow-backed Oriole Icterus chrysater PR
Up to three were recorded on four dates at Guacamallo. Netted and photographed.

Yellow-tailed Oriole Icterus mesomelas PR
Fairly common in the open thicket at Guacamallo. One was also seen at Big Falls.

Northern Oriole Icterus galbula T-WR
Five were seen at Guacamallo, one at Crooked Tree and one at Airport Camp.

Yellow-billed Caticue Amblycercus holosericeus PR
Up to six were seen daily at Guacamallo and one was seen at Airport Camp on 27 February. Netted and photographed.

Montezuma Oropendola Psarocolius montezuma

PR

There is a traditional colony in a huge tree beside the track between Guacamallo and Millionario. This colony had been damaged by high winds during the winter 1985-86 (Lt Col Hodges, pers comm.), but had now been rebuilt. 55 nests and 38 birds were counted. 500m downstream from Guacamallo Bridge, on the southern bank, a small colony contained three nests. At both colonies the male birds were calling and the females were building. Birds were also heard calling at the Blue Hole cave.

Black-headed Siskin Carduelis notata

PR

Six birds were recorded at Guacamallo.

INCONCLUSIVE SIGHTINGS

The following notes cover species for which the record is probable but not definite. The notes are included not only for completeness and interest but also because further observation and discussion may help to shed light on the reliability of the reports and assist in extending our knowledge of the species in question.

Bald Eagle Haliaeetus leucocephalus

An immature eagle was seen at close range by ten observers 1km south-west of Guacamallo Bridge at 09:00 on 3rd March. It passed directly overhead, gliding downwards at a distance of about 50m, without flapping. The wings were very broad and were held level. The primaries were prominent and each wing was longer than the body. The axillaries and the underwing coverts were noticeably pale; the remainder of the wings and body were dark. It had a dark, square ended tail. There was no contrast between the head, breast and belly. The bird was in sight for five minutes in clear sunny weather.

One observer, NAS, has seen H.leucocephalus in North America and is confident of the identification. Another, DJRC, is familiar with Golden Eagle Aquila chrysaetos and was able to exclude this as a possibility, particularly because of the light axillaries and underwing coverts. The bird (presumably the same one) was seen again briefly by two observers a week later.

The species has not been recorded reliably in Belize. Its normal winter range does not extend south of the USA, where it is frequently seen on sea coasts, rivers and lakes. The present sighting could be the result of abnormal juvenile dispersal or reverse migration and is assessed as no higher than probable.

Great Black Hawk Buteogallus urubitinga

PR

Two birds were seen at Guacamallo on two dates. No field notes were taken and the observers were subsequently unable to convince the recorder that the description excluded confusion with Solitary Eagle Harpyhaliaetus solitarius. On 28th February 1982 B.urubitinga was recorded at Guacamallo Bridge by the ABWS.

Walter Craig of the Belize Audubon Society, in pers.comm. states that this species was recorded in the Chiquebul Forest Reserve in May 1980 and has been seen in the Guacamallo area.

The present record is assessed as highly probable.

Solitary Eagle Harpyhaliaetus solitarius

PR

Two birds were recorded at Guacamallo on two dates. The recorder decided that the description did not exclude confusion with B. urubitinga for instance, and has not accepted the record.

The species is apparently breeding on the Mountain Pine Ridge (Hartshorn 1984). Walter Craig (pers. comm.) recorded a Solitary Eagle within the Archaeological Reserve about 14km from Guacamallo in June 1987 and mentions a possible record near the Millionario road in April 1987.

Zone-tailed Hawk Buteo albonotatus

A bird was seen for about five minutes at noon on 4th February as it soared with two Plumbeous Kites Ictinia plumbea over sub-tropical jungle to the west of Guacamallo bridge at about 600m from the observers, NAS and BJH. Its tail was noticeably long, square and evenly barred on the underside. There were at least two white bands, not very broad, but the exact number could not be ascertained. The wings were held level and slightly upturned at the tips and were approximately the same length as those of the accompanying kites, but were much broader. The underwing coverts contrasted with the flight feathers, being discernably darker.

This species has not previously been recorded in Belize, but it is found in the United States, in southern Mexico and in South America. In Guatemala it is a transient and winter visitor, possibly resident (Land 1970).

NETTING AND RINGING REPORT

Introduction.

There have been two previous UK service expeditions to Belize. In 1981 RAFOS sent two teams over an extended period between February and April. They netted at many locations throughout the country and handled nearly 600 birds (Jenkins 1983). The following spring the ABWS covered much the same ground but in only three weeks. It had a larger netting team and caught 1151 birds, including 859 North American migrants which were ringed (Adjutant Vol 12 1982). The 1986 RAFOS expedition operated in three of the four areas that the ABWS had visited and had a very similar degree of netting and ringing success.

Ringing in Belize.

The Bird Banding Laboratory of the US Fish and Wildlife Service, Laurel, Maryland, administers the national banding (ringing) scheme for the whole of Canada and the United States. In addition it can authorize the use of its rings in Central and South America on specific projects.

