Sociedad de la Ornitología Caribeña

# EL PITIRRE

Society of Caribbean Ornithology

Winter 1997 Vol. 10, No. 3

EL PITIRRE

*El Pitirre* is the bulletin of the Society of Caribbean Ornithology.

*El Pitirre* es el boletín informativo de la Sociedad de la Ornitología Caribeña.

EDITOR: James W. Wiley, 2201 Ashland St., Ruston, Louisiana 71270, U.S.A.
ASSISTANT EDITORS: Michael Bobb, Alwin Dornelly, and Barbara Keesee, Grambling Cooperative Wildlife Project, P. O. Box 841, Grambling State University, Grambling, Louisiana 71245, U.S.A.

News, comments or requests should be mailed to the editor for inclusion in the newsletter.

Noticias, comentarios o peticiones deben ser envíadas al editor para inclusión en el boletín.

*Tyrannus dominicensis*

Pitirre, Gray Kingbird, Pestigre, Petchary, Pipirit

The Society of Caribbean Ornithology is a non-profit organization whose goals are to promote the scientific study and conservation of Caribbean birds and their habitats, to provide a link among island ornithologists and those elsewhere, to provide a written forum for researchers in the region, and to provide data or technical aid to conservation groups in the Caribbean.

La Sociedad de la Ornitología Caribeña es una organización sin fines de lucro cuyas metas son promover el estudio científico y la conservación de la avifauna caribeña, auspiciar un simposio anual sobre la ornitología caribeña, ser una fuente de comunicación entre ornitólogos caribeños y en otras áreas y proveer ayuda técnica o datos a grupos de conservación en el caribe.

## CONTENTS

MOLECULAR PHYLOGENETICS AND CONSERVATION OF CARIBBEAN BIRDS. Robert E. Ricklefs and Eldredge Bermingham. ..... 85
REGISTRO DE AVES DE LA SIERRA DE CUBITAS, CAMAGÜEY, CUBA. Yanette Concepción Hernández y Rafael Tadeo Perez. ..... 93
FIRST REPORT OF THE ORANGE-CROWNED WARBLER (*VERMIVORA CELATA CELATA*) IN CUBA. Arturo Kirkconnell, Alejandro Llanes, and Orlando Garrido. ..... 95
INDICIOS DE DEPREDACIÓN DE HUEVOS DE *HIRUNDO FULVA* (PASSERIFORMES: HIRUNDINIDAE) POR *EPICRATES ANGULIFER* (SERPENTES: BOIDAE). Carlos A. Mancina y Alejandro Llanes Sosa. ..... 95
LA BIAYA O BAMBIAYA DE LOS INDOCUBANOS. Osvaldo Jiménez Vázquez. ..... 96
AGGRESSIVE BEHAVIOR OF A GRAY KINGBIRD (*TYRANNUS DOMINICENSIS*) TOWARD A BAT (*MOLOSSUS MOLOSSUS*) IN LA HABANA, CUBA. Juan P. Soy. ..... 97
CURRENT STATUS OF WHITE-TAILED TROPICBIRDS (*PHAETHON LEPTURUS*) NESTING IN CUBA. Nicasio Viña, Martha Walsh-McGehee, and David S. Lee. ..... 98
NUEVAS ADICIONES A LA PALEORNITOLOGIA CUBANA. William Suárez y Oscar Arredondo. ..... 100
ABSTRACTS OF PAPERS PRESENTED AT THE SOCIETY OF CARIBBEAN ORNITHOLOGY ANNUAL MEETING IN ARUBA, DUTCH WEST INDIES, AUGUST 1997
THE AVIFAUNA OF THE PITONS IN ST. LUCIA. Donald Anthony. ..... 102

Continued on page 135

# MOLECULAR PHYLOGENETICS AND CONSERVATION OF CARIBBEAN BIRDS

ROBERT E. RICKLEFS[1], AND ELDREDGE BERMINGHAM[2]

[1]*Department of Biology, University of Missouri at St. Louis, 8001 Natural Bridge Road, St. Louis, Missouri 63121-4499, USA*
[2]*Smithsonian Tropical Research Institute, Unit 0948, APO AA 34002-0948, USA or*
*Apartado Postal 2072, Balboa, República de Panama*

AT THE 1997 MEETING OF THE Society of Caribbean Ornithology on Aruba, one of us (RER) presented a talk on the application of new techniques in DNA sequence analysis to understanding the evolutionary relationships among birds on West Indian islands. This was followed on the next day by a panel discussion, organized by Dr. Nedra Klein of Lewis and Clark University, Portland, Oregon, addressing many of the same issues in more detail. I was asked to prepare for the SCO bulletin *El Pitirre* a brief overview of molecular approaches to evolutionary relationships among species and populations and to summarize the main points and some examples from this talk. I am pleased to do this with my collaborator, Dr. Eldredge Bermingham. We have organized this summary to answer five basic questions: What is DNA sequence analysis? What kinds of information does it provide? What does this approach show about the distinctiveness of West Indian birds? How can this information be used in management and conservation? How can this information be accessed for particular needs? We will begin by providing some background about our own project.

We are interested in the regional history and biogeography of birds in the West Indies, which provide an ideal laboratory for studying processes of evolution and ecology. We would like to understand how colonization and extinction influence the avifauna of a particular island; we would also like to know how the ecological relationships of birds change over time. To pursue these goals, we needed to estimate the ages of individual island populations and determine their relationships to other island populations within the archipelago. As we shall explain below, this can be accomplished by measuring the amount of genetic change in independently evolving lineages of birds. These may be distinct lineages within a given population, populations of the same species on different islands, or different species.

We began to plan this study in 1989 and initiated field work in 1991. Several individuals have been closely involved in the work: we would like to mention especially Dr. Gilles Seutin, now at McGill University in Montreal, who was instrumental in establishing the field and laboratory programs for this project, Mr. Irby Lovette, at the University of Pennsylvania in Philadelphia, and Mr. Jeffrey Hunt at the Smithsonian Tropical Research Institute. Our first priority has been to collect samples of blood and tissues from island birds. We have now conducted field work on 14 islands and several continental localities[1], sponsored by the National Geographic Society. Our own samples have been supplemented by tissue specimens generously provided by several museums in the United States, particularly the Academy of Natural Sciences of Philadelphia, the Field Museum of Natural History (Chicago), the Louisiana State University Museum of Zoology, and the National Museum of Natural History (Washington, D.C.). As of this date, our tissue collection of West Indian birds represents over 3,000 individuals, including virtually all the species of small land birds. Our collection also includes representative geographic and phylogenetic outgroup taxa collected from continental locations in the Neotropics. We have sampled the majority of our specimens non-destructively (taking only tissue biopsies and blood samples) in accordance with our permits from the various island nations in the West Indies. We capture birds in mist nets, take samples of blood and breast muscle, and then release all individuals after processing. Blood and tissue samples are preserved in buffer solutions in small vials and returned to EB's laboratory in Panama, where the DNA work begins. The mortality rate resulting from our work has been about 2%. We are able to use this non-destructive sampling method because the birds of the West Indies are completely known and are readily identified in the hand. Additionally, we have tissue samples matched by voucher specimens in museum collections for many West Indian birds, against which we can check our DNA sequences.[2]

---

[1]These are the following: Trinidad, Barbados, Grenada, St. Vincent, St. Lucia, Martinique, Dominica, Guadeloupe, Montserrat, Puerto Rico, Dominican Republic, Jamaica, New Providence, Abaco, and continental localities in Venezuela, Panama, and Honduras. In addition, we have obtained material from some other localities from various museum collections, and hope to visit Cuba in the near future.

[2]Although we have not collected museum specimens of birds in our work, we would like to emphasize that there are many types of studies involving the relationship between genetics, morphology, and taxonomy for which collecting is necessary. We have seen in our work that genetic variation between island populations does not always correspond to subspecific or other taxonomic distinctions, in which case a more thorough appraisal of morphological and genetic variation may be required to ascertain the distinctiveness of, and relationships among, island populations. Dr. Nedra Klein's study of the Yellow Warbler has demonstrated mixing of highly divergent lineages on several islands in the Lesser Antilles. In such cases, it is important to ascertain whether genetic variation is accompanied by recognizable morphological markers, which can only be accomplished with collected specimens.

First, we briefly review some background information in genetics. Each cell in our bodies contains all the genetic information needed to direct our growth and development and regulate our biological processes. This information is contained in long chain-like molecules of DNA (**D**eoxyribo**N**ucleic **A**cid). Each DNA molecule consists of a long string of four different types of subunits, called nucleotides. The nucleotides are named after their principal structural components: adenine, thymine, cytosine, and guanine, or A, T, C, and G. Thus, the nucleotide sequence of any particular part of a DNA molecule might be written as AATCGGTTACCG, etc. This sequence is read three nucleotides at a time when proteins are made. Each nucleotide triplet specifies which of 20 different amino acids is placed in each position in the structural proteins and enzymes that are built on the genetic template. In this example, AAT = leucine, CGG = alanine, TTA = asparagine, CCG = glycine.

Many of the differences we observe between individuals in populations, and between different populations and species, are due to differences in the DNA sequences that encode particular proteins. Changes in the DNA sequence come about through mutations, which result in part from errors in copying the DNA as new cells are formed, including the sex cells that create the next generation. Changes also result from damage caused by environmental factors such as ultraviolet radiation, toxic chemicals of various sorts, and highly reactive products of our own metabolism. If these errors are not corrected, they are then transmitted as mutations from generation to generation.

Some mutations affect the structure and functioning of the organism, either beneficially or, more commonly, to the individual's detriment. In either case, if a mutation affects the reproductive rate of the individual that bears it, its frequency in the population might be increased or decreased accordingly, and the genetic composition of the population changes over time. This is, of course, what we refer to as evolution, which is responsible for most of the visible differences between species and accounts for the adaptation of species to their particular environments.

Other mutations have no visible effect on the organism. Some of these occur in parts of the DNA which are not translated into proteins (there are many of these regions in the DNA which sometimes represent old gene sequences no longer used). Others result in changes in proteins that have no functional consequence or more typically cause changes in the DNA sequence that have no effect on the amino acid sequence in the protein. For example, the three-nucleotide sequences CAA, CAC, CAG, and CAT all code for valine; thus, a change in the third position in this triplet has no effect on the amino acid sequence of the protein. Such mutations are generally considered to be unaffected by natural selection and are referred to as "neutral" mutations. The rate at which they appear in populations is determined only by the process of mutation, which is thought to occur at a more or less constant rate for a particular part of the genetic sequence. Thus, neutral mutations allow us to estimate the time that has passed since the divergence of two lineages by the number of nucleotide differences that have accumulated between them.

Most studies of the genetic relationships between lineages of birds are based on a special type of DNA found in the mitochondria of cells. Mitochondria are organelles responsible for much of the oxidative metabolism of the cell. They originated more than a billion years ago as symbiotic bacteria in cells of the organisms that were the ancestors of all present-day animals, plants, and fungi. Some of the DNA of the original bacterial symbionts is retained in our mitochondria. It is a single circular string of about 16-17,000 nucleotides in birds. Mitochondrial DNA (mtDNA) is transmitted only through the female line, and thus there is no mixing of maternal and paternal genes in mtDNA. There are several advantages to using mtDNA. Because of maternal inheritance, mtDNA is passed from generation to generation as a single unit and each mutation gives rise to a new, distinctive lineage which cannot mix with other lineages. Thus, ancestry is unambiguous. Furthermore, mtDNA in birds has a mutation rate that is several times higher than that of nuclear DNA (probably due to a less efficient DNA repair enzyme). This rate has been estimated as one change per 100 million ($10^{-8}$) nucleotides per generation, as a ball-park figure. Multiplied by 17,000 nucleotides, this is 0.17 mutations somewhere in the mtDNA molecule per 1,000 individuals per generation. By extrapolation, in a population having 6,000 females, about 1 mutation would appear per generation. This high rate of mutation creates a high diversity of mtDNA lineages within populations and causes relatively rapid divergence in the sequences of lineages between populations, as we shall see.

At this point, we should mention laboratory techniques briefly because DNA sequence analysis is an intensive laboratory procedure. Three major steps are required to go from a tissue sample to a genetic sequence: extraction of DNA, amplification of DNA, and determination of the DNA sequence. Extraction begins by breaking up the cells in the tissue using detergents and other chemicals. The DNA is then isolated by alternately dissolving and precipitating the DNA so that it can separated by centrifugation from other cell components. Next, some specific region of the more-or-less purified whole DNA (including both nuclear and mitochondrial types) is amplified by Polymerase Chain Reaction (PCR). In this step, the amount of a specific short sequence is increased many million-fold to obtain a large number of copies of the same DNA region. This is done by borrowing the DNA replication machinery (polymerase enzyme) from a type of bacterium found in hot springs. The process is referred to as thermocycling. We can specify which part of the DNA sequence we amplify by supplying a specific sequence of DNA assembled in the laboratory, often about 20 nucleotides long, that attaches to a particular unique point in

the extracted DNA molecule and causes the replication to take place only at that point. This short DNA sequence is called a primer. Amplification proceeds by using two of these primers, typically displaced from one another by 1,000-2,000 nucleotides, which create overlapping strands of DNA (or PCR products) between the two primer points. In the laboratory, the temperature of the reaction solution containing the DNA, enzyme, and primers is then changed in a way that causes repeated cycles of DNA replication.

In our research, we work primarily with primers that permit the amplification of mtDNA genes such as ATP synthase, cytochrome b, cytochrome oxidase, and NADH dehydrogenase. After a particular region of the mtDNA has been amplified, the nucleotide sequence of these products is determined by a rather complex procedure which, fortunately, has been more or less fully automated. We will not delve into the specifics. What we obtain is a sequence of DNA for each individual bird, that is, AATCGGTTACCG and so on, up to 1,000 or 2,000 nucleotides in length for a particular primer pair.

### What information does DNA sequencing provide?

The primary data are the nucleotide sequences. Secondary data are the number of nucleotide differences between sequences, which we can quantify as percent sequence divergence ([number of differences/total number of nucleotides examined]$\times$ 100). Suppose we find the following sequences of 20 nucleotides in three individuals:

| | |
|---|---|
| individual 1: | ATC CAT TCC AGG TAC ATT GA ... |
| individual 2: | ATC CAT CCC AGA TAC ATT GA ... |
| individual 3: | ATA CGT CCC AGG TAC ATG GA ... |

The bold letters indicate positions at which there have been changes in the nucleotides (often called nucleotide substitutions). Individuals 1 and 2 differ at 2 positions out of 20 and so they exhibit a 10% sequence divergence. Between individual 3 and either individual 1 or 2 there are 4 differences and thus 20% divergence. This information suggests that individual 1 and individual 2 shared a common female ancestor more recently that either did with individual 3. The interpretation of this information depends on where individuals 1, 2, and 3 were sampled. If they lived together on the same island, the genetic differences between the sequences provide a measure of the genetic diversity of the island population. If they lived on different islands, and if the differences between the islands were much greater than differences within the islands, we could conclude that the island populations of individuals 1 and 2 are more closely related to each other than either are to that of individual 3. Alternatively, we may say that population 3 is genetically more distinctive, and has had a longer independent evolutionary history, than have populations 1 and 2.

Sequence divergence among individuals and populations also tell us something of the history of a taxon within a region. If a population has a very low genetic diversity—perhaps all the individuals have the same nucleotide sequence for a particular mtDNA region—we can infer that the mtDNA of all the individuals was recently descended from that of a single female. This is most likely to happen when an island is colonized by a small number of individuals, the so-called founder effect. Because each individual carries only one identical set of mtDNA genomes in its cells, colonization of an island by a single pair of birds (that is, by only one mother) results in there being only a single mtDNA sequence in the descendants of the pair. Even when there are several females in the founding population, these do not carry all the genetic diversity of the parental population from which the new one is derived. In addition, some of the DNA sequences might be lost just by chance when a particular female carrying a unique sequence dies.

An older, established population might also have low genetic diversity if it has been reduced to small size—a population bottleneck—sometime in the recent past. Often this can be distinguished from a colonization event by the fact that the mtDNA sequences present on the island, no matter how few in number, are highly diverged from those of other islands or continental areas from which the population might have been derived.

When populations of a species on two different islands have high genetic diversity but share a substantial proportion of genetic sequences, population geneticists interpret the pattern to represent occasional (or frequent) movement of individuals between islands. Movement of one bird (a female in the case of mtDNA) per generation is thought to be sufficient to keep two island populations from diverging from each other. Data from Bananaquits (*Coereba flaveola*) in the Lesser Antilles illustrate some of the properties of genetic variation within island populations:

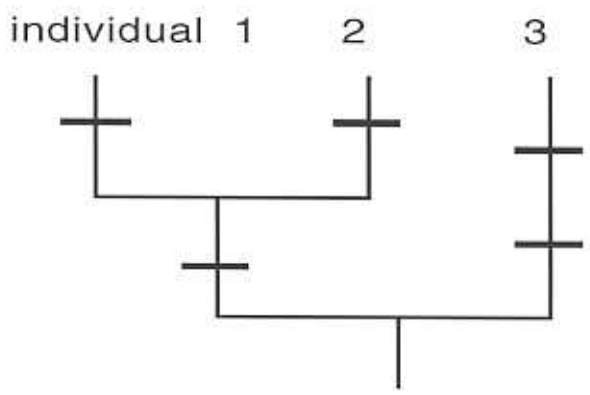
| mtDNA sequence type | Island | | | | | | |
|---|---|---|---|---|---|---|---|
| | MO | GU | DO | MA | SL | SV | GR |
| 1 | 5 | 6 | 8 | 3 | 9 | | |
| 2 | | | 1 | | 2 | | |
| 3 | | | 4 | 2 | 1 | | |
| unique group A | | | 6 (4) | 3 (3) | 6 (6) | | |
| 4 | | | | | | 5 | 2 |
| 5 | | | | | | 3 | 11 |
| unique group B | | | | | | 7 (5) | 4 (1) |
| Individuals (sequences) | 5 (1) | 6 (1) | 19 (7) | 8 (5) | 18 (9) | 15 (7) | 17 (3) |

NOTE: The unique groups include sequences found only on a single island; i.e., on Dominica (DO) 6 individuals each had one of four sequences found on no other island. Sequences in group A were similar to other sequences (1-3) more widely distributed in the northern Lesser Antilles; those in group B were more similar to sequences (4 and 5) shared between St. Vincent (SV) and Grenada (GR).

As you can see, Dominica (DO), Martinique (MA), and St. Lucia (SL) share several mtDNA sequences, which differ completely from sequences shared by populations on St. Vincent (SV) and Grenada (GR). Unique sequences within in each of these groups of islands are most similar to the shared sequences within each group, indicating recent common ancestry. We interpret this pattern to represent either sufficient continuing movement of Bananaquits between the first three islands to prevent genetic divergence, or recent colonization events within each of the island groups. We consider the sequence divergence that has accumulated between St. Vincent and Grenada, on one hand, and St. Lucia, Martinique, and Dominica, on the other, to indicate a complete barrier to the movement of Bananaquits between the two groups of islands. The presence of unique sequences on each of the islands may be due to inadequate sampling of individuals or to mutations that were not carried between the islands by movement of individuals. The Bananaquits examined in populations on Guadeloupe (GU) and Montserrat (MO) carried a single sequence type, which happens to be the commonest of the Dominican sequences, suggesting that these populations were established recently by a small number of founders from Dominica. We should add that the mtDNA sequences in Bananaquit populations on Puerto Rico to the north and Venezuela to the south are highly divergent from those of the two Lesser Antillean groups presented here.

### WHAT DOES THIS APPROACH SHOW ABOUT THE DISTINCTIVENESS OF WEST INDIAN BIRDS?

Genetic divergence between island populations provides information from which we can construct hypotheses or scenarios for the evolutionary relationships among them. These hypotheses usually take the form of a phylogenetic tree, in which the most ancestral gene sequence occupies the trunk position and each branch point in the tree represents a mutational step that separates one lineage into two different daughter lineages. One must always remember that, in the absence of a fossil record, our knowledge is based only on present-day genetic information, which is represented at the tips of the smallest branches of the phylogenetic tree. Rather sophisticated computer techniques are available for reconstructing phylogenetic trees and assigning a degree of confidence to each of the branch points. The three hypothetical sequences described above provide a simple case, as shown in the following diagram, where the heavy horizontal bars represent nucleotide substitutions:




Turning to a couple of real cases, one from the Greater Antilles and one from the Lesser Antilles, we begin to see the power of the molecular phylogenetic approach. We emphasize that these are only preliminary versions of the molecular phylogenies for these groups. The first example is that of the

todies (genus *Todus*) which comprise an endemic family (Todidae) presently restricted to the Greater Antilles. There are five recognized species, one each on Cuba, Jamaica, and Puerto Rico, and two on Hispaniola. The phylogenetic tree shown in Figure 1 portrays several aspects of the evolutionary histories of todies quite clearly, and also has a few surprises. First, the sequences we have used in this analysis do not provide enough resolution to pinpoint the closest relative of the todies or to estimate the age of the group. Fossil remains from the Oligocene (> 24 million years ago) of Wyoming and Europe have been assigned to the family, but there appears to be too little sequence divergence between todies and several groups of coraciiform birds (kingfishers, jacamars, motmots) for the Todidae to be of such age. Alternatively, todies may have evolved uniquely in the West Indies from a kingfisher-like colonist. What we can say, however, is that the present species of todies probably formed about 6-7 million years ago when independent lineages were established on the major islands from an ancestor that clearly was a tody, much like its descendants.

How can we estimate the age of a branch point between lineages? If we take as a rule of thumb that mutations occur at the rate of one in 100 million per nucleotide per generation, this is about 1% per million years. (This value is likely to vary widely depending on the particular DNA sequence and group of organisms considered, and should be taken only as a coarse approximation.) Population genetics theory tells us that for neutral mutations, the rate of replacement of nucleotides in the population is equal to the mutation rate. Thus, we might suppose that a particular sequence changes at about 1% of its nucleotide positions per million years, and that two sequences diverge from each other at a rate of 2% per million years. This gives us an approximate meter stick for estimating age.

The tody data are not sufficiently well resolved to show with certainty the order in which populations on the Greater Antilles were established. However, the Narrow-billed Tody (*Todus angustirostris*), one of the two species on Hispaniola, is more closely related to the Puerto Rican Tody (*Todus mexicanus*) than to the second Hispaniolan species (*T. subulatus*), suggesting either a secondary colonization of Hispaniola from Puerto Rico, or that the Puerto Rican Tody was derived from one of two differentiated Hispaniolan todies. Apropos of the second hypothesis, we have discovered that populations of Narrow-billed Todies on the northern and southern mountain ranges of Hispaniola are highly divergent genetically, perhaps having been evolutionarily independent for 2 million years. From the standpoint of conservation, these two populations probably should be considered as different species. The Hispaniolan todies raise the possibility that other species exhibit similar divergence between populations in the northern and southern ranges. We should emphasize that these results are preliminary and that additional sequence for other DNA regions might be helpful

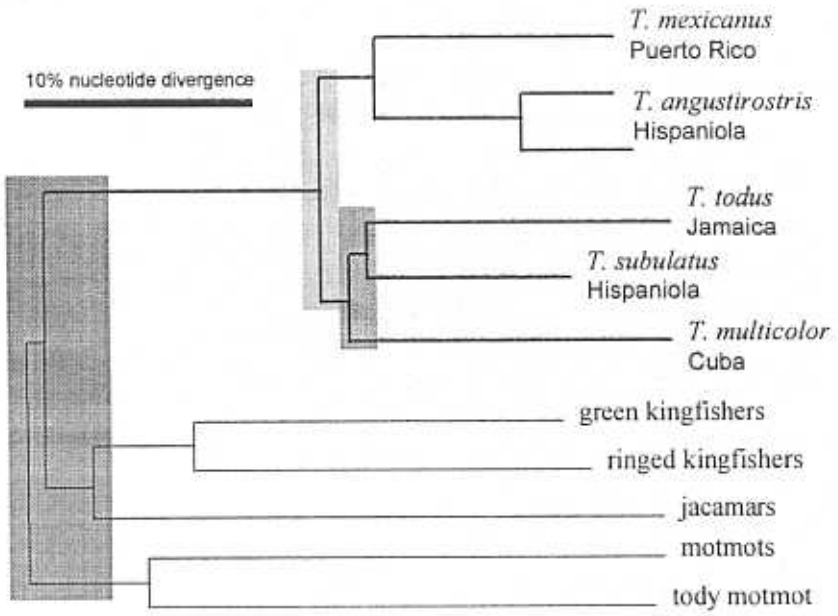



Figure 1. Phylogenetic relationships of the todies (Todidae) based on ATPase sequences of the mitochondrial DNA. Gray shading indicates poorly resolved branch points in the phylogenetic tree. The solid bar represents 10% nucleotide divergence or approximately 5 million years of separate evolution. The closest sister taxon of the todies cannot presently be resolved among kingfishers, motmots, and other groups of coraciiform birds living in tropical America. DNA sequences prepared in collaboration with Lowell Overton, who is a Ph.D. student in Biology at the University of Arkansas.

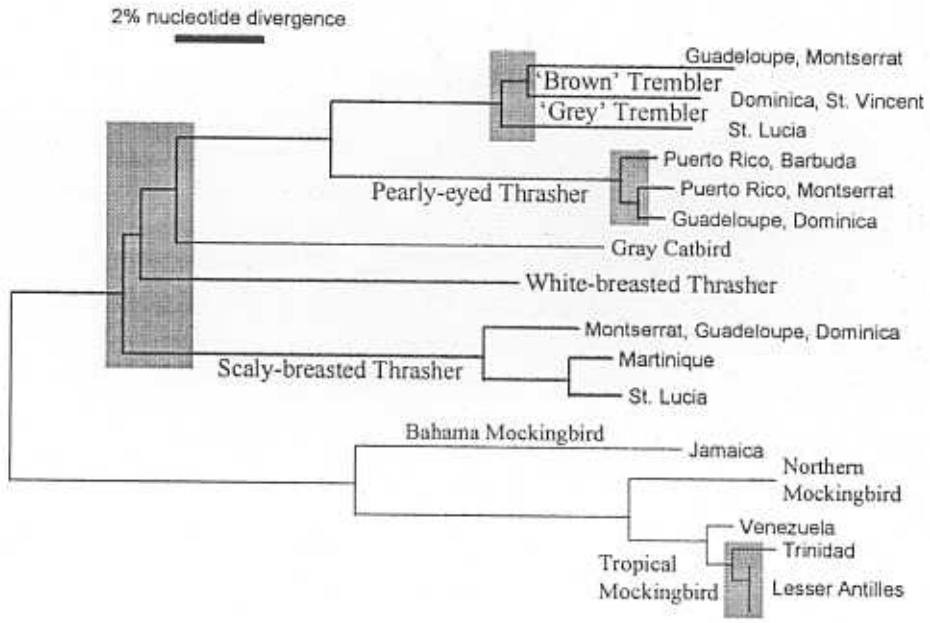



Figure 2. Phylogenetic tree featuring the distinctive Lesser Antillean mimids based on ATPase sequences of mitochondrial DNA. The scale of nucleotide substitution suggests that the initial radiation of the Lesser Antillean clade occurred about 5 million years ago. Gray shading indicates poorly resolved branch points in the phylogenetic tree. The solid bar represents 2% nucleotide divergence or approximately 1 million years of separate evolution. The DNA sequences were prepared by Mr. Jeffrey Hunt at the Smithsonian Tropical Research Institute.

in resolving the relationships among the Cuban, Jamaican, and Hispaniolan Broad-billed Todies.

Another group of distinctive West Indian birds is made up of the endemic mimids of the Lesser Antilles and Puerto Rico. These include the Pearly-eyed Thrasher (*Margarops fuscatus*), Scaly-breasted Thrasher (*Margarops fuscus*), White-breasted Thrasher (*Ramphocinclus brachyurus*), and trembler (*Cinclocerthia ruficauda* species group). The phylogenetic tree in Figure 2 shows that these form a single set of lineages, or clade, along with the Gray Catbird (*Dumetella carolinensis*) of North America. Again, the resolution at the base of this phylogenetic tree is not yet good enough to work out where the Gray Catbird fits into the branching order, but it is possible that this species originated from a West Indian ancestor. Among the clearer points to be made from this analysis is that the Scaly-breasted and White-breasted Thrashers are genetically the most distinctive of the taxa, their lineages originating from the base of the Antillean endemics. The Pearly-eyed and Scaly-breasted Thrashers, which are now both placed in the genus *Margarops* are not closely related (the Pearly-eyed Thrasher is more closely allied with the trembler); perhaps the latter should be given back its old generic name, *Allenia*. Finally, the tremblers appear to comprise three distinct lineages rather than two (Gray and Brown Trembler) as previously suspected.

