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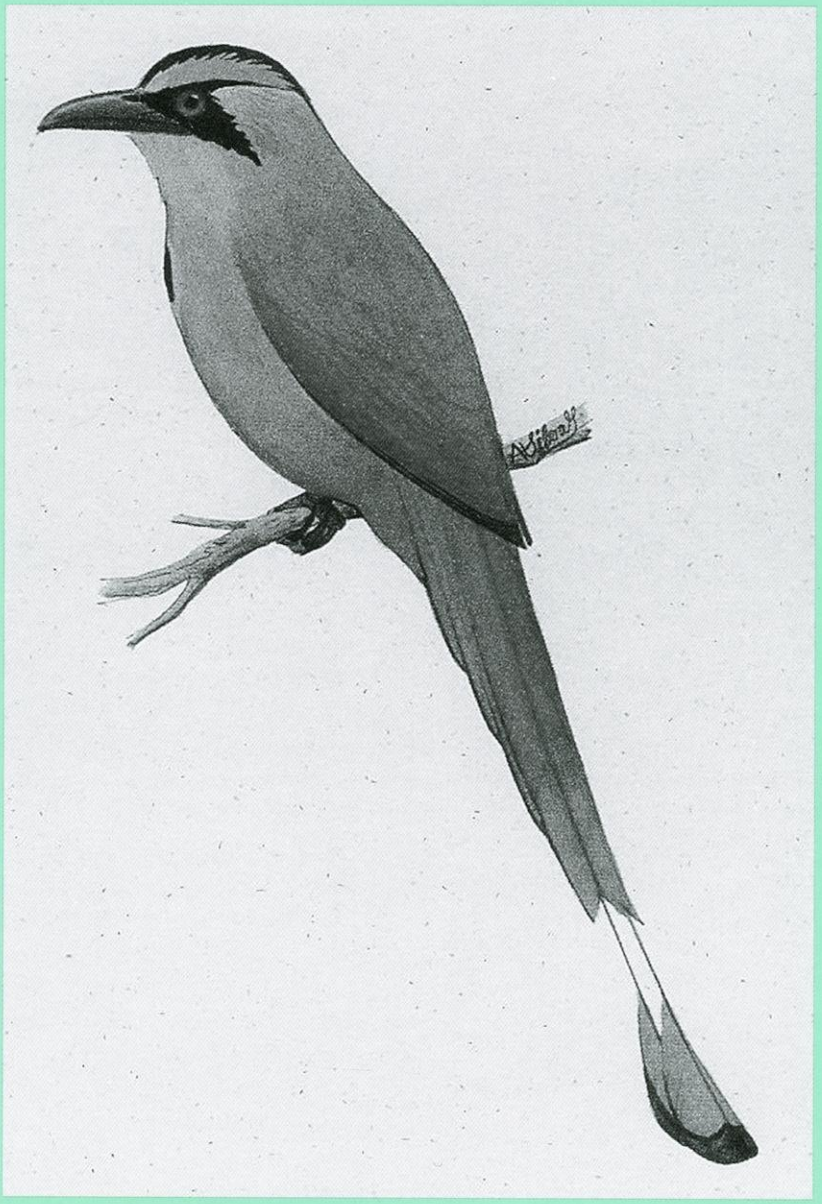

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Send all manuscripts and related correspondence to the Editors. Information for "Seasonal Field Notes" should be sent to the Bird Reports Coordinator (see inside back cover). Art work and questions about the art should be sent to the Associate Editor for art (see left column). Manuscripts that deal with Wisconsin birds, ornithological topics of interest to WSO members, and WSO activities are considered for publication. For detailed submission guidelines, see pages 3–5 of the Spring 2000 issue (Vol. 62, No. 1) or contact the Editors. As a general guide to style, use issues after Vol. 60, No. 1, 1998.

Front Cover: Blue-crowned Motmot, the national bird of Nicaragua, by Augusto Silva. All art in this issue will appear in the up-coming Field Guide to the Birds of Nicaragua and was painted by Señor Silva. To find out how to support this project see page 143, About the Artist and the Art.

Lucky

Have you ever said to yourself, under your breath or out loud, "That birder sure is lucky?" Maybe even with a hint of jealously. Well, *The American Heritage Dictionary* defines "lucky" as: 1. Having good luck. 2. Occurring by chance; fortuitous. I don't remember the exact situation, but several years ago a coach of mine, defined "luck" as; "***When opportunity meets preparation.***" I often think of this adage when I hear someone say that envious line. Let's see how this axiom may pertain to us birders.

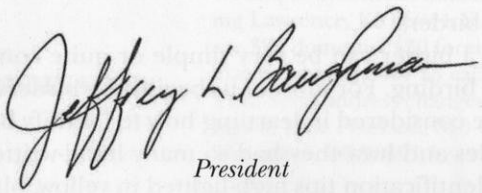
Preparation for a birder can be very simple or quite complex depending on one's approach to birding. For most of us beginning birders, our field guide was the only avenue we considered in learning how to identify birds. I remember my first few field guides and how they had so many hand-written notes in the margins and species identification tips high-lighted in yellow, blue, or green, to help me commit those important tips to memory. Soon we discovered that these field guides helped us tremendously, but for some of us these generalized guides weren't enough. We then graduated to "specialized" guides that included more detailed identification points, plus added knowledge of sub-adults, subspecies, distribution, and phenology of a particular group of birds. We, in the mean time, joined local bird clubs, state, and national birding organizations to draw on the knowledge of other more experienced birders and/or the scientific community. Some of these organizations have their journals not only address the issues we're interested in, but also offer us field trips, conferences, conventions, and symposia, so we can learn first-hand about the birds we pursue.

You are reading one of those journals right now and within this particular issue you will have the opportunity to read several of the papers presented at the 2005 WSO/WBCI Symposium on Neotropical Migrants. Those of us who attended were fascinated by each of the presentations. The presenters gave us new, or added, insight into the lives of those imperiled birds. It is these types of gatherings that help us birders prepare for that future birding experience and help us understand the birds we pursue, but sometimes take for granted. If you've never attended one of these well-organized events, you are truly missing out.

For most birders, opportunities are limited. Those of us with families, jobs, other interests, and limited resources understand those limitations. What we need to do is make each of our opportunities a quality experience by spending time using all of our senses to gather knowledge. As you walk outside to go to work, become familiar with what is right around you, and as you go farther afield use that knowledge to improve your ability. Attend a local bird club, WSO, or professional field trip, not only to learn about the birds but to find out where to find birds. It's also important that you ask questions while you are there, to draw on the leader's knowledge of the birds you see and their expertise on the loca-

tions (habitats) where they take you. Return to these locations, or discover your own "good" birding spots in your own home area, and practice what you've learned.

The more opportunities you create for birding, the more rewarding the birding experience will become. There is no better way to improve your skills, than to actually get out there and practice. The more frequently you do quality birding, the more likely you will be rewarded with that fall-out of migrants, able to locate that hard to find resident/migrant bird or that mega rarity that comes along. If you truly apply these suggestions, when someone says, "How did you ever find that bird?" you can simply smile and reply "Just ***lucky***, I guess."



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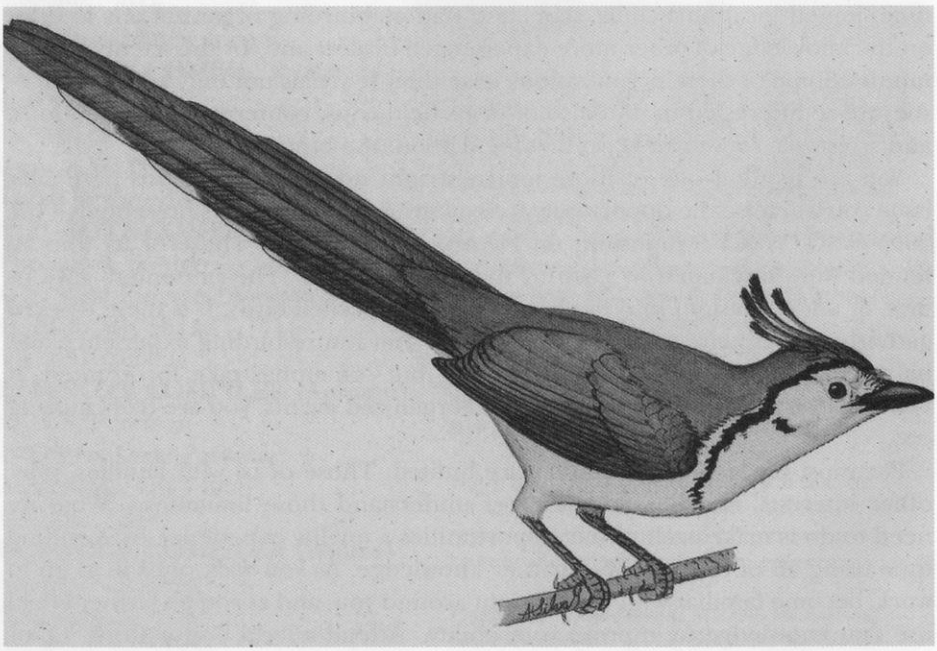


White-throated Magpie Jay

Neotropical Migrants: Insuring Their Return

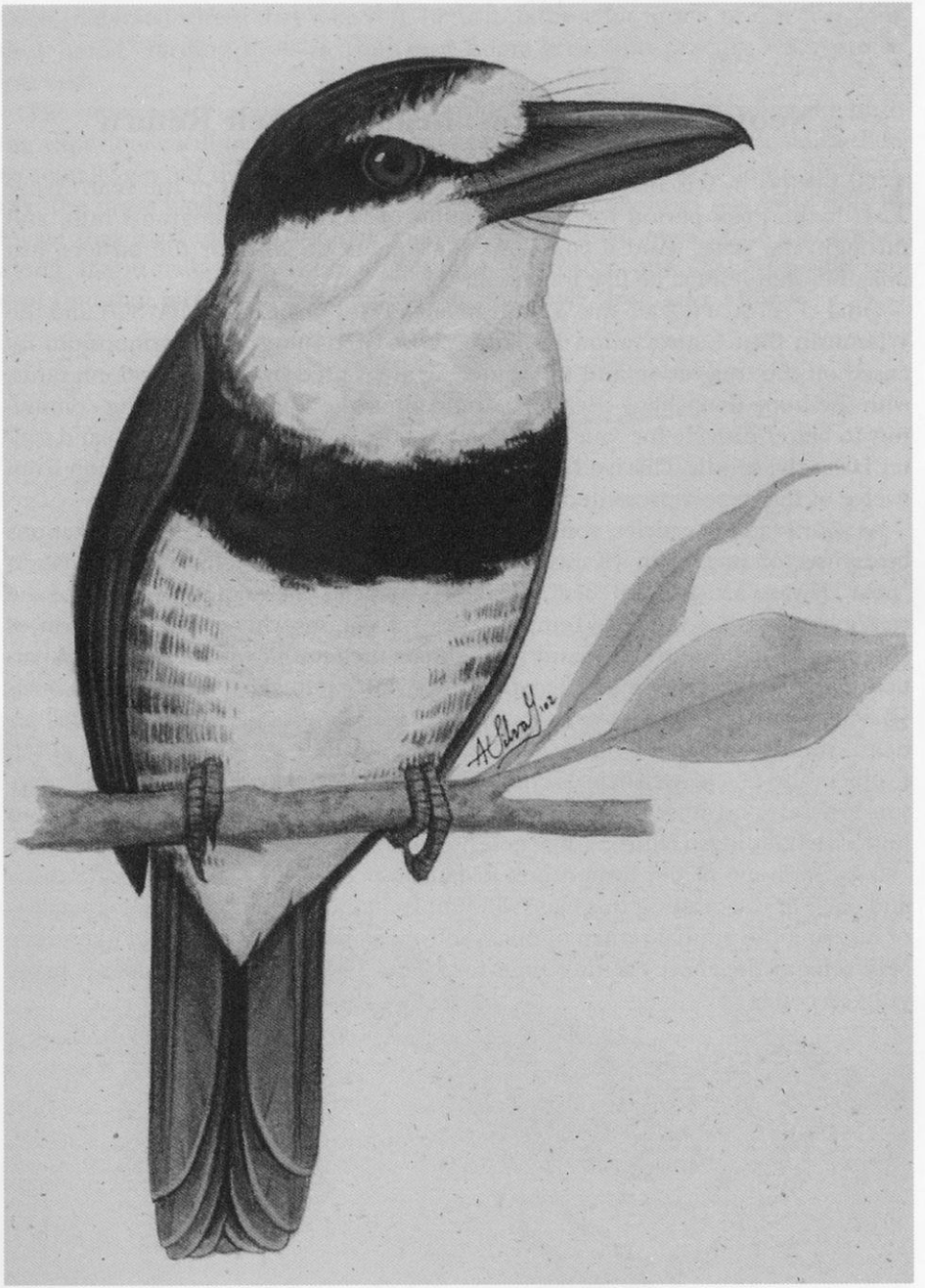
For birders in Wisconsin, May is the most exciting month of the year. Why? It is the peak period for the migration of Neotropical migrants into, and through, the state. And if you think the time is exciting for the birders, just imagine what it must be like for the birds.

On 4–5 February, 2005 the Wisconsin Society for Ornithology (WSO) and the Wisconsin Bird Conservation Initiative (WBCI) co-sponsored a symposium focused on this migration and the wintering areas used by Neotropical migrants, with the hope that what we learned would allow the Wisconsin birding community to better provide for "our" birds as they take this annual round trip and winter far to the south. This issue of *The Passenger Pigeon* contains information from twelve of the papers presented at the Symposium.

As your read the articles, you will learn about some of the physical adaptations birds use for migration [Karasov article], some of the techniques we use to "hear" [Evans article] and "see" [Idzikowski article] the migration, some of the reasons species are limited [Temple article], locations where "our" birds winter [Rich and Robbins articles], and the habitats they use in winter [Piaskowski article]. You will discover that the coffee you drink can make a difference to birds [Baicich article], how to create community conservation projects [Horwich article], what Nicaragua is doing about educating students on bird conservation [Volkert and Gilchrist article], some places to go birding in the tropics [Thompson article], and how to help protect migrants from collisions with glass and high-rise buildings [Hunsinger article].

It is the hope of the Symposium organizing committee that everyone there and each of you reading this issue will find some way—whether large or small—of insuring the annual return of our Neotropical migrants. We would like to see May remain the most exciting time for birding in Wisconsin for many, many years to come.