Brian Etheridge wrote to them, enclosing a copy of his UK ringing permit and details of the planned ringing programme in Belize. Application was sought for the ringing of North American migrant species only, as it was considered that to ring resident Belizean forest birds would have been difficult to justify over such a short period of time. Unlike the British scheme where ringers pay for their supplies, the US Fish and Wildlife Service provides, free of charge, all rings, manuals and stationery required by the ringer. To avoid the risk of loss or delay in the post the US Fish and Wildlife Service was asked to send 3000 rings to Air Vice-Marshall Dick, a member of RAFOS at the British Embassy in Washington. The rings were handed to the expedition when it staged through the nearby Dulles Airport en route to Belize.

Ringing Team.

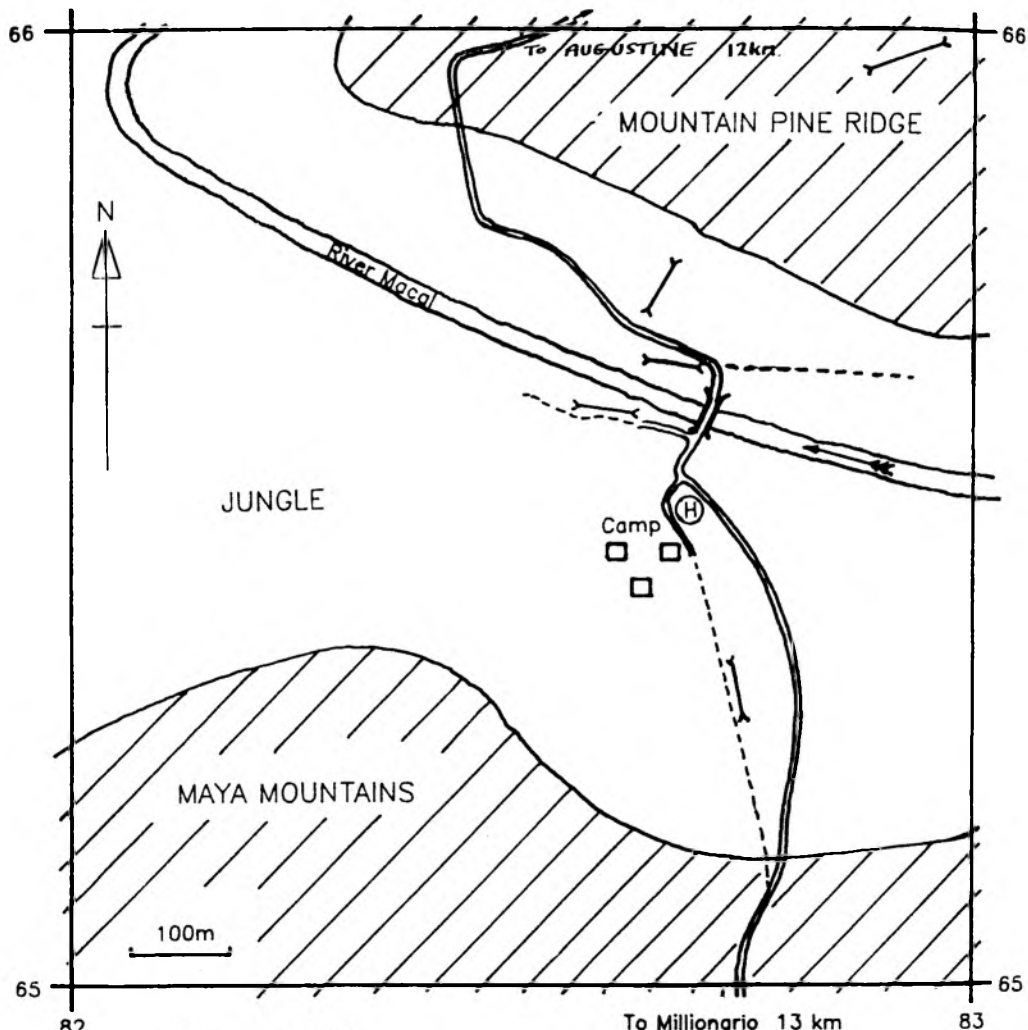
This consisted of Brian Etheridge and Bill Taylor, who held full ringing and mist-netting permits, and Paul Triggs, a trainee who, prior to the expedition, had only very limited experience of mist-netting. Regrettably, after only one week, Bill Taylor had to return to the UK but he kindly left his nets and equipment behind for the others to use. The ringers were at one time or another visited and sometimes assisted in their activities by all expedition members.

Trapping Methods.

Mist-nets were the sole means employed for catching birds in Belize and were erected and operated most days from dawn (0600 hrs) to dusk (1830 hrs). Netting was most successful in the first four hours and the last two hours of the day. It was during the slack mid-day period that the nets were taken down and moved to new sites. This constant movement of the nets was found to be very necessary in order to maintain a high catch rate. This was especially true at Guacamallo, where after a day's operation at a site, trapping success dropped rapidly as the local birds became net shy. Care was taken to erect nets in well shaded locations; nets sited in

GUACAMALLO

16° 52' N 089° 02' W



KEY :-

TRACKS



NETTING SITES



HELICOPTER PAD



HIGH GROUND



50

direct sunshine are more conspicuous and so catch fewer birds and, if temperatures are high, imperil the lives of any caught. The nets used were of four shelf design and 12 ft high. A total length of 400 ft was available but it was only at certain sites around Guacamallo bridge that it could all be erected.