With regard to the tremblers, we found one distinct lineage on Guadeloupe and Montserrat, a second on St. Lucia, and a third on Dominica and St. Vincent. This creates a geographical puzzle: the St. Lucian lineage, placed geographically between Dominica and St. Vincent, is interposed between island populations of one of the Brown Trembler lineages. We occasionally see geographically complex relationships of this kind, which might arise from our failure to sample lineages from particular islands, or from the extinction of lineages on intermediate islands. There is also a possibility of what is called lineage sorting, which results in the haphazard disappearance of lineages shared by an ancestral population on different islands. These processes can only be resolved by additional sampling of individuals and genetic sequences, including nuclear genes. Geographical anomalies do, however, raise red flags which show us where more work has to be done. To date, such geographic anomalies have turned out to be rather uncommon in the West Indies.

Much more could be said about inferences from genetic data, but the examples from Bananaquits, todies, and mimids presented above give a general idea of what is possible.

## How can this information be used in management and conservation?

(1) *Identification of genetically unique taxa and island populations.* Most importantly, genetic data can provide information on the distinctiveness of island populations and their relationships among each other. Knowing that Narrow-billed Todies of Hispaniola comprise two distinct populations that have been separated for perhaps 2 million years (4% sequence divergence) provides a much stronger incentive for management because neither population can stand in for the

other. These probably should be considered as two different species, each of which potentially would have special management considerations. Similarly, knowing that the Brown Trembler of Guadeloupe is distinct genetically from that of neighboring Dominica multiplies the danger of losing either one of these endemic populations from the standpoint of preserving genetic diversity within the West Indies. In another typical example, populations of Adelaide's Warbler (*Dendroica adelaidae*) on Barbuda and St. Lucia differ by more than 2% nucleotide divergence from each other and by more than 4% from the population of Adelaide's Warbler on Puerto Rico. These are all called the same species, but they clearly have had independent evolutionary histories for a million years or so and are genetically very distinctive. Mitochondrial DNA sequence data show that orioles of the *Icterus dominicensis* group diverged 2-4 million years ago, with populations on Montserrat (*I. oberi*), Martinique (*I. bonana*), and St. Lucia (*I. laudabilis*) all being highly distinctive from their relatives in the Greater Antilles. These have been called different species, but an appreciation of their ages drives home the long, intimate, and unique association of each of these populations with its island home. Each taxon will have its own story, of course, but molecular phylogenetic data provide the best hope of making quantitative assessments of the distinctiveness of island populations and their relative genetic value for conservation.

(2) *Identification of critical habitats for conservation and management.* If we can determine the genetic uniqueness of the populations on a given island, this information can be combined with the habitat distributions of the species to establish conservation values for different types of habitats. This would allow managers to defend the preservation of tracts of critical habitat to maintain an island landscape that can support the maximum biological diversity. Our genetic analyses suggest that highly endemic species of birds are most often found in environments that differ most from lowland forests, which were undoubtedly the habitats of their colonizing ancestors. Thus, montane forests, cloud forests, arid scrub, and wetlands are the most critical habitats for preservation of avian diversity on islands. Of course, different groups of animals have different habitat requirements, and so a knowledge of local natural history has to be used to judge the generality of results obtained for land birds. Similar molecular phylogenetic analyses are also underway with groups of reptiles and insects, and undoubtedly some other taxa will be included as these approaches gain adherents and the West Indies become more widely recognized as an important opportunity for evolutionary studies and management applications of genetic approaches to conservation.

(3) *Introductions of individuals between islands.* Transport of individuals from one island to another may be a suitable management approach for a threatened population, as an emergency action to bolster a declining population and perhaps infuse new genetic variation. It is essential in such cases that the evolutionary relationships between island populations be known so that widely different genetic lineages are not mixed. From the example of the Bananaquit in the Lesser Antilles (where populations are hardly endangered), it would be appropriate to introduce individuals to St. Lucia from Martinique but not from St. Vincent, whose Bananaquit populations have had a long period of independent evolution. Populations with low genetic variability, such as those of the Bananaquit on Guadeloupe and the northern Lesser Antilles, might be helped if there were a need to do so by infusion of genetic diversity from closely related populations on Dominica, where there are many related genetic lineages.

(4) *Assessment of the history of population size.* Large samples of the genetic diversity of island populations can be used to infer the history of population change. We have seen how colonization events can greatly reduce the genetic diversity of an island population, such as that of the Bananaquit on Guadeloupe. When island populations are old and have had time to accumulate equilibrium levels of genetic diversity, as indicated by their divergence from sister populations on other islands, low diversity can reveal recent bottlenecks in population size. Todies and Bananaquits on Puerto Rico provide an interesting comparison in this regard. The genetic diversity among the todies in our Puerto Rican sample is about what one would expect of a population of 1-2 birds per hectare (0.9-1.8 million on the entire island), whereas the genetic diversity among Bananaquits (with a population of about 10 per hectare, or 9 million total) is far too low. These data suggest that Bananaquit populations have fluctuated greatly in the past, but that todies have maintained a more constant level. Of course, two species are not enough for a generalization, but the work of Joe Wunderle, of the U.S. Forest Service in Puerto Rico, and others, suggests that frugivorous and nectarivorous birds such as the Bananaquit are more vulnerable than such insectivorous birds as todies to such disturbances as hurricanes and droughts. It is possible that additional population-level analyses of diversity might allow us to predict the vulnerability of populations to catastrophic disturbances, judged from past population performance. This might also permit a closer focusing of management efforts.

(5) *Lessons from historical extinctions of island populations.* One pattern that seems quite consistent is that older island populations, that is, populations most distinct genetically from sister populations on other islands, have had the highest rates of extinction from anthropogenic causes, whether habitat destruction, hunting, or introduction of diseases and predators. This pattern seems to hold true for the Galapagos and Hawaiian Islands, as well as for the West Indies. Such is clearly the case for the trembler on Martinique, and for the House Wren (*Troglodytes aedon*) on Martinique and Guadeloupe. Regardless of the particular causes of the extinctions of these populations, these represented old, genetically distinctive lineages within the Lesser Antilles. It is also clear that the risk of extinction is higher on smaller islands than on larger islands and, by implication, it is higher in habitats with smaller areas than in habitats with larger areas

on a particular island. Again, this knowledge should help to identify potentially vulnerable populations and the habitats that support them.

### How can this information be accessed for particular needs?

Analysis of DNA sequences from tissue samples is time-consuming and expensive. Thus, although we now have a relatively complete sample of island populations of small West Indian land birds, analysis of this material will take many years, and the resulting publications will not be easily accessible or interpretable by many individuals working on conservation issues on particular islands. In addition, although tissue collections are extensive, they are not complete. Some taxa, such as swifts and swallows are difficult to capture in nets without special efforts. Others, especially taxa of great conservation concern, are often missed in spite of efforts to catch them, because of their rareness and local distribution. For example, in the Lesser Antilles, we failed to capture the Forest Thrush (*Cichlherminia lherminieri*) on St. Lucia, the White-breasted Thrasher on Martinique, and the Pearly-eyed Thrasher on St. Lucia and Martinique.

To make molecular phylogenetic results available to individuals interested in conservation and management of local populations, we shall respond to direct requests for such information. If we have sequences on hand that would provide answers to your questions, we can provide an explanation of the data and interpretation of the results. If we have suitable unprocessed samples and the information from these can be used in the context of our own studies, we can give these a high priority. In each case, we could provide suitable documentation of specimens, techniques, and results to make a clear assessment of the status of a particular island population. When the data contain ambiguities, these would also be explained. Our goals are to provide genetic results, on an island-by-island basis, that are directly applicable to conservation issues within the West Indies, perhaps even leading to a regional comprehensive assessment of critical species, island populations, and habitats. This will take time, of course, but we have a good beginning. Meanwhile, we would like to hear your comments and will provide assistance where we can.

### Additional Reading


Avise, J. C. 1994. Molecular markers, natural history, and evolution. Chapman and Hall, New York.

Avise, J. C., and J. L. Hamrick. 1996. Conservation genetics. Case histories from nature. Chapman and Hall, New York.

Bermingham, E., G. Seutin, and R. E. Ricklefs. 1996. Regional approaches to conservation biology: RFLPs, DNA sequence, and Caribbean birds. Pp. 104-124 *in* T. B. Smith and R. K. Wayne (eds.), Molecular genetic approaches in conservation. Oxford Univ. Press, Oxford and New York.

Klein, N. K., and W. M. Brown. 1994. Intraspecific molecular phylogeny in the Yellow Warbler (*Dendroica petechia*), and implications for avian biogeography in the West Indies. Evolution 48:1914-1932.

Seutin, G., J. Brawn, R. E. Ricklefs, and E. Bermingham. 1993. Genetic divergence among populations of a tropical passerine, the Streaked Saltator (*Saltator albicollis*). Auk 110:117-126.

Seutin, G., N. K. Klein, R. E. Ricklefs, and E. Bermingham. 1994. Historical biogeography of the Bananaquit (*Coereba flaveola*) in the Caribbean region: a mitochondrial DNA assessment. Evolution 48:1041-1061.

# REGISTRO DE AVES DE LA SIERRA DE CUBITAS, CAMAGÜEY, CUBA

YANETTE CONCEPCIÓN HERNÁNDEZ[1, 3] Y RAFAEL TADEO PEREZ[2]
[1]*Virtudes 202, Centro Habana;* [2]*Facultad de Biologia, Universidad de la Habana;*
[3]*BioKarst, Cuba;* [3]*BioKarst, Grupo Bioespeleológico de la Sociedad de Cuba.*

POCOS HAN SIDO los estudios que se han realizado acerca de las comunidades de aves que habitan en la Sierra de Cubitas, Camagüey; y estos han sido referidos a algunas poblaciones en especial o lugares como El Hoyo de Bonet. Por lo que el presente trabajo pretende brindar un listado preliminar de las especies de aves de esta zona. El trabajo fue realizado durante la expedición "Cubitas 96" del grupo BioKarst en el período comprendido entre el 7-23 de agosto de 1996. Los registros se efectuaron en seis localidades: alrededores de Cueva Rolando, Algibito, Hoyo de Bonet, alrededores de Cueva Lechuza, Cerro Tuabaquey y la base del Cerro Tuabaquey.

La formaciones vegetales predominantes en dicha sierra son el bosque semideciduo mesófilo y el bosque siempreverde micrófilo (Méndez *et al.* 1989) observándose en las localidades de Cueva Rolando, Cueva Lechuza y Cerro Tuabaquey. El grado de antropización del resto de las localidades difería; encontrádose desde un bosque degradado en Algibito, hasta un pastizal dedicado a la ganadería y una presa en la base del Cerro Tuabaquey. El Hoyo de Bonet por su formación geomorfológica posee determinadas peculiaridades, encontrádose en él una vegetación característica de mogotes, con un grupo de formaciones en el que se incluyen la vegetación del paredón, el bosque semideciduo y el siempreverde (Mendez *et al.* 1990).

Los registros en las localidades se realizaron entre las 07:00 y las 10:00 hr, anotándose todas las aves oidas u observadas, ya sea a simple vista o con la ayuda de binoculares. Como promedio cada localidad fue muestreada dos dias, excepto los alrededores de Cueva Rolando y Cueva Lechuza, donde la estancia permitió mayor número de registros, posibilitando determinar además la abundancia relativa por especies (Tadeo y Concepción, inédito).

Un total de 56 especies fueron identificadas (Tabla 1), estando representadas de acuerdo con Garrido y Garcia (1975) 31 familias ya cuatro géneros endémicos. El indice de endemismo a nivel de especies resultó del 14% y a nivel de subespecie de un 23%.

Según la clasificación de Garrido y Kirkconnell (1993) de este listado la Caraira (*Caracara plancus*), Codorniz (*Colinus virginianus*) y Camao (*Geotrygon caniceps*) son consideradas especies raras y el Catey (*Aratinga euops*) se encuentra amenazado. El resto de las especies se estiman como comunes.

Es válido destacar la presencia de tres especies consideradas como migratorias de invierno en franco período de verano. Tales especies son: la Bijirita Trepadora (*Mniotilta varia*), la Señorita de Monte (*Seiurus aurocapillus*) y la Candelita (*Setophaga ruticilla*). De esta última ya se han hecho reportes de que cría en Cuba (Kirkconnell y Garrido 1996). La presencia de las otras dos especies no antes reportadas en este periodo, puede ser un indicio de una migración temprana o de una residencia permanente.

AGRADECIMIENTOS

El grupo BioKarst agradece a todas las entidades y personas que hicieron posible la realización de la expedición "Cubitas '96."

LITERATURA CITADA

GARRIDO, O. H. Y F. GARCÍA MONTAÑA. 1975. Catálogo de las aves de Cuba. Academica de Ciencias, La Habana.

GARRIDO, O. H. AND A. KIRKCONNELL. 1993. Checklist of Cuban Birds. Spec. Publ. for Soc. CArib. Ornithol. Ann. Meeting, Playa Girón, Cuba.

KIRKCONNELL, A. Y O. H. GARRIDO. 1996. La Candelita, *Setophaga ruticilla* (Aves: Parulidae) nidificando en Cuba. El Pitirre 9(3):5.

Mendez *et al.* 1989. Contribución al conocimiento de la flora y vegetación de La Sierra de Cubitas (Camagüey). Rev. Jardín Botánico Nacional 10 (2):147-173.

Mendez *et al.* 1990. Valoración de la propuesta de Reserva Natural Hoyo de Bonet, Sierra de Cubitas, Camagüey. Rev. Jardín Botánico Nacional 11 (2 y 3):135-153.

Tadeo, R. y Y. Concepción (inédito). Avifauna de dos localidades de la Sierra de Cubitas, Camagüey, Cuba.

Tabla 1. Listado de especies de aves oídas e observadas de la Sierra de Cubitas, Camagüey, Cuba, 7-23 de agosto de 1996.

| Nombre científico[1] | Nombre vulgar | Localidad | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cueva Rolando | Hoyo de Algibito | Bonet | Cueva Lechuza | Cerro Tuabaquey | Base del Cerro Tuabaquey |
| *Egretta caerulea* | Garza Azul | | | | | | + |
| *Babulcus ibis* | Garcita Bueyera | | | | | | + |
| *Butorides striatus* | Aguatacaimán | | | | | | + |
| *Cathartes aura* | Aura Tiñosa | + | + | | + | + | + |
| *Rostrhamus sociabilis* | Gavilán Caracolero | | | | | | + |
| *Buteo jamaicensis* | Gavilán de Monte | | | | + | | |
| *Caracara plancus* | Caraira | | + | | | | |
| *Falco sparverius sparverioides** | Cernícalo | | + | | | | + |
| *Colinus virginianus cubanensis** | Codorniz | | + | | | | |
| *Gallinala chloropus* | Gallereta de Pico Colorado | | | | | | + |
| *Aramus guarauna* | Guareao | | + | | | | |
| *Charadrius vociferus* | Títere Sabanero | | | | | | + |
| *Himantopus mexicanus* | Cachiporra | | | | | | + |
| *Jacana spinosa* | Gallito de Río | | | | | | + |
| *Columba squamosa* | Torcaza Cuellimorada | + | | + | + | | |
| *Zenaida asiatica* | Paloma Aliblanca | | | | | | + |
| *Zenaida aurita* | Paloma Sanjuanero | + | | | + | | |
| *Zenaida macroura* | Paloma Rabiche | | + | | | | + |
| *Columbina passerina* | Tojosa | + | + | | | | + |
| *Geotrygon chrysia* | Barbiquejo | + | | | + | | |
| *Geotrygon caniceps caniceps** | Camao | + | | | | | |
| *Geotrygon montana* | Boyero | + | | | + | + | |
| *Starnoenas cyanocephala*** | Paloma Perdiz | | | | + | | |
| *Aratinga euops*** | Catey | | | | | | + |
| *Saurothera merlini merlini** | Arriero | + | + | + | + | + | |
| *Crotophaga ani* | Judío | | + | | + | | + |
| *Tyto alba* | Lechuza | | | | + | | |
| *Glaucidium siju*** | Sijú Platanero | + | + | + | + | + | |
| *Chordeiles gundlachii* | Querequeté | | | | + | | + |
| *Tachornis phoenicobia iradii** | Vencejito | | | | | | + |
| *Chlorostilbon ricordii ricordii** | Zunzún | + | + | + | + | + | |
| *Priotelus temnurus**** | Tocororo | + | | + | + | + | |
| *Todus multicolor*** | Cartacuba | + | + | + | + | + | |
| *Melanerpes superciliaris* | Carpintero Jabado | + | + | + | + | + | |
| *Xiphidiopicus percussus**** | Carpintero Verde | + | + | + | + | + | |
| *Contopus caribaeus caribaeus** | Bobito Chico | + | + | + | + | + | |
| *Myiarchus sagrae* | Bobito Grande | + | + | + | + | + | |
| *Tyrannus dominicensis* | Pitírre Abejero | + | + | + | + | + | |
| *Tyrannus c. caudifasciatus** | Pitírre Guatíbere | + | + | + | + | + | + |
| *Progne cryptoleuca* | Golondrina Azul | | | | | | + |
| *Turdus plumbeus* | Zorzal Real | + | + | + | + | + | + |
| *Mimus polyglottos* | Sinsonte | | + | | | | + |
| *Vireo gundlachii*** | Juan Chiví | + | + | + | + | + | |
| *Vireo altiloquus* | Bien-te-veo | + | + | + | + | + | |
| *Mniotilta varia* | Bijirita Trepadora | | | | + | | |
| *Setophaga ruticilla* | Candelita | + | | | + | | |
| *Seiurus aurocapillus* | Señorita de Monte | | | | + | | |
| *Teretistris fornsi**** | Pechero | + | | | + | + | |
| *Cyanerpes cyaneus* | Aparecido de San Diego | + | | | | | |
| *Spindalis zena petrei** | Cabrero | + | | + | + | + | |
| *Melopyrrha nigra nigra** | Negrito | + | + | + | + | + | |
| *Tiaris olivacea* | Tomeguín de la Tierra | + | + | + | + | + | + |
| *Sturnella magna hippocrepis** | Sabanero | | | | | | + |
| *Dives atroviolacea*** | Totí | + | + | | + | | + |
| *Quiscalus niger gundlachii** | Chichinguaco | | | | + | | |
| *Icterus dominicensis melanopsis** | Solibio | + | + | + | + | | + |
| Σ | | 28 | 26 | 18 | 34 | 19 | 26 |

[1]Nivel de endemismo: ***Género; **Especie; *Subespecie.

## FIRST REPORT OF THE ORANGE-CROWNED WARBLER (*VERMIVORA CELATA CELATA*) IN CUBA

ARTURO KIRKCONNELL[1], ALEJANDRO LLANES[2] AND ORLANDO GARRIDO[1]
[1]*Museo Nacional de Historia Natural de Cuba,* [2]*Instituto de Ecología y Sistemática, La Habana, Cuba*

ON 11 NOVEMBER 1989, during an expedition to Guanahacabibes Peninsula (westernmost Cuba), we collected an Orange-crowned Warbler (*Vermivora celata celata*). The bird was foraging among leaves about 3 m above the ground in coastal vegetation, near the beach called "Las Tumbas."

*Vermivora c. celata* breeds in northern and northwestern Canada. It winters in the southern United States and Mexico (Howard and Moore 1991). The Orange-crowned Warbler regularly migrates through the United States west of the Appalachian Mountains, and only rarely through the eastern states. It occurs casually in the northern Bahama Islands, but our specimen represents the first record for Cuba (American Ornithologists' Union 1983).

The Cuba specimen (catalogue number 1065) is deposited in the collection of the Cuban Natural History Museum.

### LITERATURE CITED

AMERICAN ORNITHOLOGISTS' UNION. 1983. Check-list of North American birds, 6th ed. American Ornithologists' Union, Washington, D. C.

HOWARD, RICHARD, AND ALICK MOORE. 1991. A complete checklist of the birds of the World, 2nd ed. Academic Press Inc., San Diego.

## INDICIOS DE DEPREDACIÓN DE HUEVOS DE *HIRUNDO FULVA* (PASSERIFORMES: HIRUNDINIDAE) POR *EPICRATES ANGULIFER* (SERPENTES: BOIDAE)

CARLOS A. MANCINA Y ALEJANDRO LLANES SOSA
*Instituto de Ecología y Sistemética, CITMA, A.P. 8029, La Habana, Cuba*

EN JUNIO DE 1996, se estudió una colonia de Golondrina de Cuevas (*Hirundo fulva*) que se encontraba anidando en una solapa costera en la Reserva Natural de Cayo Caguanes, al norte de la provincia de Sancti Spíritus, región central de Cuba. En este lugar se hallaron depresiones donde las aves depositaban directamente los huevos sobre material vegetal, y no se observaron las formas de nido que han sido descritas para la especie (Bond 1985). A pocos centímetros de uno de los nidos, en el que se encontraban dos huevos, se localizó un ejemplar de majá de Santa María, *Epicrates angulifer*, probablemente atraído por la presencia de las aves o por el calor que irradiaban los huevos. Minutos más tarde, no se encontraron los huevos ni restos de los mismos, lo cual sugiere que fueron engullidos por el ofidio.

Las especies del género *Epicrates* se alimentan, en dependencia de su tamaño, de mamíferos (principalmente roedores y murciélagos), aves (tanto silvestres como domésticas) y reptiles y anfibios (Schwartz y Henderson 1991). La alimentación de la especie cubana está basada fundamentalmente en roedores (caprómidos y múridos) y especies gregarias de murciélagos, además de aves, pequeños reptiles y anfibios (Gundlach 1880, Hardy 1957, Silva y Koopman 1964).

Godinez *et al.* (1987) ubicaron a *E. angulifer* como enemigo natural de *Columba leucocephala*, pero sin especificar en que consistían los daños que esta especie infringía a las poblaciones de dicha paloma. Schwartz y Henderson (1991) citaron el consumo de huevos de aves de corral por *Epicrates chrysogaster* de Islas Turks y Caicos, Bahamas. En la literatura consultada no se encontró ningún caso de consumo de huevos por *E. angulifer*, pero se conoce de la capacidad de esta especie de subir a los árboles y rocas hasta alturas considerables, por lo que la depredación de huevos de aves silvestres pudiera resultar un suceso habitual.

Por otra parte se conoce que en Norteamérica, algunas especies de ofidios pueden llegar a devorar pichones, adultos e incluso huevos de la Golondrina de Cueva Americana, *Hirundo pyrrhonota* (Bent 1942, Bullard 1963). En Cuba no se conocen enemigos naturales de la Golondrina de Cuevas. Tanto *H. fulva* como *Epicrates angulifer* son habitantes comunes de numerosos espeleoaccidentes cubanos, por lo que este reptil constituye un depredador potencial de las poblaciones cavernícolas de esta golondrina.

### LITERATURA CITADA

BENT, A. C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. Order Passeriformes.

U. S. Natl. Mus. Bull. 179.

Bond, J. 1985. Birds of the West Indies. Fifth Edition. Houghton-Mifflin Co., Boston.

Bullard, R. T., Jr. 1963. Banding notes on the Nickajack Cliff Swallows (*Petrochelidon pyrrhonota*). EBBA News 26:191-203.

Godinez, E., M. Gómez, J. A. Puentes y S. Vargas. 1987. Características reproductivas de *Columba leucocephala* en la Península de Guanacahabibes, Cuba. Poeyana 340:1-8.

Gundlach, J. 1880. Contribución a la erpetologia cubana. Imp. G. Montiel, La Habana.

Hardy, J. D., Jr. 1957. Bat predation by the Cuban boa *Epicrates angulifer* Bibron. Copeia 1957(2):151-152.

Schwartz, A., and R. W. Henderson. 1991. Amphibians and reptiles of the West Indies: descriptions, and natural History. Univ. Florida Press, Gainesville.

Silva, G. T., and K . F. Koopman. 1964. Notes on the occurrence and ecology of *Tadarida laticaudata yucatanica* in eastern Cuba. Amer. Mus. Nov. 2174:1-6.

## LA BIÁYA O BAMBIÁYA DE LOS INDOCUBANOS

Osvaldo Jiménez Vázquez
*Instituto de Ecologia y Sistemática, La Habana, Cuba*

La visión real maravillosa de la fauna y flora cubana, causó grata impresión al colonizador europeo al irrumpir en nuestra tierra a finales del siglo XV. Los manatíes, psitácidos de vivos colores, focas tropicales y otros componentes faunísticos, merecieron la atención de los cronistas del descubrimiento y colonización. La identidad taxonómica de algunos vertebrados terrestres que coexistieron con los indocubanos ha estado sometida a discusión, los casos más típicos son el "perro mudo," el Guaminíquinaje y la Biáya o Bambiáya. Esta última ocupa nuestra atención en el presente trabajo.

Las primeras referencias acerca de un ave conocida como Bambiáya las encontramos en las Crónicas de Indias. Fray Bartolomé de las Casas dice: "Hay unas aves que vuelan cuasi junto al suelo que los indios llamaban Biáyas, la media silaba luenga, y los indios corriendo las alcanzaban y también con perros, si no me olvidado, las cuales cocidas hacen el caldo como azafranado; son muy sabrosas y teníamos en lugar de Faisanes" (Las Casas *in* Pérez-Beato 1942).

Joannis de Laët (1625) relata que habian ciertas aves llamadas Bambiáyas que corrian algo sobre la tierra mejor que volaban y que los aborigenes las cazaban como si fueran animales salvajes (Parajón 1967). Gallinas de la Tierra les nombraron los hispanos (Siglo XVI). Paradógicamente se les relacionó con el Flamenco (*Phoenicopterus ruber*) (Parajón 1967, Buide 1986). Otros autores (Parajón 1967) estimaron que era un galliforme quizás parecido a las Chachalacas de Centro y Sudamérica (*Ortalis vetula, O. ruficauda*).

S. L. Olson (com. pers.) considera que el único galliforme endémico de las Antillas siempre ha sido *Colinus virginianus*. Entre las aves registradas en sitios aborigenes cubanos, la que guarda analogías con las descripciones de los cronistas es el rálido extinto, *Nesotrochis* (Wetmore 1918), que tuvo una especie en Cuba (*N. picapicensis*) y otras en la Espanola (*N. steganinos*) y Puerto Rico e Isla Virgenes (*N. debooyi*).

*Nesotrochis picapicensis* se conoce de siete localidades cavernarias del occidente cubano, dos de ellas constituyen basurales idigenas precolombinos y las restantes depósitos sedimentarios de origen pluvial.

Los caractéres diagósticos del género *Nesotrochis*, basados en estudios osteológicos (Wetmore 1918, Olson 1974) muestran un ave mayor que *Rallus elegans* y *Gallinula chloropus* aunque con variaciones de talla notables, dadas por el dimorfismo sexual. Con alas muy cortas casi inútiles para volar como se observa en los húmeros, que son muy cortos en proporción al fémur comparados con los de otros rálidos antillanos, con la excepción de *Cyanolimnas cerverai* Barbour y Peters, en la cual son los húmeros también menos alargados que el fémur, aunque en menor proporción. Medidas de correspondencia entre fémures y húmeros de algunos rálidos antillanos (Longitud en mm.). *Nesotrochis picapicensis*: fémur–64, 65.3, 66.8, 68.5, 73; húmeros–43.3, 46.5. *Cyanolimnas cerverai*: fémur–41.5, 43.5, 44.2, 47.5; húmero–32.4, 36.7. *Rallus elegans*: fémur–59.5; húmero–60.4. *Gallinula chloropus*: fémur–52.4, 55.3; húmero–53.2, 57.6. *Porphyrula martinica*: fémur–52.4; húmero–53. *Laterallus jamaicensis*: fémur–36.6; húmero–34.6. A esto se agrega que la Quilla (Carina) del esternón en la cintura pectoral esta muy reducida, carácter también presente en *Cyanolimnas*. Las extremidades inferiores de *Nesotrochis* estaban bien desarrolladas, como es visible en el fémur y la tibia, más fuertes y pesados en proporción al largo que en otros rálidos antillanos, además la tibia tiene todas las crestas y tubérculos muy desarrollados por la inserción de músculos y tendones fuertes (Wetmore 1918). Con toda certeza *Nesotrochis* se desplazaba velozmente en tierra al no volar con habilidad, como le es posible a otras gallinuelas, cuando eran invadidos sus hábitats en lagunas, ciénagas y márgenes de arroyos. Probablemente por tal razón los españoles les llamaron Gallinas de la Tierra. Otras aves fósiles cubanas, casi ineptas en el vuelo, también presentan húmeros y quillas reducidos; son las especies del género *Ornimegalonyx* Arredondo, 1958 (Strigidae) y *Grus cubensis* (Fischer and Stephan 1971) (*Ciconidae*).

