INTERACTIONS AND INTERDEPENDENCE ON A FRAGILE FRINGE: BIRDS AND MAN IN A CHANGING CARIBBEAN

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"All night long we heard birds passing. We must be very close to landfall, thanks be to God."

So noted Christopher Columbus on Tuesday, 9 October 1492, as he neared landfall in the Bahamas. He and his crew were heartened and led to land by migrant birds. What would have happened had Columbus arrived in the New World at some time other than the peak of migration — say in mid-summer or mid-winter, when land birds would not have been encountered at sea? Columbus' crew was disgruntled and anxious to turn back. Would he have turned back without discovering the New World? Would the course of history have been drastically changed?

To Columbus and his crew, land birds at sea were the ultimate in environmental indicators. They carried a message, not of hope, but of promise. They were at the threshold of a world unknown in Europe.

Imagine the excitement among the crew the morning when land first came into view! If only Columbus had known what lay beyond — to the west and north — after so many weeks at sea — that he was only on the fringe of discovery. If only our ancestors had recognized what a fragile and important fringe it was and is.

What I want to share with you are some thoughts on the changes that have occurred in the Caribbean in the last 500 years as they relate to birds. I want to discuss (1) other roles of birds as environmental indicators; (2) the roles of the Caribbean and Bahamas relative to the development and maintenance of the North American avifauna; (3) the need for a sense of history and environment in studying birds; (4) the need for understanding that things are not always as they seem; (5) the complexity of the interrelationships of birds and other components of their ecosystems, in particular, the significance of recognizing and maintaining biodiversity; (6) the great interdependence of birds and humans; and finally (7) how "exploitation" isn't always a bad word.

The Bahamas that Columbus found, the Cuba that Columbus visited, were peopled by cultures long gone today. They were clothed in forests the likes of which we have never seen. They had avifaunas quite different from those we know. There were no Budgerigars (*Melopsittacus undulatus*) from Australia breeding in the wild in Puerto Rico, nor Java Finches (*Padda oryzivora*) from Indonesia, nor Monk Parakeets (*Myopsitta monachus*) from Argentina, nor Rock Doves (*Columba livia*) from Europe, nor Cattle Egrets (*Bulbulcus ibis*) from South Africa. The first three species, and many others, have been introduced through the pet trade. Humans have an affinity for birds. Their bright colors, their often melodious songs, the ability of some to mimic human voice, their parental care, and other behaviors attract us to them. But such introduced species compete with native species and may introduce diseases and parasites to them.

The fourth species, the Cattle Egret, which is now found throughout the Americas, we've been told got here on its own. Well, perhaps. But it is unlikely to have become established after it got here had it not been for the clearing of the forests and introduction of horses and cattle by Europeans. A similar link to such habitat changes could be drawn for the cowbirds that have expanded northward through the Caribbean to parasitize species that have never before been exposed to them.

I'd like to diverge a moment now to tell you of a personal experience that has forever influenced my understanding of biogeography. An experience that I think also has particular relevance to the expansion of Cattle Egrets and other birds. I'm a pilot. Twenty years ago as I was completing my pilot training, I went up for one last session with my flight instructor. I knew what was coming; it seems to be traditional in pilot training: when we were about five miles from the airport and at an altitude of about 3000 feet, the instructor reached over and turned off the engine.

"Now what are you going to do?" he asked.

I checked my altitude and looked at the runway five miles away.

"I've got enough altitude. I can land back at the airport."

"Let's see you do it." he said.

At the time I was over bare agricultural land. I put the plane in a glide path that would easily take me to the end of the runway, and everything went smoothly as I descended through 2000 feet. However, between me and the airport was a block of forest that was about a mile wide. As soon as I got over the forest, the plane sank rapidly, losing enough altitude that I was worried about making it to the grass near the runway. Fortunately we made it safely — but barely — to the runway!