Processing

Species identification in the hand was aided by reference to Peterson and Chaiif (1973) and the National Geographic Society (1983)

When time allowed the following were recorded for each bird:

Age and sex. The above two references were also helpful for sexing purposes. For migrant species Volume 2 of the North American Bird Banding Manual proved invaluable.

Wing length. Maximum chord was measured in millimetres.

Weight. Pesola spring balances were used to weigh small birds to the nearest 0.1g and larger species (over 50g) to the nearest 1g.

Bill length. This was recorded on Hummingbirds only to the nearest 0.1 mm and measured with vernier callipers from the skull to the tip of the bill.

Marking Resident species were marked by snipping off the extreme tip (1-2mm) of the longest primary of the right wing to allow the bird to be identified if recaptured. Hummingbirds were not marked.

When processing a large catch, the species, age, sex and marking were recorded as a minimum.

Birds considered to be North American migrants were ringed, as were a few species of special interest such as birds of prey and Pauraque.

American rings are not made to the very high standards of British rings and the smaller sizes are provided on strings of 100. They need to be opened before being fitted onto the birds leg. A very useful tool for this is a small pair of spring-loaded pliers for opening circlips.

Netting Sites

Airport Camp: (27&28 February, 12&17 March)

Nets were erected mainly in short lines in and around the camp sewage farm, utilizing existing rides and tracks. Some limited netting was conducted on the sports field and at the nearby Garrison Church, where Gray-breasted Martins were roosting.

Guacamallo Bridge: (1-11 March)

Six different netting sites were used in succession. At these various sites (on the Mountain Pine Ridge, beside the river crossing and in secondary jungle along the dirt road to Millionario) there were many old

trails and logging tracks. Along these, continuous long lines of mist-net were erected (up to 400 ft) to sample the local bird populations. The most productive sites were those beside clearings within the secondary jungle, or close to the River Macal. The disused track which runs behind the camp-site was particularly productive. It runs downhill to the river at a point 100m downstream from the bridge, then continues on the other side of the river up through dense scrub to connect with the present road. As previously stated, the secret of catching good numbers of birds in this area was to move the net lines every two days to new new sites.

Big Falls Ranch. (13-15 March)

All mist-netting was conducted in the vicinity of rice grain silos beside the Belize River. Huge numbers of seed-eating birds congregated here (mainly Indigo Buntings) and so because of the risk of nets being overwhelmed with birds, no more than two were erected at a time. None the less over 650 birds were caught in three days of hectic activity.

Results.

A grand total of 1242 birds of 118 species was caught during 18 days of mist-netting. Daily trapping success was very variable, ranging from less than 20 birds caught on the Mountain Pine Ridge to over 250 in a day at Big Falls Ranch. Of the total caught, 871 of 43 species were ringed. Table 1 gives the species and totals for each area.

Three Indigo Buntings controlled, ie caught already ringed, at Big Falls were found to have been ringed by the ABWS (Chris Mead) on 5 March 1982 at the same place. As this species is a long distance migrant breeding in the eastern USA and Canada, these three records constitute examples of wintering site fidelity in Belize.

Biometric data is given in Table 2. For each species data has been separated by sex where possible. The large sample of Indigo Buntings allowed a separate analysis for both age and sex. The data on weight were analysed to discover if any relationship existed between body weight and time of day, ie, lower weights at dawn, higher in late afternoon - the pattern normal for passerines in temperate climates. From the limited data obtained in Belize none was apparent, therefore all weights in table 2 are presented as found without any correction for time of day. Body weight did however vary directly with body size (wing length being the parameter). This is indicated in Figure 1 for a resident forest bird, the Yellow-billed Cacique but it does not take into account any sexual difference in size as this species was not sexed in the hand.

Much of the data obtained during the expedition remain to be analysed. Of particular interest would appear to be the habitat selection of forest birds as shown by the netting results from the various sites around Guacamallo Bridge. In addition, analysis of the large Indigo Bunting catch at Big Falls will provide a wealth of information on the age and sex composition of the wintering population and data on the timing of the spring body moult.

Conclusions

The three ringers enjoyed a superb expedition. Valuable biometric data were collected for several resident forest birds infrequently handled. Several of the many species caught have scarce or uncertain status in Belize and one bird, Northern Pygmy Owl, was new to the current checklist (Wood et al, 1986). Mist-netting proved to be a very valuable tool in making possible the recording of skulking species which would otherwise have been missed by normal bird-watching activities.

Paul Triggs, the trainee ringer in the team gained much valuable trapping and ringing experience. It is very important that full use be made of the ringing activities on RAFOS expeditions to train new recruits, since active serving ringers are dwindling rapidly from the RAF.

Acknowledgements

Chris Mead of the British Trust for Ornithology and Tim Hallichurch and Robin Walters of the ABWS supplied valuable information on ringing and on how to obtain rings for Belize. The US Fish and Wildlife Service kindly provided the rings and ringing literature which made the team's activities much more valuable. Air Vice-Marshal Dick was the vital link in a trans-atlantic chain. Finally Vic Cozens lent his set of light-weight aluminium mist-net poles, for which the trainee ringer is forever grateful as he did all of the carrying.