La presencia en Cuba de varios géneros de aves extintas con poca especialización en el vuelo quizás se deba a la inexistencia de depredadores terrestres del orden Carnívora antes del arribo del hombre aborigen hace unos 10,000 años ap.

La abundancia de *Nesotrochis* en depósitos de dieta aborigen en el área antillana, es un indicio de que su carne era tenida en alta estima como recurso alimenticio, asi como de la amplia distribución geográfica y abundancia que tuvo en tiempos pre y post colombinos, hasta su extinción ocurrida entre los siglos XVIII y XIX (Parajón 1967).

Localidades Y Materiales De *Nesotrochis picapicensis* Examinados

Pinar del Río.—Caverna de Pío Domingo (localidad tipo), Sumidero, Minas. Depósito no cultural. Pleistoceno superior. No se examinaron huesos.

Cueva de José Brea, Pan de Azúcar, Viñales.—Sitio arqueológico. Tarso derecho OA. 3171. Cueva del Mono Fósil, Sierra de Galeras, Viñales; deposito no cultural. Pleistoceno superior. Tibia derecha GEPAB. 163.

La Habana.—Cueva de Paradones, Ceiba del Agua, Caimito, deposito no cultural, Pleistoceno superior. Tarso derecho OA. 688.

Cueva del Caracol, Siete Cuevas Bejucal. Sitio arqueológico. Fémur derecho GEPAB 229.

Cuevas Blancas, Quivicán. depósito no cultural. Pleistoceno superior. Tibia derecha GEPAB 340.

Cueva del Indio, Tapaste, San José de las Lajas, depósito no cultural.. Pleistoceno superior. Cráneo 317; pelvis 318, 319, 320; tarsos derechos 321, 322; húmero derecho 323; fémures izquierdos 325, 326, 327, 328, derechos 329, 330; tibias izquierdas 331, 332, 333, 339, derechas 334, 335, 336, 337, 338. Todas piezas del GEPAB.

Abreviaturas:

OA. Colección Oscar Arredondo.

GEPAB. Colección Grupo Espeleológico "Pedro A. Borrás." Sociedad Espeleológica de Cuba.

Literatura Citada


Buide, M. 1986. Diccionario de nombres vernáculos de vertebrados cubanos. Edit. Academia, La Habana.

Fischer, K., and B. Stephan. 1971. Ein flugunfähiger Kranich (*Grus cubensis* n. sp.) aus dem Pleistozän von Kuba–Eine Osteologie der Familie Kraniche (Gruidae). Wiss. Z. Humbolt–Univ. Berl., Math–Naturwiss. Reihe 20:541-592.

Olson, S. L. 1974. A new species of *Nesotrochis* from Hispaniola with notes on other fossil rails from the West Indies (Aves: Rallidae). Proc. Biol. Soc. Wash. 87:439-450.

Parajón, S. M. 1967. Los faisanes de América. Estudio en relación con las aves denominadas por nuestros aborígenes Biáyas o Bambiáyas, que no eran flamencos sino faisanes de América, Inédito.

Pérez-Beato, M. 1942. La Falacia del idioma indigena. Ensayo lexicográfico. Ediciones del Archivo Histórico, Habana.

Wetmore, A. 1918. Bones of birds collected by Theodor de Booy from Kitchen Midden deposits in the islands of St. Thomas and St. Croix. Proc. U.S. Nat. Mus. 54:513-522.


## AGGRESSIVE BEHAVIOR OF A GRAY KINGBIRD (*TYRANNUS DOMINICENSIS*) TOWARD A BAT (*MOLOSSUS MOLOSSUS*) IN LA HABANA, CUBA


Juan P. Soy

*Apartado 4928, Correo de 23 y 12, La Habana 4 (10400), Cuba*


At 20:20 hr on 2 June 1996 I observed a Gray Kingbird (*Tyrannus dominicensis*) perching on the television antenna of a house in Vedado, La Habana City. Suddenly the bird flew down with an irregular flight, as if it was trying to catch a small bird. After the acrobatics, the kingbird returned to perch on the same antenna. At 20:30 hr I observed another such erratic flight, but this time I verified that the kingbird was attacking a flying bat. The kingbird made four more such attacks on passing bats in the next 30 mins. I observed the same aggressive behavior by a Gray Kingbird in the same area on 18 June, at 20:25 hr, when a kingbird attacked bats twice in 30 mins of observation. The bats effectively evaded the kingbirds' attacks and I did not observe the kingbirds touching any of bats. Because of their crepuscular habit in foraging for insects during the summer season, the attacked bats were most likely *Molossus molossus*.

I did not observe nests of Gray Kingbirds around the area, and I do not think the birds were trying to catch the bats for food. Instead, I believe that the aggressive behavior was territorial defense toward the bat, which is at the same time a competitor for the insects on which both species feed. Gundlach (1876) reported the Gray Kingbird's aggressive behavior against hawks, vultures, herons, and other birds that approach its nest. García (1987) also noted the defensive behavior of the kingbird in protecting its nest. Vaurie (1957) considered this species "extremely aggressive," and Pough

(1949) characterized the kingbird's aggressive behavior as a territorial defense against all larger birds and mammals, including man.

Although I do not consider the behavior I observed as predation attempts, Gray Kingbirds have been reported capturing large prey items, including flying vertebrates. Dathe (1971) reported an American Kestrel (*Falco sparverius*) catching bats in La Habana. Although Dathe reported the bat species as *Artibeus jamaicensis* (identified in flight), Silva (1979) suggested that this bat should be *Molossus molossus*. In addition, Seutin and Apanius (1995) reported a case of hummingbird (*Eulampis*) predation by the Gray Kingbird.

LITERATURE CITED


DATHE, H. 1971. Der Buntfalk, *Falco sparverius*, als Fledermausjäger auf Kuba. Milu 3(2):195-197.

GARCÍA MONTAÑA, F. 1987. Las aves de Cuba — subespecies endémicas, Vol. II. Editorial Gente Nueva, La Habana.

GUNDLACH, J. C. 1876. Contribución á la ornitología cubana. Imprenta "La Antilla" de N. Cacho–Negrette, La Habana.

POUGH, R. H. 1949. Audubon bird guide. Doubleday and Company, Inc., NY.

SEUTIN, G., AND V. APANIUS. 1995. Gray kingbird predation on a hummingbird. Wilson Bull. 107(3): 565-567.

SILVA, G. 1979. Los murciélagos de Cuba. Editorial Academia, La Habana.

VAURIE, C. 1957. Field notes on some Cuban birds. Wilson Bull. 69(4):301-313.


## STATUS OF WHITE-TAILED TROPICBIRDS (*PHAETHON LEPTURUS*) NESTING IN CUBA


NICASIO VIÑA[1], MARTHA WALSH-MCGEHEE[2], AND DAVID S. LEE[3]

[1] *José A. Saco No. 418, Santiago de Cuba, Cuba 90100;* [2]*Island Conservation Effort, P. O. Box 599, Saba, Netherlands Antilles; and* [3]*North Carolina State Museum of Natural Sciences, P. O. Box 29555, Raleigh, North Carolina 27626, U. S. A.*


DESPITE THE FACT THAT White-tailed Tropicbirds (*Phaethon lepturus*) are known to nest throughout the Bahamas, the Turks and Caicos, and the Greater Antilles (American Ornithologists' Union 1983, Sprunt 1984, Buden 1987), in the interval between the early part of this century and 1975 no reports of this species nesting in Cuba were published. Barbour (1943) noted that on a visit to Cabo Cruz in 1913 the breeding colony of tropicbirds reported by Gundlach in the 19th century was still in existence. Gundlach referenced White-tailed Tropicbirds in 10 publications dating from 1859 to 1893. Wiley (ms.) shows 80 references to these tropicbirds in Cuba in his bibliography of West Indian seabirds. Fifty-three of these references are pre-Barbour (1943) and, with one exception (Cruz and Alayo 1984), the remaining references contain no additional information on the distribution of breeding colonies or the size of nesting populations in Cuba. Garrido and García (1975) listed White-tailed Tropicbirds as breeders on the southeastern coast of Oriente Province, but gave no population estimates. van Halewyn and Norton (1984) reported this species breeding along the entire southeastern coast of Cuba, but gave no indication of the source of this information or of the size of the Cuban population. In 1993, Garrido and Kirkconnell categorized this species as a rare breeder on the southeastern coast of Oriente Province. Morales and Garrido (1996) included White-tailed Tropicbirds in a list of birds of Cayo Sabinal (Archipiélago de Sabana-Camagüey) with no indication of their nesting status. Whereas it is possible that they nest there, González (under review) made no reference to these tropicbirds in his summary of seabirds breeding on the northern coast of Cuba.

Small numbers of White-tailed Tropicbirds continue to nest along the southeastern coast of Cuba between Cabo Cruz and ca. 50 km west of Santiago de Cuba. However, they are apparently absent as a breeding species elsewhere in Cuba and occur only sporadically along a coastal area smaller than that indicated by van Halewyn and Norton (1984). The area along this coast occupied by nesting White-tailed Tropicbirds may have been more extensive in the past. For example, Cory (1891) noted a pair flying about near the entrance to the harbor of Santiago de Cuba in the spring of 1891.The only recent report is from Cruz and Alayo (1984) who reported about 80 nesting pairs at Punta El Inglés, a few kilometers east of Cabo Cruz. The nesting areas are confined to steep or vertical cliffs rising from the ocean. Viña (pers. obser.) estimates the remainder of the Cuban population along this portion of the coastline to be about 10 active pairs. Another colony of no more than 12 pairs is known from the southern coast of Guantánamo at Loma de los Chivos. It is not productive in all years and the site is used irregularly (Jorge de la Cruz, pers. comm.). Thus, the total Cuban population numbers approximately 100 pairs.

We attribute this small population size to limited availability of predator-free nesting sites. The small population size may, in part, also be explained by the construction of a coastal road between villages at the base of the Sierra Maestras. This road was widened and improved in the early- to mid–

1990s in response to the growing in–country tourist trade, and the grading has had an obvious impact on the sea cliffs and presumably on tropicbird nest sites. During the winters of 1992 and 1997 numerous instances of major erosion and massive rock slides occurred both above and below road grade (Lee and Walsh–McGehee, pers. obs.). Cruz believes the tropicbirds may be abandoning the Guantánamo site because of disturbance from the road adjacent to the cliff they use for nesting. The extent to which this development makes locally nesting seabirds vulnerable to poaching is unknown, but poaching is presumed to be limited for this cliff nesting species. White-tailed Tropicbirds will travel at least 89 km to foraging sites (Pennycuick *et al.* 1990), and adults can travel up to an air distance of 315 km in 6.7 hours, the average time between chick feedings (Schaffner 1990a, b). Strong upwellings along portions of this section of the Cuban coast provide dependable foraging areas (Lee and Viña 1993). We have seen White-tailed Tropicbirds feeding over these upwellings and have no reason to suspect that food is a locally limiting resource. We suspect that lack of adequate undisturbed nesting sites is the primary, and perhaps only, factor restricting population size.

The western Atlantic White-tailed Tropicbird is an endemic subspecies (*Phaethon lepturus catesbyi*) whose total population was believed to number more than 10,000 pairs in the early 1980s (van Halewyn and Norton 1984). Lee and Walsh-McGehee (unpubl.) made a reassessment in the late 1990s and, despite the documentation of additional colonies, estimated the total population to be about half this size. Approximately 2,500 pairs of this population nest in Bermuda, an estimated 2,000 pairs breed in the Bahamas (Walsh-McGehee and Lee, unpubl.), and less than 2,000 pairs nest in the Greater and Lesser Antilles. Except for a few remote sites in the Greater Antilles, most nesting colonies in the West Indies are small and consist of less than 50 pairs. These low numbers clearly result from the introduction of exotic predators by European colonists. These predators have led to the tropicbird's current dependence on inaccessible cliff faces for nesting as is evidenced by a wider selection of nest sites and by higher densities elsewhere in this species' range where predators are absent. The White-tailed Tropicbirds in Cuba, and elsewhere in the West Indies, today appear to be relict populations and provide only clues to former distribution and abundance.

## Literature Cited


American Ornithologists' Union. 1983. Check-list of North American birds, 6th ed. American Ornithologists' Union. Washington, D. C.

Barbour, T. 1943. Cuban ornithology. Mem. Nuttall Ornith. Club. No 9.

Buden, D. W. 1987. The birds of the southern Bahamas. An annotated check-list. B.O.U. Checklist No 8. British Ornithologists' Union. London.

Cory, C. B. 1891. A list of birds taken and observed in Cuba and the Bahama Islands, during March and April, 1981. Auk 8 (3):292-294.

Cruz Lorenzo, J.de la, and R. Alayo Soto. 1984. Primeros datos sobre la nidificación del Vencejo de Collar, *Streptoprocne zonaris pallidifrons*, y del Contramaestre, *Phaethon lepturus catesbyi* (Aves: Apodidae y Phaethonidae) en Cuba. P. 456 *in* Conferencia Cientifica sobre Educación Superior, 1984, Univ. La Habana.

Garrido, O. H., and F. García Montaña. 1975. Catálogo de las aves de Cuba. Academia de Ciencias de Cuba. La Habana, Cuba.

Garrido, O. H., and A. Kirkconnell. 1993. Checklist of Cuban birds. Special Publ. for Soc. Carib. Ornithol. Annual Meeting. Playa Girón, Cuba.

González, H. Under review. Status of Cuban seabirds. Proc. Symp. Caribb. Seabirds, August 1996, Society of Caribbean Ornithology, Aruba.

Lee, D. S., and N. Viña. 1993. A re-evaluation of the status of the endangered Black-capped Petrel, *Pterodroma hasitata* in Cuba. Ornitologia Neotropical 4(2):99-101.

Morales Leal, J. y Orlando H. Garrido. 1996. Aves y reptiles de Cayo Sabinal, Archipiélago de Sabana-Camagüey, Cuba. El Pitirre 9 (3):9-11.

Pennycuick, C. J., F. C. Schaffner, M. R. Fuller, H. H. Obrecht, III, and L. Sternberg. 1990. Foraging flights of the White-tailed Tropicbird (*Phaethon lepturus*): radiotracking and doubly-labelled water. Colon. Waterbirds 13(2):96-102.

Schaffner, F. C. 1990a. Food provisioning by White-tailed Tropicbirds: effects on the developmental patterns of chicks. Ecology. 71(1):375-390.

Schaffner, F. C. 1990b. Feed size and feeding periodicity in pelagic birds: notes on methodology. Colon. Waterbirds 13(1):7-15.

Sprunt, A., IV. 1984. The status and conservation of seabirds of the Bahama Islands. Pp. 157-168 *in* Croxall, J. P., P. G. H. Evans, and R. W. Schreiber (eds.). Status and conservation of the world's seabirds. ICBP Tech. Publ. No. 2, Cambridge, U. K.

van Halewyn, R., and R. L. Norton. 1984. The status and conservation of seabirds in the Caribbean. Pp. 169-222 *in* Croxall, J. P., P. G. H. Evans, and R. W. Schreiber (eds.). Status and conservation of the world's seabirds. ICBP Tech. Publ. No. 2, Cambridge, U. K.

Wiley, J. W. Ms. A bibliography of West Indian seabirds. Unpublished.

# NUEVAS ADICIONES A LA PALEORNITOLOGIA CUBANA

WILLIAM SUÁREZ Y OSCAR ARREDONDO
*Colaboradores del Museo Nacional de Historia Natural de La Habana, Cuba*

EN LOS AÑOS 1911 Y 1918 se colectaron los primeros especímenes de aves fósiles en Cuba. Estos se eshumaron al suroeste de la ciudad de Cienfuegos, localidad de Ciego Montero, pero no se dieron a conocer hasta 10 años después, luego de ser estudiadas por Alexander Wetmore (Wetmore 1928). Desde esa fecha hasta 1957, las aves fósiles volvieron a ser ignoradas y permanecieron en el olvido por más de un cuarto de siglo. En 1958 se erigió el primer género endémico para nuestra paleornitofauna (Arredondo 1958), del mismo (*Ornimegalonyx*) se conocen los mayores estrígidos de todo el planeta (Arredondo 1958, 1982). Este hecho marcó un punto a partir del cual autores cubanos y extranjeros se dieron a la tarea de conocer nuestras aves fósiles, sus trabajos permitieron descubrir nuevos taxones para la ciencia y evidenciar la presencia de muchos que aunque descritos de otras tierras formaron parte de aquella fauna vertebrada ya extinta (Arredondo 1970, 1971, 1972a, 1972b, 1982, 1984; Arredondo y Olson 1994; Brodkorb 1969; Fischer 1968; Fischer y Stephan 1971; Olson 1985; Olson y Kúrochkin 1987).

Recientemente fueron encontrados restos de aves en estratos del período terciario (Mioceno) en el centro-sur de Cuba (Macphee e Iturralde-Vinent 1994), los cuáles se encuentran indeterminados a otros niveles taxonómicos; además se darán a conocer ocho nuevas aves para el cuaternario que aun subsisten en el archipielago cubano (O. Jiménez, com. per.).

Luego de reconsideradas por uno de nosotros (Suárez) las aves fósiles del cuaternario (Pleistoceno-Holoceno temprano) conocidas y recogidas en la literatura, suman realmente solo 41 taxones, de ellos dos géneros son endémicos de Cuba y la subregión antillana. Muchas de estas serán tratadas en trabajos apartes, debido a hallazgos de nuevos y más completos especímenes que permiten una mejor exploración taxonómica y su adecuada ubicación a niveles genéricos y específicos (Suárez, en prep.).

En el presente trabajo agregamos cuatro nuevos géneros de aves para el cuaternario cubano: tres de ellos son desconocidos hasta hoy en Cuba y las Antillas, aunque conocidos en el continente; una especie esta extinta de las Bahamas y otras que aun viven en Cuba pero no habían sido encontradas antes en depósitos fosiliferos.

## RELACIÓN DE AVES

### Orden Ciconiiformes

Familia Teratornithidae

***Teratornis* sp.** — Material y distribución: 7 especímenes. Fémur derecho completo; colectado en la Cueva de Paredones, Caimito, La Habana, Colección del Insituto de Ecología y Sistemática (IES.) No. 400–649, cóndilo medial de fémur izquierdo, colectado en la Cueva de Paredones, colección Oscar Arredondo (OA–3151); cuadrado, colectado en la Cueva del Túnel, La Salud, La Habana (OA–2205); fragmento distal de fémur, colectado en Cuevas Blancas, Quivicán, La Habana, depositado en la colección de Osvaldo Jiménez (OJ–p–8); húmero derecho incompleto, coracoides incompleto y mitad distal de tibiotarso derecho, colectados en la Cueva de Sandoval, Caimito, La Habana, colección de William Suárez (WS–936, 363, 364). Género conocido de Norteamérica, California, E.E.U.U. Desconocido en las Antillas hasta hoy. Edad: Cuaternario, posiblemente pleistoceno.

Familia Vulturidae

***Gymnogyps* sp.** — Material y distribución: 1 especímen. Tarsometatarso izquierdo sin trocleas, colectado en la Cueva de Paredones, Caimito, La Habana (WS–125). Género viviente en Norteamérica. Edad: Cuaternario, posiblemente pleistoceno.

### Orden Accipitriformes

Familia Accipitridae

***Accipiter striatus fringilloides* Vigors, 1827.** — Material y distribución: 2 especímenes. Fémures izquierdos incompletos (WS–975, 976); Colectados en la Cueva de Paredones, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

***Accipiter gundlachi gundlachi* Lawrence, 1860.** — Material y distribución: 2 especimenes. Tarsometatarso derecho incompleto (WS–277); Cueva del Túnel, La Salud, La Habana y tarsometatarso derecho incompleto (WS–785); colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

***Buteo platypterus cubanensis* Burns, 1911.** — Material y distribución: 1 especímen. Tibiotarso izquierdo incompleto (OA–3023) colectado en la Cueva de Paredones, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

***Amplibuteo* sp.** — Material y distribución: 1 esqueleto incompleto (tarsometatarso izquierdo completo,

WS–365e; fémures, WS–374 y WS–375; pelvis, WS–365s; falanges subterminales, WS–365h, 365f, 365l, 382; falanges ungueales, WS–335, 336; vértebras, WS–365o, 365j, 365k, 369; fragmentos de húmero, WS–376a, 376b, 376c; rótula, WS–852; fibula fragmentada, WS–365t; costillas WS–365x0 al 365x6) colectado en la Cueva de Sandoval, Caimito, La Habana. Etad: Cuaternario, posiblemente pleistoceno. Género conocido en ambos hemisferios del continente americano, desconocido hasta hoy en las Antillas.

Familia Falconidae

***Caracara creightoni* Brodkorb, 1959.** — Material y distribución: 3 especímenes. Cráneo fragmentado (OA–3928) colectado en Cueva Calero, Cantel, Matanzas; porción distal de fémur izquierdo (WS–0209) y mitad proximal de fémur derecho (WS–0142), ambos colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno. Especie fósil conocida de las Bahamas.

***Milvago* sp.** — Material y distribución: 1 especímen. Fragmento proximal de tarsometarso izquierdo (WS–977) colectado en la Cueva de Paredones, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno. Exíste una especie fosil (*M. alexandri*) descrita para las Antillas (Olson 1976).

Orden Columbiformes

Familia Columbidae

***Zenaida aurita zenaida* (Bonaparte, 1825).** — Material y distribución: 33 especímenes. 15 húmeros (WS–264, 009, 018, 023, 032, 046, 095, 097, 0101, 0104, 0206, 0210, 0211, 0212 y 0216), 12 ulnas (WS–862, 013, 017, 019, 021, 027, 036, 037, 0100, 0130, 0133 y 0207), 3 fémures (WS–025, 0111 y 0208), 3 tibiotarso (WS–014, 015, 0134) colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

Orden Cuculiformes

Familia Cuculidae

***Crotophaga ani* Linneo, 1758.** — Material y distribución: 2 especímenes. Mitad próximal de tarsometatarso izquierdo (OA–400-305), fémur derecho incompleto (WS–r–44) colectados en la Cueva de Paredones, Caimito, La Habana, y húmero derecho (WS–039) colectado en la Cueva de Sandoval del mismo municipio. Edad: Cuaternario, posiblemente pleistoceno.

Orden Piciformes

Familia Picidae

***Colaptes fernandinae* Vigors, 1827.** — Material y distribución: 20 especímenes. 10 húmeros (WS–353, 783, 784, 005, 008, 028, 0172, 0173, 0175 y 0176), 7 ulnas (WS–047, 0135, 0174, 0177, 0178, 0179 y 0180), 1 fémur (WS–007), 2 tibiotarsos (WS–050, 094) colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

Orden Passeriformes

Familia Corvidae

***Corvus palmarum* cf. *minutus* Gundlach, 1852.** — Material y distribución: 33 especímenes. 7 húmeros (WS–268, 13124, 004, 088, 098, 0187 y 0188), 8 ulnas (WS–011, 012, 022, 036-1, 0103, 0186, 0191 y 0217), 1 carpometacarpo (WS–0154), 9 fémures (WS–620, 856, 002, 016, 033, 0183, 0185, 0198 y 0189), 8 tibiotarsos (WS–942, 0102, 0123, 0163, 0181, 0182, 0184 y 0218), colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

Familia Hirundinidae

***Hirundo fulva cavicola* (Barbour y Brooks, 1917)** — Material y distribución: 5 especímenes. 1 húmero derecho (WS–063), 2 cúbitos (WS–069, 070), 1 fémur (WS–034) y 1 tibiotarso (WS–078) colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

Familia Emberizidae

***Sturnella magna hippocrepis* (Wagler, 1832).** — Material y distribución: 3 especímenes, 2 fémures incompletos (WS–0199 y 0204), 1 tarsometarso (WS–0147), colectados en la Cueva de Sandoval, Caimito, La Habana. Edad: Cuaternario, posiblemente pleistoceno.

COMENTARIOS

Muchas aves hoy relictas en Cuba y que han sido halladas pocas veces en depósitos fosilíferos (Olson y Pregill 1982), como *Athene [Speotyto] cunicularia*, se han encontrado en gran número de especímenes y localidades, sobre todo en las espeluncas del sur de la provincia La Habana, así también otras especies como *Torreornis inexpectata*, citada por otros autores (Pregill y Olson 1981) para la región Oriental y La Habana.

Aves conocidas solamente de la localidad tipo, como *Grus cubensis*, *Nesotrochis picapicensis* y *Tyto riveroi*, han sido encontradas en las cuevas de La Habana, ampliando su

distribución en Cuba.

Dejamos constancia de nuestra gratitud a Storrs L. Olson, Museo Nacional de Historia Natural, Smithsonian Institution, Washington, D. C., por sus opiniones y comentarios sobre algunos de los especímenes aquí tratados.

LITERATURA CITADA

ARRENDONDO, O. 1958. Aves gigantes de nuestro pasado prehistórico. El Cartero Cubano, La Habana 17(7):10-12.

ARRENDONDO, O. 1970. Nueva especie de ave pleistocénica del orden Accipitriformes (Accipitridae) y nuevo género para las Antillas. Cienc. Biol., Univ. La Habana 8:1-19.

ARRENDONDO, O. 1971. Nuevo género y especie de ave fósil (Accipitriforme: Vulturidae) del pleistoceno de Cuba. Mem. Soc.Cienc. Nat. La Salle 31(90):309-323.

ARRENDONDO, O. 1972a. Nueva especie de ave fósil (Strigiformes: Tytonidae) del pleistoceno superior de Cuba. Bol. Soc. Venezolana Cienc. Nat. 29(122-123):415-431.

ARRENDONDO, O. 1972b. Especie nueva de lechuza gigante (Strigiformes: Tytonidae) del pleistoceno cubano. Bol. Soc. Venezolana Cienc. Nat. 30(124-125):129-140.

ARRENDONDO, O. 1982. Los Strigiformes fósiles del pleistoceno cubano. Bol. Soc. Venezolana Cienc. Nat. 37(140):33-35.

ARRENDONDO, O. 1984. Sinopsis de las aves halladas en depósitos fosilíferos pleistoholocénico de Cuba. Rep. Invest. Inst. Zool. 17:1-35.

ARRENDONDO, O. y S. L. OLSON. 1994. A new species of owl of the genus *Bubo* from the Pleistocene of Cuba (Aves: Strigiformes). Proc. Biol. Soc. Wash. 107(3):436-444.

BRODKORB, P. 1969. An extinct Pleistocene owl from Cuba. Q. J. Florida Acad. Sci. 31(2):112-114.

FISCHER, K.–H. 1968. Ein flugunfähier Kranich aus dem pleistozän von Cuba. Falke 15(8):270-271.

FISCHER, K. y B. STEPHAN. 1971. Weitere Volgelreste aus dem pleistozän der Pio-Domingo-Höhle in Kuba. Wiss. Z. Humboldt-Univ. Berl., Math-Naturwiss. Reihe 20(4-5):593-607.

MACPHEE, R. D. E. y M. A. ITURRALDE–VINENT. 1994. First Tertiary land mammal from Greater Antilles: an early Miocene sloth (Xenarthra, Megalonychidae) from Cuba. Am. Mus. Nat. Hist. Nov. 3094:1-13.

OLSON, S. L. 1976. A new species of *Milvago* from Hispaniola, with notes on other fossil caracaras from the West Indies (Aves: Falconidae). Proc. Biol. Soc. Wash. 88(33):355-366.