What had gone wrong? I had forgotten an important lesson about the relationships of our atmosphere to land. But I had now learned that lesson very well from experience. Bare land heats up rapidly in the sun and reflects heat back into the atmosphere. That heat rising off the land was a thermal pushing up on my plane and slowing its rate of descent. A forest, however, absorbs the sun's energy. The shaded land was not heated, and there wereno thermals, so the plane descended rapidly.

The eastern half of North America was once almost completely forested such that thermals would have been rare. The same was true of most Caribbean islands. In the past five hundred years, however, we have cleared most of the forests and, indeed, have often replaced them with concrete and asphalt that heat up quicker and reflect even more heat than bare soil. Thermals abound during the day. Just think what all

these thermals do. Hot air causes evaporation of moisture from the surface, making the land more arid.

In flying to the Bahamas or any Caribbean island, you may notice that clouds are most concentrated over land. The bare land heats up and dries out fast; the hot air over the land rises, pulling in water vapor from the sea. As the warm moist air rises, it cools to condense and form clouds. The more bare land there is, the more hot air there is, the greater the updrafts, and the greater the height and magnitude of the clouds.

These high white pillars of clouds over land are visible for tens, often hundreds of miles. They are guideposts in the sky that once aided sailors and almost certainly aid migrant or dispersing birds. Perhaps our clearing of the forests and the resultant increase in thermals and clouds over land have facilitated dispersal of these invading birds.

Aside from these influences, however, there may be more important signs that can be read in these clouds. Surely such massive clearing of the land that we have done is having a profound influence on the Caribbean and North American climates in which we and all of the creatures of our ecosystems live. Are range expansions of these birds indicators of global warming problems resulting in part from reflection of solar heat back into the atmosphere? Are they indicators of changing weather patterns, perhaps more violent storms associated with these changing air movements?

Today as we consider the migrant birds that Columbus and his crew saw, we understand the special significance of the Bahamas and the islands of the Caribbean as a fragile fringe of habitat jewels supporting passing migrants, wintering birds from North America, and an incredible array of unique island species. The fragility of this fringe is evidenced in many ways: the small land area of each island, the vulnerability of the islands to tropical storms, the vulnerability of the islands to human disturbance. But no evidence is so clear as that provided by birds. Not only do the islands tenuously support some of the world's most beautiful birds, but also some of the world's most endangered ones: the Bahama Parrot (*Amazona leucocephala*), Kirtland's Warbler (*Dendroica kirtlandii*), Puerto Rican Parrot (*Amazona vittata*) — and yes, we hope, even the Ivory-billed Woodpecker (*Campephilus principalis*).

Just as Columbus before us, today we also recognize value in the birds around us. We appreciate the swallows as they capture flying insects, and the cuckoos that consume swarms of caterpillars. We acknowledge the role of hummingbirds in pollinating some favored flowers and fruit crops. We applaud the role of finches in consuming weed seeds. We enjoy hunting game birds and the companionship of pet birds. We find aesthetic value in the songs and brilliant colors of so many birds. But there are other values to be realized.

Migrant shorebirds, such as Ruddy Turnstones (*Arenaria interpres*) on Walker's Cay at the northern end of the Bahamas, need a healthy "shoreline" ecosystem all along their migratory pathway and throughout wintering areas. We too need that ecosystem to be healthy. Nowhere is our need greater than in the island ecosystems of the Bahamas and Caribbean where humans live at this interface between land and water. Shorebirds can be indicators of health or problems along these shores.

Humans in the Bahamas and Caribbean depend on the sea for food as do a number of bird species. We once looked at birds such as cormorants, pelicans, and terns as competitors. Now we know that they play a much more significant role as environmental indicators that are more sensitive to chemical pollutants than we are. These birds suffered greatest during the DDT era, but their suffering warned us of the danger to our own health.