TABLE 1

LIST OF BIRDS NETTED AND RINGED

BELIZE 1986

Species	Airport Camp	Guacamallo	Big Falls	Netted	Ringed
Sharp-shinned Hawk		1		1	1
Bat Falcon			1	1	1
Plain Chachalaca		1		1	
Solitary Sandpiper	1			1	1
Scaled Pigeon		1		1	
Red-billed Pigeon		1		1	
Ruddy Ground-dove	1		1	2	
Blue Ground-dove		1	1	2	
Gray-fronted Dove		2		2	
Ruddy Quail-dove		6		6	
Vermiculated Screech-owl		1		1	
Ferruginous Pygmy-owl		1		1	1
Northern Pygmy-owl		1		1	1
Mottled Owl		3		3	
Common Pauraque		7		7	7
Long-tailed Hermit		2		2	
Little Hermit		6		6	
Wedge-tailed Sabrewing		4		4	
Fork-tailed Emerald	1	3		4	
White-bellied Emerald		5		5	
Azure-crowned Hummingbird		4		4	
Rufous-tailed Hummingbird		14	1	15	
Buff-bellied Hummingbird		3		3	
Cinnamon Hummingbird	7			7	
Ruby-throated Hummingbird		1		1	
Collared Trogon		1		1	
Green Kingfisher		1		1	
Yellow-bellied Sapsucker	1			1	1
Rufous-breasted Spinetail		3		3	
Plain Xenops		1		1	
Scaly-throated Leaf-tosser		1		1	
Tawny-winged Woodcreeper		1		1	
Ruddy Woodcreeper		2		2	
Barred Antshrike		1		1	
Dot-winged Antwren		1		1	
Dusky Antbird		4		4	
Black-faced Antthrush		2		2	
Yellow-bellied Elaenia	1			1	
Ochre-bellied Flycatcher		16	1	17	
Sepia-capped Flycatcher		2		2	
Northern Bentbill		7		7	
Common Tody-flycatcher		3		3	
Yellow-olive Flycatcher		7		7	
White-throated Spadebill		5		5	
Royal Flycatcher		2		2	
Eastern Wood-pewee	1			1	1
Yellow-bellied Flycatcher		1		1	1
White-throated Flycatcher	2	2		4	1

Table 1 continued

Species	Airport Camp	Guacamallo	Big Falls	Netted	Ringed
Least Flycatcher		5		5	5
Vermilion Flycatcher	3			3	3
Bright-rumped Attila		1		1	
Yucatan Flycatcher		4		4	
Dusky-capped Flycatcher	4			4	
Brown-crested Flycatcher		1		1	1
Tropical Kingbird		1		1	1
Thrushlike Manakin		2		2	
White-collared Manakin		4		4	
Red-capped Manakin		8		8	
Gray-breasted Martin	10			10	10
Green Jay		1		1	
Spot-breasted Wren	1	21		22	
House Wren			2	2	
White-breasted Wood-wren		10		10	
Long-billed Gnatwren		8		8	
Wood Thrush		12		12	12
Clay-colored Robin	5	2		7	
White-throated Robin		1		1	
Gray Catbird	15	8		23	22
Tropical Mockingbird	1			1	
White-eyed Vireo	2	5		7	7
Mangrove Vireo	4			4	
Yellow-throated Vireo		1		1	1
Tawny-crowned Greenlet		4		4	
Blue-winged Warbler		3		3	3
Tennessee Warbler		3		3	3
Northern Parula	1			1	1
Yellow Warbler	1	1		2	2
Chestnut-sided Warbler		1		1	1
Magnolia Warbler	3	7		10	10
Yellow-rumped Warbler	4	1		5	5
Black and White Warbler	2	4		6	6
American Redstart	9	6		15	15
Worm-eating Warbler		3		3	3
Swainson's Warbler	1			1	1
Ovenbird	3	12		15	15
Northern Waterthrush	8	5	1	14	14
Kentucky Warbler	1	8		9	9
Common Yellowthroat	13	5	5	23	23
Gray-crowned Yellowthroat		1		1	1
Hooded Warbler	2	6		8	8
Wilson's Warbler		1		1	1
Golden-crowned Warbler		4		4	4
Rufous-capped Warbler		12		12	
Yellow-breasted Chat	6	7		13	11
Gray-throated Chat		3		3	
Golden-masked Tanager		1		1	

Table 1 continued

Species	Airport	Guacamallo	Big Falls	Netted	Ringed Camp
Scrub Euphonia		1		1	
Yellow-throated Euphonia		2		2	
Blue-gray Tanager	7			7	
Red-throated Ant-tanager		20		20	
Summer Tanager	1			1	1
Buff-throated Saltator		1		1	
Black-headed Saltator		6		6	
Black-faced Grosbeak		1		1	
Northern Cardinal	1			1	1
Blue-black Grosbeak		5		5	
Blue Bunting		8		8	
Blue Grosbeak		1	1	2	2
Indigo Bunting	4	15	634	653	653
Orange-billed Sparrow		6		6	
Green-backed Sparrow		20		20	
Blue-black Grassquit			10	10	
White-collared Seedeater	3	22		25	
Thick-billed Seed-finch		4		4	
Rusty Sparrow		1		1	
Great-tailed Grackle	6			6	
Yellow-backed Oriole		2		2	
Yellow-billed Cacique	1	8		9	
Totals	137	447	658	1242	871
Species	37	98	11		