OLSON, S. L. 1985. A new species of *Siphonorhis* from the Quaternary cave deposits in Cuba (Aves: Caprimulgidae). Proc. Biol. Soc. Wash. 98(2):526-532.

OLSON, S. L. y E. N. KÚROCHKIN. 1987. Fossil evidence of a tapaculo in the Quaternary of Cuba (Aves: Passeriformes: Scytalopodidae). Proc. Biol. Soc. Wash. 100(2)353-357.

OLSON, S. L. y G. K. PREGILL. 1982. Introduction to the paleontology of Bahaman vertebrates. Pp. 1-7 *in* Olson, S. L. (ed.) Fossil vertebrates from the Bahamas. Smithsonian Contrib. Paleobiol. 48:1-65.

PREGILL, G. K. y S. L. OLSON. 1981. Zoogeography of West Indian vertebrates in relation to Pleistocene climatic cycles. Annu. Rev. Ecol. Syst. 12:75-98.

WETMORE, A. 1928. Bones of birds from the Ciego Montero deposit of Cuba. Am. Mus. Nat. Hist. Nov. 301:1-5.

---

## ABSTRACTS OF PAPERS PRESENTED AT THE SOCIETY OF CARIBBEAN ORNITHOLOGY ANNUAL MEETING IN ARUBA, DUTCH WEST INDIES, AUGUST 1997

### THE AVIFAUNA OF THE PITONS IN ST. LUCIA

DONALD ANTHONY
*Forestry Department, Castries, St. Lucia*

A SURVEY OF THE BIRDS on Gros and Petit Piton, St. Lucia, was conducted in February 1997. A total of 27 species were observed including four island endemics: St. Lucia Oriole (*Icteus laudabilis*), St. Lucia Wren (*Troglodytes aedon maesoleucos*), Lesser Antillean Flycatcher (*Myiarchus oberi*), and the St. Lucia Black Finch (*Melanospiza richardsoni*). Three species of hummingbirds, four columbids, and four finches also occur in St. Lucia. On the Pitons, man's impact has been minimal since the steep slopes have deterred most forms of agriculture. Beard (1949) referred to the Pitons as "the most spectacular piece of scenery in the West Indies." Today the pitons are a haven for bird life.

**LA AVIFAUNA DE LAS PITONS EN ST. LUCIA.** Un censo de aves en las islas de Gros y Petiti Piton en St. Lucía se llevó a cabo en febrero de 1997. Fueron observadas un total de 27 especies de aves, incluyendo cuatro endémicas; *Icterus laudabilis, Troglodytes aedon maesoleucos, Myiarchus oberi* y *Melanospiza richardsoni*. Cuatro especies de zumbadores, cuatro colúmbidos y cuatro gorriones también se encuentran aquí. En las Pitón, sin embargo, el impacto del hombre ha sido mínimo debido a que sus empinadas laderas han detenido las formas tradicionales de agricultura. Beard (1949) se refiere a las Pitons como "la más extraordinaria área escénica de las Antillas." En la actualidad, las Pitons son un paraíso para las aves.

## HISTORY AND SUBSPECIATION OF THE PEARLY-EYED THRASHER, EMPHASIZING *MARGAROPS FUSCATUS BONARIENSIS* IN THE NETHERLANDS ANTILLES

WAYNE J. ARENDT
*International Institute of Tropical Forestry, USDA Forest Service. P. O. Box 490, Palmer, Puerto Rico 00721*

THE PALEONTOLOGICAL RECORD and early written accounts document that two of the three subspecies of *Margarops fuscatus* were once more widely distributed in the eastern Caribbean (= *Margarops f. densirostris*) and among the extralimital islands north of the Venezuela, South America; i.e., Bonaire and La Horquilla Island in the Los Hermanos Archipelago (= *M. f. bonariensis*). In support of the hypothesis that the predecessor of *Margarops fuscatus* arrived in the Lesser Antilles before the Wisconsin glaciation and then spread northward, there exists an ever-growing body of evidence from archeological sites (Amerindian middens) and paleontological material (owl pellets from caves) in the Eastern Caribbean dating back to the late Quaternary from Anguilla, St. Eustatius, Barbuda, Antigua, and Montserrat. Some mineralized bones date back more than 2,000 years (St. Martin). Before the turn of the century, authors made reference to *Margarops* species, and specimens of *M. fuscatus* were collected, from both St. Vincent (23 April 1890) and Barbados (2 March 1889), but today the pearly-eye is absent on both islands. Whereas the pearly-eye has undergone population declines in the southern extremes of its range, populations farther north, on islands such as Puerto Rico and Montserrat, have exhibited almost explosive population increases. Similarly, on Bonaire, Netherlands Antilles, the disjunct population of *M. f. bonariensis*, which was limited to the Fontein plantation for almost 100 years, within the last 20 years has spread over most of the island. Univariate statistics and stepwise discriminate function analysis (DFA) on five morphological characters were used to show that *Margarops bonariensis*, the most isolated of the three subspecies, is the most distinct phenotype. Culmen length from the nares, tarsus, and wing chord, respectively, were the most influential variables in the DFA model.

HISTORIA Y SUBESPECIACIÓN DEL *MARGAROPS FUSCATUS*, CON ÉNFASIS EN EL *M. F. BONARIENSIS* EN LAS ANTILLAS HOLANDESAS. El registro paleontológico y documentos escritos antiguos documentan que dos de las tres subespecies de *Margarops fuscatus* antes se encontraban más ampliamente distribuidas en el Caribe Oriental (=*Margarops f. densirostris*) y entre las islas del noreste de Venezuela, tales como Bonaire e Isla La Horquilla en el Archipiélago de Los Hermanos (=*M. f. bonariensis*). En apoyo de la hipótesis de que el predecesor del *Margorops fuscatus* antes de la glaciación de Wisconsin y luego se dispersó hacia el norte, existe una creciente cantidad de evidencia recopilada en sitios arqueológicos y material paleontológico en el Caribe occidental que data del período Cuaternario Tardío procedente de Anguilla, St. Eustatius, Barbuda, Antigua y Monserrat. Algunos huesos mineralizados tienen más de 2000 años (St. Martin). Antes del fin del siglo pasado, varios autores hacían referencia a la especie *Margarops*, y especímenes de *M. fuscatus* se coleccionaron en St, Vincent (23 de abril de 1890) y en Barbados (2 de marzo de 1889), pero hoy en día el ave no se encuentra en estas islas. Aún cuando esta ave haya mostrado descensos poblacionales en el extremos sur de su territorio, en islas como Puerto Rico y Monserrat ha experimentado aumentos poblacionales casi explosivos. En forma similar, en Bonaire, Antillas Holandesas, la población de *M. f. bonariensis*, que estaba limitada a la plantación de Fontein por casi 100 años, en los últimos 20 años se ha extendido sobre la mayor parte de la isla. Diferentes análisis estadísticos se usaron en cinco características morfológicas para demostrar que *M. bonariensis*, la más aislada de las tres subespecies, posee el fenotipo más distintivo. Medidas del pico, tarso y las alas fueron las variables más influyentes en los análisis estadísticos.

## PHYLOGENETIC RELATIONSHIPS AND CONSERVATION STATUS OF SOME WEST INDIAN VIREOS

JON C. BARLOW
*The Center for Biodiversity and Conservation Biology, Royal Ontario Museum and Department of Zoology, University of Toronto, Toronto, Ontario, Canada*

CURRENT PHYLOGENETIC STUDIES (Barlow and Peck 1996, 1997) indicate a probable common origin for endemic West Indian scrub–dwelling vireos (subgenus *Vireo*) whereas the origins of species of the "more forest loving" species in the subgenus *Vireosylva* (i.e., Black-whiskered Vireo [*Vireo altiloquus* ssp., 6 taxa], Yucatán Vireo [*Vireo magister* ssp., 2 taxa]) are not yet completely determined. Where the two kinds occur together they tend to forage at higher (*Vireosylva*) and lower (*Vireo*) levels in the canopy — effecting a kind of habitat partitioning reminiscent of ecological relationships

between members of the two subgenera in mainland environments. Herein I concentrate on West Indian vireos from small islands (e.g., St. Andrews Vireo [*V. caribaeus*]) where restricted size of the range versus natural and human-introduced threats are critical to survival of the species and to speculation about the conservation status of vireos in severely degraded environments on large islands (e.g., Flat-billed Vireo [*V. nanus*] population of Hispaniola). A summary of taxonomic relationships, based on my research and that of my students, and of behavioral parameters, is also provided and examined in the light of my varying experience with each of these taxa. The prognosis for survival of the seemingly most vulnerable populations of vireos lies largely in the hands of the resident conservationists of each of these countries.

**Relaciones Filogenéticas y el Estado de la Conservación de Algunos Vireos de las Antillas.** Los estudios filogenéticos actuales (Barlow y Peck, 1996 y 1997) indican un probable origen común para los vireos de matorrales endémicos de las Antillas (subgénero *Vireo*) mientras que los orígenes de las especies más afines al bosque en el subgénero *Vireosylva* (tales como el *Vireo altiloquus* spp., 6 taxones; *V. magister* ssp., 2 taxones) aún no se han determinado completamente. En las áreas donde ambos tipos ocurren simultáneamente tienden a alimentarse en niveles más altos (*Vireosylva*) y más bajos (*Vireo*) del dosel – llevando a cabo una repartición del hábitat similar a las relaciones ecológicas entre las dos subgéneros en ambientes continentales. En este trabajo me concentro en Vireos (*V. caribaeus*) en las Antillas pequeñas donde la comparación del tamaño reducido de su distribución a las amenazas naturales y las añadidas por el hombre son esenciales para la supervivencia de la especie y acerca de la especulación sobre el estado actual de los esfuerzos de conservación en ambientes severamente degradados en la islas mayores. Un resumen de las relaciones taxonómicas, basado en parámetros de comportamiento y en estudios míos y de mis estudiantes, también se provee y amolda a la luz de mis distintas experiencias con cada una de estos taxones. La prognósis para la supervivencia de estas poblaciones tan vulnerables de vireos recae grandemente en las manos de los conservacionistas de cada uno de estos países.

## POPULATION DYNAMICS OF THE WHITE-CHEEKED PINTAIL IN PUERTO RICO

G. Bonilla, R. Castro, and F. Rivera
*Departamento de Recursos Naturales y Ambientales, División de Ecología Terrestre, San Juan, Puerto Rico 00906-6600*

In this study we analyze certain parameters of the population dynamics of the White-cheeked Pintail (*Anas bahamensis*). The distribution, movements, population estimates, annual survival, and habit use were determined using various methods, including capture–recapture and radio telemetry. The species is distributed mostly in eastern Puerto Rico. The population is estimated to consist of 400–500 individuals. A total of 154 individuals were marked. Habitat use was determined using 10 ducks fitted with radio transmitters. These birds were found in five vegetation communities in the lagoon in the wildlife refuge at Humacao.

**Dinámica Poblacional del Pato Quijada Colorada en Puerto Rico.** En este estudio se analizan ciertos parámetros de la dinámica poblacional del Pato Quijada Colorada (*Anas bahamansis*). Su distribución, movimiento, estimado poblacional, sobrevivencia anual y uso del hábitat son determinados utilizando métodos tales, como captura–recaptura y telemetría. Esta especies está distribuida al este de Puerto Rico. Su estimado poblacional anual es de 400–500 individuos. Un total de 154 individuos han sido marcados. El uso del hábitat ha sido medido utilizando 10 individuos con transmisores. Estos han sido encontrados distribuidos en cinco tipos de formación de vegetación en el sistema de lagunas del Refugio de Vida Silvestre de Humacao

## CONSERVATION AND STATUS OF THE CAYMAN BRAC PARROT AND WINTERING NEOTROPICAL MIGRANTS

Frederic J. Burton[1], Patricia E. Bradley[1], E. J. Williams[2], and Trevor B. Baxter[1]
*[1]National Trust for the Cayman Islands, P. O. Box 31116 SMB, Cayman Islands; [2]Georgia Partners in Flight, Wildlife Resources Division, 116 Rum Creek Drive, Forsyth, Georgia 31029 USA*

Beginning at the Society of Caribbean Ornithology meeting in the Bahamas in August 1996, representatives of Georgia Partners in Flight (GPIF) began exploring possible development of an international partnership with the National Trust for the Cayman Islands. The partnership, which may include research, monitoring, education, and outreach through nature tourism, is intended to foster cooperative bird conservation efforts necessary for both native bird and wintering neotropical migrants. Following identification of a priority bird conservation need for both an endemic species, the

Cayman Brac Parrot (*Amazona leucocephala hesterna*), and numerous neotropical migrants that either nest or migrate through Georgia, GPIF secured a private grant to accomplish the triennial parrot census and collect preliminary data on migrants sharing the woodland habitat of Cayman Brac. The Cayman Brac Parrot is an endangered endemic subspecies of the Cuban Parrot, restricted to the 38 km² island of Cayman Brac. Studies in 1991–1994 by Burton and Wiley (in prep.) indicated that approximately 400 *A. l. hesterna* survived in the wild, and that the population was stable in numbers over that 3-year period after a lull in historical pressures from nest robbing and hunting, habitat destruction, and the introduction of exotic predators and competitors. A parrot census was conducted from 7–14 February 1997, when 62 fixed observation stations, which were originally established throughout the island in 1991, were manned. The network of stations sample ca. 50% of the land area of Cayman Brac, including coverage of all major habitat types. Stations were occupied for approximately 3 hours during both peak morning and evening activity periods of parrots. Calls and sightings were correlated between adjacent stations to develop maximum and minimum count estimates for contiguous areas each session. The 1997 census showed no significant difference in abundance in *A. l. hesterna* since the previous censuses in 1991 and 1994, with the mean population estimate remaining around 400 birds. The Cayman Brac Parrot is heavily dependent on old growth Dry Evergreen Woodland which covers much of the Brac's elevated plateau. This habitat is also critical for a wide range of flora and fauna, including an abundant neotropical migrant bird influx in winter months, with at least 12 species observed during the 1997 census. A recent flurry of road construction and development incentives are cause for concern that renewed deforestation on Cayman Brac's woodlands may degrade this diverse and rich habitat, and further threaten the precariously small population of *A. l. hesterna.*

**El Estado y la Conservación de *Amazona leucocephala hesterna* y de las Aves Migratorias Neotropicales.** Luego de la reunión anual de la Sociedad de Ornitología del Caribe en Bahamas en agosto de 1996, representantes de Georgia Partners in Flight (GPIF) empezaron a explorar la posibilidad de desarrollar una cooperación en sociedad con el National Trust for the Cayman Islands. Esta sociedad, que podría incluir investigación, censos, educación y alcances amplios a través del ecoturismo, busca estimular los esfuerzos para la conservación de las aves tanto nativas como las migratorias neotropicales. Luego de identificar las prioridades de conservación tanto para la Cotorra de Cayman Brac *Amazona leucocephala hesterna* y las numerosas aves migratorias que anidan o que pasan a través de Georgia, GPIF obtuvo fondos privados para lograr censos trienales de la cotorra y la colección de data preliminar sobre las aves migratorias que comparten el hábitat boscoso de esta cotorra. La cotorra *A. l. hesterna* es una subespecie de la cotorra de Cuba restringida a los 32 km² de la isla de Cayman Brac. Estudios por Burton y Wiley de 1991 al 1994 (en preparación) indican que 400 individuos sobreviven en estado silvestre, en números estables en los tres años luego de una tregua en las presiones históricas en los robos de nidos y la cacería, le destrucción del hábitat y la introducción de competidores y depredadores. Un censo se llevó a cabo del 7 al 14 de febrero de 1997, ocupando 62 estaciones de observación fijas preestablecidas en toda la isla desde 1991. Esta red de estaciones es capaz de cubrir cerca de 50% de la isla de Cayman Brac, incluyendo la cobertura de los tipos de hábitat más importantes. La estaciones se ocuparon por 3 horas en los períodos pico de las actividades en la mañana y al atardecer. Los cantos y los avistamientos fueron correlacionados entre las estaciones adyacentes para desarrollar un estimado de máximo y mínimo para cada seción en áreas contiguas. El censo de 1997 no mostró una diferencia significativa con los censos de 1991 y 1994, con un estimado promedio de la población manteniéndose alrededor de los 400 individuos. La Cotorra de Cayman Brac es altamente dependiente del Bosque Seco Siempreverde que cubre gran parte dela zona alta de Brac, este hábitat es crucial también para una alta gama de flora y fauna, incluyendo un flujo de aves migratorias neotropicales en los meses de invierno, con al menos 12 especies de aves observadas en el censo de 1997. Un reciente frenesí en la construcción de caminos y en los incentivos para el desarrollo son un motivo de preocupación ya que nuevas presiones causadas por la deforestación en los bosques del Brac puede degradar este rico y diverso hábitat y amenazar aún más la precaria población de la Cotorra de Brac.

## DEMOGRAPHIC IMPACTS OF HURRICANES ON CARIBBEAN SEABIRDS

J. W. Chardine[1], and R. D. Morris[2]
[1]*Canadian Wildlife Service, St. John's, Newfoundland, Canada;* [2]*Brock University, St. Catharines, Ontario, Canada*

The past few years have seen an increase in the frequency and severity of tropical storms in the Caribbean. In fact the 1995 season was considered the most severe since the 1930s. In September 1989, just after the breeding season, a category 4 hurricane (Hugo) passed over our Brown Noddy (*Anous stolidus*) study site in the Culebra National Wildlife Refuge, Puerto Rico. The storm killed both adults and fledglings. Only 67% of adults alive in 1989 survived to 1990, whereas survival rates typically exceed 90% per annum at our study site. This change amounted to a tripling of the mortality rate in 1989 compared to typical years. In addition, only 3% of the 1989 cohort of chicks was recruited into the breeding population, compared to 7-13 % in other cohorts. In September 1995, category 4 (Luis) and category 2 (Marilyn) hurricanes passed by Culebra within a week of each other and, again, adult survival was reduced in the subsequent year. Despite reduced survival, colony size did not decline appreciably in 1990 or 1996, which suggests that a pool of birds was

available to enter the breeding population and fill gaps left by dead birds. Since breeding dispersal of noddies at Culebra is virtually zero, we assume that new recruits are first-time breeders. Thus the average age of noddies breeding at the study site likely declined in 1990 and 1996. The existence of a pool of young birds capable of breeding if given the opportunity imparts a buffering capacity to seabird populations against fluctuations in survival rates as are caused by hurricanes. Periodic reductions in survival would act to draw-down this pool of non-breeders, which would build up between events through reproduction. Repeated draw-downs caused by more frequent hurricanes may reduce the size of the pool to a level at which it can no longer act as an effective buffer.

**Impactos Demográficos de los Huracanes en las Aves Marinas del Caribe.** En los pasados años hemos visto un aumento en la frecuencia y severidad de los huracanes en el Caribe. De hecho, la temporada de 1995 fue considerada la más severa desde 1930. En Septiembre de 1989, justo luego de la temporada de anidaje, un huracán de categoría 4 (Hugo) paso sobre nuestra área de estudio del *Anous stolidus* en el Refugio Nacional de Vida Silvestre de Culebra, en Puerto Rico. La tormenta mató tanto a los adultos como a los pichones. Solo el 67% de los adultos vivos en 1989 sobrevivió hasta 1990, cuando las tazas de supervivencia típicas exceden el 90% anual en nuestra área de estudio. Este cambio logró triplicar la taza de mortalidad comparándolo a años anteriores. Además de eso, solo el 3% de los pichones pudieron ser reclutados a la población adulta, comparándolo con un 7 al 13% en otros años anteriores. En septiembre de 1995, huracanes de categoría 4 (Luís) y de categoría 2 (Marilyn) pasaron por Culebra con solo una semana de diferencia, reduciendo la supervivencia de adultos en el año siguiente. A pesar de la reducción de la supervivencia, el tamaño de la colonia no se redujo notablemente en 1990 o 1996, lo que sugiere que un fondo de aves estaba disponible para integrarse a la población reproductiva y llenar las brechas dejadas por las aves muertas. Debido a que la dispersión reproductiva de estas gaviotas es prácticamente nula, asumimos que los nuevos reclutas son gaviotas que se habrán de reproducir por primera vez. Por lo tanto la edad promedio de las gaviotas reproduciéndose en nuestra área de estudio declinó en 1990 y 1996. La existencia de una fuente de aves jóvenes con la capacidad de reproducir si se le da la oportunidad le imparte una capacidad amortiguadora a las poblaciones de aves marinas contra las fluctuaciones en las tazas de supervivencia como son las causadas por los huracanes. Las fluctuaciones periódicas en las tasas de supervivencia actuaría atrayendo esta fuente de aves no reproductoras, la cual se iría formando entre eventos catastróficos y temporadas de anidaje. La repetida recurrencia a asta fuente causada por una mayor frecuencia de los huracanes puede reducirla en tamaño hasta un nivel en el cual no pueda actuar más como amortiguadora efectiva.

## *AMAZONA* PARROTS IN JAMAICA

Herlitz Davis[1] and Susan Koening[2]
[1]*Department of Life Sciences, University of West Indies, Mona, Jamaica; and*
[2]*School of Forestry & Environmental Sciences, Yale University, Connecticut, USA*

In light of the current proposal to upgrade the Black-billed Parrot (*Amazona agilis*) from Appendix II to Appendix I of CITES, efforts are now being made to look more comprehensively at the distribution and movement of the two Jamaican *Amazona* Parrots, particularly in western Jamaica's karst area. This research is but one component of the Jamaica Parrot Project, which also includes study of the reproductive biology of the Black-billed Parrot and Yellow-billed Parrot (*Amazona collaria*) in our study area in Windsor Parish, Trelawny. Both species occur in good numbers in the limestone terrain known as the Cockpit Country, with a more or less patchy distribution for other parts of the island, such as Lumsden, Worthy Park, and the John Crow Mountains. In 1891 Scott stated that *A. agilis* was common in the Parish of Portland. Subsequently, various authors have remarked that it was becoming more and more rare. By 1976, Lack stated that "no modern ornithologist has seen it in the John Crow Mountains." A year after hurricane Gilbert, Varty found *A. agilis* only in the Hog House Hill area of eastern Portland. On the other hand, *A. collaria* is has generally been reported as more widespread and the commoner of the two species. This paper will present information gathered by the Jamaica Parrot Project on the distribution and movement patterns observed in the Cockpit Country, and in other parts of the island. So far, results obtained differ from previous reports, and they raise more questions than they provide answers.

**Las Cotorras del Género *Amazona* En Jamaica.** A luz de la propuesta actual de elevar la cotorra *Amazona agilis* del Apéndice II al Apéndice I de CITES, en estos momentos se están llevando a cabo esfuerzos para entender en forma más abarcadora la distribución y movimiento de las dos cotorras del género *Amazona* en Jamaica, particularmente en la zona kárstica occidental de Jamaica. Este es solo una parte del Proyecto Cotorra de Jamaica, al mando de por Susan Koening de la Universidad de Yale. Ella y sus asociados han examinado en forma intensiva la biología reproductiva de *Amazona agilis* y *Amazona collaria*, en la localidad de Windsor, en Trelawny. Ambas especies se encuentran bien representadas en los terrenos de piedra caliza en el área conocida como Cockpit Country, con una distribución desordenada en otras partes de la isla, tales como Lumsden, Worthy Park y las

Montañas John Crow. En 1891 Scott aseveró que *Amazona agilis* era común en el Condado de Portland. Luego de esto varios autores remarcaron el hecho de que se estaba convirtiendo más y más rara cada vez, hasta que en 1976 Lack asevera que "ningún ornitólogo moderno la ha visto en las Montañas de John Crow." Un año después del huracán de 1988, Varty coloca a *Amazona agilis* en el área de Hog House Hill en el área oriental de Portland. Por otro lado, *A. collaria* se reporta generalmente como siendo la más dispersa y común de las dos especies. Este trabajo presentará información coleccionada por el Proyecto Cotorra de Jamaica acerca de la distribución y patrones de movimientos observados en Cockpit Country y en otras partes de la isla. Hasta el momento, los resultados obtenidos difieren de otros reportes previos, levantando más preguntas que las respuestas que provee.

## RELATIONSHIPS BETWEEN HABITAT FRAGMENTATION AND BIRD COMMUNITIES IN THE BUFFER ZONE OF THE BLUE AND JOHN CROW MOUNTAINS NATIONAL PARK

SUZANNE DAVIS
*20 Gloucester Ave., Kingston 6, Jamaica*

HABITAT FRAGMENTATION in the Rio Grande Valley area of the Blue and John Crow Mountains National Park (BJCMNP) buffer zone, has resulted in the conversion of extensive forest into a patchwork of forest with other types of vegetation. Agriculture and silviculture have been key factors in the process of habitat fragmentation. Subsequent changes in vegetation structure (e.g., tree density; herb, shrub, and canopy cover) are assessed in this paper and related to the composition and relative abundance of bird communities. Recommendations are given for the management of avifauna in the Rio Grande Valley area of the BJCMNP buffer zone.

**RELACIONES ENTRE LA FRAGMENTACIÓN DEL HÁBITAT Y LAS COMUNIDADES DE AVES EN LAS ZONAS DE AMORTIGUAMIENTO DEL PARQUE NACIONAL BLUE Y JOHN CROW MOUNTAINS (BJCMNP).** La fragmentación del hábitat en las zonas de amortiguamiento del área del Valle de Río Grande en el BJCMNP, ha resultado en la conversión de grandes extensiones de terreno boscoso en un mosaico de bosque y otros tipos de vegetación. La agricultura y la silvicultura han sido factores claves en el proceso de la fragmentación del hábitat. Los cambios producidos en la estructura de la vegetación (tales como la densidad de árboles, la cubierta de hierbas, arbustos y dosel, etc.) son discutidos en este estudio y relacionados a la composición y abundancia relativa de las comunidades de aves. Se dan también recomendaciones para el manejo del área del valle de Río Grande en la zona de amortiguamiento del BJCMNP.

## CONTRIBUTION OF THE NATIONAL ZOOLOGICAL PARK TO AVIAN CONSERVATION IN HISPANIOLA

SIMÓN GUERREO
*Parque Zoológico Nacional (ZOODOM), Santo Domingo, República Dominicana*

HERE I SUMMARIZE the Hispaniolan bird species represented in the National Zoological Park, including those species which form part of the captive collection and those that live freely in the natural environment of the park. Also, I will describe the education and research programs implemented by ZOODOM for the conservation of the native avifauna.

**CONTRIBUCIONES DEL PARQUE ZOOLÓGICO NACIONAL A LA CONSERVACIÓN DE LAS AVES DE LA HISPANIOLA.** Se reportan las especies de la avifauna de la Hispaniola representadas en el Parque Zoológico Nacional, tanto las que forman parte de su población cautiva, como las que viven libremente en los ambientes naturales del parque. También de describen los programas educativos y de investigación que implementa el ZOODOM en pro de la conservación de la avifauna nativa.

## CONSERVATION IMPLICATIONS OF STUDIES OF EVOLUTIONARY RELATIONSHIPS AMONG SOME CARIBBEAN BIRDS

NEDRA KLEIN
*Zoology Department, University of Wisconsin, Madison, Wisconsin 53706, USA; and Department of Ornithology, American Museum of Natural History, New York, New York 10024, USA*

I STUDIED EVOLUTIONARY relationships among Bananaquits (*Coereba flaveola*), Yellow Warblers (*Dendroica petechia*), and Stripe-headed Tanagers (*Spindalis zena*) on Caribbean islands, using mitochondrial DNA sequences and morphological characters. From the results I infer that the West Indies has been colonized more than once by Bananaquits and Yellow Warblers, and some individual islands have been colonized multiple times by Yellow Warblers. Several island

populations of all three species are both morphologically and genetically distinct, suggesting a long, independent evolutionary history. They can thus be considered "phylogenetic species" and worthy of recognition in conservation planning for the region. I have also studied evolutionary relationships among paruline warblers, emphasizing the relationships of Caribbean endemics to the rest of the group. Preliminary results suggest that the endemic species are genetically very divergent from the rest of the warblers. Any conservation strategy plans for the region should take into consideration the high level of genetic diversity that is contributed by these taxa.