Bettie and Neil Harriman, Editors



White-necked Puffbird

Physiological Mechanisms of Resource Use by Migrating Birds and Their Conservation Implications

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ABSTRACT

In migratory birds, many physiological changes occur relating to nutrient assimilation by organs such as the stomach, intestine, and liver. Recent findings, highlighted in three case studies, have brought about a new understanding of the dynamic nature of the avian body plan, and offer knowledge and tools that can be applied in management and conservation of migratory birds. Some migratory passerine birds, such as Blackcaps (Sylvia atricapilla) *and Yellow-rumped Warblers* (Dendroica coronata) *apparently arrive at stopover sites with relatively small intestines and livers, which may initially constrain their ability to feed and gain mass at the highest rates theoretically achievable. Blackcaps can restore their intestines and livers to normal size after two days of feeding. In an analogous situation, migrant Red Knots* (Calidris canutus) *and Bar-tailed Godwits* (Limosa lapponica) *may arrive at their stopover sites with relatively smaller stomachs, and cannot feed rapidly on hard-shelled prey such as some molluscs until their stomachs have enlarged and become more muscular. Reversible changes in stomach size occur within several days in Red Knots. Changes in the masses of these organs account for much of the change in the total lean mass of migrant birds, and underscore how changes in body mass during migration are not simply the result of deposition and utilization of body fat. The organ recovery times could account for time lags in mass gain in avian species during stopover. Changes in nutritional biochemistry may not operate as constraints on migrants but can inform us about the migrants. In many birds, plasma triacylglycerol levels are positively related, and β-hydroxy-butyrate levels negatively related, to rates of feeding and mass gain. Thus, the biochemical features of migrants themselves, measured in single blood samples, could be used to assess the relative value of a habitat for supporting refueling.*

INTRODUCTION

Bird lovers are well familiar with some of the physiological adjustments

of migratory birds because they can see them with their eyes. Many who have spent time at banding stations during spring or fall migration have held birds in their hand and gently blown apart breast feathers to visually score fat level in the abdominal region and in the intraclavicular depression, perhaps using a graded score as described in Kaiser (1993). A score of zero corresponds to no visible fat, and the highest score corresponds to fat visible everywhere (a veritable butterball!). Fat is the primary energy fueling migratory flight, and in preparation for migration, birds increase their food intake (i.e., become hyperphagic) and store a lot of fat to fuel the costs of subsequent migratory flight(s) (Blem 1990; Biebach 1996). Other changes occur that are less visible. Ornithologists have long recognized that birds increase the size and capacity of their flight muscles when they migrate (Marsh 1984; Driedzic et al. 1993; Bishop et al. 1996). The increase in muscle capacity in migratory birds is necessary to satisfy the physiological demands of long-distance flight (reviewed by Butler and Bishop 2000).

Many special physiological features of migratory birds are essentially invisible to the unaided human eye, but are no less important to the bird, such as those that deal with food digestion, absorption, and post-absorptive processing. In the past decade we have learned a lot about these features, which are performed by vital organs such as the stomach, intestine, and liver. I will describe some of this work by focusing on three case studies. They highlight new findings which were partly aided by the application of new technology; have brought about a new understanding of the dynamic nature of the avian body plan; and offer knowledge and tools that can be applied in the management and conservation of migratory birds.

Case I: Changes in Body Composition of Small Migrant Passerines

On a frozen morning in October of 1992, my graduate student Danny Afik visited the site of a radio tower near Eau Claire, WI to collect carcasses of Yellow-rumped Warblers (*Dendroica coronata*) that had collided with the tower the previous night during a southward migratory flight. Danny had been directed to the site by Dr. Charles Kemper, a long-time member of the Wisconsin Society for Ornithology (WSO) and an avid birder and bander of migratory birds. What Danny discovered about these birds was surprising and not immediately explicable. These migrants had small intestine masses (0.53 ± 0.02 g, $n = 14$) that were 35–55% lighter than the intestines of yellow-rumps held in captivity. The mean intestine masses of captives, which Danny would report later vary somewhat according to the diet they are fed, range in size from 0.81–1.20 g (Afik et al. 1995). Because we knew that migrants are typically hyperphagic, and because hyperphagia was known to bring about an increase in gut size of birds to accommodate higher energy needs (Dykstra and Karasov 1992), it was surprising and inexplicable that the migrants would have lighter intestines. The mystery remained unresolved for several years, until we understood better some of the changes that occur in body composition of some migratory birds

based on our own studies a half-world away in the Middle East, and those of Theunis Piersma and his colleagues all around the world (described in Case II, below).

Upon migration from Africa to their Palearctic breeding sites, hundreds of millions of birds cross the Sahara, with the most intensive migration into and through the eastern and western Mediterranean basin (Berthold 1988; Helbig 1994). Beginning in 1996, we studied Blackcaps (*Sylvia atricapilla*) that stop over at the northern edge of the Sahara ecological barrier in the Negev highlands of southern Israel. Our research site was the campus of Ben Gurion University of the Negev at Midreshet Ben-Gurion (30°52′ N, 34°57′ E, 475 m above sea level); the campus includes gardens and greenery that attract the birds, where they feed on insects, fruit, and nectar. Our primary goal was to challenge the prevailing view about body composition changes of migrants. Passerine birds increase their fat loads considerably during migratory periods (fat loads as a % of body mass are 24% on average, 70% maximum) compared to pre-migratory periods (when fat loads are <5% on average) (Blem 1980; Alerstam and Lindström 1990). Early studies suggested that nonfat body components of migrating birds remain in homeostasis down to some lower limit of body mass, that fat is added and used without appreciable change in the largely nonfat tissue structure of the body, and that changes in body mass during stopover were due to fat deposition (Connell et al. 1960; Odum et al. 1964; Hicks 1967). However, more recent studies had demonstrated that the nonfat body components can vary in concert with lipid in some migrants (Marsh 1984; Gaunt et al. 1990; Jenni-Eiermann and Jenni-L. 1991; Lindstrom and Piersma 1993). We wanted to measure changes in lean mass coincident with changes in body fat. Lean mass, which is most easily defined as the difference between body mass and fat mass (Van Der Meer and Piersma 1994), includes the masses of muscles and vital organs (as well as their water content).

Our study of Blackcaps (Karasov and Pinshow 1998) included calibration and validation procedures for determining both lean and fat compartments in birds nondestructively: lean mass, using total body electrical conductivity, a method described for small birds in 1988 by Glen Walsberg (Walsberg 1988), and fat mass by the dilution of hydrogen (H) isotope-labeled water, as suggested by (Campbell and Leatherland 1980). With these methods in hand, which had measured precisions of 3–4% and 10–15% respectively, we captured migrants, measured their body composition, and then brought them into captivity. Some were allowed to feed *ad libitum*, and gained body mass. Some were fasted or food-restricted and lost mass. In all cases we measured final body compositions, and we found that for each one gram change in body mass (whether gained or lost), around 40% was change in lean mass and 60% change in fat mass. This was a picture far different from that of a bird mainly adding or subtracting fat without appreciable change in lean mass. What components of lean mass were changing? More on that below.

More recently, my collaborator Berry Pinshow, has used an even more precise method for measuring body composition, called dual energy X-ray

absorptiometry (DEXA). It is based on the principle that different tissues have different absorptivities for X-rays, and the device can be calibrated to measure fat mass, bone-free lean mass, and total bone (Nagy and Clair 2000; Korine et al. 2004). Studying Blackcaps stopping at Eilat in the southern Negev, Pinshow, along with Michal Wojciechowski and Reuven Yosef, confirmed our previous finding that a unit change in mass of a migrant Blackcap was at least 40% lean mass, and they learned something new. Refueling of Blackcaps is apparently biphasic—first Blackcaps mainly increase their lean mass, and once that is complete they mainly increase body fat.

What remained to be learned was what components of lean mass were changing, and what were the implications of those changes. Recall our original finding of lighter small intestines in migrant Yellow-rumped Warblers. Evidence is accumulating that also in migrating Blackcaps (Karasov and Pinshow 1998), and in other migrating birds (Piersma and Gill 1998; Bauchinger 2002), declines in size of organs of nutrient assimilation such as the small intestine and liver account for some of the decline in lean mass. When Blackcaps are fasted or food restricted, the masses of liver, stomach, and small intestine decline and account for 44% of the total lean mass decline, a disproportionate amount considering that these organs make up only 11% of a Blackcap's lean mass (Karasov and Pinshow 1998; Karasov et al. 2004).

Could atrophy of organs important in food assimilation reduce feeding rate and digestive rate and efficiency? If so, how quickly might birds recover from these putative effects? If there is a lag for recovery, could this limit the time course of mass gain during a stopover? This would be important, because the length of the stopover influences a species' overall migration speed and therefore its success. From theoretical models of optimal migration (Alerstam and Lindstrom 1990), it is apparent that the rate at which a species can add stores or restore a physiological deficit before the next flight is critical to migrating birds. Free-living Blackcaps at stopover indeed exhibited a delay of three to four days before significant mass gains were apparent (Langslow 1976; Gannes 1999). Researchers that have observed similar time lags in mass gain in other avian species during stopover have suggested that they might be due to factors that limit access to food such as competition (Hansson and Pettersson 1989; Moore and Yong 1991), time needed to establish feeding territories (Rappole and Warner 1976), or handling shock or missed opportunity costs as a result of capture (Mueller and Berger 1966).

According to our hypothetical physiological limitation it may take several days for Blackcaps to rebuild the reduced organs of nutrient assimilation, and during this recovery interval high feeding rates might not be possible. This could be the basis for the absence of immediate body mass gain in Blackcaps at stop-over sites, and it would be consistent with the observation of Wojciechowski et al. (2005) that the birds appear to increase their lean mass first, before greatly increasing body fat. To test predictions from this hypothesis we used an established fasting protocol to create a group of Blackcaps with reduced intestinal and liver mass, compared with *ad libitum* fed

controls (Karasov and Pinshow 2000). Once they were again provided food *ad libitum,* they did not immediately achieve the highest assimilation rates. Instead, they progressively increased their daily assimilation rate and achieved the highest rate (one third higher than controls) three days after the end of their fast. Furthermore, Blackcaps refeeding following a fast increased their intestine and liver masses by 36% and 45%, respectively, within two days of ending their fast (Karasov et al. 2004). Thus, the time course for rebuilding the organs (two days) corresponded very well with that for achieving the very highest feeding rate (by the third day). The response of the fasted birds thus supported the hypothesis that there may be physiological constraints on the rate of refueling during migratory stopover. However, it will be important in the future to determine how well the digestive organ changes that occur in the fasting protocol mimic the natural changes in digestive organs that apparently occur in migrants.

Case II: Change in Digestive Organ Size and a Digestive Bottleneck in a Shorebird.

In the early 1990s Theunis Piersma and his colleagues in the Netherlands summarized observations they had made on body composition and feeding behavior of several species of shorebirds they had been studying (Piersma et al. 1993). Briefly, they observed in both Red Knots (*Calidris canutus*) and Bar-tailed Godwits (*Limosa lapponica*) that birds consuming hard-shelled prey (e.g., molluscs) had heavier, more muscular gizzards than birds consuming softer food (e.g., soft-bodied polychaete worms). Furthermore, they noticed that captives habituated to soft food pellets were reluctant to eat their usual hard-shelled mollusc prey, and took several days to adjust to the latter when switched from the former. Piersma and colleagues hypothesized that there was a dynamic, two-way relationship between diet and gizzard size, such that the prevailing diet influenced gizzard size and the prevailing gizzard size influenced diet selection.

In order to study this dynamic more thoroughly, Piersma and his colleagues needed to look inside more birds. But, there is probably no one that loves a knot more than Theunis Piersma, and it was probably overwhelmingly unappealing to design experiments requiring the destruction of many of the birds. So, they made a novel application of the common clinical tool of ultrasonography to measure stomach diameters of live birds, and correlated diameters with stomach masses (Dietz et al. 1999). Then, in captive Red Knots, they switched birds back and forth between hard-shelled mussels (*Mytilus edulis*) and soft trout-food pellets and measured stomach diameters (and hence estimated stomach masses) every other day (Dekinga et al. 2001). The data were clear and beautiful—Red Knots could double stomach mass in about a week, and reduce it by half in about a week. Diet clearly determined stomach size.

But, did stomach size determine diet selection? The earlier behavioral observations on captives suggested that it did, but Piersma et al. also found evidence in the field. After they installed an ultrasound device

on their research vessel, the Navicula, they began following the movements of radio-tagged Red Knots, whose stomach sizes had been measured, as they fed on mudflats in the Wadden Sea. The diets of the birds could be determined based on droppings collected at the feeding sites. There was a positive relation between mean estimated stomach size of Red Knots and the proportion of their diet composed of hard-shelled cockles (*Cerastoderma edule*) as opposed to more easily cracked bivalves (*Macoma balthica* and *Mya arenaria*) (Piersma et al. 1999a). So, the arrows between diet and stomach size go both ways. In their most recent studies, Piersma *et al.* have carried out cost-benefit analyses of stomach size in different natural contexts and have shown that, in order to balance their energy budgets, the adjustments in gut size are critical (van Gils et al. 2003). Indeed, when Red Knots feed on molluscs, the rate-limiting step in energy acquisition is not finding prey, but the time it takes to digest it.

If large stomachs are so useful, why not always possess a large one? (We could apply the same question to intestine size of Blackcaps). Piersma et al.(1999) argued that in flying animals, weight-saving may be a strong selective force on form and function. When guts are not required, as during long migratory flights, it would be selectively advantageous to reduce their size. Piersma et al. have presented evidence that both Red Knots (Piersma et al. 1999b) and Bar-tailed Godwits (Piersma and Gill 1998) reduce their gut size **prior** to departure on long flights. The cost of this plastic response comes later, upon arrival at a stopover, when birds must delay rapid mass gain a few days as they rebuild their guts. These shorebirds thus add support for the hypothesis that there may be physiological constraints to the rate of refueling during migratory stopover, as discussed for migrant passerines above.