Land birds can tell us a great deal too. Yes, the species native to each island we know were present. But where? In what numbers? In what habitats? When we speak today of distribution patterns and habitat preferences of birds, we speak of the present. To say that a bird species prefers this or that habitat is only to say that it prefers that habitat over whatever else is currently available. Perhaps the habitat being used today is only marginal in comparison to what once was available.

The Hairy Woodpecker (*Picoides villosus*) is a species found throughout North America. It also occurs naturally in the Bahamas on Andros, Grand Bahama, Abaco, and New Providence where it is found primarily in pine forest. What has happened to Hairy Woodpecker populations since these forests have been cut and pines have been left only to smaller patches of younger trees?

To what extent do the Hairy Woodpeckers and other forest birds control forest insect pests? If the birds were gone, what would be the economic cost of timber resources lost in insects and insect spread diseases?

Why is the Hairy Woodpecker so limited to the pine forests in the Bahamas, while in the eastern United States it is most often found in hardwoods? Is it a result of competition for food or nest sites with the West Indian Woodpecker (*Melanerpes superciliaris*)? Why is the West Indian Woodpecker on Abaco so closely associated with humans and exotic trees? Is it simply because these are the only big trees around? In Cuba this woodpecker seems to use a much wider variety of habitats. How has the Jamaican Woodpecker (*Melanerpes radiolatus*) fared as its forests have been fragmented and reduced to younger trees and many exotics?

The Ivory-billed Woodpecker of the southeastern United States and Cuba provides an instructive example of how habitat destruction by man can alter our perception of a species habitat needs. In the southeastern United States, the Ivory-bill was once widespread, although by the late 1930s it was only known from riverine swamp forest in northeast Louisiana. It was studied there extensively by James Tanner and we have come to think of it as a swamp forest bird. Early literature and data from specimen records, however, tell us that it also fed and nested in pine forest. We knew the Ivory-bill was threatened by habitat destruction even before 1912 when a children's book, "Bird Children," by Elizabeth Gor-

don, had the Ivory-bill proclaim:

"Dear me!
They're cutting down my family tree;
Where can I live, I'd like to know,
If men will spoil the forest so?"

In North America, the last of the Ivory-bill's habitats to disappear were the virgin swamp forests such as where Tanner studied the birds.

In Cuba, as in the United States, the Ivory-bill also once occurred in both old growth hardwoods and pines, and it disappeared as those forests were cut. There, however, the last of the virgin forests to be cut were the montane pines and that's where the Ivory-bill survived. Thus we have come to think of the Cuban and American Ivory-bills as being different in their choice of habitats. In truth, what was important about the habitat of both birds was not whether the habitat was pine or hardwood forest, but whether or not it had recently dead, large, old trees that supported populations of their food supply — large Cerambycid beetles. When the big trees went, the big beetles went. When the big beetles and the big old trees it needed as nest sites were gone, the Ivory-billed Woodpecker could not survive. Certainly the story is even more complex, but the message here is that such critical interconnections among habitats, food supplies, and birds are likely the rule rather than the exception. We think we know a great deal about our birds, but we have just begun to understand.

Another woodpecker illustrates well the complexities of interconnections between a species and its ecosystem and changes wrought by man. The Red-cockaded Woodpecker (*Picoides borealis*) does have a Caribbean connection, although it occurs only in the southeastern United States. It was described for science by a French merchant from what is Haiti today. Viellot called the bird "*Picus borealis*" -- northern woodpecker -- not because he found it in boreal Canada, but because where he found it when he was on a trip to the United States was indeed "north" relative to his Caribbean home. The Red-cockaded Woodpecker got its English common name from Alexander Wilson who saw the birds' large white cheek patches and the tiny tuft of red feathers on males and was reminded of the cockades -- the decorations -- on the hats of American Revolutionary War soldiers.