**Las Implicaciones para la Conservación en los Estudios de Relaciones Evolutivas en Algunas Especies de Aves del Caribe.** He estudiado las relaciones evolutivas entre *Coereba flaveola, Dendroica petechia* y *Spindalis zena* en las islas del Caribe usando secuencias del ADN Mitocondrial y características morfológicas. De los resultados obtenidos infiero que las Antillas Occidentales han sido colonizadas en más de una ocasión por *Coereba flaveola* y *Dendroica petechia* y en algunas islas en múltiples ocasiones por este último. Varias poblaciones isleñas de estas especies son distintas tanto genética como morfológicamente, sugiriendo una historia evolutiva larga e independiente. Estas especies por lo tanto se pueden considerar como "especies filogenéticas" y merecedoras de reconocimiento en los planes de conservación de la región. He estudiado también relaciones evolutivas entre Parúlidos, haciendo énfasis las relaciones entre las especies endémicas del Caribe con el resto del grupo. Los resultados preliminares sugieren que las especies endémicas son muy divergentes genéticamente del resto de las aves canoras. Todos los planes estratégicos de conservación para la región deben tener en cuenta los altos niveles de variación genética que este taxón contribuye.

## A CD-ROM GUIDE TO THE RESIDENT BIRDS OF THE DOMINICAN REPUBLIC

Nicolás López
*Club de observadores de Aves Annabelle Dod, Santo Domingo, República Dominicana*

An interactive CD-ROM guide of the birds of the Dominican Republic was created for educational purposes to be used by birders, schools, museums, and other interested institutions. This guide contains more than 120 color photos of birds resident in the country. Besides a distribution map, descriptions of the birds and habitats are included.

**Una guía interactiva en CD-ROM de las aves residentes en la República Dominicana** ha sido creada con fines educativos para ser utilizada por ornitólogos, aficionados, escuelas, museos y demás instituciones de interés. Esta guía cuenta con más de 120 fotografías a color de las aves residentes en el país, además incluye mapas de distribución, descripción del ave y de su hábitat.

## VALUES OF THE CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE

Herbert A. Raffaele
*Chief, Office of International Affairs, U.S. Fish and Wildlife Service*

This presentation will outline the values of the Convention on Wetlands of International Importance (Ramsar Convention) as it relates to the Caribbean. It will also describe Wetlands for the Future, a small grants initiative supporting on-the-ground conservation activities in wetlands of Ramsar party nations. The potential benefits of Wetlands for the Future to the Society of Caribbean Ornithology will be explored.

**El Valor de la Convención Sobre Anegados de Importancia Internacional.** Esta presentación subrayará la importancia de la Convención Sobre Anegados de Importancia Internacional (la Convención de Ramsar) según se relaciona al Caribe. También describirá la iniciativa de pequeñas ayudas financieras conocida como Anegados Para el Futuro, que ayuda a las actividades de conservación "in situ" en los anegados de las naciones participantes del grupo de Ramsar. Los beneficios potenciales del programa Anegados Para el Futuro para la Sociedad de Ornitología Caribeña serán explorados.

## UPDATE ON WEST INDIAN WHISTLING-DUCK CONSERVATION

Lisa G. Sorenson
*Museum of Zoology/Bird Division. University of Michigan, Ann Arbor, Michigan 48109-1079, USA*

The West Indian Whistling-Duck (*Dendrocygna arborea*), a non-migratory species endemic to the West Indies, has experienced a drastic decline throughout its range in recent years due to excessive hunting, destruction of wetland habitat, and the introduction of predators. Following discussions at a workshop on the West Indian Whistling-Duck at the

Society of Caribbean Ornithology (SCO) annual meeting in Nassau, August 1996, the West Indian Whistling-Duck Working Group (WIWD–WG) was formed to initiate a regional conservation program to reverse this decline. I report on progress made by the group during the past year. First, an action plan summarizing this species' status, threats to its continued survival, and conservation needs has been completed by Nancy Staus. This document will be available for review by meeting attendees for final comment before publication. Second, several grant proposals have been submitted for funding of two objectives of the group: (1) initiation of a public education and awareness program in six Caribbean countries on the decline and threatened status of the West Indian Whistling-Duck, and (2) survey of West Indian Whistling-Duck population levels and habitat use, and initiation of a long–term monitoring program of West Indian Whistling-Ducks. To date, we have been awarded funding from two agencies: the U.S. Fish and Wildlife Service Western Hemisphere Program and Conservation Intentional ($30,000 total). In addition, we have obtained commitments from SCO WIWD-WG members, natural resource agency personnel, schoolteachers, and local volunteers on each island to donate their time and resources to the successful completion of this project. We are currently working on the education program's slide show on the West Indian Whistling-Duck and importance of wetland conservation and are gathering materials and developing the education program for schoolchildren. During the present meeting, we will meet to review the slide show and coordinate plans for the project for the coming year.

**La Información Más Reciente Acerca del Proyecto para la Conservación del *Dendrocygna arborea*.** El pato *Dendrocygna arborea*, una especie endémica no migratoria de las Antillas, ha experimentado una drástica merma en los últimos años en todo su territorio debido al exceso de caza, la destrucción de su hábitat de anegados y la introducción de depredadores. Luego de una discusión sobre esta especie en un taller en la reunión anual de la Sociedad de Ornitología del Caribe llevada a cabo en Nassau en agosto de 1996, se formó el Grupo de Trabajo del *Dendrocygna arborea*, (WIWD–WG, por sus siglas en inglés) con la idea de formar programas regionales de conservación para revertir este declive. Daré un informe sobre el progreso hecho por este grupo en el pasado año. Primero, un plan de acción resumiendo el estado general de la especie, las amenazas para su continua supervivencia y sus necesidades de conservación ya ha sido completado por Nancy Staus. Este documento estará disponible para revisión de los presentes para los comentarios finales antes de su publicación. En segundo lugar, varias propuestas para la obtención de fondos ya han sido sometidas para solventar los dos objetivos del Grupo: (1) la iniciación de un programa de concientización y educación en seis países del Caribe acerca del declive y la amenaza existente sobre esta ave; y (2) censos de los niveles poblacionales y uso del hábitat de esta especie, además de la iniciación de un programa de monitoreo a largo plazo del *D. arborea*. Al día de hoy, se nos han concedido fondos de dos agencias: del Programa Hemisferio Occidental del Servicio de Pesca y Vida Silvestre de los EE. UU. y de Conservation International ($30,000). Además, hemos obtenido el compromiso de miembros del WIWD–WG y de la Sociedad, del personal de las agencias de manejo de recursos naturales, maestros de escuela y voluntarios locales en cada isla para que donen tiempo y recursos para completar exitosamente este proyecto. En este momento estamos trabajando en las diapositivas de un programa educacional del ave y de la importancia de la conservación de los humedales, a la vez que estamos recolectando materiales y desarrollando un programa educacional para niños de escuela. Durante esta reunión, nos reuniremos para revisar la presentación en diapositivas y para coordinar planes para el próximo año en el proyecto

## PREPARATION AND PRODUCTION OF EDUCATION MATERIALS FOR AVIAN CONSERVATION IN THE DOMINICAN REPUBLIC

E. Vázquez, K. Wallace, and R. Lorenzo
*Grupo Ecologista Tinglar, Santo Domingo, República Dominicana*

We describe the stages involved in the creation and production of education materials for the conservation of birds. The creation of the materials involves the community (or groups likely to be impacted) in an initial stage to determine the appropriate themes to be included in the education materials. Finally, the initial community participants are actively involved in the education effort to increase the effectiveness of conservation education in the community.

**Confección y Producción de Materiales Educativos para la Conservación de la Avifauna.** Grupo Ecologista Tinglar, Santo Domingo, República Dominicana. Se describen las fases para la creación y producción de materiales educativos relativos a la conservación de la avifauna; creación que incluye participación de las comunidades o de los grupos a impactar, inicialmente en una fase de investigación cualitativa relativa a los temas que se tratan en el material. Finalmente, los participantes quedan integrados como Multiplicadores Educativos Comunitarios.

## CONTROL OF THE SHINY COWBIRD (*MOLOTHRUS BONARIENSIS*): CAN IT IMPROVE THE REPRODUCTIVE SUCCESS OF RARE OR ENDANGERED SPECIES? THE CASE OF THE YELLOW-SHOULDERED BLACKBIRD (*AGELAIUS XANTHOMUS*) IN PUERTO RICO

E. A. Ventosa–Febles, R. López, J. Camacho y A. Falcón
*Departamento de Recurcos Naturales y Ambientales. Box 491, Boquerón, Puerto Rico 00622*

The parasitic Shiny Cowbird (*Molothrus bonariensis*) was originally restricted to South America and Trinidad. During the last 97 years, this species has expanded its range into the Caribbean and the southeastern portion of the continental United States. As a nest parasite, the cowbird adversely affects its host by reducing the host's reproductive success. Since the beginning of the cowbird control program in southwestern Puerto Rico, the population of this brood parasite has shown a substantial reduction in population (2,255 in 1985 vs. 107 in 1997). Also, we have found a considerable reduction in the proportion of Yellow-shouldered Blackbird (*Agelaius xanthomus*) nests which have been parasitized by cowbirds (94% in 1975–1982 vs 0% in 1996) and an increase in the number of successful blackbird nests (13 in 1985 vs. 167 in 1996). We present a complete methodology to initiate a control program for the cowbird, including materials for traps, costs, and location for the control effort.

**La Captura del Tordo Lustroso (*Molothrus bonariensis*): ¿Puede Mejorar el Éxito Reproductivo de Especies Raras o en Peligro de Extinción? El Caso de la Mariquita de Puerto Rico (*Agelaius xanthomus*).** El ave parasítica Tordo Lustroso (*Molothrus bonariensis*) se encontraba originalmente restringida a Sur América y Trinidad. Durante los últimos 97 años, esta ave ha expandido su territorio en la región del Caribe y la parte este de los EE. UU. El parasitismo del Tordo afecta adversamente al hospedero, reduciendo grandemente su éxito reproductivo. Desde que comenzó el programa de control del Tordo, en el sudoeste de Puerto Rico, las poblaciones del tordo han demostrado una reducción significativa en los conteos poblacionales realizados (2,255 en 1985 vs. 107 en 1997. También se ha encontrado una reducción significativa en el porcentaje de nidos de Mariquita (*Agelaius xanthomus*) parasitados por el Tordo (94% entre 1975-1982 vs. 0% en 1996) y un aumento en el número de nidos exitosos en la Mariquita (13 en 1985 vs. 167 en 1996). Se presenta una completa metodología para la realización del programa del control del Tordo, incluyendo materiales de las trampas, costo, localidades y esfuerzo, entre otros.

## RESTORATION AND HABITAT MANAGEMENT AT THE HUMACAO WILDLIFE REFUGE. PHASE I: HABITAT ASSESSMENTS AND WETLAND MANAGEMENT PLAN

Francisco J. Vilella and Matthew J. Gray
*Cooperative Fish and Wildlife Research Unit, Department of Wildlife and Fisheries, Mississippi State University, USA*

The Humacao Wildlife Refuge (HWR) in eastern Puerto Rico includes estuarine lagoons, herbaceous and forested wetlands, coastal forest, and beach scrub. The Puerto Rico Department of Natural and Environmental Resources (DNER) has jurisdiction over HWR, and is currently interested in implementing wetland management practices. We quantitatively assessed HWR habitats by measuring vegetation, censused vertebrate communities, and evaluated water chemistry in herbaceous marsh, *Pterocarpus* and mangrove wetlands, coastal forest, beach scrub, and six open-water lagoons. Geo-referenced spatial coverage of HWR vegetation types were generated using GIS analysis. Animal community complexity and species occurrence were typically related to microhabitat (vegetation, water) characteristics and landscape diversity. Vertebrate and insect abundance were greatest ($P < 0.05$) in coastal forest, and insect diversity was greatest ($P < 0.03$) in *Pterocarpus* forest. In lagoons, bird abundance and diversity were greatest ($P < 0.05$) in Mandri 1. Greatest occurrence of breeding waterfowl was in Palmas and Santa Teresa 2 ($P < 0.05$). Our results indicate Mandri 2 and Santa Teresa 1 were the best locations for herbaceous wetland and waterfowl management. We recommend conservation of pristine (mangrove, *Pterocarpus*) and restorable (coastal forest, beach scrub) habitats at HWR. We propose two projects in our HWR Wetland Management Plan for breeding and wintering waterfowl. Vegetative productivity and waterbird use is maximized by fluctuating water levels and performing mechanical manipulations in herbaceous wetlands. We suggest excavation of levees and installation of water control structures in Mandri 2 and Santa Teresa 1. In addition, essential wetland management (e.g., portable hydraulic pump, agricultural disk) and levee maintenance (e.g., side-mounted mower, backhoe loader) equipment needs to be available at HWR. Phase II of the plan will involve initial surveying work and drafting engineering plans, as well as securing all necessary agency permits and initial on-site construction.

**Restauración y Manejo del Hábitat en el Refugio de Vida Silvestre de Humacao. Fase I: Evaluación del Hábitat y Plan de Manejo de Humedales.** El Refugio de Vida Silvestre de Humacao esta localizado al sudeste de Puerto Rico e incluye lagunas estuarinas, humedales herbáceos y boscosos, bosques costaneros y matorrales de playas. El

Departamento de Recursos Naturales y Ambientales de Puerto Rico tiene jurisdicción sobre este refugio y esta interesado en la implantación de prácticas de manejo de humedales. Hemos evaluado cuantitativamente los distintos hábitats del refugio midiendo la vegetación, realizando un censo de las comunidades de vertebrados y un análisis químico de la composición del agua en los pantanos herbáceos, anegados de mangle y de *Pterocarpus*, bosques costeros, matorrales playeros y en 6 lagunas. Coberturas espaciales georeferenciadas con los distintos tipos de vegetación del bosque se generaron usando GIS. La complejidad del la comunidad animal y la ocurrencia de especies estaban típicamente relacionadas a las características del microhábitat (vegetación, agua) y a la diversidad del paisaje. La abundancia de insectos y de vertebrados fue mayor ($P>0.05$) en el bosque costero y la diversidad de insectos fue mayor ($P>0.03$) en el bosque de *Pterocarpus*. En las lagunas, la abundancia y diversidad de aves fue mayor en Mandri 1 ($P>0.05$). La mayor ocurrencia de aves acuáticas en reproducción se dio en las lagunas de Palmas y Santa Teresa 2 ($P>0.05$). Nuestros resultados indican que las lagunas Santa Teresa 1 y Mandri 2 fueron las mejores localizaciones para el manejo de anegados herbáceos y de aves acuáticas. Recomendamos la conservación de los hábitats intactos (mangle, *Pterocarpus*) y de los restaurables (bosque costero, matorral playero) en el Refugio de Vida Silvestre de Humacao. Proponemos dos proyectos para las aves acuáticas reproduciéndose y las que inviernan en nuestro Plan Para el Manejo de Anegados en el Refugio. La productividad vegetal y su uso por las aves acuáticas se maximiza mediante la fluctuación de los niveles de agua y las manipulaciones mecánicas en los humedales herbáceos. Sugerimos la excavación de canales y estructuras de control de agua en Mandri 2 y en Santa Teresa 1. Además, equipo esencial para el manejo de los humedales (por ejem., bombas hidráulicas portátiles) y para el mantenimiento de las canales (cortadoras manuales portátiles, perforadoras)debe de estar disponible en todo momento en el refugio. La Fase II del plan envolverá los trabajos de mensura y los planes preliminares de ingeniería, la obtención de los permisos pertinentes de todas las agencias y la construcción inicial en el sitio.

## ARE HURRICANES A KEY FACTOR FOR THE ECOLOGY OF THE GUADELOUPE WOODPECKER?

PASCAL VILLARD
*Association pour l'Etude et la protection des Vertébrés des petites Antilles [AEVA], c/o Barre, Bel Air Desrozieres, 97170 Petit Bourg, Guadeloupe, French Antilles*

IN THE LESSER ANTILLES, Guadeloupe (including Bass-Terre and Grande-Terre) is the only island with a sedentary woodpecker (*Melanerpes herminieri*). In the West Indies four other endemic species of *Melanerpes* inhabit the Greater Antilles. In the Lesser Antilles, a hurricane with winds > 118 km/h has been recorded on average every 2 years since 1886. From 1885 to 1995 (110 years), centers of 32 hurricanes passed closer than 180 km of Guadeloupe (one every 3.4 years). Because of the small size of the island, the population of the Guadeloupe Woodpecker is more likely to be affected by close-passing hurricanes than would be woodpecker species on larger islands. Hurricanes can affect the ecology of the woodpecker in several ways, including: (1) proximate effects—high mortality of fledglings, and (2) ultimate effects—end of breeding season in August. - No helpers? - Almost no use of living coconut trees compared to dead ones? Hurricanes seems to be molding the biology and ecology of the Guadeloupe Woodpecker.

**¿SON LOS HURACANES UN FACTOR CLAVE PARA EXPLICAR LA ECOLOGÍA DEL CARPINTERO DE GUADALOUPE?** En las Antillas Menores, el archipiélago de Guadaloupe (incluyendo Basse-Terre y Grande-Terre) son las únicas con un pájaro carpintero sedentario (*Melanerpes herminieri*). En el Caribe, oras 4 especies de *Melanerpes* endémicos habitan las Antillas Mayores. Cada dos años desde 1886, se ha registrado un huracán con vientos > de 118 km/h. Desde 1885 al 1995 (110 años) el centro de 32 huracanes pasaron dentro de un radio de 180 km de Guadaloupe, uno cada 3.4 años. Debido al tamaño reducido de la isla, la población del Carpintero de Guadaloupe tiende a ser más afectada por los huracanes que si estuviera en islas mayores. ¿Cómo es posible que los huracanes tengan un efecto en la ecología del carpintero? Como efecto inmediato, una alta mortalidad en los pichones. Como efectos posteriores, un final temprano de la temporada de reproducción en agosto; la eliminación de los ayudantes del nido; un uso mínimo de palmas de cocos vivas comparadas a las muertas. Los huracanes aparentan estar moldeando la biología y ecología del Carpintero de Guadaloupe.

**LES CYCLONES SONT ILS UN FACTEUR CLE POUR EXPLIQUER L'ECOLOGIE DU PIC DE LA GUADELOUPE.** Dans les Petites Antilles, la Guadeloupe (Basse-Terre et Grande-Terre) sont les seules îles avec une espèce sedentaire de pic (*Melanerpes herminieri*). Dans les Caraibes, quatre autres espèces endémiques de *Melanerpes* se trouvent dans les Grandes Antilles. Dans les Petites Antilles, depuis 1886, chaque 2 années, un cyclone avec des vents > 118 km/h était enregistré. De 1885 à 1995 (110 années), 32 cyclones sont passés avec l'oeil à moins de 180 km/h de la Guadeloupe (soit un chaque 3,4 années). Du fait de la faible taille de l'île, les populations du Pic de la Guadeloupe sont plus susceptibles d'être affecteés que sur une grande île. Comment les cyclones peuvent ils avoir une action sur l'ecologie du pic? Effect direct: - Mortalité élevée des jeunes qui ont quitté le nid. Effect à long terme: - La fin de la saison de reproduction en août. - Pas d'aides à la reproduction?- Quasirnent pas d'utilisation des cocotiers vivants cornparés à ceux qui sont morts? La biologie et l'écologie du Pic de la Guadeloupe sont donc influencées par les cyclones.

## THE THICK-BILLED VIREO: A CONSERVATION PERSPECTIVE FOR A WEST INDIES ENDEMIC

MARLENE WALKER
*The Center for Biodiversity and Conservation Biology, Royal Ontario Museum, and the Department of Zoology, University of Toronto, Toronto, Canada*

THE PRESENT INVESTIGATION of conservation issues for the sedentary, endemic Thick-billed Vireo (*Vireo crassirostris*) of the West Indies, is part of an ongoing study of the magnitude of inter-island genetic and vocal variation for the species. Its unique distribution, primarily in the Bahamas and the Cayman Islands, is bisected by the Cuban land mass barrier on which a relic population may exist. This species, which exhibits a high degree of song plasticity within an individual as well as among and between populations, has the most highly fragmented 'megapopulation' in the subgenus *Vireo* in the region. Increasingly the small islands which it inhabits are being subjected to anthropogenic fragmentation, superimposed on the natural patchiness of the islands. This fact, combined with stochastic ones, including catastrophes, can spell disaster for the species. Multiplicative consequences of fragmentation on islands requires a model that demonstrates the potential loss of diversity. The Embedded Model of Island Fragmentation predicts that when islands habitats are embedded within a true island, dire consequences may result; neither the problems of habitat fragmentation nor the isolation of small islands alone have the same degree of importance. When we consider the impact of hurricanes with anthropogenic fragmentation, the relationship strengthens in magnitude. The Thick-billed Vireo is well adapted for persistence in the aftermath of hurricanes, but not for increased anthropogenic habitat loss, destruction, and fragmentation. Although not currently endangered, increased anthropogenic impact and the demise of other West Indian songbirds suggest that active conservation planning for the protection of the scrub habitat on which the Thick-billed Vireo and other scrub-dwelling insular avifauna depend would be valuable.

EL *VIREO CRASSIROSTRIS*: UNA PERSPECTIVA CONSERVACIONISTA PARA UNA ESPECIE ENDÉMICA DE LAS ANTILLAS. Esta presente investigación acerca de distintos asuntos de la conservación del sedentario y endémico *Vireo crassirostris* es parte de un estudio que se esta llevando a cabo sobre la variación vocal entre islas para esta especie. La distribución única del *Vireo crassirostris*, primordialmente en las Bahamas y las Islas Cayman, es bisecada por la barrera de la masa de tierra de Cuba, en donde una población vestigial pudiera existir. Esta especie, que exhibe una gran plasticidad en los cantos de los individuos, como entre poblaciones, tiene la más altamente fragmentada megapoblación en el subgénero *Vireo* en la región. Las pequeñas islas en que habita estás siendo sujetas a una acelerada fragmentación antropogénica, superpuesta a la fragementación natural de las islas. Estos factores, combinados con los estocásticos, incluyendo los huracanes, pueden representar serios problemas para esta y otras especies endémicas de las islas. Las consecuencias multiplicativas de la fragmentación de las islas requiere de un modelo capaz de demostrar la perdida potencial de diversidad. El Modelo de Fragmentación de Islas predice que cuando una isla de hábitat está incrustada dentro de una isla real, pueden dar como resultado consecuencias fatales, que ni la fragmentación del hábitat, ni el aislamiento de la isla, pueden tener por sí mismas. Cuando consideramos el impacto delos huracanes con la fragmentación antropogénica, se fortalece esa relación en magnitud. La especie esta bien adaptada para su persistencia luego del impacto de un huracán, pero no para acelerada una pérdida, destrucción y fragmentación antropogénica del hábitat. Aunque hoy por hoy no esta amenazada, el constante impacto antropogénico y el declive en otras aves canoras antillanas sugiere que una planificación para la conservación y protección del hábitat del matorral del que el *Vireo crassirostris* y otra avifauna insular dependen será muy valiosa.

## IMPLICATIONS OF INTRODUCED PREDATORS AND PARASITES FOR THE PUERTO RICAN VIREO IN GUÁNICA FOREST, PUERTO RICO

BETHANY L. WOODWORTH
*Biological Resources Division, USGS, Pacific Islands Ecosystems Research Center, Hawaii National Park, Hawaii 96718, USA*

THE PUERTO RICAN VIREO (*Vireo latimeri*) is a single-island endemic songbird which is declining in Guánica Forest Reserve, Puerto Rico. During 1990-1993, I color-marked 88 birds and located 156 nests. This research showed that the primary causes of reproductive failure in this population are brood parasitism by the introduced Shiny Cowbird (*Molothrus bonariensis*; 73-83% of nests parasitized), and nest predation by native and introduced predators (80% of active nests depredated). As a result, daily nest survival rate was only 0.93 (± 0.01), and only 5% of nests fledged vireo young. Females re-nested after failure and attempted two to six nests per season, fledgling on average 0.24–1.33 vireos per season. Adult and juvenile survival rates were relatively high (74 and 40%, respectively). To determine the implications of these demographic data for population persistence of the vireo, I used a model of seasonal fecundity (Pease and Grzybowski 1995) combined with a stage-based matrix model. This approach is widely applicable to songbirds, and allowed the explicit examination of the relative contributions of parasitism, predation, and survival rates to population persistence,

and the quantitative assessment of alternative management options.

**Las implicaciones de la Introducción de Depredadores y de Parásitos para el *Vireo latimeri* en el Bosque de Guánica, Puerto Rico.** El *Vireo latimeri* es un ave canora endémica la cual esta declinando en la reserva del Bosque de Guánica, Puerto Rico. Durante 1990-93 marqué con anillas de colores 88 aves y localicé 156 nidos. Este estudio demostró que las causas principales del fracaso reproductivo en esta población son el parasitismo de nidos por el *Molothrus bonariensis* (73-83% de los nidos parasitados) y la depredación de los nidos por depredadores introducidos o nativos (80% de los nidos activos depredados). Como resultado, la taza de supervivencia diaria del nido fue de solo el 0.93 (± 0.01) y solo el 5 % de los nidos produjeron pichones del ave. Las hembras volvieron a anidar luego del fracaso intentando de dos a seis nidadas por temporada, produciendo un promedio de 0.24 a 1.33 pichones por temporada. La supervivencia adultos y de juveniles fue relativamente alta (74 y 40% respectivamente). Para determinar las implicaciones de estos datos demográficos para la persistencia poblacional del ave, use un modelo de fecundidad temporal (Pease y Grzybowsky 1995) combinado un modelo de matrices "stage-based." Este modelo es cómodamente aplicable a las aves canoras y permite examinar explícitamente las contribuciones relativas del parasitismo, depredación y tasas de supervivencia a la persistencia poblacional, permitiendo a la vez una evaluación cuantitativa de varias opciones de manejo.

## THE TIMING OF THE BREEDING SEASON IN THE BANANAQUIT (*COEREBA FLAVEOLA*) ON THE ISLAND OF GRENADA, WEST INDIES

J. M. Wunderle
*International Institute of Tropical Forestry, USDA Forest Service, P.O. Box 490. Palmer, Puerto Rico 00721*

Caribbean bird species display considerable variation in the timing of their breeding seasons, which are assumed to coincide with maximum availability of food for egg production and/or rearing of nestlings. However, few studies in the Caribbean have tested this hypothesis, despite its importance for understanding avian breeding seasons and potential conservation value in some species. Here I describe a study in which I compare the consequences of early versus late breeding in the Bananaquit (*Coereba flaveola*) in an effort to identify the selective pressures that seasonally adjust its reproductive period in a seasonally dry forest on Grenada. Initiation of Bananaquit breeding is synchronized with the earliest rains of the wet season. In the course of the five-month (March-August) breeding season, clutch sizes increase, weights of nestlings increase, nest predation rates increase, and nestling deaths due to starvation decrease. Fledgling success decreases as the breeding season proceeds, reflecting the increased predation rates. Although early breeders may be food stressed, late breeders face high nest predation probabilities. Thus the timing of Bananaquit breeding in this dry forest is seen as a balance between increasing food availability and increasing nest predation.

**Cronología de la Temporada de Reproducción de la *Coereba flaveola* en la Isla de Granada, Antillas Menores.** Las aves del Caribe tienen mucha variación en los períodos reproductivos, lo que se asume es una coordinación con la máxima disponibilidad de alimentos para la producción de huevos y/o pichones. Sin embargo, habían muy pocos estudios que probaran esta hipótesis en el Caribe, a pesar de su importancia para entender el calendario reproductivo y su valor potencial para la conservación de algunas especies. Aquí describo un estudio en donde comparo las consecuencias de la reproducción en el primera parte de la época reproductiva con la última parte en la Reinita (*Coereba flaveola*). El objetivo del estudio fue la identificación de las fuerzas selectivas que determinan el calendario reproductivo en un bosque seco en la isla de Grenada. El inicio del período reproductivo de la Reinita está sincronizado con el comienzo de la época de lluvias. A lo largo de los cinco meses que dura dicho periodo (Marzo–Agosto) se observa un incremento en el tamaño de la nidada, en el peso de los pichones y en los índices de depredación en el nido; la proporción de pollos muertos debido a insuficiente alimento decrece durante este mismo período. La probabilidad de supervivencia de los pichones disminuye conforme avanza la época de reproducción, reflejando un incremento en los índices de depredación. Las primeras parejas en anidar suelen estar expuestas a fuentes insuficientes de alimento, las aves que se reproducen posteriormente afrontan incrementos en la probabilidad de pérdida de huevos y pollos en el nido. El calendario reproductivo de esta especie es interpretado como el resultado de un compromiso entre el acceso a una fuente mayor de alimentos por un lado, y la exposición a un índice creciente de depredación en le nido en el otro.