Case III: Post-digestion Metabolic Profiles can Inform Us about Stopover Site Quality

Sometimes physiological features do not operate as constraints on migrants but they have much to tell us about the migrants. As discussed above, the migration of birds can be divided into alternating phases of intense energy use during flight and intense energy deposition during stopovers, although birds do not necessarily feed at every stopover site. The overall rate of migration is very much influenced by the fuel deposition rate during the stopover, which can be limited by intrinsic physiological constraints and/or environmental conditions. Among the latter, differences in habitat quality (food availability, competitors, predators) are undoubtedly important but they are very difficult to measure. Could biochemical features of the migrants themselves be used to assess the relative value of a habitat for supporting refueling? Currently, this kind of knowledge is available by weighing many birds at a stopover site throughout the day (Dunn 2000) or by reweighing the very small proportion of birds that are captured at a stopover site more than once. Perhaps biochemical analysis of blood sampled from the vast numbers of birds that are captured only once could be informative.

This possibility is increasing as we learn more about metabolic changes in migratory birds. Migrants at a stopover site that do not feed remain in a fasted catabolic state in which they mainly breakdown tissue, whereas those that feed should be anabolic, meaning that they mainly build up tissue. Based on growing knowledge of the nutritional biochemistry of birds, the catabolic and anabolic profiles should differ considerably. For example, during fasting a compound called ß-hydroxy-butyrate (HBA) is synthesized from stored body fat, circulates in the blood, and is used as a source of energy by some tissues in the body. Fasted migrant passerines exhibited 4 times higher levels of HBA compared with fed birds, whereas plasma levels of triacylglycerols (TRIG), which are building blocks of fat, were nearly 2 times higher in fed birds (Jenni and Jenni 1991). Studies with passerines (Jenni-Eiermann and Jenni 1994) and shorebirds (Williams et al. 1999) have shown that plasma TRIG levels are positively related, and HBA levels negatively related, to rates of feeding and mass gain (Guglielmo et al. 2002). Using such relationships, it is possible to capture a bird, sample and analyze its blood, and then calculate a fattening index that incorporates measures of both metabolites, with corrections for body mass and time of day that also influence the metabolite levels (Schaub and Jenni 2001).

In the first field studies of this kind, the fattening indices of wild birds did seem to correspond to rates of mass gain and habitat quality (Schaub and Jenni 2001; Guglielmo et al. 2002; Guglielmo et al. 2005). One study was conducted at Long Point, Ontario, a 35 km peninsula extending eastward from the north shore of Lake Erie, which is an attractive stopover for migratory passerines. Previous studies of body mass gain demonstrated that spring refueling rates were higher in a wide variety of bird species at a site near the base of Long Point than at the tip (Dunn 2000; Dunn 2001). Guglielmo et al. (2005) compared plasma metabolites in five species collected at either the higher quality or lower quality sites. They found that relative levels of plasma metabolites corresponded to relative habitat quality. At the better site, relative to the poorer site, plasma TRIG was higher, and HBA was lower, and of course the ratio of TRIG/HBA was higher at the better quality site. Thus, the biochemical features of migrants themselves could be used to assess the relative value of a habitat for supporting refueling.

As promising as this approach may appear, its success depends critically on a sound understanding of the metabolic and biochemical responses of the particular species, because species do respond differently. Examples of such interspecies differences abound: migrating Great White Pelicans (*Pelecanus onocrotalus*) exhibited higher plasma TRIG when fasted than when fed, which is opposite from the pattern in the small passerines that were studied (Shmueli et al. 2000), and short-distance migrants appeared to rely more on glucose and protein and less on lipid oxidation than long-distance migrants (Jenni and Jenni 1991). This cautionary note should be considered a call for careful calibration and validation of biochemical indices of condition.

Conclusions

Many physiological changes occur in migratory birds that are essentially invisible to the unaided human eye, including some that deal with food digestion, absorption, and post-absorptive processing. In the past decade we have learned a lot about these changes, partly through the application of new technology (TOBEC, DEXA, ultrasonography) and techniques (metabolic profiling). It is becoming increasingly apparent that substantial reversible changes occur in the organs of nutrient assimilation such as the stomach, small intestine, and liver. Their sizes may decline by up to 50% prior to or during migratory flights, and their sizes may increase during stopover. Changes in the masses of these organs account for much of the change in the total lean mass of migrant birds, and underscore how changes in body mass are not simply the result of deposition and utilization of body fat. The nutrient processing rates of these organs sometimes limit the rate of refueling prior to migratory flight, and certainly are important permitting very high rates of feeding and fuel deposition. The metabolic profile of a bird refueling can be quite distinct from that of bird not refueling. In many birds, plasma triacylglycerol levels are positively related, and ß-hydroxy-butyrate levels negatively related, to rates of feeding and mass gain. Thus, the biochemical features of migrants themselves, measured in single blood samples, could be used to assess the relative value of a habitat for supporting refueling.

Acknowledgments

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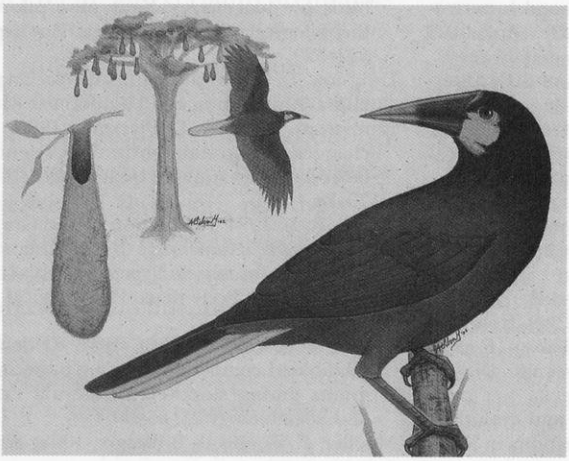

Montezuma Oropendola

Monitoring Avian Night Flight Calls—The New Century Ahead

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On September 14, 1896, on a small hill outside of Madison, Wisconsin, Orin Libby counted 3600 calls from night-migrating birds in five hours of listening (Libby 1899). This count is the first published record of an attempt to quantify the night flight call phenomenon of North America's avifauna. Native people in Wisconsin likely heard nocturnal bird migrations during the previous 10,000 years.

In the 50 years after Libby's report, only two other counts of nocturnal flight calls were reported, those by Paul Howes (1914) counting Swainson's Thrushes [then called Olive-backed Thrush] in Connecticut and the extraordinary 15-year study by Stanley Ball (1952) counting migrating thrushes in eastern Quebec. Ball's work was the first to use nocturnal flight call monitoring to produce data on the migration timing of species in a region.

Beginning in the 1950s, regular nocturnal flight call counts were reported from regions throughout eastern North America in the *Audubon Field Notes*. Most of the reports were tallies of call totals or of estimated numbers of *Catharus* thrushes passing over during a portion of an evening. One outstanding effort is the long-term work by Ron Weir who has been counting thrush calls in fall migration near Kingston, Ontario for more than 25 years (see *American Birds*, Lake Ontario region, fall reports).

In the 1950s technological developments enabled the first audio recording of nocturnal bird migration. Bill Gunn recorded some short periods of calling from the top of the Imperial Oil building in downtown Toronto in late September 1957. At about the same time, the team of Richard Graber and Bill Cochran were beginning their pioneering nocturnal flight call study in central Illinois (Fig.1). Some recordings of both of these efforts are archived at the Macauley Library of Natural Sounds at Cornell University.

Graber and Cochran were associated with the Illinois Natural History Survey. Cochran was an electrical engineer and designed the recording equipment. He was able to configure a

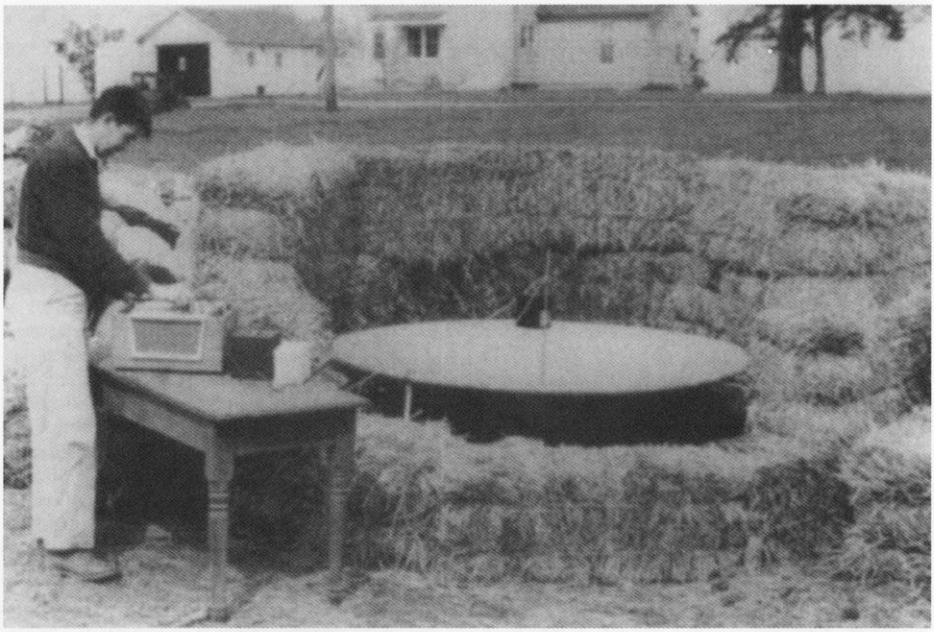

Figure 1. Dick Graber is pictured with night flight call monitoring equipment designed by Bill Cochran at the Illinois Natural History Survey in the late 1950s.

reel-to-reel tape recorder to record for two hours and to automatically record ten minutes out of every hour. By recording ten minutes out of every hour all night long, the device was able to sample night flight calling through the course of an evening. This allowed the researchers to sleep while the machine automatically recorded sounds in the night sky. They would later listen to the recordings and log any bird calls. The method allowed them to study the quantity, and to some degree, the species composition of calling during the course of a night, throughout a migration season, and in different weather conditions. Like Ball, they documented the seasonal timing of migration for a number of species and their work laid the conceptual foundation for machine-based recording of nocturnal flight calls (Graber and Cochran 1959 & 1960).

In his classic 1968 paper, Graber discussed the potential of acoustic monitoring but pointed out several major impediments. One was the labor necessary for the analysis of the calls and the other was deciphering the identity of the many unknown callers. The concept of night flight call monitoring clearly existed in the 1960s, but the method would need some technological developments before it was ready to advance further.

On a late May night in 1985, I was camped on a bluff along the St. Croix River on the Minnesota/Wisconsin border. It was a beautiful late spring evening with a light wind from the south. Shortly after I settled into my

sleeping bag my attention was drawn to the faint sounds of birds in night migration. A decade earlier my father had pointed out this night flight calling to me when I was a teenager growing up in southern Minnesota, but I had never heard it again until this night. With nothing else on my mind, I tuned in and was enthralled in wonder for hours by the beauty of voices trickling down from the passing river of birds.

For the past 20 years I have been studying the night flight calling phenomenon across eastern North America. I was motivated by the idea that all-night recordings of events like the one I heard in my camping experience would be of interest to people in the future. I remember being very inspired by Audubon's account of seeing hoards of migrating Passenger Pigeons darkening the skies over southern Ohio back in the early 19th century. I remember the sadness evoked from realizing I would never get to see that original North American wilderness. But then I remember the change to a paradoxical optimism in realizing that the wilderness was only likely to deteriorate further and that at least I was here now and there were still lots of birds migrating. I believed that the all-night, all-season recordings of avian night flight calls would in some way reflect the species composition and numbers of birds on the continent now, and that someone might appreciate this information hundreds of years from now.

By 1985, a lot had changed technologically since Graber and Cochran's recording efforts in the late 1950s. The consumer electronics revolution had begun and for $1000 one could buy a portable hi-fi Video Cassette Recorder (VCR) and make a recording of 8-hours of good quality stereo sound. For the next ten years I would record and listen to thousands of hours of audio tape recordings of the night sky.

A sign of the next technological advance was reported in 1987 by Volker Dierschke, studying the nocturnal flight call phenomenon on Helgoland Island in western Germany (Dierschke 1989). Peter Kaetsch, an engineer working on the project, developed a voice-activated nocturnal flight call recording system. The tape recorder was activated when it received a signal of specified loudness in the 3–8 kHz range. This conserved audio tape and also saved analysis time in allowing one to bypass the long sections of night when no calling occurred.

I have no regrets about the thousands of hours I spent listening to audio tapes, as this experience convinced me more than ever that there is utility in monitoring avian night flight calls. But, the idea of automating the call detection and extraction process had been in my sight since my listening experience in 1985. This dream began to come together in 1994 when I teamed with the Cornell Lab of Ornithology's newly formed Bioacoustics Research Program (BRP) to work on the development of automatic nocturnal flight call detectors. Under the direction of Dr. Chris Clark, BRP was pioneering the development of computer-based (digital) acoustic analysis software. BRP programmer Harold Mills wrote the first functional nocturnal flight call detector in 1994 (Mills 1995). This software for Macintosh computers allowed automatic detection of the short, high-pitched flight calls of warblers and sparrows.

This development allowed the automatic extraction of their flight calls from audio tapes or in real-time directly from an active microphone pointed at the sky.

BRP's spectrographic analysis software called *Canary*, written by Steve Mitchell, was then used to study and help discriminate similar calls. Time-frequency spectrograms allow one to see how the frequency of flight calls varied with time, and *Canary* enabled one to quickly make a spectrogram of a call and make measurements of its fine acoustic features. It was the tool that opened the door to breaking the code of nocturnal flight call identification.

Back in 1990 I had released an audio cassette tape identification guide to the flight calls of night-migrating thrushes. Pirated copies of the tape made the rounds of the birding underground and as I set my sights on the daunting task of completing the warblers and sparrows, I was joined in that effort by Michael O'Brien, an ardent night flight call enthusiast from Rockford, MD. Ten years later we would release a CD-Rom guide to the flight calls of landbirds in eastern North America (Evans and O'Brien, 2002).

In 1998, my myopic focus brought on the creation of an organization dedicated solely to night flight call monitoring, and I founded the nonprofit organization called Old Bird. Old Bird contracted former BRP programmer Steve Mitchell to develop advanced night flight call analysis software. New detectors were written that enabled operation on the more common PC computers. This included the first detector for thrush calls. In addition, software was developed for automatic recognition of one of the most distinctive small passerine night flight calls in eastern North America, the Dickcissel. Using Dickcissel call detection software, the first transect of automated night flight call recording stations was established in spring 2000 at a network of high schools in south Texas (see www.oldbird.org/dicks.html).