The Red-cockaded Woodpecker is a bird of old growth pine forests and a species that is endangered, like many birds of the Caribbean, because of the clearing of its forests. Human needs have conflicted with bird needs. In conciliatory efforts to help the species, we began by leaving their nest trees, but cutting the forests around them. But obviously that wasn't enough, because the birds had to have a place to find food also. In addition, cleared areas attract predators such as the American Kestrel (*Falco sparverius*), so the woodpeckers were soon gone from such areas.

What more did they need? The Red-cockaded Woodpecker requires old trees in which to excavate nest and roost cavities — living pines that are safe from lightning started fire in their ecosystem. We know now that they need these old trees because they need the presence of the red heart fungus to soften the wood to make it easier to excavate. Nest and roost cavities usually are shaped to follow the contours of the fungal decay.

What if we protected the forests from fire? Then the ecosystem changes and becomes unsuitable for the birds. One of the biggest enemies of southern pine ecosystems — and indeed of Caribbean pine ecosystems — has been "Smokey the Bear" — who personifies our attitudes and actions that consider fire as "evil" and "destructive." Without fire the pine ecosystem becomes a hardwood ecosystem. In the pine ecosystems fire kills hardwood trees, but pines can survive because of fire resistant bark and other adaptations. When fire passes through a longleaf pine (*Pinus palustris*) forest, young pines are also reduced to charred needles. But part the charred needles and you find a living, growing tip inside. The competing hardwoods are gone, their ashes fertilize the soil, and the young pine is ready to grow rapidly in the sunshine. It will have company too, because the heat from the fire causes pine cones to open, dropping their seeds to the fertilized soil.

So foresters today leave the birds' nest trees; they provide fire at frequent intervals; and they leave additional pine forest for the birds to forage in. But there are still problems due to lack of understanding of the complexity of the interactions of the birds and their environment.

In good habitat male and female Red-cockaded Woodpeckers feed together, but in different places on the same trees. Males tend to forage high in the tree and more on the branches; females primarily on the trunk below the branches. By maintaining these differences they are not competing for food and it is believed their pair bond may be stronger. In a study we did on a military base in Louisiana where the Army wanted to build a new tank range, we found the birds favored their typical feeding sites: males high and on branches, females low on the trunk. We also found that their home ranges were about 250 acres — typical for the species — and that males and females each weighed about 50 g.

Then the army constructed their tank range, in the process taking out all pines bigger than 10 inches in diameter other than the cavity trees and a small buffer around them. What was left was still a pine forest, but the forest wasn't the same. The trees averaged much smaller and were more widely dispersed. The males had plenty of branches to feed on; the females, however, had no large pine trunks to forage on. The home ranges of the birds expanded from 250 acres to more than 1000 acres. They had to travel farther to find enough to eat. In addition, the average weight of males declined slightly to about 49 g; that of females, however, declined to nearly 43 g. The different habitat needs of the female meant a different effect on the female! The females were starving to death. Ultimately the birds disappeared from the area.

How many Caribbean birds do you know well enough to know that needs of males and females, juveniles and adults,

are not the same? Get close to your birds. Take notes. Quantify your observations. With knowledge comes understanding. Look for interconnections.

It was understanding that was needed by NASA last year when the space shuttle Discovery was grounded because Yellow-shafted Flickers (*Colaptes auratus*) had pecked holes in the foam covering of the main shuttle fuel tank, causing over a million dollars in damage and delays. I was called to help them solve the problem. When I arrived, I found the depth of their understanding was reflected in signs indicating "no flickers allowed," simple solutions such as "kill the birds," or "move the birds," and in the use of scare devices.

The problem seemed to be a habitat problem. Nicely mowed fields near the launch pad were perfect for the ground-feeding flickers and there were nest sites nearby. So why did the birds peck holes in the shuttle fuel tank? One contributing factor may have been the color of the foam on the fuel tank — it was the same as that of the upper parts of palms in which flickers there were nesting. So why didn't these flickers nest in palms?