## HUMAN INTERACTIONS WITH SEABIRDS IN THE CARIBBEAN

Ann M. Haynes–Sutton
*Marshall's Pen, P. O. Box 58, Mandeville, Jamaica*

The history of the use of seabirds in the Caribbean is as long as the history of human settlement. The scale and extent of the uses of seabirds in the Caribbean has never been documented. Seabirds and their products have been used as

subsistence and luxury foods, aphrodisiacs, fishing bait, fuel, fertilizer, and medicine. Seabirds have been killed for sport and predator control, and fishermen depend on them for navigation and finding fish. A few colonies are important for tourism or research. Human activities, including coastal development, pollution, and fishing, may impact seabirds and their habitat. The collection of eggs, especially tern eggs, is probably the most widespread and detrimental of all interactions. Studies in Jamaica suggest that egg harvesting contributed to a catastrophic decline in tern populations. Habitat protection and controlled exploitation are among the options for the future.

## GREMIOS TROFICOS DE LAS COMUNIDADES DE AVES RESIDENTES Y MIGRATORIAS EN DIFERENTES LOCALIDADES DE CUBA

HIRAM GONZALEZ ALONSO
*Museo Nacional de Historia Natural, La Habana, Cuba*

SE UBICARON TODAS las especies de aves de las 15 localidades estudiadas dentro de las 17 categorias de gremios tróficos propuestas por el autor. Se determinó que el mayor número de especies y los mayores valores de abundancia corresponden a las especies clasificadas como insectivoros de follaje y los insectívoros-frugívoros de follaje, tanto en la residencia invernal como en la migración otoñal. Se analizan los factores que inciden en estos resultados.

## AREAS DE IMPORTANCIA PARA LA REPRODUCCIÓN DE ESPECIES MARINAS COLONIALES (CHARADRIIFORMES) EN CUBA

PEDRO BLANCO RODRÍGUEZ, BÁRBARA SÁNCHEZ Y A. HERNÁNDEZ
*Instituto de Ecología y Sistemática, CITMA, La Habana, Cuba*

SE OFRECE INFORMACIÓN gráfica acerca de la distribución de las principales colonias de nidificación de aves marinas del orden Charadriiformes que se conocen hasta la fecha en Cuba correspondientes a 8 especies, entre las que figuran: *Larus atricilla*, *Sterna maxima*, *Sterna sandvicensis*, *Sterna dougallii* y *Anous stolidus*, entre otras. Se hace referencia además a la existencia de otras areas de interés para la nidificación colonial de estas especies en base a observasiones de campo.

## AREAS DE IMPORTANCIA REGIONAL PARA LAS AVES DEL ORDEN CHARADRIIFORMES EN CUBA

PEDRO BLANCO RODRÍGUEZ
*Instituto de Ecología y Sistemática, CITMA, La Habana, Cuba*

SE EXPONE LA PROYECCIÓN general y resultados preliminares de un proyecto de investigación nacional dirigido al estudio y evaluación de las comunidades de residentes y migratorias del orden Charadriiformes, desarrollado durante el periodo de 1989-1997, en Cuba. La información que se ofrece se logra a partir del desarrollo, análisis e integración de diferentes temáticas entre las que figuran: la recuperación de anillas extranjeras en Cuba desde 1925, la consulta del material de colecciones depositado en varias intituciones cientificas del pais y evaluación y monitoreos de campo, entre otras actividades. Para una mejor interpretación de la información, los resultados se muestran de forma gráfica a través de mapas, fotos y figuras reflejando datos inéditos acerca de la ubicación de las areas de mayor importancia para el arribo y permanencia de aves nearticas migratorias del orden Charadriiformes en el Archipiélago cubano, sitios de nidificación de gran valor para especies de este orden incluyendo aves marinas coloniales, asi como sitios de invierno frecuentados por una especie en peligro de extinción.

## AREAS DE INVIERNO DEL FRAILECILLO SILBADOR EN CUBA

PEDRO BLANCO RODRÍGUEZ
*Instituto de Ecología y Sistemática, CITMA, La Habana, Cuba*

SE EXPONE INFORMACIÓN acerca de 23 registros del Frailecillo Silbador (*Charadrius melodus*) obtenidos en 14 regiones del territorio cubano durante el periodo 1965–1996. Se ofrece a través de un mapa la ubicación de las areas de invierno que son utilizadas por la especie durante la migración y se reflejan además algunos comentarios de interés acerca de la

importancia del Archipiélago cubano como sitio invernal de importancia para esta especie en el área del Caribe.

## COMPOSICIÓN Y ABUNDANCIA DE LA AVIFAUNA EN DOS FORMACIONES VEGETALES DE LA ALTIPLANICIE DE NIPE, HOLGUÍN, CUBA

BÁRBARA SÁNCHEZ[1], RAMONA OVIEDO[1], NILS NAVARRO[2], ARTURO HERNÁNDEZ[1], CARLOS PEÑA[2] Y ERNESTO REYES[3]
*[1]Instituto de Ecología y Sistemática, CITMA, La Habana, Cuba; [2]Museo de Ciencias Naturales "Carlos de la Torre Huerta," Holguín, Cuba; y [3]Estación Ecológica de Mayarí, CITMA, Mayarí, Cuba*

SE DETERMINÓ LA COMPOSICIÓN y abundancia de las aves en dos formaciones vegetales (Pinar y Charrascal) a través de los métodos de captura con redes ornitológicas y de conteos de parcelas circulares en la Altiplanicie de Nipe, Holguín. Los muestreos se efecturaron del 14 al 22 de octubre de 1996 y del 19 de enero al 3 de febrero de 1997, correspondiendo con los periodos de migración otoñal y residencia invernal de las aves migratorias. En total se detectaron en el área 13 especies migratorias y 19 residentes permanentes. Los mayores valores de abundancia relativa y tasa de captura correspondieron a la vegetación de Charrascal, en ambos períodos analizados. Algunas especies migratorias como *Dendroica tigrina, Setophaga ruticilla, Helmitheros vermivorus, Parula americana* y *Sphyrapicus varius* permanecieron en el Charrascal sólo temporalmente. Se comparan los resultados con los obtenidos en otras localidades de Cuba. Se presenta una tendencia a obtener valores bajos de riqueza de especies y tasa de captura de las aves migratorias durante el periodo de residencia invernal en estos hábitat estudiados.

## ESTRUCTURA DE LA COMUNIDAD DE AVES EN LA ARROCERA DE SUR DEL JÍBARO, SANCTI SPÍRITUS

LOURDES MUGICA, MARTÍN ACOSTA, DENNIS DENIS Y PEDRO L. MARTÍNEZ
*Facultad de Biología, Universidad de La Habana, Cuba*

SE ESTUDIA LA ESTRUCTURA de la comunidad de aves asociadas al cultivo del arroz durante los años 1992 y 1995. Un total de 72 especies de 12 órdenes se reportan, de los cuales Ciconiiformes, Anseriformes, Gruiformes y Charadriiformes son los mejor representados. Se determina la variación mensual de los diferentes índices ecológicos. Octubre muestra un importante pico por la entrada de la migración que aporta un 36% de las especies que usan la arrocera. Se analiza el uso del hábitat desde la siembra hasta la cosecha, encontrándose las mayores densidades de aves durante la preparación para la siembra. Se establecen las variaciones anuales y el uso del hábitat en los órdenes más importantes. Se concluye que las arroceras constituyen un valioso ecosistema para la conservación de las aves acuáticas.

**BIRD COMMUNITY FROM THE SUR DEL JÍBARO RICE CULTURES IN SANCTI SPÍRITUS, SOUTH–CENTERAL CUBA.** The structure of the bird community associated with rice cultures was studied during 1992 and 1995 in the "Sur del Jíbaro" rice culture, south–central Cuba. A total of 72 species were reported through the year. Birds in the orders Ciconiiformes, Anseriformes, Gruiformes y Charadriiformes were the best represented. Annual variation of the ecological indexes was determined. October showed an important increase resulting from winter migration (36% of the species were winter migrants). Habitat use (from sowing to harvesting) was analyzed as well. Highest densities of birds were found during preparation for sowing. Habitat use and annual variation was analyzed for the most important orders. We conclude that rice field habitats should be recognized as important areas for waterbird conservation.

## RELACIÓN ENTRE LA MORFOLOGÍA DEL SISTEMA DIGESTIVO CON LA DIETA EN EL COCO PRIETO *PLEGADIS FALCINELLUS*

DENNIS DENIS, MARTÍN ACOSTA Y LOURDES MUGICA
*Facultad de Biología, Universidad de La Habana, Cuba*

EN EL AGROECOSISTEMA arrocero Sur del Jíbaro, en la zona sur-central de Cuba, se ha detectado que el Coco Prieto (*Plegadis falcinellus*) cambia estacionalmente su dieta de totalmente granívora en la época no reproductiva a depredadora durante la reproductiva. En el presente trabajo se describe la posible influencia que tiene este cambio estacional de la dieta en la morfometría de las estructuras digestivas y así conocer las adaptaciones morfológicas a esta situación. Al igual que en Anseriformes y Charadriiformes existe una variación del tamaño y masa estomacal en relación con la composición cuantitativa de la dieta. Durante la etapa no reproductiva, el estómago aumentó su masa muscular en un 22%. Por el contrario disminuye el grosor de la capa muscular de este órgano en un 69% cuando la dieta pasa a ser

depredadora durante el periodo reproductivo en el que existen altas demandas protéicas. Se describe una serie de correlaciones existentes entre la morfología externa e interna y las características de la dieta.

**Relationship Between the Morphology of the Digestive System and Diet in the Glossy Ibis (*Plegadis falcinellus*).** The Glossy Ibis (*Plegadis falcinellus*) changes its diet seasonally from granivorous during the non-breeding season to feed on animal items in the breeding season. The influence of the seasonal changes on the morphometry of the digestive system is described. The stomach variations in size and mass in relation to the composition of the diet is similar to the variation found in Anseriformes and Charadriiformes. During non-reproductive season the stomach increased 22% in muscle mass, whereas the width of the muscle layer decreased 69% in the breeding season, when protein demands were higher. Several correlations between the external and internal morphology and the diet are also described.

## ALIMENTACIÓN DE *BUBULCUS IBIS IBIS* (AVES: ARDEIDAE) EN UN PASTIZAL DE LA PROVINCIA DE LA HABANA, CUBA

Maria Elena García Romero
*Instituto de Ecología y Sistemática, Ministerio de Ciencia Tecnología y Medio Ambiente, La Habana, Cuba*

Se ofrecen una caracterización del subnicho trófico de la Garza Boyera (*Bubulcus ibis ibis*) a través del análisis de 23 contenidos estomacales (10 hembras y 13 machos). Los ejemplares fueron capturados en un pastizal manejado para pastoreo de ganado, en la localidad conocida como Niña Bonita en la provincia de La Habana, Cuba. Se determinó que la dieta alimentaria está basada fundamentalmente en materia animal, siendo los insectos el grupo mejor representado. Los órdenes más consumidos fueron: Lepidoptera, Orthoptera, Dyctioptera, Dermaptera y Coleoptera. El mayor valor para el índice de diversidad (H') se obtuvo en la estación de lluvia, al igual que la amplitud del nicho (Bij); época en que se observó la menor equitatividad de los artículos alimentarios (J'). La comparación entre sexos permitió conocer que la diversidad alimentaria de los machos y las hembras es semejante, aunque la de éstas últimas es ligeramente superior y el índice de superposición entre ambos, es alto (0.70).

## LAS RAPACES EXTINTAS DE CUBA Y SU IMPORTANCIA ECOLÓGICA DURANTE EL CUATERNARIO

Carlos Arredondo Antónez
*Universidad Pedagógica Enrique J. Varona, Facultad de Ciencias Naturales, Departamento de Biología, Calle 108 #29E08 e/ 29E y 29F, Ciudad Libertad, Marianao, Ciudad Habana, Cuba*

Se hace un análisis sobre la composición y distribución de la ornitofauna extinta de rapaces cubanas halladas en depósitos Pleisto-holocénicos. Más de 10 géneros y 15 especies actuaron como controladores ecológicos en los ecosistemas terrestres de Cuba durante el Cuaternario sobre las extensas poblaciones de mamiferos existentes entonces pertenecientes a géneros como, *Capromys, Geocaproyms, Heterpsomys, Nesophontes*, entre otros. Se discute sobre el control ecológico de las rapaces en Cuba a partir de la escasa presencia de mamíferos del órden Carnivora.

## CONSIDERACIONES SOBRE LA ACTIVIDAD TRÓFICA DE *TYTO ALBA FURCATA* Y LA NECESIDAD DE SU CONSERVACIÓN

Carlos Arredondo Antónez
*Universidad Pedagógica Enrique J. Varona, Facultad de Ciencias Naturales, Departamento de Biología, Calle 108 #29E08 e/ 29E y 29F, Ciudad Libertad, Marianao, Ciudad Habana, Cuba*

Pocos han sido los trabajos realizados en Cuba sobre la actividad trófica de la Lechuza (*Tyto alba furcata*). Se realiza un análisis del contenido óseo en 800 egagrópilas colectadas en varias localidades de la región central de Cuba. Cada egagrópila fue estudiadad por separado, separando todo el material que la componía. Posteriormente se identificaron las especies contenidas en cada bolo regurgitado, obeniéndose como resultado una dominancia de restos de mamíferos (*Mus* y *Rattus*), asi como valores importantes en restos de anfibios (*Osteopillus* y *Rana*); los grupos menos importantes en la dieta son los reptiles y las aves. Se discuten los resultados y derivado de esto la necesidad de promover una campaña de protección a la Lechuza, ave de extrema importancia como controladora de potenciales vectores de enfermedades y de enemigos de los sembrados del hombre.

# JAMAICA

SUZANNE DAVIS
*Island Representative for Jamaica, Society of Caribbean Ornithology*

ACTIVE PROMOTION OF environmental education activities has been given priority among both non-government (NGO) and government organizations. NGOs such as the Natural History Society of Jamaica (NHSJ), as well as the Jamaica Conservation Development Trust (JDCT), have organised island-wide school competitions on insects, the seashore, recycling, and organic gardening. The NHSJ has also produced an *A-Z Colouring Book on Jamaican Wildlife*. In keeping with the International Year of the Reef, the Centre for Marine Sciences, University of the West Indies, has held public seminars on marine ecosystems and related issues.

The Gosse Bird Club (GBC) has held its own by developing a public education programme on Jamaican birds. Funding obtained from the U. S. Fish and Wildlife Service was used to develop and print 500 copies of a *Teacher's Guide to the Birds of Jamaica* and 1000 copies of a colour poster showing five Jamaican birds. The illustrated black-and-white *Teacher's Guide* was designed to make teachers and students aware of local bird life and their habitats. These resource materials along with the colour photographic field guide *Birds of Jamaica* by A. Downer and R. Sutton (1990) will eventually be distributed to mainly secondary level schools and resource centres islandwide. Thanks to the education component of the Institutional Strengthening Project financed by the Canadian Green Fund, the GBC held a successful three-day Teacher Training Workshop. The Workshop demonstrated how the resource material could be used and gave practical "hands-on" experience through two birdwatches and in the making of bird feeders. The twelve participants from primary and secondary level schools, resource centres, a teacher's college, an environmental youth group, and the national zoo maintained a high level of interest and enthusiasm. It is hoped that in the future the GBC will attract more funding to grant the participants' requests for more workshops.

These environmental education activities in the NGO sector coincide with current efforts by government agencies. The Natural Resources Conservation Authority (NRCA) has collaborated with representatives from the Ministry of Education, Association of Science Teachers of Jamaica, the University of the West Indies, NGOs, other community groups, and the media to establish a National Environmental Education Committee (NEEC). According to the NRCA supplement of June 1997, the central objective is to give focus and momentum to environmental education in formal and non-formal sectors. One of the major outputs scheduled for later this year is a National Education Action Plan for Sustainable Development.

Other significant developments over the past year are:

- The NRCA's delegation of co-management of the Blue and John Crow Mountains National Park (BJCMNP) to the JCDT and the delegation of the Montego Bay Marine Park to the Montego Bay Marine Park Trust.
- An emerging National Protected Areas System.
- The introduction of a new Permit and Licensing System by the NRCA which stipulates that any development in a prescribed area which can potentially affect the environment must get permission from the NRCA before implementation.

It is unfortunate that after all the initiatives taken by the NRCA, its future is questionable because of a proposed merger with the Town Planning Department, the Land Development and Utilization Commission, and the Rural Physical Planning Unit. The rationale for the merger according to statements released by the Ministry of Housing and Environment, is the facilitation of more efficient functioning of the four agencies. The proposed merger has been a source of heated debate, as there are fears that the NRCA's capacity to manage Jamaica's natural resources under the NRCA Act, the Beach Control Act, the Wildlife Protection Act, and Watershed Protection Act will be compromised.

Research on birds in Jamaica continues to expand with more involvement from local persons, as well as overseas visitors (Table 1).

Table 1. The status of some recent research projects in Jamaica.

| Project | Status | Participants[1] | Institution |
|---|---|---|---|
| Inventory of birds in the Blue and John Crow Mountains | Completed | Marcia Mundle[1] | Gosse Bird Club (Jamaica) |
| Censusing Swainson's Warblers | Completed | Gary Graves[1] Kevin Winker | National Museum of Natural History, Smithsonian Institution (US) |
| Habitat fragmentation effects on bird communities in the buffer zone of the BJCMNP | Results pending | Suzanne Davis | University of the West Indies (Jamaica) |
| Biology & distribution of psittacines in Jamaica | In progress | Susan Koenig[1] Jimmy Basant Herlitz Davis | Wildlife Preservation Trust International (US) and Gosse Bird Club (Jamaica) |
| The impact of human disturbance on tropical dry limestone forest of Jamaica on resident & migrant bird communities | In progress | Leo Douglas | University of the West Indies (Jamaica) |

[1]Leader

## TRINIDAD AND TOBAGO

GERARD ALLENG

GOVERNMENT INITIATIVES

- *Habitat Conservation*

  The Wildlife Section of the Forestry Division of the Ministry of Agriculture, Lands and Marine Resources has an on-going wetlands programme aimed at the conservation of wetlands in Trinidad and Tobago. Through this programme, the Section attempts to monitor some components of the waterfowl and shorebird populations within these habitats. Regular bird surveys are conducted within four wetlands of national importance: Caroni Swamp (western coast of Trinidad), Nariva Swamp (eastern coast of Trinidad), Godineau Swamp (western coast of Trinidad), and Icacos Swamp (southwestern coast of Trinidad). The surveys focus on population trends and threats to certain species, particularly species of national concern such as the Scarlet Ibis (*Eudocimus ruber*). Some minimal socio-economic and habitat assessments are also undertaken at the sites. Concern for the Scarlet Ibis increased because they ceased nesting in the Caroni Swamp a few years ago and only recently resumed after many years of inactivity. This wetland is the main nesting area for the species in Trinidad and Tobago. There have been reports of smaller populations in other wetland areas and the Section has been trying to monitor and manage these areas and, by extension, these populations through the wetlands programme.

- *Education Programme*

  The Wildlife Section has initiated an education programme under the RARE Center for Conservation, aimed at conservation education with regard to the

Trinidad Piping Guan or Pawi (*Pipile pipile*). This bird is the only endemic sub-species found on the island and is considered to be endangered as a result of habitat loss and over-hunting. The section has focused its efforts on increasing the awareness of its importance among communities who live close to the habitat of the species.

- *Establishment Of A National Park And Wildlife Authority*
  A draft of a bill for the establishment of a National Parks and Wildlife Authority in Trinidad and Tobago was released for public comment in April 1997, by the Government of Trinidad and Tobago. The bill is "an act to provide for the establishment, conservation, management of national parks, strict nature reserves, wildlife management reserves, recreation areas, protected landscapes and other areas, the conservation and management of wildlife in terrestrial, aquatic and marine environments within Trinidad and Tobago, the establishment and operation of a National Parks and Wildlife Authority and for related matters." Part of the bill involves the protection of native species of animals, including birds. A number of birds are listed under endangered, vulnerable and rare species of animals. The bill seeks for example, to remove all seed-eating birds or finches from the list of caged birds allowed to be taken in the wild. It seeks to place them on the protected list because of declining population trends. The bill is presently being reviewed, but a decision has already been taken to separate the two components; there will be a separate wildlife bill.

- *Captive Breeding Programme*
  The Wildlife Section is actively pursuing a captive-breeding programme of the Blue-and-Gold Macaw (*Ara ararauna*) with the aim of re-introducing the species back into the Nariva Swamp, its only natural habitat. The species was extirpated from this area because of over-hunting for the pet trade.

- *Nariva Swamp (Ramsar Site)*
  The Government of Trinidad and Tobago has awarded a contract for an environmental impact assessment of activities in the Nariva Swamp. Part of the programme involves the formulation of a management and monitoring plan for the area, which has implications for the bird populations utilizing the system.

RESEARCH INITIATIVES

- *Research Project*
  A new research project directly related to the conservation of birds in Trinidad and Tobago was initiated at the Zoology Unit, Department of Biological Sciences, University of the West Indies, St. Augustine. The project started in September 1996 and is a survey of shorebirds and seabirds in Trinidad and Tobago. It is an attempt to investigate the use of coastal habitats by birds, with the aim of improving the coastal sensitivity index of Trinidad and Tobago.

## SABA REPORT

MARTHA WALSH-MCGEHEE

SABA, THE SMALLEST ISLAND in the Netherlands Antilles, occupies little more than 5 sq. mi. and has only 27 resident bird species. It has, nevertheless, made significant progress this year toward the preservation of the birds and their habitats.

A proposal to establish a reserve at the upper elevation of Mt. Scenery has been presented to the Lieutenant Governnor, and his signature is expected momentarily. This reserve will protect the elfin cloud forest and tree fern zone where the less common species, such as the Brown Trembler (*Cinclocerthia ruficauda*), Bridled Quail-Dove (*Geotrygon mystacea*), Purple-throated Carib (*Eulampis jugularis*), and Scaly-breasted Thrasher (*Margarops fuscus*), are most frequently encountered.

With the assistance of the USDA Forestry Service and a team of volunteers from Canada, Saba's eight nature trails have been greatly expanded and improved. More interpretative signs are being constructed, and local guides are becoming increasingly familiar with the indigenous birds.

The Government of the Netherlands has directed the local governments of Saba, St. Eustatius, and St. Maarten to enact new wildlife legislation for their respective islands. This legislation must be completed within two years. Traditionally, wildlife legislation has focused on marine life, but Island Conservation Effort and the Saba Conservation Foundation have asked that bird species on Saba be afforded protection under the new law. Both organizations have contacted NGO counterparts on the other two islands to ask their assistance in coordinating protection throughout the three closely situated islands.

In late April 1997, David S. Lee (North Carolina State Museum of Natural Sciences) and Martha Walsh-McGehee (Island Conservation Effort) established a one hectare site for a study of breeding Red-billed Tropicbirds (*Phaethon aethereus*). After circumnavigating the island by boat to survey the coastline and determine areas with a high density of tropicbirds, a breeding colony on the southeastern coast was selected as a study site because of the relatively easy access to the nests. Although only preliminary studies have been completed, 24 nests have been located (last published estimate was less than 20 pairs on Saba; Voous 1983). Approximately 80% of the coastline provides suitable nest

sites for tropicbirds, and a rudimentary estimate of 750–1000 pairs made by Lee and Walsh-McGehee makes Saba the largest known colony of breeding Red-billed Tropicbirds in the Caribbean Basin. Some components of the study are being documented with video, and an educational video will be created for use in schools and other community gatherings.

Public awareness of the tropicbird study has produced an increased interest in birds in general. One nature club has already been established at the Saba School of Medicine to coordinate volunteer assistants for nest monitoring. Other volunteers have come from the local community.

The final draft of *A Guide to the Birds of Saba*, by Walsh-McGehee, has been reviewed and should be ready for publication in 1998.

## THE CAYMAN ISLANDS

TREVOR BAXTER
*Cayman Islands Bird Club, P. O. Box 630GT, Grand Cayman; and National Trust for the Cayman Islands, P. O. Box 31116 SMB, Grand Cayman, Cayman Islands, B. W. I.*

TERRESTRIAL CONSERVATION EFFORTS in the Cayman Islands are primarily undertaken by the National Trust for the Cayman Islands, a statutory non-profit NGO, whereas the Cayman Islands Government's Department of Environment focuses on marine conservation, and regulatory/legal matters regarding the environment. The Trust now owns and manages 655 ha [1,619 acres] of protected conservation land in all three of the Cayman Islands, which includes significant habitat for resident and migratory birds. Major terrestrial reserves on Grand Cayman are the Salina Reserve (253 ha [625 acres]) of primary woodlands, thickets, buttonwood wetland and sedge swamp; the 155-ha [382 acre] Mastic Reserve (old growth woodland); and parts of the Central Mangrove Wetland (approx. 648 ha [1,600 acres] are partially protected). On Cayman Brac, the Brac Parrot Reserve protects 73 ha [180 acres] of woodland, and in Little Cayman the 81-ha (200 acre) Booby Pond Nature Reserve protects a large breeding colony of Red-footed Boobies (*Sula sula*). Overall, 5 ′ % of the total area of the Cayman Islands now enjoys some level of environmental protection.

In March 1997 the Trust conducted a survey of the large Red-footed Booby (*Sula sula*) rookery in Little Cayman (F. J. Burton, P. E. Bradley, E. A. Schreiber, G. Schenk, and R. W. Burton, *in prep.*). The nesting population was estimated at 5,000 pairs, occupying an area almost entirely protected in the Trust's Booby Pond Nature Reserve, which is currently the Cayman Islands' only Ramsar site (Table 1). This large seabird rookery appears to have expanded since it was last surveyed by R. Clapp in 1986 when 2,800 pairs were counted, and is clearly thriving. Several other species were surveyed, including Magnificent Frigatebird (*Fregata magnificens*), Bridled Tern (*Sterna anaethetus*), and Least Tern (*S. antillarum*) (Table 1). Bradley surveyed the West Indian Whistling-Duck, frigatebird, and Least Tern on Little Cayman.

Immediately after the Red-footed Booby survey, the Trust teamed up with volunteers from the Cayman Islands Bird Club, to perform the third triennial census of the endangered Cayman Brac Parrot (*Amazona leucocephala hesterna*). Occupying fixed stations at 0.6 km spacing, first established in 1991, the survey team observed parrot activity for 3 hours beginning at dawn and 3 hours ending at dusk for each of 7 days to estimate the parrot population area by area throughout the island. All three censuses, in 1991, 1994 and 1997 have indicated the Cayman Brac population is currently stable, at approximately 400 birds. No statistically significant differences were detected between the three censuses. Census of the Grand Cayman parrot, using the same standardized technique, show this subspecies (*A. l. caymenensis*) also to be stable, with a population of approximately 2,000 birds in 1992 and 1995.

The 1997 Brac Parrot Census was funded by a Partners in Flight grant through the Georgia Department of Natural Resources: this was the first formal Partners in Flight project in the Cayman Islands, and we hope to build on this relationship. The habitat for the Cayman Islands parrots is also important habitat for neotropical migrants.

The population of the West Indian Whistling-Duck (*Dendrocygna arborea*) continues its recovery in Grand Cayman, where we have recent sightings in the developed western districts long vacated by this species. The population was estimated at approximately 400 adults by Fiona O'Brien in 1995. The species is also present in Little Cayman and Cayman Brac. A total of 220 adults in five populations was estimated in 1996-1997 (P. E. Bradley). One population at Booby Pond consisted of 22 adults with 48 young in August 1997 (P. E. Bradley). Since hunting ceased, the ducks feed on roadside ponds throughout the day and breed from January through August.

On Cayman Brac, Patricia Bradley conducted a survey of the wetlands and a survey of the waterbirds for the Department of Environment, including surveys of the tropicbirds, Brown Booby, Least Tern, and West Indian Whistling-Duck (Table 2).

Building on early work by W. B. Richardson, C. B. Cory, then Percy Lowe and James Bond, Patricia Bradley and members of the Cayman Islands Bird Club now have records of over 200 bird species in the Cayman Islands, and records of rare migrants are being continuously added. Bradley and Baxter have compiled a list of migrant warblers recorded in the Cayman Islands up to 1997 (Table 3).