A big advance at this time was Mitchell's development of the software called *GlassOFire* that greatly facilitated the sorting of extracted bird calls into user-determined species categories.

Now, 20 years after I bought my first VCR, a similarly capable VCR costs only $50. But, VCRs have become almost obsolete for night flight call recording. Advances in the speed, software, and information storage capacity of computers make it much more efficient to record sound directly to a computer. Having a digital sound file allows one to run the automatic call detection software directly on the file. For a typical modern PC it takes about 20 minutes to extract the warbler and sparrow calls on an 8-hour sound file. This way one can capture and archive the whole night and use different software to extract different species groups, and apply new software as it is developed in the coming years.

Given the rapid advances in technology in the last 20 years, one can imagine that in the next 20 years there will be software for automatically identifying many of the species and that there will be automatic monitoring networks across the continent. I have no doubt that birders will someday wake up in the morning and, with a cup of shade-grown coffee in hand, tune in to continental images of the previous night's migration for many songbirds across the Americas.

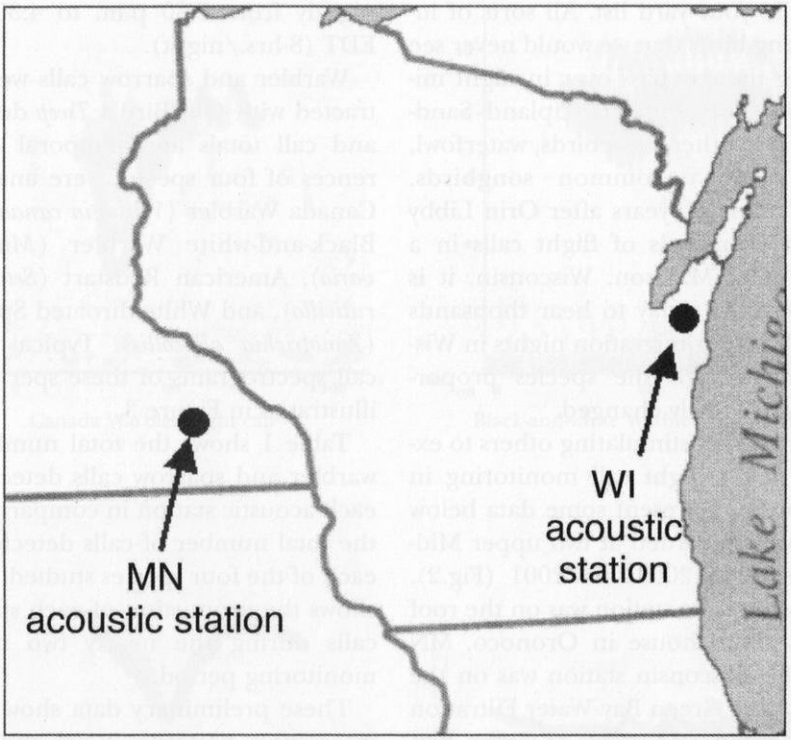

Figure 2. Locations of night flight call monitoring station in the upper Midwest in fall 2000 and 2001.

NEXRAD radar allows us to see the mass migrations now, but acoustics is the only means we have for resolving those masses to species.

In the meantime, the study of avian night flight calls is only in its infancy and holds a lot of promise. Right now the phenomenon is wide open for exploration and interesting discoveries are likely to be made by anyone who undertakes monitoring. Indeed, the really exciting discoveries are likely to come when birders start monitoring from their homes and start comparing data with one another. Building an acoustic monitoring station is also a great school project, and more than 30 high schools in the eastern U.S. have been involved with night flight call monitoring.

The www.oldbird.org website has instructions and the design for a simple but effective microphone for picking up night flight calls of migrating birds. It costs about $30 and takes an hour and a half to build. The software for call extraction and analysis can all be downloaded from the website. A spectrogram library of common call types is available as well as many publications and reports on night flight call monitoring.

Besides the scientific value of night flight call monitoring, it is a great way

to build your yard list. All sorts of interesting birds that we would never see during the day pass over in night migration: rails, bitterns, Upland Sandpiper and other shorebirds, waterfowl, and many uncommon songbirds. More than 100 years after Orin Libby tallied thousands of flight calls in a night near Madison, Wisconsin, it is still possible today to hear thousands of calls on big migration nights in Wisconsin, though the species proportions have likely changed.

In hopes of stimulating others to explore night flight call monitoring in Wisconsin, I present some data below that were recorded at two upper Midwest sites in 2000 and 2001 (Fig.2). The Minnesota station was on the roof of my dad's house in Oronoco, MN and the Wisconsin station was on the roof of the Green Bay Water Filtration Plant, about 15 km east of Green Bay. The Minnesota station operated in the fall of 2000 and 2001. The Wisconsin station operated in the fall of 2001. Both stations used the microphone design on the www.oldbird.org website and both operated between August 18 and October 17. Monitoring occurred nightly from 8:30 p.m. to 4:30 a.m. EDT (8-hrs./night).

Warbler and sparrow calls were extracted with Old Bird's *Tseep* detector and call totals and temporal occurrences of four species were analyzed: Canada Warbler (*Wilsonia canadensis*), Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), and White-throated Sparrow (*Zonotrichia albicollis*). Typical flight call spectrograms of these species are illustrated in Figure 3.

Table 1 shows the total number of warbler and sparrow calls detected at each acoustic station in comparison to the total number of calls detected for each of the four species studied. Fig. 4 shows the proportion of each species' calls during the nearly two month monitoring period.

These preliminary data show some interesting patterns. Black-and-white Warbler and Canada Warbler calling each composed around the 0.5 percent of the total calling. This was true in the fall of 2000 and 2001 in Minnesota and in the 2001 fall season in Wisconsin. White-throated Sparrow calls composed 1.5–2.0 percent of all

Table 1. Total calls and calls of four species detected from August 18 through October 17 at acoustic stations in Minnesota (2000 & 2001) and Wisconsin (2001). AMRE = American Redstart, WTSP = White-throated Sparrow, BAWW = Black-and-white Warbler, CAWA = Canada Warbler. Monitoring occurred nightly from 8:30PM to 4:30AM (8-hrs./night).

	Fall 2000—MN	Fall 2001—MN	Fall 2001—WI
AMRE	571	511	204
WTSP	141	234	160
BAWW	44	72	28
CAWA	85	41	49
Total calls	9671	11377	8525

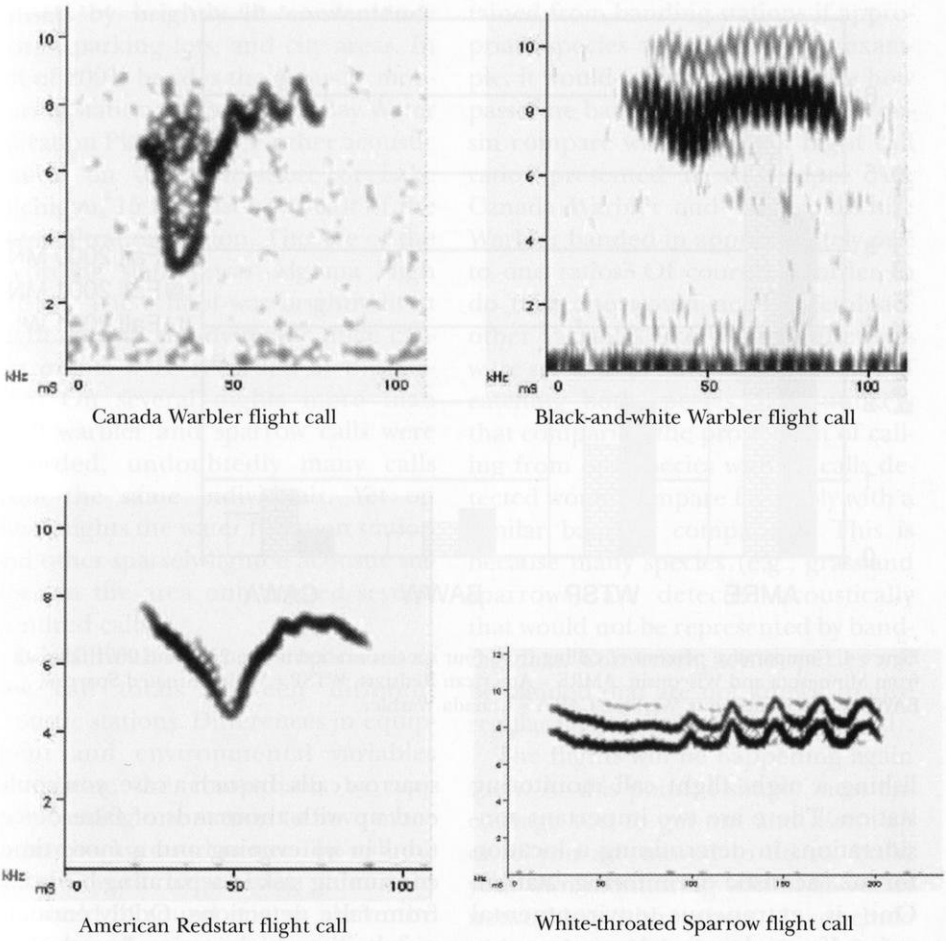

Figure 3. Distinctive night flight call spectrograms of four species studied in the 2000 and 2001 fall data from Minnesota and Wisconsin.

calls. This was also similar between both seasons in Minnesota and the single season in Wisconsin. American Redstart had the largest percentage of calls at both stations, but the percentage was distinctly higher at the Minnesota station for these species in both years (between 4% and 6% of total calls in Minnesota compared with less than 2.5% in Wisconsin). This suggests to me that American Redstarts may be relatively more common in western Wisconsin than in eastern Wisconsin. There are certainly too few data here to make any firm conclusions, but I pass it along in hopes of enticing someone to try to confirm or disprove the pattern.

Here are a few notes to consider before you embark on the road to estab-

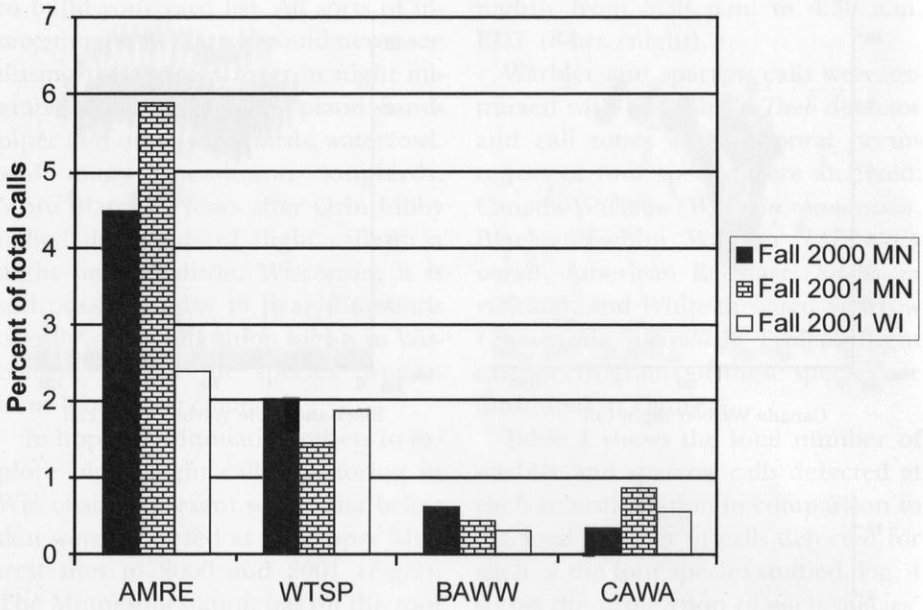

Figure 4. Comparative percent of calling from four species studied in the 2000 and 2001 fall data from Minnesota and Wisconsin. AMRE = American Redstart, WTSP = White-throated Sparrow, BAWW = Black-and-white Warbler, CAWA = Canada Warbler.

lishing a night flight call monitoring station. There are two important considerations in determining a location for an acoustic monitoring station. One is extraneous environmental noise. If your location is near a population of Spring Peepers *(Hyla crucifer)*, this will impede your ability to hear and also to automatically detect thrushes. If your location is close to one or more singing insects, this may impede your ability to detect warbler and sparrow calls. A distant insect chorus is usually present everywhere in the fall migration and that is usually not a problem. What can be a major problem, especially if you want to use automatic call extraction software, is if you have individual crickets, etc. singing close to your microphone. Their individual calls can be similar in duration and frequency to warbler and sparrow calls. In such a case, you could end up with thousands of false detections in an evening and a more time-consuming task in separating bird calls from false detections. Oddly enough, proximity to highways and road noise is not a problem, especially if you are just monitoring warblers and sparrows. The calls of these species have frequencies above the lower rumble of typical auto traffic.

Artificial lighting is an important factor that can cause disoriented individual birds to call more rapidly when there is low cloud cover. Such conditions can be detected by the appearance of abnormally high call rates. A tell-tale sign is if an individual warbler or sparrow gives a series of calls, each less than a second apart. In general, residential lighting at night does not cause this phenomenon, but it may be

caused by brightly lit convenience stores, parking lots, and city areas. In fall of 2001, besides the acoustic monitoring station on the Green Bay Water Filtration Plant, I had another acoustic station on the west shore of Lake Michigan, 15 km east-northeast of the water filtration station. The site of the recording station was Algoma High School. The school was brightly lit at night and on cloudy nights huge calling events were recorded at this station. On several nights more than 5000 warbler and sparrow calls were recorded, undoubtedly many calls from the same individuals. Yet on these nights the water filtration station and other sparsely-lighted acoustic stations in the area only logged several hundred calls.

It is difficult making comparisons of raw call totals between different acoustic stations. Differences in equipment and environmental variables complicate the comparison by typically causing one station to have more or less background noise. The call detectors work by sensing a certain threshold of sound energy above the background noise in a specified frequency band. So, if one station has twice the background noise as another, that former station will not detect weak calls that the latter station might.