The real problem I believe was an exotic species: the European Starling (*Sturnus vulgaris*). We saw several flocks of forty or more juvenile starlings. They had obviously had a successful year! Starlings are well known as usurpers of flicker nest cavities and I believe that as fast as the flickers excavated a nest cavity, starlings would take it over. The end result was that the flickers ended up at the space shuttle as a last resort.

The answer seemed simple, but not without understanding. Control the starlings in the launch pad area and the flickers will nest in their traditional sites. Unfortunately, that wasn't "understanding" enough. A female flicker was captured on a nest with eggs in a palm 2.1 miles from the space shuttle and it was going to be removed. I convinced NASA that a bird on a nest with eggs won't be spending its time excavating and that a bird 2.1 miles away was not at all likely to be the bird that excavated on the shuttle fuel tank. The bird was returned to its nest.

I know that you love birds -- or you probably wouldn't be reading this. But there are many from the Bahamas, Caribbean islands, and North America who do not share that love. Indeed, to some humans, birds just get in the way. In Mississippi I see bumper stickers that say: "When you run out of toilet paper, use a woodpecker."
I also see t-shirts that say:

"Save a forester, kill a woodpecker — Red-cockaded Woodpecker."

There is a lack of understanding! What is the answer?

Take a popular song from the United States in the 1950s as your guide. I loved the song as a teenager and find new meaning in it today. It was sung by a group known as the "Teddy Bears" and it began like this:

"To know, know, know him is to love, love, love him..."

The message is simple: we don't appreciate what we don't know about. The cliché "Out of sight, out of mind" also fits. Education is the key. If we can teach people to appreciate the diversity of birds around them, if we can teach them the complexity of interconnections between birds and their environment, then they can appreciate the birds and will want to protect them. A positive educational message can do much more than a negative "don't!"

In the Bahamas, the Bahamas National Trust and others have done a wonderful job with positive education about the Bahama Parrot. St. Lucia is doing a similar wonderful job with educating people about the St. Lucia Parrot (*A. versicolor*). Similar efforts work hand-in-hand with providing artificial nest sites for the Puerto Rican Parrot and the Cuban Parrot (*A. leucocephala*).

But what about all those other native species that are not yet on the critical list? The hard work is bringing a species back from the brink of extinction. Conservation efforts should begin before your species are on the way out. Focus on Bahamian and Caribbean endemics and their habitats. Exploit their novelty. This is where exploitation can be positive. Promote the uniqueness of your ecosystems to attract ecotourism. Many islands have species unique to them or to a small number of islands. One whole family of birds, the todies, is found only in the Caribbean.

To effectively exploit the unique ecosystems of the Bahamas and Caribbean, you must study them, understand them, and appreciate them. By studying healthy populations we may be able to truly understand the interconnections that are vital to a species' survival. By the time a species is endangered, evidence of those interconnections — the web of interdependence that holds the ecosystem together — may already be lost.

In Cuba posters I saw proclaimed that "Care of the flora and fauna is everyone's responsibility." It is. And we should share in that responsibility and in developing an understanding of that responsibility. If you are a bird bander or just a bird watcher, share your efforts with children. Remember: "To know them is to love them." That applies to all — to children and to birds. Teaching our children to know and appreciate nature provides our best hope for Bahamian, Caribbean, and North American ecosystems for the future.

Tourism is vital to Bahamian and Caribbean economies and can be vital to bird conservation too. It varies in importance from island to island, but can bring in conservation dollars and also change attitudes towards habitats and birds. Ecotourism is growing in popularity — in part as a result of conservation efforts and education to date. The excellent field guides available for many island nations certainly pave the way. Postage stamps featuring birds also aid both the economy and the educational message, but can best serve the islands by focusing on endemic species and their ecosystems.

We can't protect our birds with just what I call "techno fixes." They can't survive with just artificial housing and bird feeders. They need much more. They need the natural biodiversity of a healthy ecosystem.