Patricia Bradley has produced the fourth checklist (following Cory 1892, Lowe 1911, and Johnston *et al.* 1971) of birds of the Cayman Islands for the British Ornithologists' Union series. The manuscript is scheduled for publication in 1998. Records, including those of unpublished visiting birders, Cayman Islands Bird Club members, residents, and P. E. Bradley (1982-1997) bring the total species list to 220. In 1996-1997, Bradley studied the Cayman Islands collections in the American Museum of Natural History, U. S. National Museum, Louisiana State University Museum, Field Museum of Natural History, and British Museum of Natural History.

Table 1. Results of surveys of birds in Little Cayman and Grand Cayman, Cayman Islands, 1983–1997.

| Species | Site | Year | Estimated population |
|---|---|---|---|
| Red-footed Booby (*Sula sula*) | Little Cayman | 1986 | 2,800 pairs (Clapp) |
| | | 1997 | 5,000 pairs (Burton et al.) |
| Magnificent Frigatebird (*Fregata magnificens*) | Little Cayman | 1983 | 150 pairs (Bradley) |
| | | 1986 | 150 pairs (Bradley) |
| | | 1996 | 350–400 pairs (Bradley) |
| | | 1997 | 350–400 pairs (Bradley) |
| Bridled Tern (*Sterna anaethetus*) | Grand Cayman | 1995 | 19 pairs (Bradley) |
| | | 1997 | 21 pairs (Bradley) |
| Least Tern (*Sterna antillarum*) | Little Cayman | 1996 | 60 pairs (Bradley) |
| | | 1997 | 54 pairs (Bradley) |

Table 2. Results of Patrica E. Bradley's surveys of wetlands in Cayman Brac, Cayman Islands, 1983–1997.

| Species | Year | Estimated population |
|---|---|---|
| White-tailed Tropicbird (*Phaethon lepturus*) | 1984 | ca. 800 adults |
| | 1996 | ca. 85 adults |
| | 1997 | 54 adults |
| Brown Booby (*Sula leucogaster*) | 1983 | ca. 360 adults, ca. 130 young |
| | 1996 | 65 adults, 20 young |
| | 1997 | 60 adults, min. 15 young |
| West Indian Whistling-Duck (*Dendrocygna arborea*) | 1996 | 25 birds |
| | 1997 | 22 birds |
| Least Tern (*Sterna antillarum*) | 1996 | 27 pairs |
| | 1997 | 45 pairs |

Table 3. Status of migrant warblers recorded in the Cayman Islands up to1997, compiled by Trevor Baxter (from Bradley and Rey-Millet, *Birds of the Cayman Islands* (1995). Status data are preliminary and these observations represent a guide to the frequency in an average year.

| Species | Status |
|---|---|
| Blue-winged Warbler *Vermivora pinus* | Very rare |
| Golden-winged Warbler *Vermivora chrysoptera* | Very rare |
| Tennessee Warbler *Vermivora peregrina* | Uncommon–common |
| Orange-crowned Warbler *Vermivora celata* | Unconfirmed |
| Nashville Warbler *Vermivora ruficapilla* | Very rare |
| Northern Parula *Parula americana* | Fairly common |
| Yellow Warbler *Dendroica petechia* | Common |
| Chestnut-sided Warbler *Dendroica pensylvanica* | Rare |
| Magnolia Warbler *Dendroica magnolia* | Uncommon |
| Cape May Warbler *Dendroica tigrina* | Fairly common |
| Black-throated Blue Warbler *Dendroica caerulescens* | Fairly common |
| Yellow-rumped Warbler *Dendroica coronata* | Rare to locally common |
| Black-throated Green Warbler *Dendroica virens* | Rare |
| Blackburnian Warbler *Dendroica fusca* | Uncommon |
| Yellow-throated Warbler *Dendroica dominica* | Fairly common |
| Pine Warbler *Dendroica pinus* | Rare |
| Prairie Warbler *Dendroica discolor* | Common to fairly common |
| Palm Warbler *Dendroica palmarum* | Common |
| Bay-breasted Warbler *Dendroica castanea* | Very uncommon |
| Blackpoll Warbler *Dendroica striata* | Very uncommon |
| Cerulean Warbler *Dendroica cerulea* | Very rare |
| Black-and-white Warbler *Mniotilta varia* | Fairly common |
| American Redstart *Setophaga ruticilla* | Fairly common |
| Prothonotary Warbler *Prothonotaria citrea* | Rare |
| Worm-eating Warbler *Helmitheros vermivorus* | Fairly common |
| Swainson's Warbler *Limnothlypis swainsonii* | Rare |
| Ovenbird *Seiurus aurocapillus* | Fairly common |
| Northern Waterthrush *Seiurus noveboracensis* | Fairly common |
| Louisiana Waterthrush *Seiurus motacilla* | Very rare |
| Kentucky Warbler *Oporornis formosus* | Rare |
| Connecticut Warbler *Oporornis agilis* | Unconfirmed |
| Common Yellowthroat *Geothlypis trichas* | Fairly common |
| Hooded Warbler *Wilsonia citrina* | Rare |
| Wilson's Warbler *Wilsonia pusilla* | Vagrant |
| Canada Warbler *Wilsonia canadensis* | Very rare |
| Yellow-breasted Chat *Icteria virens* | Unconfirmed |

# WHAT'S HAPPENING IN THE ENVIRONMENTAL COMMUNITY IN ANTIGUA-BARBUDA

Kevel Lindsay
*Island Resources Foundation, P. O. Box 103, Museum of Antigua-Barbuda, Long Street, St. John's*

### Wetlands Project

Environmental Awareness Group, Island Resources Foundation and United Nations Environment Programme/ Global Environmental Facility

The Environmental Awareness Group (EAG) has just received a grant from the United Nations Environmental Programme(UNEP)/Global Environmental Facility (GEF) Small Grants Project to conduct a survey of the wetlands of Antigua and Barbuda. The project aims to catalogue all wetland sites on both islands, update current information, prepare maps, conduct a detailed study of five selected sites, and develop an action conservation plan. There is a community component, which entails a survey and mapping of wetland sites. The funding is for 18 months, starting this July.

### Frigate Bird Sanctuary Project—Barbuda

Organization of American States/Natural Resources Management Unit, Environmental Unit & Barbuda Council

The Organization of American States Natural Resources Management Unit (OECS/NRMU) is working with the Barbuda Government Council and the Environmental Unit in the Ministry of the Environment, to develop a management plan for the Magnificent Frigatebird (*Fregata magnificens*) nesting colony in the Codrington Lagoon in Barbuda. The Colony is estimated to have over 2500 nesting pairs, and is believed to be one of the largest in the Caribbean. Dr. Betty Ann Schreiber has already paid two visits to the island to conduct surveys and provide recommendations as to the management needs of the colony. A survey is also being done on the marine habitats of the lagoon. This project is ongoing.

### Agroforestry Project

Gilbert Agricultural Rural Development Centre, Environmental Awareness Group (EAG), Barclays Bank & Caribbean Natural Resources Institute

During the 1995 hurricane season, the EAG nursery was completely destroyed when Hurricanes Luís and Marilyn passed the Leeward Islands. Today, the EAG and the Gilbert Agricultural and Rural Development Centre (GARDC) are collaborating on developing plant nursery facilities and tree planting programmes throughout the country. A nursery programme has been initiated in two schools. It is hoped that the nursery facilities will be producing native and introduced species for community projects, private gardens and forestry projects. A number of workshops will also be conducted to sensitize farmers to the need to reforest their plots and help conserve and protect biodiversity, soil fertility, and increase water retention.

### Climate Change Project

United Nation Environment Programme/Global Environmental Facility, Government of Antigua-Barbuda

In order to prepare for potential climate change, UNEP is developing methods of evaluating climate change impacts and formulating strategies to adapt to climate change, and to moderate its impacts. UNEP has selected Antigua-Barbuda as one of four countries from around the world to participate in the formulation and development of these methods and strategies. The Ministry of Planning has commissioned a national study team to undertake and to report on the expected impacts of climate change on Antigua-Barbuda, as well as possible adaptation and mitigation measures. The study team is made up of various sectors of the economy and the society. The study ends in September 1997.

### Conservation of the Antiguan Racer

Environmental Awareness Group/Island Resources Foundation/Fauna & Flora International/Forestry Unit

The conservation of the Antiguan racer snake (*Alsophis antiguae*) continues. Following up on the 1995/96 effort to determine the status and biology of the rare species, Dr. Jenny Daltry conducted a follow-up survey in March 1997. Dr. Daltry spent two months on Great Bird Island, the only home of the snake, completing a mark-recapture programme of the snakes to determine the current population. Dr. Daltry was particularly interested in the breeding success of the snakes over the past two years, especially since the passage of Hurricanes Luís and Marilyn, and the eradication of introduced black rats (*Rattus rattus*).

In her preliminary report, Dr. Daltry concluded that the population of the snakes has increased from approximately 50 in 1995, to over 100 in 1997. She observed a number of year old juveniles and reported that all snakes seem to be doing quite well. No fresh scars were observed, which is a good indication that the threat of the introduced rats has been eliminated. There were no signs of rats. The project is ongoing.

### Bird Monitoring Programme

Island Resources Foundation

The Foundation has continued its "seabird-monitoring

programme" in 1997. The project was initiated a year ago after the Rat Eradication Project on Great Bird and the nearby Galley Islands, and the Parham Harbour Project's development of the Bird Island Marine Reserve's Management Plan. The Foundation was contracted to complete the design of the management plan. Although the main focus is the island in the North Sound off of the northeastern tip of Antigua, we are also gathering data from other small offshore island, Redonda and Barbuda. This is an ongoing project of the Foundation.

### Neem Project

Organization of American States & Environmental Unit

The Organization of American States has provided funding for the development of organic pesticides and other products from the neem tree (*Azadaractha indica*). The two major aims are to encourage local cottage industries and encourage farmers to look at alternative to synthetic pesticides. The project is based at the Environmental Unit, Ministry of Environment. The initial duration is a year and a half, with the hopes of further extension.

### Biodiversity Profiles & Species &Ecosystem Recovery Programmes/Updated Vegetation Classification

Island Resources Foundation

The Foundation has prepared a draft of the Antigua-Barbuda Biodiversity Profile. The profile is a synthesis of the current information on the information available on the flora and fauna of Antigua-Barbuda. Out of this synthesis will arise a Species and Ecosystem Recovery Programme for Antigua-Barbuda and Redonda. The recovery programme will examine various approaches to the conservation of rare and endangered species and ecosystems, and the institutional framework needed ensure their future survival. This is an ongoing project of Island Resources Foundation.

### Seatons Development Project

SC, Environmental Awareness Group(EAG), German Government and Caribbean Natural Resources Institute

Members of Seatons Village, a small coastal community on the northeastern end of Antigua, have gotten together to sustainably manage their coastal resources, and encourage self reliance. The person spearheading the programme is Foster Derrick, who is also a member of the EAG. Funding has been secured from the Caribbean Natural Resources Institute (CANARI) and the German Government to develop artificial reefs in Seatons Harbour and the cultivation of seamoss. The artificial reef foundation has been created using discarded tyres. It was established two years ago and is already showing signs of life as lobsters, soft coral and juvenile fish have moved in. The seamoss project is now in its initial stages. This project is ongoing.

## STATUS OF ORNITHOLOGICAL RESEARCH IN THE BAHAMAS

Carolyn Wardle
*Bahamas Representative, P. O. Box N3189, Nassau, Bahamas*

### Research Permits Issued

Genetic studies of the West Indian Woodpecker (*Melanerpes superciliaris*)
Dr. Lowell Overton
Department of Biological Sciences
University of Arkansas
Fayetteville, Arkansas 72701, U. S. A.
Research Locations: Abaco, San Salvador, Grand Bahama

Study of the inter-island variation of Thick-billed Vireos (*Vireo crassirotris*)
Dr. John Barlow and Ms. Marlene Walker
Royal Ontario Museum
Toronto, Ontario, Canada
Research Locations: New Providence, Abaco, Andros, Rum Cay, San Salvador and Crooked Island

### Current and Proposed Projects

Trapping of Shiny Cowbirds (*Molothrus bonariensis*) on Andros Island (proposed project)
Funding being sought
Michael Baltz
Division of Biological Sciences
University of Missouri
Columbia, Missouri 65211, U. S. A.

The Nature Conservancy: Kirtland's Warbler (*Dendroica kirtlandii*) winter habitat survey
Mr. Eric Carey, Ministry of Agriculture and Fisheries, Mr. Paul Dean, Bahamas National Trust (BNT), Mr. Rick Oliver, BNT and Mrs. Aileen Bainton, BNT were invited by The Nature Conservancy to visit the summer

breeding grounds of the Kirtland's Warbler. They were able to see the bird in its summer habitat and discuss possible wintering habitats. The four participants were selected for their ability to return to the Bahamas and educate others so that a monitoring program for the Kirtland's Warbler can be implemented this winter. The BNT Ornithology group is keen to participate and will be organizing their monthly bird walks with this in mind.

ESTABLISHMENT OF HABITAT FRAGMENT AND NATIVE TREE AREA IN SAN SOUCI, NEW PROVIDENCE

Joint project of the BNT Native Flora and Ornithology group. A vacant lot was donated to the BNT with the request that it be maintained as an area for Bahamian bird life. Plans are currently underway to fence, and label trees already there as well as replant native trees for use as an outdoor classroom.

WEST INDIAN WHISTLING–DUCK (*DENDROCYGNA ARBOREA*) CONSERVATION PROJECT

Society of Caribbean Ornithology, West Indian Whistling–Duck Working Group Bahamian Counterparts: Ministry of Agriculture and Fisheries, Bahamas National Trust and Ministry of Education. The Bahamas National Trust with the Ministry of Agriculture has worked with the committee submitting their ideas for the educational programs as well as the monitoring program for the family islands. The BNT requested and received an additional grant of $5,000.00 from Conservation International Bahamas Ltd. for the whistling–duck project. This donation will be utilized to cover travel expenses within the Bahamas so that BNT Education Officers will be able to assist in the presentation of the educational program. The Trust has also solicited the assistance of a local artist, Melissa Maura, in the production of a whistling–duck coloring book.

BAHAMAS NATIONAL TRUST GAMEBIRD SPECIAL MEETING ON THE SCIENTIFIC MONITORING OF THE WHITE-CROWNED PIGEON

The Bahamas National Trust Gamebird Sub-Committee at the request of the Ministry of Agriculture and Fisheries organized a special meeting March 1997 for ornithological experts and knowledgeable local people to discuss the scientific monitoring of the White-crowned Pigeon. Attending from abroad were David Blankenship of the U. S. Fish Wildlife Service, who conducted White-crowned Pigeon research for Audubon from October 1975 to October 1976 and Mr. Alexander Sprunt, IV, who was Research Director for Audubon at the time. Also invited but unable to attend were Tom Bancroft, Archbold Research Center in Florida, Dr. Frank Rivera, U. S. Fish and Wildlife and Dr. James Wiley, Grambling State University. All minutes were circulated to overseas representatives who were unable to attend for their input. The group realized that many of the problems for the White-crowned Pigeon had to do with hunter education. The BNT Gamebird Committee, an arm of the BNT Wildlife Committee, resolved to visit and organize public meetings in the Family Island Communities that have hunting populations. The object of the meetings will be to facilitate better communication between the BNT's Gamebird Committee, the Ministry of Agriculture and Fisheries and hunting population of the family islands. A special effort will be made to present an educational program about the biology of the pigeon thus explaining its needs, and why certain legislation must be in place to manage this resource. The Gamebird Committee has also agreed to assist the Ministry of Agriculture and Fisheries in the collection of wings from Mourning Doves (*Zenaida macroura*) so that decisions regarding the hunting of this bird can be founded on scientific evidence.

REPRODUCTION OF BAHAMA PARROT FACT SHEET AND A-Z BOOKLET OF BAHAMIAN WILDLIFE AND WILD PLACES

RARE Center for Tropical Conservation has recently granted funding to the BNT for the reproduction of the Bahama Parrot (*Amazona leucocephala bahamensis*) Fact Sheet and the A-Z Booklet of Bahamian Wildlife and Wild Places.

GROG POND, GREAT EXUMA

This area has been pinpointed by local BNT members as an important wetland and efforts are under way to identify the owners of property surrounding the Grog Pond in an attempt to heighten awareness of its importance and ultimately to attempt to have the area under the protection of the BNT.

WILSON AND HARROLD PONDS, NEW PROVIDENCE

The Ornithology Group has pin-pointed this area as an important habitat for wading and other birds. The BNT is particularly concerned about the agricultural activities on the east side of Wilson Pond. Efforts are under way to verify the status of the land in this area before proceeding further. A comprehensive list of birds using this area has already been compiled.

# ACTIVIDADES DE CONSERVACIÓN DE LA AVIFAUNA EN LA REPÚBLICA DOMINICANA EN 1997

SIMÓN GUERRERO
*Zoodom, Santo Domingo, República Dominicana*

DURANTE EL ÚLTIMO AÑO se iniciaron diversos programas relacionados con la conservación de las aves en la República Dominicana, tanto por organismos gubernamentales como por organizaciones privadas. Entre los organismos oficiales habría que citar al Departamento de Vida Silvestre, el cual ha iniciado una revisión de los reglamentos que regulan todo lo relativo al uso de la vida silvestre y hace esfuerzos para que se cumplan las leyes de fauna vigentes.

Una comisión de asesoría ecológica creada por la Procuraduría General de la República ha sido de gran ayuda en la aplicación de las leyes que protegen la fauna.

El Jardín Botánico Nacional sirve de soporte a la campaña masiva de reforestación que desarrolla el Plan Nacional Quisqueya Verde, suministrándole plántulas nativas y endémicas producidas en su Centro de Conservación de Plantas. El Jardín botánico cuenta, además, con un banco de semillas.

Como miembro del Plan Quisqueya Verde, el Parque Zoológico Nacional implementa un programa de creación de "Mini-Reservas de Vida Silvestre," las cuales consisten en áreas pequeñas cuyo acceso al público se restringe y en las cuales se siembra arbustos, arbolitos y lianas nativos que proporcionan refugio y alimento a la fauna silvestre. En este programa se introduce el concepto de "Restauración Ecológica," que vendría a complementar el término "Reforestación" que ha sido distorsionado por el modelo agronómico.

Otra actividad conservacionista realizada por el Parque Zoológico fue un acto de Bienvenida a las Aves Migratorias en cordinación con la Dirección Nacional de Parques y el Club de Observadores de Aves Annabelle Dod. El acto se realizó en la escuela primaria de "Las Calderas," en el sur del país, una zona de gran importancia para las aves migratorias.

El Parque Zoológico implementa, en la actualidad, un programa de Instalación de nidos artificiales para aves que anidan en cavidades, especialmente de los géneros *Amazona* y *Aratinga*, especies de las cuales existen pequeñas poblaciones establecidas en la Ciudad de Santo Domingo. Con este programa pretendemos educar a la gente sobre la importancia de realizar actividades que contribuyan a la conservación de la avifauna, lo que es particularmente importante en el caso de los dos Psittaciformes endémicos de la isla, que son percibidos por la población únicamente como mascotas. Estos nidos son financiados por estudiantes que participan activamente en su instalación y se comprometen a darle seguimiento a los mismos.

En el manejo de la colección de aves del zoológico y en sus proyectos de educación e investigación, se hace énfasis en las especies nativas y endémicas. Además, se realizan trabajos de restauración en los terrenos del Parque, a fin de mejorar la calidad del hábitat en el que viven muchas especies silvestres.

Otro programa de conservación del Zoológico incluye campañas que se inician con el diseño de afiches en pro de la conservación de la fauna autóctona. El primero de la serie lleva una foto de un arbusto (*Lantana camara*) con flores y mariposas y la leyenda "Para que vuelvan las Mariposas," en el cual se instruye a la ciudadanía a plantar de estos arbustos en patios y jardines como una forma de facilitar la recuperación de estas especies. El lema de otro afiche de la serie tendrá una foto de otro arbusto (*Amelia pattens*) con flores y colibríes y el lema "Para que vuelvan los Zumbadores."

Otro afiche promoverá la siembra de *Ficus*, como parte de una campaña en pro de la conservación de los murciélagos. También se aprovechan las exhibiciones naturales que hay en el Parque (nidos de *Dulus dominicus* y vencejos de palmar, por ejemplo), para fines educativos.

Para hacer más efectiva esta campaña, se ha constituído un "Club Infantil Amigos del Zoológico," cuyos miembros participarán activamente en las tareas de conservación del Parque.

El ZOODOM está también involucrado en la promoción de los cultivos orgánicos, especialmente los cafetales de sombra, cuya importancia para la avifauna está ampliamente demostrada. Se contempla la creación en el Parque de un cafetal de sombra con fines educativos.

El Parque Zoológico desarrolla en la actualidad, en coordinación con la Dirección Nacional de Parques, el Proyecto de Recuperación de la Cotorra Puetorriqueña y las Universidades de Mississipi y Carolina del Norte, un proyecto de liberación de Cotorras Dominicanas (*Amazona ventralis*) de las nacidas en los aviarios del proyecto puertorriqueño, con el propósito de hacer estudios de telemetría y determinar el índice de sobrevivencia de las mismas.

Entre las ONGS tenemos al Grupo Jaragua Inc., que trabaja en el área protegida del mismo nombre, situada en el suroeste del país, realiza censos anuales de Cotorras Dominicanas, Palomas Coronitas (*Columba leucocephala*) y de las aves acuáticas de la Laguna de Oviedo, tanto nativas como migratorias, con la participación de de voluntarios de las comunidades próximas al Parque. Este grupo también colabora con el proyecto que implementa Chris Rimmer en el Parque Nacional Sierra de Bahoruco, con la especie migratoria Bicknell's Thrush (*Catharus bicknelli*).

El Grupo Ecologista Tinglar, a través de su filial Club de Observadores de Aves Annabelle Dod, realiza continuamente visitas al campo con el propósito de iniciar a los jóvenes en la observación de las aves. También trabajaron entrenando en la identificación de las aves a estudiantes de Samaná y del Parque del Este, como parte del programa Parques en Peligro, que auspicia The Nature Conservancy. Nicolás López, miembro del Club, confeccionó un CD ROM sobre las aves residentes de la República Dominicana. También produjo este grupo camisetas con dibujos de aves endémicas de la

## NEWS OF MEMBERS

Fred C. Schaffner has recently been named Chairman, Department of Science and Technology, Universidad Metropolitana (UMET), P. O. Box 21150, San Juan, Puerto Rico 00928. Telephone: 787-766-1717, ext. 6457. e-mail: um_fschaffne@suagm3.suagm.edu (institutional) *or* fcspr@caribe.net (personal). Web page: http://umet_mie.suagm.edu/umet/projects/fschaffn/fred.html The home address listed in *The Flock* remains valid.

## REQUEST FOR ASSISTANCE

I would be very grateful for tape recordings of rhythmic dawn song of *Contopus latirostris* from St. Lucia, *Tyrannus caudifasciatus* from the Bahamas, and tapes from *Oxyura dominica* (male) from anywhere, and any unpublished color slides or prints of adult *Contopus latirostris* from Guadeloupe or Martinique. George B. Reynard, 105 Midway St., Riverton, New Jersey 08077-101, U.S.A.

## POSITIONS AND OPPORTUNITIES AVAILABLE

Universidad Metropolitana (UMET) invites applications for faculty positions at the Assistant Professor level in the following program areas: (1) computer science, (2) mathematics or applied mathematics, (3) inorganic or physical chemistry, (4) physics, and (5) environmental science, biology, or geology. Minimum qualifications for each position include a Ph.D degree from an accredited institution, although we will accept applications from Master's level candidate in computer science. One or two positions are anticipated in each program area, beginning in January or August 1998. Each position includes a maximum of 9 credit hours of undergraduate teaching, and release time for research involving undergraduate students. Candidates must be highly motivated team players with a vision for the future and strong commitment to undergraduate education and student/faculty collaborative research in the small university setting. The ability to communicate with students in their native language, Spanish, is considered highly desirable. Funding for these positions is provided through the NSF-sponsored Model Institutions for Excellence program, a consortium of six institutions nationwide (USA) devoted to excellence in undergraduate science education. UMET enjoys excellent agreements for research collaboration with numerous national laboratories, including NCAR, LBL, the Arecibo Observatory, CORE, and others. The Department currently has about 30 full-time faculty and staff and over 50 part-time faculty, and offers Bachelor's degrees in Biology, Cellular and Molecular Biology, Environmental Sciences, Chemistry, Computer Science, Sales and Distribution of Chemical and Pharmaceutical Products, and "General Natural Sciences." Master's degree programs are contemplated within the next two years. Applicants should specify to which program area they are applying, submit a complete curriculum vitae, selected reprints, evidence of teaching excellence, and statement of teaching and research goals, and should arrange to have three letters of reference sent on their behalf. Materials should be addressed to: Dr. Fred C. Schaffner, Chairman, Department of Science and Technology, Universidad Metropolitana, P. O. Box 21150, San Juan, Puerto Rico 00928–1150; tel. (787) 766–1717, ext. 6457; e-mail: um_fschaffne@suagm3.suagm.edu.

An Affirmative Action/Equal Opportunity Employer. Women and minorities are strongly encouraged to apply. Consideration of applications will begin immediately and continue until suitable candidates are found.

## MEETINGS OF INTEREST

6-12 April 1998 – **Joint North American Ornithological Meeting**: The American Ornithologists' Union, Association of Field Ornithologists, Colonial Waterbird Society, Cooper Ornithological Society, and Wilson Ornithological Society will hold their annual meetings jointly in St. Louis, Missouri. The Raptor Research Foundation will hold a special raptor symposium. For information on the scientific program, contact Jeff Brawn, Illinois Natural History Survey, 607 E. Peabody Dr., Champaign, Illinois 61820, USA (telephone: 217-244-5937l; e-mail: birdmeet@mail.inhs.uiuc.edu). For information on local arrangements, contact Bette Loiselle, Department of Biology, University of Missouri–St. Louis, 8001 Natural Bridge Road, St. Louis, Missouri 63121, USA (telephone: 314-516-6224; e-mail: bird_stl@umsl.edu). Information about the meetings will be posted on BIRDNET (http://www.nmnh.si.edu/BIRDNET/).

13–16 May 1998 – **Ecotourism and Island Birds**, Miyake-jima Nature Center, Izu Islands, Japan. Symposium topics include — Island birds: population processes and ecology and conservation; and Ecotourism. Tetsuji Hidaka, Yutaka Yamamoto, and Dr. Jack T. Moyer, Miyake-jima Nature Center, 4118 Tsubota, Miyake-mura, Miyake-jima, Izu Islands, Tokyo 100-12, Japan (telephone: 81-4994-6-0410; fax: 81-4994-6-0458).

18-22 July 1998 – **Animal Behavior Society Annual Meeting**, Southern Illinois University at Carbondale. Lee Drickamer, Department of Zoology, Southern Illinois University, Carbondale, Illinois 62901, USA.

19-25 July 1998 – **International Congress On Ecology**, Florence, Italy. (Almo Farina, INTECOL; tel: 39-187-400-252).

28 July - 3 August 1998 – **7th International Behavior Ecology Congress**, Asilomar Conference Grounds, Monterey, California, USA. (Walt Koenig; e-mail: wicker@uclink.berkeley.edu or Janis Dickinson; e-mail: sialia@

uclink2berkeley.edu; both at Hastings Reservation, 28601 E. Carmel Valley Rd., Carmel Valley, California 93924, USA).

19-22 August 1998 – **XXII International Ornithological Congress**, Durban, South Africa. (Information — Dr. Aldo Berruti, 111 Blair Atholl Road, Westville 3630, South Africa; Fax: 27-31-262-6114; e-mail: aldo@birdlife.org.za; Scientific Program — Dr. Lukas Jenni, Schweizerische Vogelwarte, CH–6204 Sempach, Switzerland; fax: 41-41-462-9710; e-mail: jennil@orninst.ch).