Fig 1 Relationship between wing length and weight for Yellow-billed Cacique

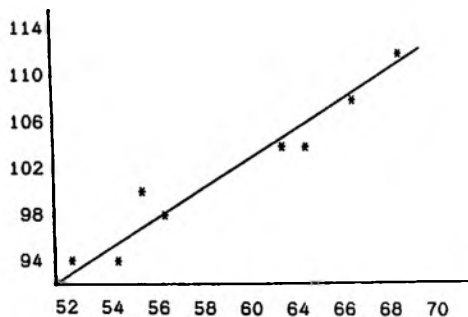


TABLE 2 WEIGHTS AND WING LENGTHS, BELIZE 27 FEB - 17 MAR 1986

Species	Wing length - mm				Weight - grms				n
	sex	mean	s.d	range	n	mean	s.d	range	
Sharp-shinned Hawk	m			172	1			93	1
Bat Falcon				187	1			133	1
Solitary Sandpiper				130	1			43.8	1
Scaled Pigeon	f			186	1			235	1
Red-billed Pigeon				145	1			147	1
Ruddy Ground-dove	m	93		93,93	2	42.5		45.0,45.5	2
Blue Ground-dove	f	115		114,116	2	78		70,86	2
Gray-fronted Dove		141		136,147	2	147		133,181	2
Ruddy Quail-dove		142.7	4.9	138-149	4	137.5	19.3	121-165	4
Vermiculated Screech-owl				178	1			107	1
Ferruginous Pygmy-owl				102	1			71	1
Northern Pygmy-owl				94	1			69	1
Mottled Owl		233.3	12.6	220-245	3	249		214,284	2
Common Pauraque	m	168.3	2.1	166-170	3	56	3.5	54-60	3
	f	164.7	6.0	157-170	4	50.4	6.7	44.4-60	4
Long-tailed Hermit		63.5		63,64	2	5.5		5.5,5.6	2
Little Hermit		39.2	1.0	38-40	4	2.4	0.2	2.2-2.6	4
Wedge-tailed Sabrewing		69.0	0.8	68-70	4	6.2	1.0	4.8-6.9	4
Fork-tailed Emerald		46.0		46	3	2.6		2.6,2.7	2
White-bellied Emerald		51.8	1.9	49-54	5	4.0	0.5	3.3-4.6	5
Azure-crowned Hummingbird		58.0	1.7	57-60	3	4.9	0.5	4.4-5.5	3
Rufous-tailed Hummingbird		57.6	2.3	51-61	15	4.6	0.4	4.0-5.5	15
Buff-bellied Hummingbird		56.3	4.5	52-61	3	4.4	1.2	3.0-5.2	3
Cinnamon Hummingbird		59.4	2.0	57-63	7	4.7	2.7	4.3-5.1	6
Collared Trogon	m			131	1			64	1
Green Kingfisher	m			87	1			38	1
Yellow-bellied Sapsucker	f			122	1			46.5	1
Rufous-breasted Spinetail		57.0	1.0	56-58	3	16.5	1.7	15.0-18.4	3
Plain Xenops				61	1			10.7	1
Scaly-throated Leaf-tosser				90	1			40.5	1
Tawny-winged Woodcreeper				100	1			34.2	1
Ruddy Woodcreeper		97.5		97,98	2	35.3		34.9,35.7	2
Barred Antshrike	m			74	1			25.9	1
Dusky Antbird		63.5	1.7	61-65	4	15.8	0.8	14.7-16.5	4
Black-faced Antthrush		92.5		92,93	2	60.5		60,61	2
Yellow-bellied Elaenia				87	1			26.3	1
Ochre-bellied Flycatcher		65.2	2.5	61-69	17	12.3	1.8	10.0-17.3	17
Sepia-capped Flycatcher		68.0		67,69	2	12.0		12.0,12.1	2
Northern Bentbill				52	1			6.4	1
Common Tody-flycatcher		42.0		42,42	2	6.2		5.8,6.6	2
Yellow-olive Flycatcher		66.7	1.4	65-69	7	13.9	0.7	12.7-14.9	7
White-throated Spadebill		56.6	3.8	52-60	5	9.5	0.7	8.6-10.2	5
Royal Flycatcher		85.0		81,89	2	17.0		15.7,18.3	2
Eastern Wood-pewee				71	1			12.5	1
Yellow-bellied Flycatcher				65	1			9.6	1
White-throated Flycatcher		60.3	1.5	59-62	3	8.5	1.0	7.9-9.6	3
Least Flycatcher		66.0	1.0	65-67	5	9.3	0.5	8.7-9.9	5