However, if one is using reasonably sensitive microphones, one can compare the ratio of the number of calls detected from a species to the total calls detected and/or the ratio betweeen different species' calls. In these comparative methods, the equipment and environmental variables tend to drop out. The ratio data between the number of calls of different species can even be compared to the ratios obtained from banding stations if appropriate species are selected. For example, it would be interesting to see how passerine banding ratios from Wisconsin compare with the night flight call ratios presented in this paper. Are Canada Warbler and Black-and-white Warbler banded in approximately one to one ratios? Of course, in order to do this, one would need to evaluate other variables like whether the nets were set so as to have a good chance of catching both species. It is unlikely that comparing the proportion of calling from one species with all calls detected would compare favorably with a similar banding comparison. This is because many species (e.g., grassland sparrows) are detected acoustically that would not be represented by banding data. Conversely, some species will be banded that are not known to give regular flight calls (e.g., vireos, catbird).

The flights will be happening again soon. At this point, I simply must encourage you to get out and listen up or, if you are moved to do so, build your own monitoring station and start networking with others. I conclude with a beautiful description of the night flight call phenomenon from Libby (1899).

> Nothing but an actual experience of a similar kind can at all adequately convey the impression produced by such observations. The air seemed at times fairly alive with invisible birds as the calls rang out, now sharply and near at hand, and now faintly and far away. Repeatedly it seemed as if some of the nearer ones must be visible, so vividly was their presence felt as they passed overhead. All varieties of bird calls came sounding out of the darkness that evening. The harsh squawk of a water bird would be followed by the musical chink of the

Bobolink. Almost human many of them seemed, too, and it was not difficult to imagine that they expressed a whole range of emotions from anxiety and fear up to good-fellowship and joy. The fine shrill notes of the smaller Sparrows or Warblers were heard only close at hand but the louder ones came from all along the line, east and west. More than once an entire flock, distinct by the unity of their calls, came into range and passed out of hearing, keeping up their regular formation with the precision of a swiftly moving but orderly body of horsemen. The great space of air above swarmed with life. Singly or in groups, large and small, or more seldom in a great throng the hurrying myriads pressed southward. It was a marvel and a mystery enacted under the cover of night, and of which only fugitive tidings reached the listeners below.—Orin Libby 1899

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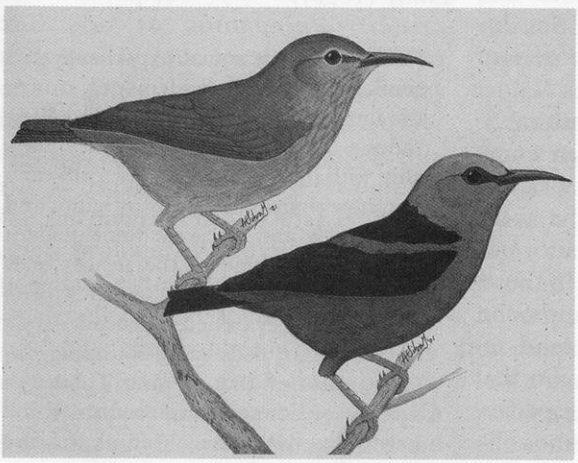

Red-legged Honeycreeper, pair

How, Where, and When Are Populations of Long-distance Migrants Being Limited?

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All bird populations have their numbers determined in one of two ways: either the population has reached the carrying capacity of its habitat or environmental factors are keeping the population below that level by reducing rates of survival and reproduction beyond the population's ability to compensate. For long-distance migrants these two types of limitations to population size can occur either in the breeding habitat, along the migration route, or in the non-breeding habitat, and they can occur at any time during the annual cycle. When unusual changes in populations of long-distance migrants are detected, it is often challenging to determine exactly how, where, and when the environment has changed, causing the population's size to either increase or decrease. When changes in population size of migratory species warrant management attention, it is absolutely essential that management actions be directed toward correcting the real problem where and when it is actually affecting the population; otherwise the effort will be ineffective in changing the population's size.

"International Migratory Bird Day" is celebrated in May each year, and numerous events around the Western Hemisphere mark either the return of many migrants to their breeding grounds or their departure from wintering ranges. Most of the attention has been focused on a group of more than 300 species known as "neotropical migrants" because they move biannually between breeding sites in the temperate areas of North America and wintering areas in Central America, the Caribbean, and South America (the Neotropics). These birds have attracted attention from scientists and conservationists because about a third of them have been declining in abundance over recent decades, and the underlying causes and appropriate remedies have often been elusive. Everyone concerned about these birds wants answers to four basic questions: Which populations are actually declining? When and where (during the year and across the Western Hemisphere) are

events causing these declines? What are the specific causes of declines? How should we respond to declines and their causes?

Detecting long-term trends in populations of widespread, mobile species, such as migratory birds, can be challenging, and it has only been practical to track changes in neotropical migrants since 1966 when Chandler Robbins, a U.S. Fish and Wildlife Service ornithologist, initiated the North American Breeding Bird Survey (BBS). This survey is based on observations of breeding birds along over 3,000 survey routes systematically located around the United States and Canada. Thousands of volunteers have counted the birds detected along these 39.4-km routes and submitted their observations to the National Biological Service. These data are then analyzed, and the results are made available to researchers and conservationists.

With few exceptions, it is the results of these BBS analyses that have provided the alarming evidence that fuels the current concern over neotropical migrants. The BBS data are especially useful because they allow detection of trends for a species over any span of years since 1966 and over either its entire range, some smaller geographic area (a state, for example) or an ecological unit (such as a particular habitat type). This versatility has allowed scientists to answer many previously intractable questions about how entire species and their regional populations are doing.

The BBS trends for some species are certainly disturbing. A few neotropical migrants—such as the Cerulean Warbler, Kentucky Warbler, Eastern Wood-Pewee, and Wood Thrush—have been declining over almost the entire period covered by the BBS. But other species—such as the Upland Sandpiper, House Wren, Blue-headed Vireo, Western Kingbird, Cliff Swallow, and Blue Grosbeak—have been on the upswing. Overall, however, the number of migrants declining throughout most of their range (23) is only slightly greater than the number increasing (18). Many migrant species have had changing fortunes over the BBS period. Dickcissels and Yellow-breasted Chats declined during the early years of the BBS and then rebounded, whereas Baltimore Orioles and Scarlet Tanagers were doing well initially then declined. Regional patterns of increase and decline within a single species are often complex, as can be seen in the maps of the BBS results. According to Bruce Peterjohn and John Sauer of the BBS program, few, if any, species are declining or increasing everywhere within their ranges; instead, most present a mosaic pattern of regional populations with very different trends, some increasing, others decreasing.

Recently, Frances James of Florida State University and others have reexamined BBS data to see whether or not they could find strong evidence for some of the widely held beliefs about declining neotropical migrants. For example, it is often purported that forest-dwelling warblers in the eastern U.S. are declining as a group, but that view was not confirmed by James' analyses. They documented complicated patterns of increase and decline for different species, geographic regions, and habitat types.

In fact, the comprehensive and systematic ways in which the BBS data are collected have shown that there are

few broad, sweeping generalizations about the status of neotropical migrants as a group. Different species and populations show different trends, depending on when and where their status is assessed. Still, when significant changes, either upward or downward, do occur, it is important to understand them and, if possible, determine what changes in the environment might be responsible. This hunt for explanations for the patterns revealed by BBS data has kept a small army of avian researchers busy for almost twenty years. The results of their investigations have so far given us many suspects but surprisingly few "smoking guns."

Although changes in populations of neotropical migrants have been documented by surveys on the breeding grounds, it is not always easy to pinpoint when and where during a migrant's complicated annual cycle the changes were caused. Because they migrate long distances, visit many places and habitats, and divide their year between temperate and tropical regions, it is almost a necessity to study a neotropical migrant throughout the year. Otherwise, analogies to the allegorical verse about blind men examining an elephant can be painfully appropriate. Independent examinations of different anatomical parts of an elephant (or stages of a bird's annual cycle) can lead to different and inaccurate descriptions of the entire beast (or the bird's complete life history). Despite the obvious advantages of large-scale, year-round studies, few researchers have studied a species over a large portion of either its breeding or non-breeding range, and even fewer have followed a species throughout its complete annual cycle.

Studies on the breeding grounds of neotropical migrants have been most common because so many ornithologists live and work in North America. These studies have revealed two general ways in which the size of a population can be set. One has to do with the availability and quality of nesting habitat. Often the size of a breeding population closely tracks the availability of breeding habitat and its ability to accommodate nesting individuals. As suitable habitat is gained and lost, populations rise and fall. Alternatively, the habitat may not be limited (there is plenty to go around), but birds that nest there have such poor reproductive success that they cannot maintain their populations at levels the habitat could potentially support.

Studies of Kirtland's Warbler, an endangered neotropical migrant, have shown that the availability of its specialized breeding habitat played a major role in setting the size of the population in Michigan. When jack pine forests of the proper age became available in the years following a 1980 fire that burned several thousand acres, warbler populations expanded rapidly to fill the newly created habitat, tripling in size in just five years between 1987 and 1993. Conversely, populations of other species have showed declines that correlated geographically and temporally with losses of breeding habitat. As forests have replaced retired farmland in New England, a group of migrants that require early successional habitats, such as old fields, has declined steadily. Chestnut-sided Warblers, Common Yellowthroats, Gray Catbirds, Bachman's Sparrows, and Indigo Buntings—as well as short-distance migrants, such as American Woodcock, Song Sparrows,

and Eastern Towhees, that shared the same nesting habitat—have declined as forest cover expanded and reoccupied areas previously converted to agriculture.

During the breeding season, neotropical migrants must not only be able to find suitable habitat, they must also reproduce successfully there. Several factors influence reproductive performance of birds. Mating success, clutch size, the number of broods per season, nesting success, and post-fledging survival of young can all influence the number of young birds added to the population each year. Several studies have shown that neotropical migrants are not always raising enough young. Studies of Ovenbirds in the Ozarks revealed that many territorial males lacked mates. Several warblers, including the Black-throated Blue, Bay-breasted, Cape May, and Tennessee, lay fewer eggs and rear fewer young when their nesting habitat lacks an abundance of caterpillars. Nesting success, however, has been the major issue for many neotropical migrants. Population declines often correlate well with nesting attempts that have failed, for a variety of reasons, to produce the expected number of young.

Even under the best of conditions, only a fraction of the eggs produced each year result in new individuals being added to a population. Of the various misfortunes that befall the eggs and nestlings of neotropical migrants, abnormally high rates of nest predation and brood parasitism (the result of Brown-headed Cowbirds laying their eggs in a nest) have been of most concern. For many neotropical migrants, only 30–65% of adults normally survive each year, and the losses must be replaced by new recruits if the population is to remain stable. But, many declining populations suffer from such high rates of nest predation and brood parasitism from Brown-headed Cowbirds that few young are produced each season. Scott Robinson and his colleagues in Illinois found that in many years every Wood Thrush nest on their study sites was parasitized. Declining populations of Kirtland's Warbler, Bell's Vireo, Willow Flycatcher, and Black-capped Vireo have experienced parasitism rates of 50–95%. In addition, a variety of mammalian, avian, and reptilian predators prey on eggs and nestlings, sometimes at unusually high rates.

Outside of the breeding season, the major requirement for population stability is good over-winter survival. Every population of neotropical migrants is at its annual peak size just at the end of the breeding season. From that point, the population dwindles continuously as individuals die, either along the migration route or on the winter range. If the number of birds at the end of the breeding season is low because of poor reproduction, even normal overwinter losses can put the population into trouble the next spring. But, a bumper crop of young will not guarantee population stability if too many individuals perish before the next nesting season. Concerns about overwinter survival have focused on the perils of long-distance migration, the availability of over-winter habitats, and threats associated with those habitats. Although these aspects of the life histories of neotropical migrants are not as well studied as events during the breeding season, there are many documented problems that may impact populations.

For most migrants, we know rela-

tively little about the habitats that they use during migration and whether or not specific places or habitats along the route are essential for survival. But, in a few cases, the importance of stopover habitats is well documented. Some North American shorebirds, most of which are neotropical migrants, congregate at traditional stopover sites where they accumulate fat to fuel their continued long-distance migrations. The importance of certain sites, such as the Copper River Delta for Dunlins, Great Basin lakes for Wilson's Phalaropes, Cheyenne Bottoms for Semipalmated Sandpipers, Mary's Point in New Brunswick for White-rumped Sandpipers, and Delaware Bay for Red Knots, is already well established. If these sites became unavailable, survival during migration could be seriously compromised.

Neotropical migrants can be as choosey about the habitats in which they spend the winter as they are about their breeding habitat. Many species have very specific requirements, and the fact that some birds are strongly territorial during the winter suggests that the habitat they need may be in short supply. Correlations between population size and changes in winter habitat have been proposed. The now-extinct Bachman's Warbler may have lost its major, but-always-limited winter habitat in the lowland areas of Cuba and the Isle of Pines in the Caribbean. Olive-sided Flycatchers, Cerulean Warblers, Kentucky Warblers, and Wood Thrushes may have suffered when their winter habitats in Central and South America were altered or destroyed. Most of this evidence is, however, circumstantial because overwinter survival has not actually been measured across the range of pristine and altered habitats that these species occupy.

No issue surrounding neotropical migrants has raised as much attention as tropical deforestation. Although the popular belief is that cutting of tropical forests is the major issue affecting migrants during winter, the realities are far more complex than this simplistic view suggests. Some neotropical migrants do require intact forest as winter habitat, but the majority do not. Many forest-dwelling species seem to be able to use a variety of secondary habitats, such as coffee and cocoa plantations or second growth, but crucial information about survival of individuals in different habitats is lacking. Species that are specialists for native tropical forests may suffer setbacks if insufficient habitat remains to accommodate the entire wintering population whereas more opportunistic species may be able to shift as habitat conditions change.

Even if a neotropical migrant can find sufficient overwinter habitat, there is still the challenge of surviving well enough there. Some species have suffered heavy overwinter mortality that is not related to either the quantity or quality of their habitat. Gian Basili and I discovered that Dickcissels wintering in agricultural areas of Venezuela have experienced heavy overwinter mortality when rice and sorghum growers used toxic chemicals to control local concentrations of birds, which now feed almost exclusively on rice and sorghum. Some of these control programs had the potential to wipe out a significant portion of the world's Dickcissel population in a matter of hours, and populations plummeted during the years when control efforts were most intense. Un-

regulated hunting of Blue-winged Teal in Central and South American wintering areas can result in over-harvesting of populations that have already experienced heavy hunting losses during their Fall migration.