To end, I would like to use an analogy I used in talking

about biodiversity in another island nation on the opposite side of the world from the Caribbean -- Indonesia. There, as in some Caribbean communities, the traditional homes are built on stilts to protect them from high water. I ask you, as I asked them, to consider such a traditional home as an ecosystem and the pilings that support it as the species in that ecosystem. We can remove one piling and the house will still stand. Perhaps we can remove two pilings. Maybe three. Four. But which ones? It is often difficult to know which piling – or which species in an ecosystem -- is important to stability. We don't always understand how all the pilings – all the species – work together to provide a stable environment. They are collectively so much more than their sum individually. And if we remove the wrong piling, or if a hurricane or other stress comes, what will happen to the home?

Our ecosystems – the ones we live in – are our homes. They are supported and stabilized by biodiversity. The interconnections among species are often interdependencies. We are dependent on other species and they are dependent on us. If we remove the wrong "piling," or too many, under stress our "homes" could collapse. Let us work together to maintain strong "homes" for ourselves and our birds.

Workshop Findings and Recommendations

WORKSHOP ON THE DRAFTING AND APPLICATION OF CARIBBEAN WILDLIFE POLICY AND LEGISLATION

Society of Caribbean Ornithology Annual Meeting, Nassau, Bahama Islands, 3 August 1996

The overall objective of the workshop was to assess the significant wildlife policy and legislation issues in the Caribbean and to elicit comments and recommendations from the workshop participants on how to most effectively use or revise existing policy and law to protect biodiversity.

The workshop focused on the need for further review of the relative role of law and policy. What can effective wildlife policy do? How can it most effectively articulate governmental intention with regard to the conservation of resources and provide an integrated perspective on the management of resources? How can policy resolve inter-ministerial conflicts and establish political will for implementation of nature conservation?

Findings

1. There is a need to publish and publicize existing policy and legislation to educate the public about the requirements of law and regulations.
2. Much creative use can be made of existing policy and legislation, including common-law principles, to achieve biodiversity protection.
3. Public and governmental support, generally referred to as "political will," is crucial to the success of biodiversity protection policy and legislative efforts.
4. The regulation of private land for biodiversity protection poses many challenges in the Caribbean because of differing concepts of the rights of landowners and the powers of government to control land uses.
5. There are significant variations in the hunting regulations and from country-to-country in the Caribbean.
6. There is a need for post-disaster (hurricanes, etc.) wildlife protection.
7. Land use planning and zoning are generally not well-developed but are essential for long-term biodiversity protection in the Caribbean.
8. Confusion exists regarding whether one law is superior to another with regard to the management of resources (e.g., is mining allowed in national parks?).
9. Confusion also exists as to the proper role of non-governmental organizations (NGOs) relative to the holding of land for biodiversity protection purposes.

Recommendations

1. There is a strong need for (and the SCO supports) public access to the biodiversity policy and law-making process, including prior consultation and review of draft policy and legislation.
2. Further review and research is needed on how to develop the "political will" to promote governmental policy, law, and enforcement for biodiversity protection. The SCO should consider holding a workshop on this topic at its next meeting.
3. Further review should be conducted of the rights of government to control private land uses for biodiversity protection.
4. Caribbean countries should attempt to coordinate and make uniform their hunting and other biodiversity protection requirements to minimize the differences between countries.
5. Caribbean countries should explore a variety of funding mechanisms to support biodiversity protection, including dedicated revenue for habitat conservation, fees, licenses, taxes, and credits.
6. Caribbean countries should understand the benefits and obligations of relevant international conventions and revise their laws and policies accordingly.
7. The SCO members should continue to explore whether there is an ideal structure for governmental ministries for biodiversity protection.
8. The SCO should continue to review Caribbean wildlife policy and legislation to identify common issues and problems in the preparation and dissemination of wildlife policy and in the drafting and enforcement of wildlife legislation, including regulations.