30 September–4 October 1998 – **The 1998 Annual Meeting of the Raptor Research Foundation, Inc.**, David Eccles Conference Center, Ogden, Utah. (Carl D. Marti, Department of Zoology, Weber State University, Ogden, Utah

---

**JORNADA 30 ANIVERSARIO**

MUSEO DE HISTORIA NATURAL
"CARLOS DE LA TORRE Y HUERTA"
HOLGUÍN, CUBA
MAYO DE 1999

Información Preliminar

El Museo de Historia Natural de Holguín y la Dirección Provincial de Patrimonio le invita a participar en la Jornada Científica por el XXX Aniversario del Museo de Historia Natural "Carlos de la Torre y Huerta." Este evento científico se desarrollará en la sede de este museo en el mes de Mayo de 1999. Los interesados podrán exponer sus trabajos en la siguientes disciplinas:

Biología (Sistemática, Ecología, Etología y Zoogeografía)
Museología (Conservación, Animación Cultural, Fondos e Inventarios)
Sistema Curatorial (Formación de Colecciones, Manejo, Automatización)
Museografía (Diseño, Montajes, etc.)

La participación en esta jornada estará limitada, por lo que rogamos responda a este cuestionario y lo envíe antes de Mayo de 1998 fecha en que se enviará la segunda circular.

---

Nombre y Apellidos: _____
Centro de Estudio o Trabajo: _____
Especialidad: _____
Dirección de su Trabajo:
_____
_____
Dirección Particular:
_____
_____
Teléfono: _____ Correo Electrónico: _____

Deseo participar en _____

Enviar a:

Museo de Historia Natural "Carlos de la Torre y Huerta"
Maceo No. 129 e/n Martí y Luz
Caballero Holguín, C.P. 80100
Cuba

Telefax: 42-3935

EVENTO INTERNACIONAL DE FOTOGRAFIA DE AVES

# FOTOAVE

Noviembre 30 – Diciembre 8, 1998
Gran Parque Montemar
Península de Zapata
Cuba

El Grupo Turístico Rumbos y el Gran Parque Natural Montemar convocan a la realización del I Evento de Fotografía de Aves a efectuarse en uno de los escenarios de mayor belleza y enemismo del Caribe, invernadero además de aves migratorias de Norteamérica, que se efectuará del 30 de Noviembre al 5 de Diciembre de 1998 en la Península de Zapata, provincia de Matanas, Cuba.

COMITÉ ORGANIZADOR

| | |
|---|---|
| Dr. José R. Cuevas | Academia de Ciencias |
| Ing. Lázaro Cotayo | Parque Natural Montemar |
| Lic. Eusebio Guerrero | Rumbos Parque de Zapata |
| Lic. María E. Dominguez | Rumbos Cuba |

COMITÉ TECNICO

| | |
|---|---|
| Hirám González Alonso | Presidente del Museo Ornitológico de Cuba |
| Orlando H. Garrido | Especialista en Ornitología |
| Celso Rodríguez | Fotógrafo, *Prensa Latina* |

CONCURSAN EN

- Mejor instantánea
- Conjunto fotográfico que muestre de forma artistica de las aves en su medio acuático natural.
- Fotografia a un ave de la zona de gran valor por su endemismo y rareza.

CUOTA DE INSCRIPCIÓN

Fotógrafos — $90.00 USD
Observadores de aves — $50.00 USD

REQUISITOS

1. Los concursantes traerán sus equipos de fotografía.
2. Los trabajos se presentarán en 35 mm.
3. Se podrá participar con trabajos a color y en blanco y negro.
4. Se presentarán en fotografía de 8 x 10 pulgadas y/o slides (diapositivas).
5. La cantidad de fotos a presentar será mayor de 5 y menor o igual a 10, las cuales serán patrimonio del Comité Organizador.

FACILIDADES

- Podrán adquirir la guía de campo de observación de aves.
- El revelado de los rollos lo realizará la entidad Cubasol a precios módicos.
- Se podrán exponer las mejores fotografías de los autores durante el evento con acceso al gran público.

PREMIOS

Se otorgará un premio por cada temática. Gran premio a la mejor fotografía.

PROGRAMA

| | |
|---|---|
| Día 30 de Noviembre | Llegada a La Habana y traslado a la Península de Zapata, acreditación, alojamiento y cóctel de bienvenida. |
| Día 1 de Diciembre | Visita al refugio de Fauna Las Salinas. |
| Día 2 de Diciembre | Visita al bosque de Soplillar. |
| Día 3 de Diciembre | Visita al refugio de fauna de Santo Tomás. |
| Día 4 de Diciembre | Excursión a Guamá. |
| Día 5 de Diciembre | Almuerzo de despedida y premiación de los trabajos presentados. |

PAQUETE TURISTICO

Dbl. — $372.00 USD
Sgl. — $399.00 USD

INCLUYE

- Alojamiento en MAP x 5 noches. Hoteles ★★ y ★★★.
- Todos los transfers.
- Excursión a Guamá.
- Almuerzo de despedida.

Envié el cupón de inscripción a la siguiente dirección:
Calle O No. 108 e/c 1 ra y 3ra, Miramar, Ciudad deLa Habana, Cuba
Telefono: (537) 24-4520
Fax: (537) 24-7167
24-7168

# FOTOAVE

Noviembre 30 – Diciembre 8, 1998
Gran Parque Montemar
Península de Zapata
Cuba

Dear colleague:

We are pleased to announce that Rumbos, the Recreation and Tourism Company of Cuba and Montemar Grand Natural Park will convene the First International Contest of Bird Photography from 30 November to 5 December 1998 in the Zapata Peninsula, Matanas province, Cuba. The venue of this important event is one of Cuba's most interesting and beautiful places of unquestionable natural and historical values and constitutes one of the most important natural areas in Cuba and the West Indies. This Natural Park is the habitat of numerous waterfowl species.

## Organizing Committee

| | |
|---|---|
| Dr. José R. Cuevas | Academy of Sciences |
| Ing. Lázaro Cotayo | Grand Natural Park Montemar |
| Lic. Eusebio Guerrero | Rumbos, Zapata Peninsula |
| Lic. María E. Dominguez | Rumbos Cuba Travel Agency, Central Office, Habana City |

## Technical Committee

| | |
|---|---|
| Hirám González Alonso | President of the Ornithological Museum of Cuba |
| Orlando H. Garrido | Ornithologist |
| Celso Rodríguez | Photographer, *Prensa Latina* |

## Contest Categories

- Best close-up.
- Ensemble of photographs showing, artistically, birds in their natural acquatic habitat.
- Photograph of a local endemic or rare bird.

## Registration Fees

Photographers — $90.00 USD
Bird watchers — $50.00 USD

## Requirements for Contestants

1. Contestants will provide their own photographic equipment.
2. Work will be presented in 35 mm.
3. Photographs may be in color or black-and-white.
4. The format established for the contest is 8" x 10" for prints. Color slides are also acceptable.
5. The number of photographs submitted to the evaluation committed will be more than five, and up to 10 maximum, which will constitute patrimony of the Organizing Committee.

## Facilities

- Paticipants can receive the Checklist of Cuban Birds.
- The film will be developed by Cubasol Company, which will offer special modest prices during the event.
- Contestants will take their photographs throughout the event in public sites especially designed for the contest.

## Prizes

Each theme will be awarded a prize. The best photograph will receive a special Grand Award.

## Program

| | |
|---|---|
| November 30 | Arrival in Havana, transfer to Zapata Peninsula, accredidation, secure lodging, welcome cocktail, opening session. |
| December 1 | Visit to the natural reserve at Las Salinas |
| December 2 | Visit to the Soplillar forest. |
| December 3 | Visit to the Santo Tomás natural reserve. |
| December 4 | Excursion to "Guamá," a replica of an Indian village at Treasure Lake, and the crocodile breeding farm. |
| December 5 | Farewell lunch, awards ceremony, and closing session. |

## Tour Packages

Double room — $372.00 USD
Single room — $399.00 USD

## Package includes:

- Plan MAP (5 noches). ★★ y ★★★ hotels.
- All transfers (in/out – domestic).
- Excursion to Guamá.
- Farewell lunch.

Reservations must be addressed directly to the Organizing Committee, First International Contest of Bird Photography.

Calle O No. 108 e/c 1 ra y 3ra, Miramar, Ciudad deLa Habana, Cuba
Telefono: (537) 24-4520
Fax: (537) 24-7167
24-7168

EVENTO INTERNACIONAL DE FOTOGRAFIA DE AVES

## FOTOAVE

Cupon de Inscripción

Sírvase llenarlo a máquina o letra de molde.

Apellidos/Surnames _____
Nombres/Name(s) _____
Institución/ Organization _____
Dirección/Mailing address _____
_____
País/Country _____
Fax _____
E-mail _____

Participa como:
Fotógrafo/Photographer _____
Observador de aves/Bird watcher _____
Acompañante/Accompanying person _____

---

NEW PUBLICATION

## A TEACHER'S GUIDE TO THE BIRDS OF JAMAICA

PREPARED BY THE EDUCATION SUBCOMMITTEE OF THE GOSSE BIRD CLUB
TEXT BY LEO DOUGLAS
ILLUSTRATIONS BY MARGARET HODGES AND LEO DOUGLAS
FUNDING BY U. S. FISH AND WILDLIFE SERVICE
1997 – 38 pp.

This new guide includes three chapters, entitled "Our Birds," "Bird Studies using the School Grounds," and "Suggestions for Class-Birder Activities." Additional materials are provided in the appendices, including Methods of presenting data, a glossary of bird related terms, national curriculum comments, list of useful contacts, and a bibliography. Accompanying the guide is a color poster, "Birds of Jamaica — protect our birds and where they live."

Available from:
Gosse Bird Club
93 Old Hope Road
Kingston 6, Jamaica, W.I.

Telephone and Fax: 876-978-5881

## Taller Ciencia, Sociedad y Medio Ambiente: Alternativas para el Próximo Milenio

### Universidad Pedagogíca "Frank País García"
### Del 15 al 17 de diciembre de 1998

**Auspician el evento**

- La facultad de Ciencias de la Universidad Pedagógica "Frank País García"
- La Unidad de Medio Ambiente Delegación Territorial del CITMA
- La Cátedra Mujer y Sociedad de Santiago de Cuba

**Objetivo**

El evento pretende analizar y debatir las diferentes temáticas mediante el intercambio de experiencias, el debate de trabajos desarrollados por educadores y estudiantes en torno al tema central del evento.

**Temáticas**

- Ciencia y medio ambiente
- Educación ambiental curricular
- Experiencias de educación ambiental por vías no formales
- Trabajo comunitario y Educación Ambiental
- Salud, educación y cultura en la escuela y la comunidad
- Educación sexual
- El juego para el desarrollo de hábitos de salud. Experiencias
- Turismo, medio ambiente y pedagogía
- Mujer, sociedad y medio ambiente

**Programa preliminar del evento**

- Cursos pre-evento
- Conferencias especiales
- Presentación y debate de ponencias en talleres
- Exposiciones temáticas
- Visitas y recorridos especializados: a escuelas y comunidades, museos, jardín de helechos, Áreas Protegidas
- Mesas redondas

**Cuota de inscripción**

- Ponentes y delegados: $40.00 MN/USD
- Acompañantes: $15.00 MN/USD

Sin incluir hospedaje y alimentación, pero con derecho de acceso a las actividades del programa, recibir el módulo, los cursos y certificados

**Formas de participación y normas para la presentación de los trabajos:**

Se podrá participar en calidad de ponente u observador. El resumen no excederá de 250 palabras debiendo incluir título, autor(s), institución y país, objetivos y sinopsis del trabajo. Se enviará al Comité Organizador antes del 15 de Noviembre de 1998.

Los ponentes entregarán un ejemplar del trabajo.

El idioma oficial será el Español. Se ofrece servicios de traducción en Ingles y Francés.

**Las solicitudes y correspondencias podrán dirigirse a:**

Dra. Eumelia V. Romero Pacheco
Universidad Pedagógica "Frank País García"
Km 3-1/2 Autopista Nacional
Z. Postal 90400
Caja Postal 4047
Santiago de Cuba
Cuba

Telex: (53-226) 6-1227
Teléfono: 4-1123
Fax: 4-3113

## IN MEMORIAM: GEORGE A. SEAMAN, 1904–1997

RO WAUER
*315 Padre Lane, Victoria, Texas 77905, USA*

NATURE LOVERS LOST a good friend and colleague when George Seaman passed away on 17 September 1997 on the tiny Caribbean island of Saba. He was buried two days later at The Bottoms with only a few folks in attendance. Most of us – conservationists, ornithologists, birders, and other admirers – did not receive the bad news until it was too late. He left behind lots of friends, two sons, a daughter, and several grandchildren. But more importantly, perhaps, at least in the long-term, were his many written contributions that revealed his love of nature and perspective on West Indian conservation. These will remain long after the rest of us have followed George to our final reward.

George Seaman, born in December 1904, was deeply involved with natural resource studies and resource protection long before most of us became aware that our island resources were disappearing. For the vast majority of his lifetime, he fought to protect those resources. He lived a full and exciting life, exploring the tropics from South America to the South Seas and throughout the Caribbean. Many Caribbean biologists were present when he was honored at the seminal meeting of the Society of Caribbean Ornithology at St. Croix, 20 May 1988. That conference, which he attended, was in fact, dedicated to "George A. Seaman, Naturalist Par Excellence."

One of the best descriptions of George comes from one of his own books, "Ay Ay — An Island Almanac," where he wrote that he was "obsessed from earliest boyhood with the urge to investigate my surroundings and see the other side of the hill." Elsewhere in "Ay Ay" he describes himself as "an incorrigible dreamer and romantic." And in his book, "Sticks from the Hawk's Nest," he reveals his inner priority: in describing his friend Harry Beatty's discovery of the Bridled Quail-Dove on St. Croix, he wrote, "One small thing like this can justify an entire life."

George Seaman credited his love of nature to his stepfather, John C. DuBois. It was DuBois who introduced young George to reading, to the nightmare stars and to birds, to nature in every sense of the word. George once told me (recorded on three 90 minute taped interviews), "In all sincerity and truthfulness, I don't believe any boy could have had a better father than I had." Young George received his primary education on St. Croix, and at the age of 16, with only $25 in his pocket, went to New York City to complete his education and to find work. Because of his knowledge of birds and taxidermy, he secured a job at the American Museum of Natural History re-labeling specimens from a Birds of the World display for Dr. Frank M. Chapman. He also assisted the famous African explorer Carl Ackley with taxidermy.

Upon learning that Dr. Ludlow Griscom, the most renown ornithologist of the day, was preparing for an extensive expedition to Panama, George asked to be included. He was first turned down, but young Seaman was finally accepted when he informed Griscom that he could speak Spanish. So, less than two years after leaving his native West Indies, he found himself in the unexplored Chirique highlands of Panama. Although the expedition began well, the Guaymis Indians misunderstood the use of binoculars (they believed binoculars could look into the mountains and find gold) and forced the Griscom party to suddenly fold camp and flee for their safety. Back in Panama City, George offered to stay in Panama with the Expedition's guide, Rex Benson, and continued collecting birds. Griscom reluctantly agreed and George remained in Panama studying birds for the American Museum for almost a full year.

The use of arsenic in preserving bird specimens was commonplace in those days, and when George came down with a serious case of poisoning, he was forced to leave their jungle camp to seek medical help in Panama City. It was there, while he was recovering, that he learned about a British expedition to the South Seas. The British team of scientists and their three-masted barkentine – the St. George – were in port loading supplies.

When the St. George sailed a few days later, George was on board. The expedition lasted about one year and collected specimens from the Galapagos, Marquises, Societies, and Easter islands. Upon his return to Panama, after myriad experiences, including a major typhoon off Easter Island, a message that his mother was extremely ill awaited him. George immediately returned to St. Croix, and his mother died soon afterward.

Jobs during the 1920s were scare on St. Croix, so George sought employment elsewhere. He worked in the Dominican Republic for three years before returning to St. Croix and various management jobs. But those did not satisfy his desire to explore "the other side of the hill." So, in 1936, when an opportunity to join the Weber Expedition to Venezuela came about, he accepted.

George Seaman fell in love with Venezuela. When the 6-week expedition came to an end, he remained in Venezuela, taking a job with Standard Oil Co. and living mainly in "wild cat" camps on the llano. In his spare time he collected bird specimens for William H. Phelps, Sr., who was then gathering his famous Venezuelan bird collection. George remained with Standard Oil for six years. "The longer I stayed the more I loved Venezuela," he told me. "The bird life! I was on the Orinoco Delta. Couldn't have been a need for waterbirds, including the rare Orinoco Goose and the Jabiru Stork. Ducks! I never saw ducks in my life like that. They rose up in clouds that practically covered the sun."

World War II shut down the oil business in South America. But it rekindled the need to obtain rubber from native plants,

and so after a brief return to St. Croix in 1942, he joined several of his Venezuelan companions who went to work for the Rubber Development Corporation in Brazil. All during the war he traveled the Amazon Basin, supplying 13 stations by air. "We used enormous Catalinas," he told me. "They could fly from Brazil to Miami without refueling, taking 5 tons of rubber with them. At least once a week I visited one of these stations."

In 1949, George again returned to the Virgin Islands. Although his visit was intended to be a short one, the Virgin Islands Government enticed him to accept a position of Wildlife Supervisor for the Department of Fish and Wildlife. So, on May 16, 1949, at 45 years of age, he began a new career. First stationed on St. Thomas, he moved to St. Croix a year later, where he was provided an office at the Agricultural Station by his friend, Dr. Richard Bond, a well-known scientist in his own right. George and Bond became close friends and companions.

George Seaman remained with the Virgin Islands Fish and Wildlife until he retired in 1969. For 20 years he was the only government spokesman for wildlife and their essential habitats. Few others cared enough about the deer, doves and pigeons, quail, and other wildlife to study their populations, document the results, and make recommendations on what the government must do to protect those valuable resources.

George's official reports included a diversity of topics: life history studies of White-crowned Pigeons and Zenaida Doves, as well as food habitats of pigeons, doves, and Bridled Quail-Doves. From 1950 to 1960, he banded 1,271 White-crowned Pigeon chicks at Krause Lagoon. His white-tailed deer studies resulted in an important paper titled "Short history of deer of St. Croix." George produced numerous reports on the introduced small Indian mongoose, which included information on its life history and threat to native animals. He also reported on the life history of the Pearly-eyed Thrasher, a deer-cattle fever-tick study, and the actual and potential stocking programs of various huntable species, such as guineafowl, chachalacas, White-winged Doves, and quail. In 1958, George published the first "Check-list of Birds of the American Virgin Islands." This document has proved quite valuable in assessing changes in the Virgin Islands' birdlife since then.

In 1966, he authored a special report: "Conservation Master Plan for the U. S. Virgin Islands." This document was the first of several "land use master plans" written but never approved for the Virgin Islands. George wrote: "We must lay aside suitable areas now for the protection of the native flora and fauna if tomorrow's population is to have and enjoy it. Our countryside can be urbanized out of all beauty and recreational value in an astoundingly short time. One look around and it is alarmingly evident that the scenic beauty of all islands is at stake."

George left the Virgin Islands government with frustration. "During the 20-odd years that I had with the local government, in the field in which I worked, I didn't get to first base," he told me. "It was very unsatisfactory from the standpoint of having built a feeling among the people of the islands relative to conservation...I did everything possible...I never got to first base. They were not interested."

Although George may not have "got to first base" during the years that he struggled as the lone government voice for resource protection, many of his recommendations have since come to pass. St. Croix's Sandy Point has been set aside as a national wildlife refuge to protect nesting leatherback sea turtles. Green Cay, off St. Croix's north shore, was established as a national wildlife refuge to protect the last remnants of the endangered St. Croix Ground-Lizard. Many of the small Cays around St. Thomas have been given special legal protection because of their importance to nesting seabirds. And the Virgin Island Legislature passed a Territorial Parks Act in 1973 to protect other places of biological importance.

But George was not finished after retirement. He then began to write about nature for the people. His first book, "Sticks from the Hawk's Nest," was published in 1973. "Ay Ay — An Island Almanac," 12 chapters about the changing seasons, appeared in 1980 and was republished by Macmillan in 1989. In 1988, "Sadly Cries the Plover," a series of poems about the jungles and llanos of Venezuela, appeared. And most recently, "Every Shadow is a Man: A Journey Back into Birds and Time," was published in 1993. Although my personal favorite is "Ay Ay," each offers something special; each deserves reading by anyone with an interest in the West Indies.

George Seaman understood, as no one else, what the islands were like before commercial developments and habitat degradation began. His perspective on the islands that he loved so much offers rare insights that are unavailable elsewhere. We are richer because of those writings and his years of conservation. He will be sorely missed!

## *Contents (continued)*


HISTORY AND SUBSPECIATION OF THE PEARLY-EYED THRASHER, EMPHASIZING *MARGAROPS FUSCATUS BONARIENSIS* IN THE NETHERLANDS ANTILLES. Wayne J. Arendt. ..... 103
PHYLOGENETIC RELATIONSHIPS AND CONSERVATION STATUS OF SOME WEST INDIAN VIREOS. Jon C. Barlow. ..... 103
POPULATION DYNAMICS OF THE WHITE-CHEEKED PINTAIL IN PUERTO RICO. G. Bonilla, R. Castro and F. Rivera. ..... 104
CONSERVATION AND STATUS OF THE CAYMAN BRAC PARROT AND WINTERING NEOTROPICAL MIGRANTS. Frederic J. Burton, Patricia E. Bradley, E. J. Williams, and Trevor B. Baxter. ..... 104
DEMOGRAPHIC IMPACTS OF HURRICANES ON CARIBBEAN SEABIRDS. J. W. Chardine and R. D. Morris. ..... 105
*AMAZONA* PARROTS IN JAMAICA. Herlitz Davis and Susan Koening. ..... 106
RELATIONSHIPS BETWEEN HABITAT FRAGMENTATION AND BIRD COMMUNITIES IN THE BUFFER ZONE OF THE BLUE AND JOHN CROW MOUNTAINS NATIONAL PARK (BJCMNP). Suzanne Davis. ..... 107
CONTRIBUTION OF THE NATIONAL ZOOLOGICAL PARK TO AVIAN CONSERVATION IN HISPANIOLA. Simón Guerreo. ..... 107
CONSERVATION IMPLICATIONS OF STUDIES OF EVOLUTIONARY RELATIONSHIPS AMONG SOME CARIBBEAN BIRDS. Nedra Klein. ..... 107
A CD-ROM GUIDE TO THE RESIDENT BIRDS OF THE DOMINICAN REPUBLIC. Nicolás López. ..... 108
VALUES OF THE CONVENTION WETLANDS OF INTERNATIONAL IMPORTANCE. Herbert A. Raffaele. ..... 108
UPDATE ON THE WEST INDIAN WHISTLING-DUCK CONSERVATION. Lisa G. Sorenson. ..... 108
PREPARATION AND PRODUCTION OF EDUCATION MATERIALS FOR AVIAN CONSERVATION IN THE DOMINICAN REPUBLIC. E. Vázquez, K. Wallace, and R. Lorenzo. ..... 109
CONTROL OF THE SHINY COWBIRD (*MOLOTHRUS BONARIENSIS*): CAN IT IMPROVE THE REPRODUCTIVE SUCCESS OF RARE OR ENDANGERED SPECIES? THE CASE OF THE YELLOW-SHOULDERED BLACKBIRD (*AGELAIUS XANTHOMUS*) IN PUERTO RICO. E. A. Ventosa-Febles, R. López, J. Camacho y A. Falcón. ..... 110
RESTORATION AND HABITAT MANAGEMENT AT THE HUMACAO WILDLIFE REFUGE. PHASE I: HABITAT ASSESSMENTS AND WETLAND MANAGEMENT PLAN. Francisco J. Vilella and Matthew J. Gray. ..... 110
ARE HURRICANES A KEY FACTOR FOR THE ECOLOGY OF THE GUADELOUPE WOODPECKER? Pascal Villard. 111
THE THICK-BILLED VIREO: A CONSERVATION PERSPECTIVE FOR A WEST INDIES ENDEMIC. Marlene Walker. 112
IMPLICATIONS OF INTRODUCED PREDATORS AND PARASITES FOR THE PUERTO RICAN VIREO IN GUÁNICA FOREST, PUERTO RICO. Bethany L. Woodworth. ..... 112
THE TIMING OF THE BREEDING SEASON IN THE BANANAQUIT (*COEREBA FLAVEOLA*) ON THE ISLAND OF GRENADA, WEST INDIES. J. M. Wunderle. ..... 113
HUMAN INTERACTIONS WITH SEABIRDS IN THE CARIBBEAN. Ann M. Haynes-Sutton. ..... 113
GREMIOS TROFICOS DE LAS COMUNIDADES DE AVES RESIDENTES Y MIGRATORIAS EN DIFERENTES LOCALIDADES DE CUBA. Hiram Gonzalez Alonso. ..... 114
AREAS DE IMPORTANCIA PARA LA REPRODUCCIÓN DE ESPECIES MARINAS COLONIALES (CHARADRIIFORMES) EN CUBA. Pedro Blanco Rodríguez, Bárbara Sánchez y A. Hernández. ..... 114
AREAS DE IMPORTANCIA REGIONAL PARA LAS AVES DEL ORDEN CHARADRIIFORMES EN CUBA. Pedro Blanco Rodríguez. ..... 114
AREAS DE INVIERNO DEL FRAILECILLO SILBADOR EN CUBA. Pedro Blanco Rodríguez. ..... 114
COMPOSICIÓN Y ABUNDANCIA DE LA AVIFAUNA EN DOS FORMACIONES VEGETALES DE LA ALTIPLANICIE DE NIPE, HOLGUÍN, CUBA. Bárbara Sánchez, Ramona Oviedo, Nils Navarro, Arturo Hernández, Carlos Peña y Ernesto Reyes. ..... 115
ESTRUCTURA DE LA COMUNIDAD DE AVES EN LA ARROCERA DE SUR DEL JÍBARO, SANCTI SPÍRITUS. Lourdes Mugica, Martín Acosta, Dennis Denis y Pedro L. Martinez. ..... 115
RELACIÓN ENTRE LA MORFOLOGÍA DEL SISTEMA DIGESTIVO CON LA DIETA EN EL COCO PRIETO *PLEGADIS FALCINELLUS*. Dennis Denis, Martín Acosta y Lourdes Mugica. ..... 115
ALIMENTACIÓN DE *BUBULCUS IBIS IBIS* (AVES: ARDEIDAE) EN UN PASTIZAL DE LA PROVINCIA DE LA HABANA, CUBA. Maria Elena García Romero. ..... 116
LAS RAPACES EXTINTAS DE CUBA Y SU IMPORANCIA ECOLÓGICA DURANTE EL CUATERNARIO. Carlos Arredondo Antónez. ..... 116
CONSIDERACIONES SOBRE LA ACTIVIDAD TRÓFICA DE *TYTO ALBA FURCATA* Y LA NECESIDAD DE SU CONSERVACIÓN. Carlos Arredondo Antónez. ..... 116
SCO REPRESENTATIVE REPORTS
JAMAICA. Suzanne Davis. ..... 117
TRINIDAD AND TOBAGO. Gerard Alleng. ..... 118
SABA REPORT. Martha Walsh-McGehee. ..... 119
THE CAYMAN ISLANDS. Trevor Baxter. ..... 120

*Contents (continued)*


WHAT'S HAPPENING IN THE ENVIRONMENT COMMUNITY IN ANTIGUA–BARBUDA. Kevel Lindsay. ..... 123
STATUS OF ORNITHOLOGICAL RESEARCH IN THE BAHAMAS. Carolyn Wardle. ..... 124
ACTIVIDADES DE CONSERVACIÓN DE LA AVIFAUNA EN LA REPÚBLICA DOMINICANA EN 1997. Simón Guerrero. ..... 126
NEWS OF MEMBERS ..... 127
REQUEST FOR ASSISTANCE ..... 127
POSITIONS AND OPPORTUNITIES AVAILABLE ..... 127
MEETINGS OF INTEREST ..... 127
JORNADA 30 ANIVERSARIO ..... 128
FOTOAVE ..... 129
NEW PUBLICATION
A TEACHER'S GUIDE TO THE BIRDS OF JAMAICA ..... 131
TALLER CIENCIA, SOCIEDAD Y MEDIO AMBIENTE ..... 132
IN MEMORIAM: GEORGE A. SEAMAN, 1904–1997. Ro Wauer. ..... 133