Table 2 continued

Species	Wing length - mm				Weight - grms				
	sex	mean	s.d	range	n	mean	s.d	range	n
Vermilion Flycatcher	m	77		76,78	2	14.4		14.3,14.6	2
	f			75	1			15.1	1
Bright-rumped Attila				93	1			40.5	1
Yucatan Flycatcher		79.2	3.1	75-82	4	17.8	0.7	17.0-18.5	4
Dusky-capped Flycatcher		81.2	1.7	79-83	4	23.5	1.9	20.9-25.3	4
Brown-crested Flycatcher				105	1			37.0	1
Tropical Kingbird				122	1			41.5	1
Thrushlike Manakin		87		86-89	2	32		32,32	2
White-collared Manakin	m			59	1			18.2	1
	f	57.3	1.5	56-59	3	15.4	1.3	14.1-16.6	3
Red-capped Manakin	m	60		60,60	2	14.9		14.8,15.0	2
	f	61.7	1.8	59-63	6	16.0	0.7	15.0-17.0	5
Gray-breasted Martin		134.4	3.7	128-139	10	41.0	2.5	35.9-44.1	10
Green Jay				114	1			82	1
Spot-breasted Wren		58.6	2.3	54-63	22	14.3	1.6	11.9-17.2	20
House Wren		49.5		49-50	2	10.8		10.3-11.4	2
White-breasted Wood-wren		55.9	2.3	52-59	10	14.4	1.0	12.6-15.7	10
Long-billed Gnatwren		51.9	3.2	48-59	8	8.5	0.4	7.8-9.2	8
Wood Thrush		107.1	1.9	104-111	11	44.2	3.2	39.4-49.0	11
Clay-colored Robin		128.4	3.2	125-135	7	76.1	5.2	67-81	7
White-throated Robin				113	1			36	1
Gray Catbird		91.5	2.9	86-97	22	36.4	3.3	28.7-43.2	22
Tropical Mockingbird				113	1			50.5	1
White-eyed Vireo		61.4	1.5	59-63	7	10.7	0.8	9.7-11.9	7
Mangrove Vireo		56.5	2.1	54-59	4	9.8	0.6	9.0-10.4	4
Yellow-throated Vireo				77	1			18.0	1
Tawny-crowned Greenlet		59.7	1.3	58-61	4	10.8	0.6	9.9-11.3	4
Blue-winged Warbler		60.3	1.5	59-62	3	8.0	0.8	7.3-8.8	3
Tennessee Warbler		61.7	1.2	61-63	3	8.4	1.0	7.7-9.5	3
Northern Parula	f			52	1			0.9	1
Yellow Warbler		63		63,63	2	8.7		8.6,8.9	2
Chestnut-sided Warbler				66	1			9.8	1
Magnolia Warbler	m			65	1			7.6	1
	f	60.2	1.5	58-62	6	7.5	0.3	7.1-8.0	6
Yellow-rumped Warbler		72.4	3.2	69-77	5	11.5	1.5	10.0-13.4	5
Black and White Warbler	m	71.6	3.2	68-74	3			9.3,9.4	2
	f	67		65,69	2	9.3		9.0,9.6	2
American Redstart	m	64.4	2.2	62-68	7	7.3	0.4	6.9-7.6	7
	f	61	2.4	58-64	6	6.7	0.5	5.6-7.1	6
Worm-eating Warbler		67.7	2.3	65-69	3	11.5	0.6	11.1-12.2	3
Swainson's Warbler				66	1			15.8	1
Ovenbird		76.2	2.1	73-81	16	18.1	0.9	16.0-19.3	16
Northern Waterthrush		77.7	2.5	75-81	12	16	1.3	13.8-17.5	12
Kentucky Warbler	m	65	1.4	64-71	4	11.8	1.0	11.0-13.0	4
	f	65		65,65	2	11.7		11.2-12.2	3
Common Yellowthroat	m	57.2	2.5	54-62	15	9.6	0.5	8.7-10.6	15
	f	53.8	1.7	52-57	6	9.0	0.6	8.0-9.7	6
Gray-crowned Yellowthroat	m			59	1			13.5	1