In the end, there are many different ways that neotropical migrants can have their populations limited. For each species—but not for the over 300 species collectively—it is useful to ask when, where, and how the principal limitation occurs. For some species it will be on the breeding grounds, whereas for others it will be in wintering areas, or stopover sites. For some it will involve habitat availability and quality, whereas for others it will involve rates of reproduction or survival. Individual species (or perhaps groups of ecologically similar species) will each have somewhat unique problems because they have such different combinations of geographic ranges, habitat affinities, migration routes, and life histories.

Neotropical migrants have always faced challenges associated with their complicated life-history strategies. Why have these challenges recently become threats to the stability of their populations? The answers, of course, involve human-caused changes that have exacerbated the problems migrants have always had to overcome. We have directly or indirectly impacted migrants by rapidly modifying their habitats, generating changes in populations of competitors, predators, and parasites, polluting their environments, and killing them deliberately or inadvertently.

Many neotropical migrants have had their habitats severely impacted by human development. For some species these habitat changes have caused population declines. The U.S. Fish and Wildlife Service has identified loss of breeding habitat as the primary problem for 24 of 28 species that are endangered or "of management concern." Black Terns have declined as shallow marshes with extensive stands of emergent vegetation have been drained across the Great Plains, usually for agriculture. Least Bell's Vireos have been threatened by the loss of dense brush and riparian thickets in California. Golden-cheeked Warblers are endangered because mature stands of Ashe juniper on hillsides of the Edwards Plateau in central Texas are being cleared for residential development.

For other species, declines are associated not with a net loss of breeding habitat but with changes in habitat quality caused by fragmentation. Fragmented habitats exist in patches that are much smaller and farther apart from each other than is naturally the case. Forest cover in eastern and Midwestern North America has actually been increasing in total area over recent decades, but unlike forests of the past, today's forests are often fragmented by roads, power-lines, housing developments, logging, and a variety of other landscape features associated with an expanding human population. For many species of neotropical migrants, fragmented habitats lead to reproductive problems as nest predators and cowbirds cause too many nesting attempts to fail. In larger tracts of forest these problems occur far less frequently. Reproductive shortfalls associated with fragmentation have been implicated in the declines of many regional populations of neotropical migrants and in the endangerment of a few entire species. The habitat of en-

dangered Black-capped Vireos in the Southwest has become fragmented as riparian woodlands have been impacted by overgrazing. As a result, rates of cowbird parasitism and nest predation have soared.

Winter habitat shortages and loss of stopover sites have also been caused by development pressures in the Neotropics. Conversions of tropical forests to permanent pastures and croplands have diminished and will continue to reduce habitat availability, especially for species with narrowly specialized requirements and for species that may have always been limited by the extent of their nonbreeding habitat, even before recent losses.

Tropical rain forests, especially ones that have been moderately disturbed or are on lowland sites, are dwindling rapidly, and species wintering in them—such as Yellow-bellied Flycatchers, Wood Thrushes, Yellow-throated Vireos, Scarlet Tanagers, Northern Waterthrushes, and Blackburnian, Worm-eating, Cerulean, Prothonotary, and Kentucky Warblers—have lost so much of their winter habitat that it is likely their populations are now or soon will be limited there. Tropical dry and semi-deciduous forests, especially in Mexico and Central America, where many migrants winter, are in even worse shape. Least Flycatchers, Blue-gray Gnatcatchers, Blue-headed, White-eyed, and Warbling Vireos, Orange-crowned, Nashville, Blue-winged, Black-and-white, Black-throated Gray, Magnolia, and Hooded Warblers depend heavily on these forests which grow on lands most easily converted to agriculture. These forests have experienced proportionally greater losses than any other tropical habitats used by migrants, and because their extent was always more restricted, winter habitat limitations for migrants using these habitats are increasingly likely.

Despite all the work over the past twenty years, there are many questions about the ecology of neotropical migrants that remain unanswered. For very few species can we say with certainty when, where, and how their populations are being limited, and without these answers conservation measures could easily be misdirected and ineffective. Ongoing research promises to provide insights into these key questions, especially as the spatial scales of investigations begin to encompass entire breeding and wintering ranges and the temporal scales begin to cover complete annual cycles. Nonetheless, if our current hunches are correct, applying what we do know and taking immediate conservation action is justified because few of the complex factors suspected of causing declines are likely to improve spontaneously.

The challenge of conserving over 300 species of neotropical migrants is enormously complex. Problems are scattered throughout most of the Western Hemisphere, and they span decades. Obviously, a major coordinated effort involving key institutions in the temperate zone and the tropics will have to promote research, education, and conservation action on a scale unprecedented in bird conservation. Other similar coordinated efforts, such as continental waterfowl conservation, are far less complex, involving a smaller number of ecologically similar species, a narrower range of habitats and a simpler mix of problems. In 1990 the daunting challenge was accepted by the National Fish and Wildlife Foundation and its Executive

Director Amos Eno when they launched the international "Partners in Flight" program.

"Partners in Flight" has already had a huge impact on all phases of neotropical migratory bird work. More efforts are underway to monitor neotropical migrants around the Western Hemisphere; more ecological research is taking place, and it is well coordinated to maximize the value of information gained; new education programs are effectively alerting the public and policy-makers about migrants and their needs; hundreds of governmental and non-governmental conservation organizations are cooperating in planning and executing conservation strategies, and neotropical migratory birds have, as a result of all this attention, become *causes célèbres* in the conservation world.

Monitoring programs, most involving volunteer observers, are now filling in gaps in the North American Breeding Bird Survey by targeting species and regions that are not covered well by the BBS routes. Birds that nest in the roadless boreal forests and tundra of Canada and Alaska are overlooked by BBS methodologies, so special programs to monitor these birds as they migrate through more populated areas are underway, coordinated by organizations such as the Point Reyes Bird Observatory in California and the Long Point Bird Observatory in Ontario. Species that are difficult to census are now receiving attention as techniques for detecting secretive species, such as rails and nocturnal birds, are being developed. Efforts in the Neotropics are expanding so that trends in regional wintering populations can be detected, much as Christmas Bird Counts monitor wintering populations in North America.

Researchers are now standardizing many of their field techniques so that results of widely scattered studies can be pooled and compared to reveal previously undetected patterns across a species' entire range. The Breeding Bird Program, initiated by Thomas Martin, allows researchers to use a standard computer program to enter and analyze data on nest success so that regional and habitat-specific patterns in reproductive performance can be detected. Cooperative research programs, such as the Cornell Laboratory of Ornithology's "Project Tanager," have allowed hundreds of volunteers at thousands of sites around North America to participate in a large-scale survey of how habitat fragmentation affects Scarlet, Summer, and Western Tanagers in different regions.

So many education programs focussed on migrants have sprung up that it is hard to imagine an environmental educator in the Western Hemisphere who does not have access to a variety of materials appropriate for any age, cultural, or national audience. In keeping with the international character of "Partners in Flight," these educational materials are being made available in the tropics as well as in North America. Well-conceived educational programs, such as "One Bird-Two Habitats," link students in the north and south via the migratory birds that they share on a seasonal basis. Students in Wisconsin, where the program originated, have been linked with students in Nicaragua to share information about the many species that migrate between their two regions. As more people understand the needs and problems of neotropical migrants

it will be easier to rally support for conservation efforts.

As a result of all the new findings and heightened awareness, neotropical migrants are finally being given special attention by the public institutions that can actually implement changes that will help the birds. Government agencies that manage public lands containing key nesting habitats and stopover sites are beginning to modify some land-management practices that in the past caused problems for migrants. The U.S. Forest Service, one of the key players in "Partners in Flight," has developed extensive guidelines for how foresters can avoid damaging nesting habitats for species of special concern in forests around the U.S. Much of the attention has focussed on avoiding habitat fragmentation. The U.S. Fish and Wildlife Service, another key player, has begun emphasizing the needs of neotropical migrants in management activities on the National Wildlife Refuge system. In the West, the Bureau of Land Management has begun the shift to new grazing policies and regulations that will improve the prospects for aridland species that depend on key ecosystems, such as riparian woodlands, for nesting habitats and stopover sites. State wildlife management agencies have been enthusiastic participants in all aspects of "Partners in Flight." The Smithsonian Institution's Migratory Bird Center has focussed on the Neotropics, training biologists from tropical countries and working closely with international organizations, such as the World Bank and USAID, that have not traditionally considered the needs of migratory birds in development plans. Conservation organizations, such as The Nature Conservancy, now have migratory bird specialists on their staffs to advise on strategies.

Still, much more is needed to secure the future for some neotropical migrants. Continuing its coordinating role, the National Fish and Wildlife Foundation has facilitated the preparation of comprehensive plans for the U.S. that will guide the "Partners in Flight" program over the coming years. The goals include identifying and ranking species most in need of conservation, setting bird population and habitat conservation objectives, identifying the habitat conservation partnerships that encompass these objectives, and implementing the plan, and monitoring its success. Canada and Mexico are developing similar plans, and other countries will be encouraged to follow these leads.

Concerned citizens will continue to play key roles in these plans. There are now many ways to become involved, ranging from voluntary participation in monitoring, research, and education programs to influencing public policies and programs that impact neotropical migrants. One of the easiest ways to keep abreast of all the activities is to become part of the "Partners in Flight" program. Write to the National Fish and Wildlife Foundation for information packages (Suite 900, 1120 Connecticut Avenue, NW, Washington, DC 20036).

Will all this recent fuss over neotropical migrants change the fortunes of these evocative long-distance travellers? The success of other efforts, such as the North American Waterfowl Management Plan, demonstrates the value of large-scale coordinated approaches and confirms that the task will not be an easy one. Migrants use

habitats in up to a dozen different countries, each with their own conservation priorities and challenges. Conserving these birds is clearly beyond the capacity of any single organization, agency, or nation. But, if all interested parties work together and their efforts are focussed specifically on removing the real limitations faced by migrants, the potential is enormous.

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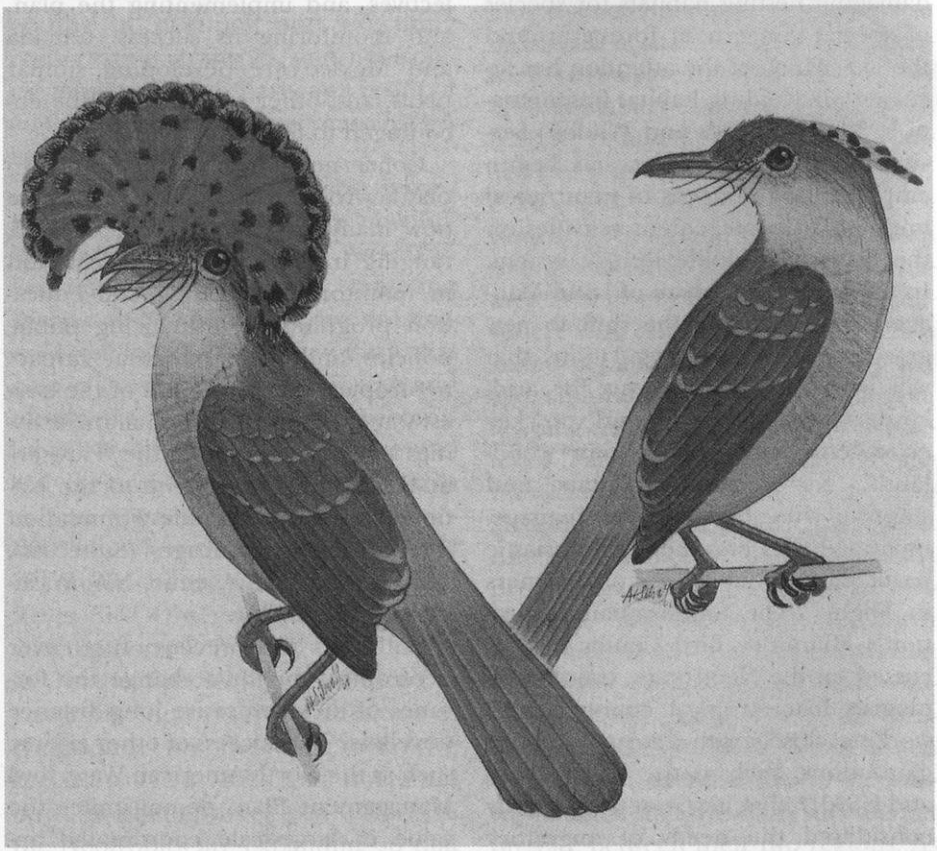

Royal Flycatcher, pair

Advances in Bird Conservation in México—1990–2005

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México has a tradition of ornithology and scientific discovery that long ago established it as one of the world's mega-diversity countries (Ramamoorthy et al. 1993). Its birds, in particular, have become ever better known and appreciated over the past century (Ridgway and Friedmann 1901–1945, Miller et al. 1957, Howell and Webb 1995). My intent here is not to review this history but rather to provide a decidedly personal perspective on advances in bird conservation in México roughly over the period 1990–2005. This is from my view as one involved with Partners in Flight (National Fish and Wildlife Foundation 1990) since its inception in 1990.

One particularly unfortunate result of the highly ethnocentric view U.S. citizens have of the world is that the most basic facts of our neighboring countries are largely untaught and unknown. While many high school students may be able to name a Canadian province, in my experience they are not likely to be able to name a single Mexican state. Similarly, a stereotypical image of cactus-dominated deserts and resort towns that are sadly not much more than little islands of Las Vegas or Miami too often round out our impressions.

The Mexican Avifauna

The reality is that México is extraordinarily diverse because its topography is tremendously varied and it has both a broad latitudinal and longitudinal spread. The resulting climatic and vegetation diversity has lead to México having about 10% of the planet's avifauna. As of the date of this article 1075 total species have been documented in México. This includes 1035 regularly occurring species, of which 105 are endemic (Gomez de Silva, pers. comm.). Many species have special status as a result of habitat and population losses. The Mexican government lists 56 species as endangered and another 122 as threatened (Arizmendi and Márquez

Valdelamar 2000). Much additional information on Mexican biodiversity can be found on the web site for the Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) at http://www.conabio.gob.mx and at the site for Comisión Nacional de Áreas Naturales Protegidas http://www.conanp.gob.mx/.

Importance of México to Northern Migrants

Not only México but the conservation community of the world is very interested in the future of México's resident avifauna (Wege and Long 1995, Stattersfield and Capper 2000). However, it is also important to demonstrate the role of México—its habitats, policies, and conservation actions—in the conservation of species that breed to its north. This may be especially important for agency administrators, congressional representatives, foundations, and other funding sources located in the U.S. who are not biologists and who understandably do not appreciate the crucial biological links that profoundly influence the future of "our" birds.

The importance of México to the well being of Nearctic-Neotropical migrants has only recently been recognized and developed for audiences outside of México (Keast and Morton 1980, Hagan and Johnston 1992, Martin and Finch 1995, Rappole 1995, Wilson and Sader 1995). Rich et al. (2004) conducted a broad-scale assessment that, for the first time, graphically portrayed the geographic importance of México to 448 species of landbirds that regularly breed in the U.S. and Canada.

The species richness of landbirds during the breeding season is revealed by overlaying their breeding season distributions. Richness is highest in portions of the American Southwest, California, and the Pacific Northwest (Fig. 1). When the winter ranges of these species are then overlaid (Fig. 2), the importance of México becomes plain. Whereas some migrants winter well into South America, México and particularly its eastern and western cordilleras stand out.

It's possible to provide more resolution to this picture by examining only that portion of the landbird avifauna that breeds in certain parts of North America. For example, we can look at just those avifaunas that breed in three Avifaunal Biomes (defined in Rich et al. 2004)—Eastern, Northern Forest, and Prairie. Each of the following set of maps was created by overlaying the breeding range and then the winter range of those landbirds that breed in the given Avifuanal Biome.

Species of the Eastern Avifaunal Biome (Fig. 3) tend to winter along México's Caribbean coast and down through Chiapas into Central America (Fig. 4). Species of the Northern Forest breed extensively across Canada (Fig. 5) and show a more complex wintering pattern. Nonetheless, the importance of both the Pacific and Caribbean coastal areas of México for these species is evident (Fig. 6). As is true for birds of the Eastern Avifaunal Biome, the southernmost states of México—Chiapas and Oaxaca—play a major role. Finally, species that breed

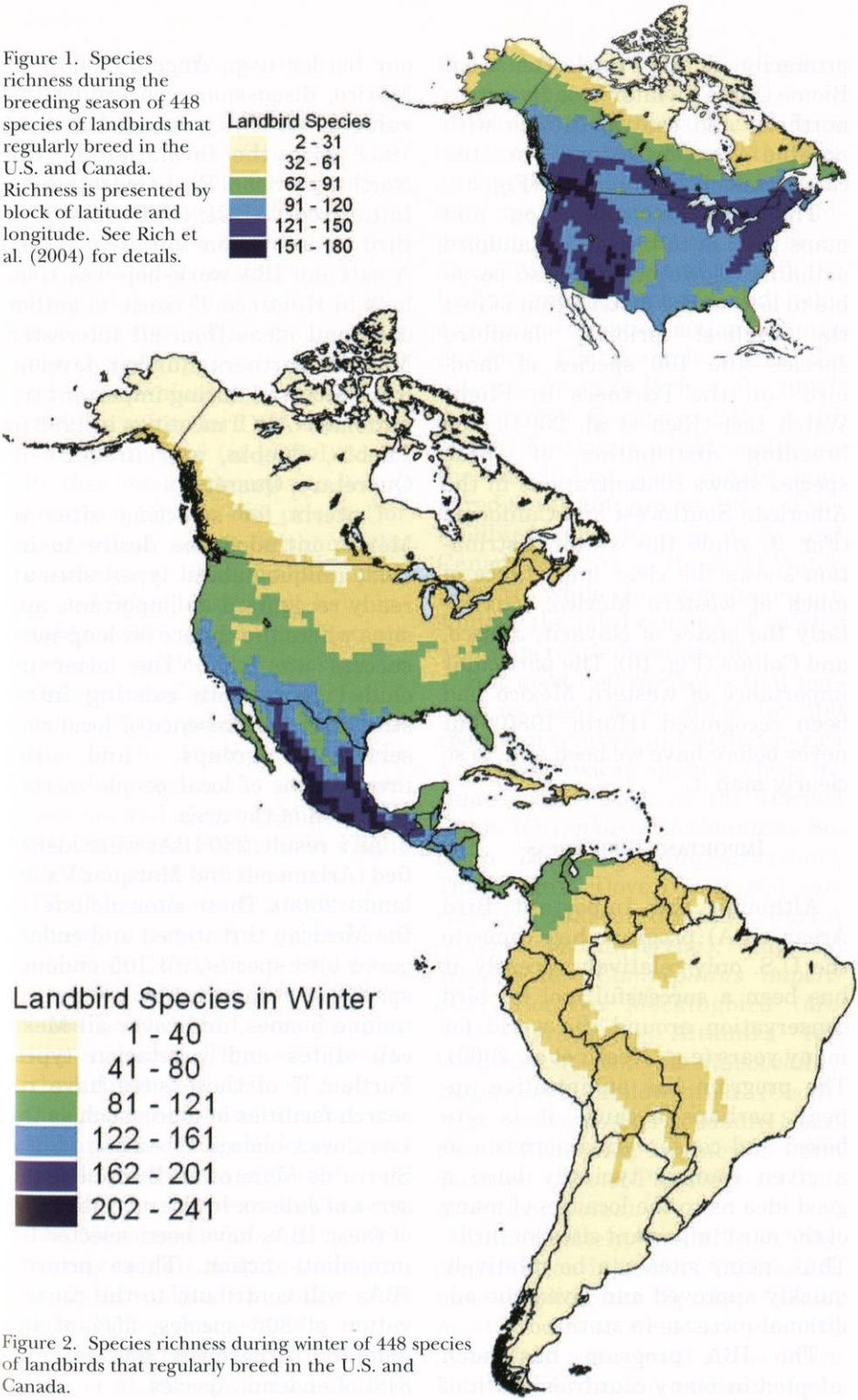


Figure 1. Species richness during the breeding season of 448 species of landbirds that regularly breed in the U.S. and Canada. Richness is presented by block of latitude and longitude. See Rich et al. (2004) for details.

Figure 2. Species richness during winter of 448 species of landbirds that regularly breed in the U.S. and Canada.

primarily in the Prairie Avifaunal Biome (Fig. 7) winter broadly across northern and central México with notable concentrations in the cordilleras of those regions (Fig. 8).

The previous discussion and maps pertain to the entire landbird avifauna. However, it is also possible to look at the distribution of just the highest priority landbird species—the 100 species of landbirds on the Partners in Flight Watch List (Rich et al. 2004). The breeding distribution of these species shows concentrations in the American Southwest and California (Fig. 9) while the winter distribution shows the clear importance of much of western México, particularly the states of Nayarit, Jalisco, and Colima (Fig. 10). The particular importance of western México had been recognized (Hutto 1980) but never before have we been able to so clearly map it.

Important Bird Areas

Although the Important Bird Areas (IBA) program has come to the U.S. only relatively recently, it has been a successful tool for bird conservation around the world for many years (e.g., Heath et al. 2000). The program has an intuitive appeal, perhaps because it is site based and conservation activists in a given country typically have a good idea as to the location of many of the most important sites for birds. Thus, many sites can be relatively quickly approved and given the additional increase in status.

The IBA program has been adopted in many countries south of our border (e.g., Angehr 2003). In México, discussions concerning the value of an IBA program began in 1997 with the formation of the North American Bird Conservation Initiative (NABCI; North American Bird Conservation Initiative 2000). A national IBA workshop was then held in Huatulco, Oaxaca, to gather data and ideas from all interested Mexican partners. Further development occurred during important trinational NABCI meetings in 1998 in Puebla, Puebla, and in 2001 in Querétaro, Querétaro.

Criteria for selecting sites in México included the desire to include unique habitat types, sites already recognized as important, and sites where the chance for long-term success was high. The latter included those with existing infrastructure, the presence of local conservation groups, and the involvement of local people in conservation of the area.

As a result, 230 IBAs were identified (Arizmendi and Márquez Valdelamar 2000). These sites include all the Mexican threatened and endangered bird species, all 105 endemic species, 60 congregatory species, 11 unique biomes, and cover all Mexican states and vegetation types. Further, 7 of these sites have research facilities in place, such as the Las Joyas biological station in the Sierra de Manantlan Biosphere Reserve of Jalisco. In the near term, 16 of these IBAs have been selected for immediate action. These priority IBAs will contribute to the conservation of 805 species, 55% of the globally threatened species, and 81% of endemic species.

Species Assessment

The Partners in Flight Species Assessment Process (Hunter et al. 1993, Carter et al. 2000, Panjabi et al. 2001) has become an important and increasingly recognized process for objectively assessing the future vulnerability of bird (and perhaps other) species. The tremendous value of this approach is that all species are evaluated by experts according to a standard set of criteria at the continental (or global) scale. This then enables species to be arrayed from high to low priority for conservation action without the provincialities, likes, dislikes, politics, and other biases that have inevitably accompanied our attempts to set one species over another for the allocation of scarce conservation resources. This process is the foundation of the Partners in Flight Watch List and many related assessments and plans (Pashley et al. 2000, California Partners in Flight 2004, Rich et al. 2004).

The Mexican bird conservation community, under the guidance of the Mexican NABCI committee, has now applied the Partners in Flight Species Assessment Process to their entire avifauna. This was accomplished through a series of four regional workshops and several national and international meetings to reconcile inevitable differences in regional perspectives. Assessment of the Mexican avifauna proceeded relatively rapidly despite their lack of long-term data on status and trends such as those we have in the U.S. from the Breeding Bird Survey (Sauer et al. 2004), Christmas Bird Count (http://www.audubon.org/bird/cbc/), and similar sources.

While a final report from México had not been produced as of the date of this paper, a number of preliminary results demonstrate how important this assessment will be in our continuing effort to identify the highest priority species and habitats for conservation action in North America. For example, using the rule sets given in Rich et al. (2004), around 250 species or 24% of the Mexican avifauna would qualify for the Watch List. This can be compared to the 100 species (22%) of the landbird avifauna, in U.S. and Canada that are on the 2004 Watch List. So, while the percentages are similar, the total number of species would increase dramatically.

But most noteworthy is that perhaps as many as 85 of the top 100 species of concern in North America would be Mexican species. These include species such as the Horned Guan (*Oreophasis derbianus*), Socorro Dove (*Zenaida graysoni*), Tuxtla Quail-Dove (*Geotrygon carrikeri),* Maroon-fronted Parrot (*Rhynchopsitta terrisi*), Imperial Woodpecker (*Campephilus imperialis*), Socorro Mockingbird (*Mimodes graysoni*), Altamira Yellowthroat (*Geothlypis flavovelata*), Black-polled Yellowthroat (*Geothlypis speciosa*), Sierra Madre Sparrow (*Xenospiza baileyi*), and Bearded Wood-Partridge (*Dendrortyx barbatus*).

Unfortunately, not all the bird conservation initiatives in the U.S. have applied the Species Assessment Process so we do not yet have a standard assessment of the entire U.S. and Canadian avifauna for a

Figure 3. Species richness during the breeding season of species of landbirds that regularly breed in the Eastern Avifaunal Biome. Richness is presented by block of latitude and longitude. See Rich et al. (2004) for details.

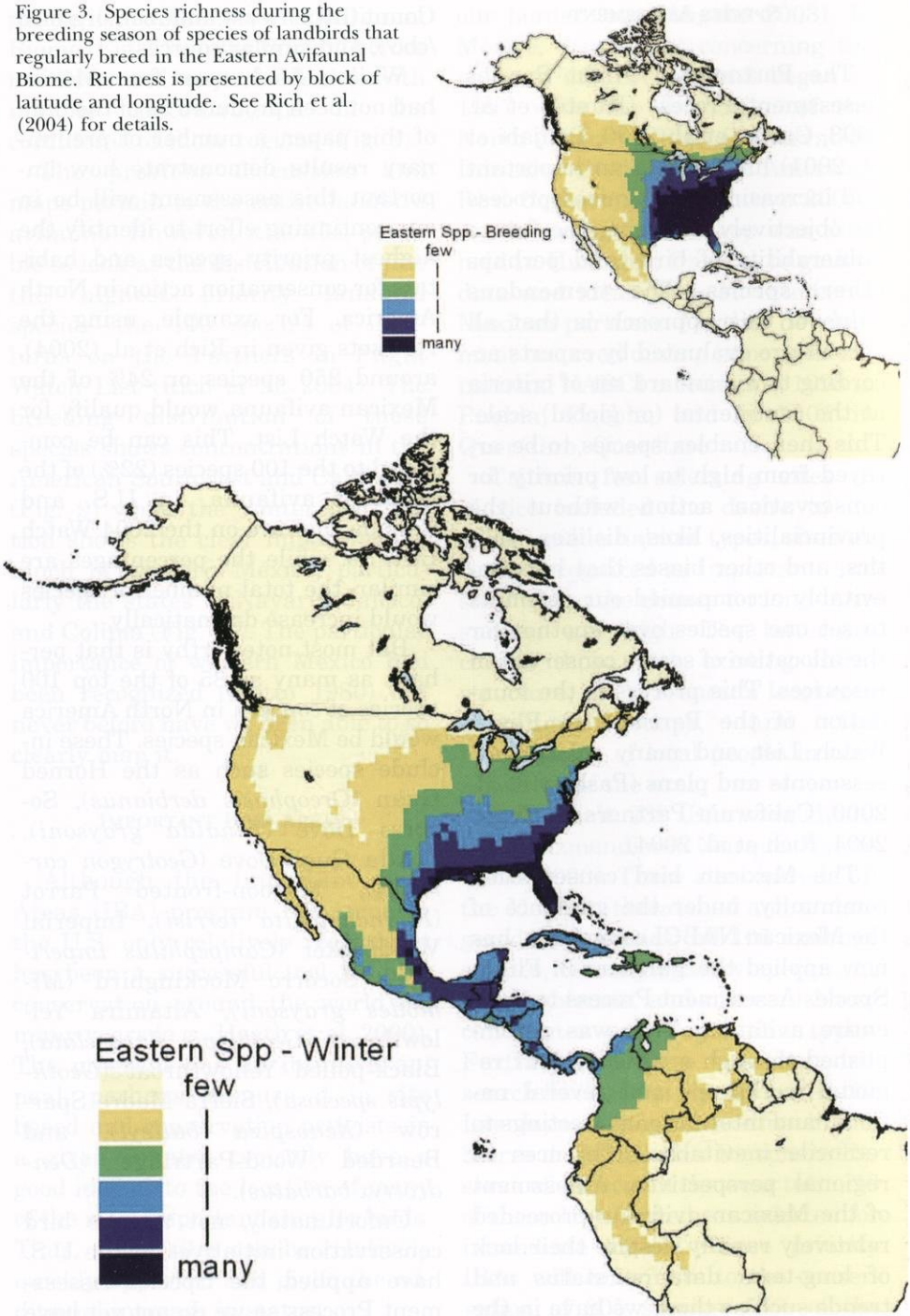


Figure 4. Species richness during winter of species of landbirds that regularly breed in the Eastern Avifaunal Biome.