Table 2 continued

Species	Wing length - mm				Weight - grms					
	sex	mean	s.d.	range	n	mean	s.d.	range	n	
Hooded Warbler	m	66.2	1.1	65-68	5	9.7	0.8	8.6-10.7	5	
	f	64	3.6	61-68	3	9.6	0.6	9.2-10.2	3	
Wilson's Warbler	m			56	1			7.6	1	
Golden-crowned Warbler	m	60.5		60,61	2	9.4		9.1,9.7	2	
	f	56.5		55,58	2	9.5		9.0,10.1	2	
Rufous-capped Warbler		52	2.3	49-56	12	10.0	1.1	8.5-12.4	12	
Yellow-breasted Chat		77.2	1.6	73-80	13	25.0	1.6	22.8-27.4	13	
Gray-throated Chat	m	61.5		61,62	2	10.2		10.0,10.4	2	
	f			57	1			9.6	1	
Golden-masked Tanager	m			75	1			17.3	1	
Scrub Euphonia	f			63	1			14.7	1	
Yellow-throated Euphonia	m	62.5		62,63	2	13.0		12.8,13.2	2	
Blue-gray Tanager		88.3	2.0	85-91	7	32.3	2.4	28.5-35.7	7	
Red-throated Ant-tanager	m	104.8	2.8	102-111	9	40.8	2.4	37.6-45.5	9	
	f	95.9	4.0	92-104	11	33.5	1.4	31.6-36.0	11	
Summer Tanager	f			93	1			27.0	1	
Buff-throated Saltator				106	1			51	1	
Black-headed Saltator		123.0	5.5	127	6	77.2	3.3	73-81	5	
Black-faced Grosbeak				88	1			36	1	
Northern Cardinal	m			86	1			34.6	1	
Blue-black Grosbeak	m	82.7	1.5	81-84	3	30.0	0.7	29.4-30.7	3	
	f	80.5		80,81	2	29.9		28.3,31.4	2	
Blue Bunting	m	69.3	1.5	68-71	3	14.6	0.7	13.8-15.2	3	
	f	66.6	2.1	65-70	5	14.6	0.8	14.0-16.0	5	
Blue Grosbeak	m	90.0		89,91	2	30.4		30.1,30.7	2	
Indigo Bunting	ASY	m	69.9	1.6	67-76	153	15.8	1.0		149
	ASY	f	65.8	1.7	63-69	43	14.7	0.9		43
	SY	m	68.8	1.7	66-74	48	15.4	1.1		48
	SY	f	65.1	1.4	63-69	13	14.3	0.6		12
Orange-billed Sparrow		81.3	2.7	78-85	6	34.2	2.9	31.3-37.9	6	
Green-backed Sparrow		68.2	2.7	63-74	17	26.1	1.8	22.9-29.0	16	
Blue-black Grassquit	m	50.0	1.0	49-51	3	9.7	0.4	9.3-10.1	3	
	f	48.7	2.1	47-51	3	10.4	0.3	10.0-10.6	3	
White-collared Seedeater	m	52.0	0.8	51-53	14	8.4	0.5	7.7-9.6	14	
	f	49.5	1.1	47-51	11	8.0	0.5	7.1-8.7	11	
Thick-billed Seed-finch	m	59.5		59,60	2	12.2		11.8,12.6	2	
	f	56.5		56,57	2	11.8		11.6,12.0	2	
Rusty Sparrow				70	1			30.6	1	
Great-tailed Grackle	m			157	1			131	1	
	f	149.6	2.1	148-153	5	137.2	13.5	128-161	5	
Yellow-backed Oriole				96,99	2			45,48	2	
Yellow-billed Caciique		101.2	6.4	94-108	9	59.5	5.9	52-68	8	

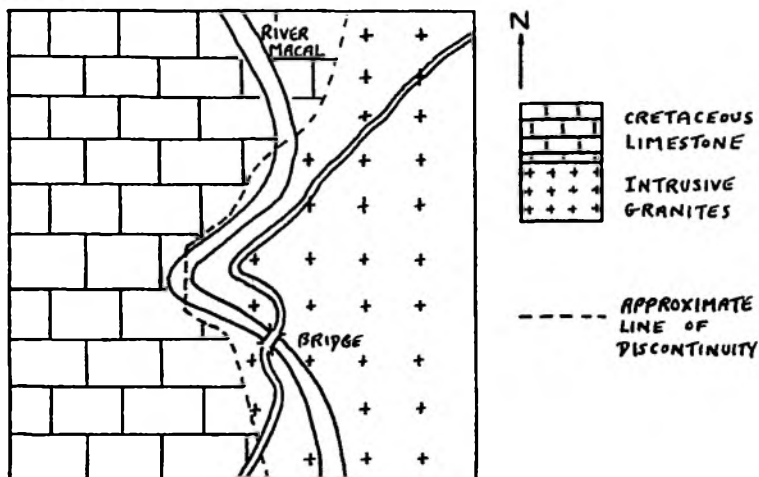
m: male

f: female

ASY: more than two calendar years old

SY: second calendar year of life

Guacamallo area

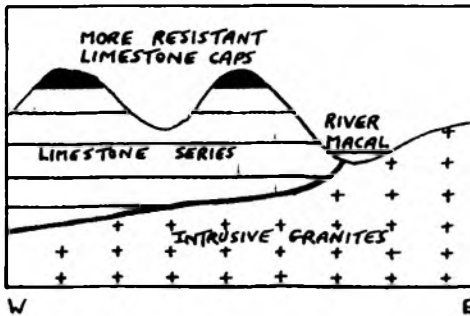


Introduction

The clearest observation to be made at this site was the marked difference in habitat from one side of the river to the other, with corresponding differences in the ranges of flora. This effect on the flora is due to the soil types and underlying geology. Another feature is the contrast in erosive action on slope and hill topology between the east and west sides of the river.

Macal River - West bank: This side of the river is an area of massive limestones laid down in shallow tropical seas some 70 million years ago. There is evidence that these limestones have been reworked and eroded many times as land and sea levels changed during the Cretaceous period. Interspersed amongst the limestones are beds of mudstones and siltstones indicative of deeper water conditions in the calm of a marine trough or basin.

Numerous broken and badly eroded crinoidal (coral) fossils were found in the limestones which I have interpreted as transported and eroded reef detritus. Several of the limestone beds contained large amounts of quartz grains 1-5mm in size which would indicate periods of uplift and erosion. Quartz is a very resistant mineral and would have been left as a residue after chemical attack by rainwater on the limestones. The west bank topology was typically that of a "Karst" landscape with high areas of more resistant limestones forming islands with steep sides amongst well eroded softer rocks.



The soils on the western bank of the river represent rendered-down fractions of the limestone rock. Large thicknesses of rock have been weathered by chemical and physical processes to leave behind a soil rich in aluminium, calcium and magnesium with quantities of chemically resistant quartz and clays. Unfortunately the very fertility of these soils supports such dense jungle that an in-depth survey of this site, particularly the elevated areas, was impossible given the time and equipment available.

Macal River - East bank: Guacamallo bridge marks a boundary between younger sedimentary rocks on the west bank and the much older plutonic rocks of the east. The granites are well exposed in the river bed and display a marked uniformity in texture and mineral composition over a large area. The distinctive dark red colouration of the granites was a feature of the abundance of coarse crystals of potassium feldspar set in a fine matrix of biotite mica and quartz.

Evidence was found of sample borings in several locations on the river bank, presumably for the purpose of radiometric dating. Published ages for the Mountain Pine Ridge granite suggests an age of 280-300 million years at this site. These ancient rocks had been weathered and eroded for some 230 million years before being partially covered by limestones accumulating in shallow seas. The granite forms uplands with the much more rounded erosion profiles of the Mountain Pine Ridge. The Ridge proper is an area of granite, roughly circular in shape, that has been revealed by erosion of the covering sediments. I would interpret this area of granite as the roof of a granite batholith that was emplaced in a time of tectonic activity during the Permian age.

The soils on the eastern side of the river are thin and deficient in potassium, phosphorus and iron amongst other trace elements. Granite breaks down very slowly and its main constituent minerals, quartz and potassium feldspars, are highly resistant to chemical weathering. Therefore these soils are among the most infertile types as essential elements are either absent from the original mineral assemblage or are quickly leached away.

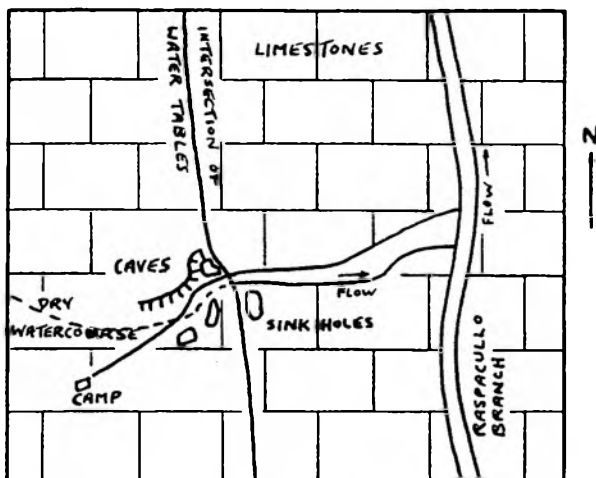
Batholiths: The process of colliding tectonic plates in the Central American region has a long history and is continuing with recent evidence of earthquake and mudslide disasters. Friction between the lighter continental crust and the heavier, descending oceanic crust generates heat and stress along a deep, inclined zone of contact. This heating causes the formation of tear-shaped masses of granite which rise towards the surface in a manner analogous to hot-air balloons. These masses never reach the surface because of relative densities but cool at varying depths and so form the batholiths. The granites are only revealed by erosion of the overlying rocks perhaps as a result of land uplift.

Economic Geology: There was extensive evidence of mineral exploitation in earlier times in the region. Some 200m from the camp site at Guacamallo were the remains of a sluice, washboards and ore trucks. The river bed was littered with gangue material from mining operations. In ancient times the granite would have developed many fissures as it cooled below the surface so allowing ground water to penetrate and become heated at depth. This heated water or hydrothermal solution would have dissolved minerals as it circulated in the granite. The heated water would have risen, cooled and precipitated minerals near to the surface. In this area the most common site of mineral precipitation would be in limestone fissures and potholes. Thick layers of minerals would have cooled out of solution and filled many of the cavities in the limestone. Most of the precipitates are of no economic value but some such as galena (lead), barytes (barium), sphalerite (zinc) and chalcopyrite (copper) were worth mining on a small scale.

I suspect that zinc and copper are two of the ores sought in the area but without good samples and proper analysis I cannot confirm either. This type of ore deposit tends to be highly localized and soon worked out. The large mining companies work large deposits as a whole, so these deposits were probably worked with cheap local labour on a small scale. With the ever rising operating costs in mining and a highly competitive market, the small operators have nearly all disappeared.

The Blue Hole Area.

The aptly named Blue Hole camp is set in classic "Karst" landscape. We encountered a number of dry valleys in this area which were shown on maps as watercourses. During the dry season the water table drops considerably and only emerges as a watercourse at a point of intersection. Limestone landscapes are often characterised by the presence of caves and sink holes, these were much in evidence. The Blue Holes are sink holes which have been enlarged by thousands of years of chemical attrition and filled with ground water. The blue colouration is caused by the different refractive indices of air and the clear water in the holes. There may also be some colouration due to dissolved minerals.



The Blue Hole area

Glossary

Cretaceous period:	Approx 136 to 65 million years ago.
Permian period:	Approx 280 to 225 million years ago.
Karst:	Named after a limestone region of Yugoslavia.
Sedimentary:	Rock formed from deposits of particles of matter.
Plutonic:	Rock formed deep within the earth, cooled slowly and generally not erupted from volcanoes.
Gangue:	Valueless mineral ore.
Crinoid:	Sea Lily, a member of the Starfish, Sea Urchin family of Echinoderms.
Batholith:	A large subterranean intrusion of rock.
Baryte:	Barium sulphate.
Chalcopyrite:	Mineral source of copper.
Galena:	Lead sulphide.