Figure 5. Species richness during the breeding season of species of landbirds that regularly breed in the Northern Forest Avifaunal Biome. Richness is presented by block of latitude and longitude. See Rich al. (2004) for details.

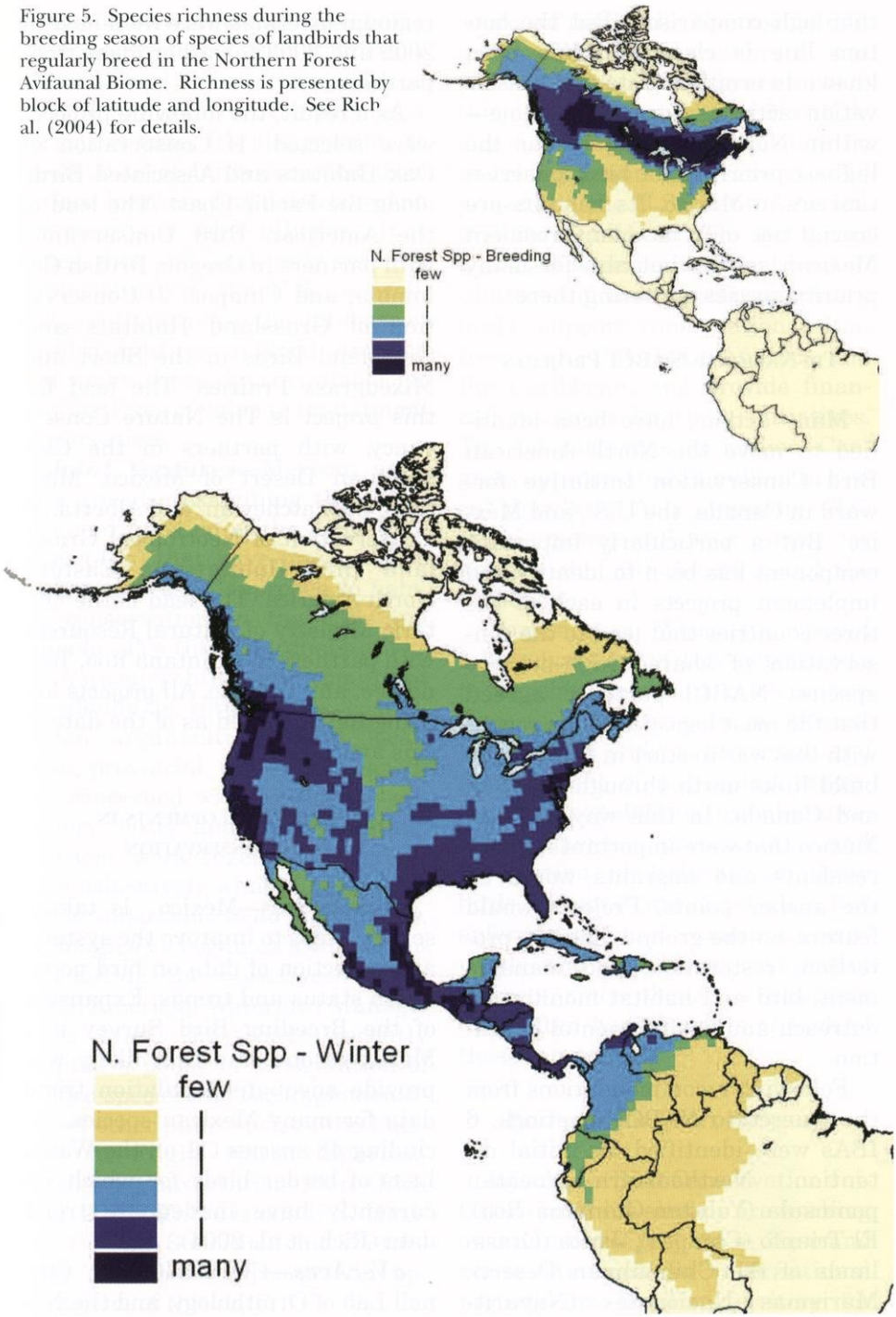


Figure 6. Species richness during winter of species of landbirds that regularly breed in the Northern Forest Avifaunal Biome.

thorough comparison. But the bottom line is clear and has been known to ornithologists and conservation activists for a long time—within North America, by far the highest priorities for bird conservation are in México. Its habitats are crucial not only for many resident Mexican species but also for many priority species wintering there.

Tri-National NABCI Projects

Many actions have been identified to move the North American Bird Conservation Initiative forward in Canada, the U.S., and México. But a particularly important component has been to identify and implement projects in each of the three countries that lead to the conservation of shared high-priority species. NABCI partners agreed that the most logical way to proceed with this was to start in México and build links north through the U.S. and Canada. In this way, sites in México that were important for both residents and migrants would be the anchor points. Projects would feature on-the-ground habitat protection, restoration, and management, bird and habitat monitoring, outreach and environmental education

Following recommendations from the Querétaro NABCI meetings, 6 IBAs were identified for initial attention: Northeastern Yucatan peninsula (Yucatan-Quintana Roo), El Triunfo (Chiapas), Janos (Grasslands of the Chihuahuan Desert), Marismas Nacionales (Nayarit-Sinaloa), Chamela-Cuixmala (Jalisco), and El Cielo (Tamaulipas). Four regional meetings were then held in 2002 and 2003 to gather ideas from partners.

As a result, the following projects were selected: 1) Conservation of Oak Habitats and Associated Birds along the Pacific Coast. The lead is the American Bird Conservancy with partners in Oregon, British Columbia, and Chiapas. 2) Conservation of Grassland Habitats and Grassland Birds in the Short and Mixedgrass Prairies. The lead for this project is The Nature Conservancy, with partners in the Chihuahuan Desert of México, Montana, Saskatchewan, and Alberta. 3) Conservation of Neotropical Grassland Bird Habitats in Eastern North America. The lead is the Ontario Ministry of Natural Resources with partners in Quintana Roo, Tennessee, and Ontario. All projects are being implemented as of the date of this article.

Other Developments in Bird Conservation

Monitoring—México is taking several steps to improve the systematic collection of data on bird population status and trends. Expansion of the Breeding Bird Survey into México is one step that likely will provide adequate population trend data for many Mexican species, including 48 species (11 on the Watch List) of border birds for which we currently have inadequate trend data (Rich et al. 2004).

aVerAves—CONABIO, the Cornell Lab of Ornithology, and the National Audubon Society have just launched the Mexican version of

e-Bird (www.ebird.org/aVerAves). This program is designed to track personal bird observations, both at specific locations or over particular periods of time. It's also possible to create lists of birds recorded from various locations and dates based on the records of other eBirders. It is hoped that this tool, only recently implemented in the U.S. as well, will greatly increase the database of all bird sightings in North America and make those data available for new analyses of value to tri-national conservation.

Joint Ventures—Mexican partners are also examining the structure and function of the Joint Ventures (JVs) that have proven to be such a successful approach to habitat conservation in the U.S. and Canada. JVs (http://birdhabitat.fws.gov/nawmp/jv.htm) are comprised of individuals, corporations, conservation organizations, and local, state, provincial, and federal agencies concerned with conserving migratory birds and their habitats. Partners work together to accomplish collectively what is often difficult or impossible to do individually. Although JVs began as a way of implementing the objectives of the North American Waterfowl Management Plan, they have recently adopted a policy of conservation of all bird species and the implementation of other plans such as the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004). There is one U.S.-Mexican JV—the Sonoran Joint Venture (http://www.sonoranjv.org/)—in operation as of this date.

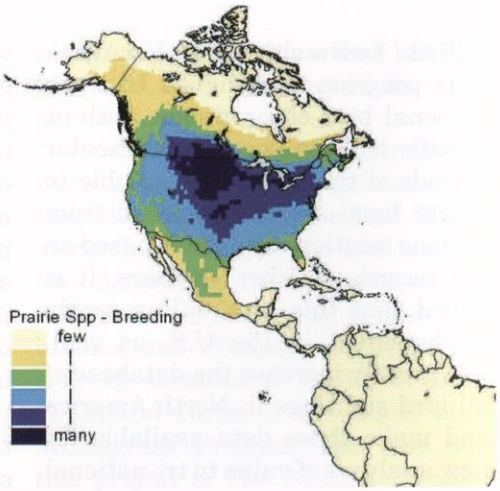
Neotropical Migratory Bird Conservation Act—A terrific new source of funds, the Neotropical Migratory Bird Conservation Act was passed by the U.S. Congress in 2000 (http://birdhabitat.fws.gov/NMBCA/eng_neo.htm). It established a matching grants program to fund projects in the U.S., Latin America, and the Caribbean. The Act's purposes are to perpetuate healthy populations of neotropical migratory birds, support conservation initiatives in the U.S., Latin America, and the Caribbean, and provide financial resources for those initiatives. The Act authorizes $5 million. Congress appropriated $4 million in Fiscal Year 2004. At a minimum, 75% of this money will be available for projects in Latin America and the Caribbean.

Partners in Wisconsin should take advantage of this opportunity to develop new bird conservation projects with partners in México. Projects can address protection and management of neotropical migratory bird populations, maintenance, management, protection, and restoration of habitats of these birds, research and monitoring, law enforcement, and community outreach and education. Successful projects since the Act's inception have often had elements of each of these components.

Partners for Joint Projects

Wisconsin Bird Conservation Initiative partners already are working on a number of projects in Meso and South America so international projects are familiar territory for many. However, I would point out that a large number of partners are

Figure 7. Species richness during the breeding season of species of landbirds that regularly breed in the Prairie Avifaunal Biome. Richness is presented by block of latitude and longitude. See Rich et al. (2004) for details.



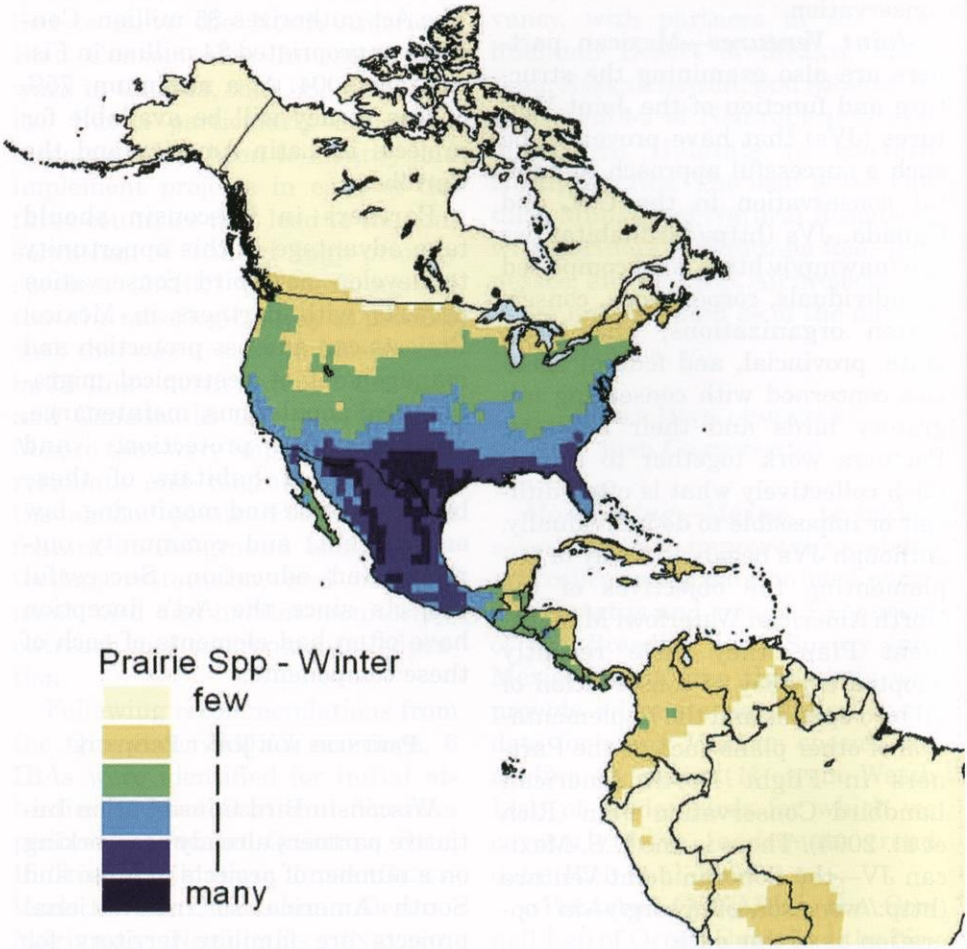
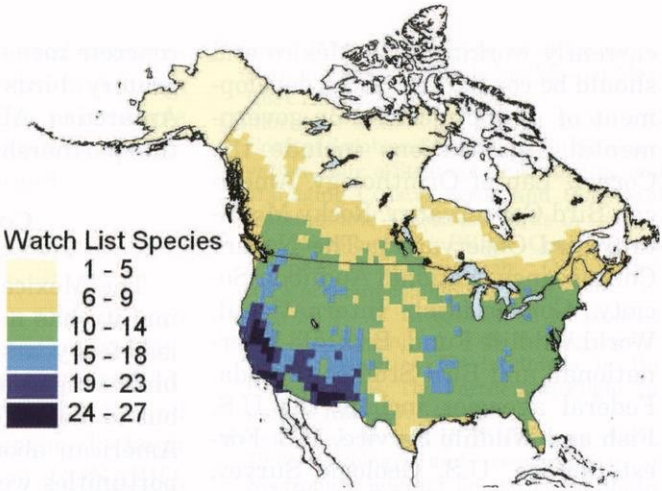


Figure 8. Species richness during winter of species of landbirds that regularly breed in the Prairie Avifaunal Biome.

Figure 9. Species richness during the breeding season of the 100 species of landbirds on the Partners in Flight Watch List. Richness is presented by block of latitude and longitude. See Rich et al. (2004) for details.



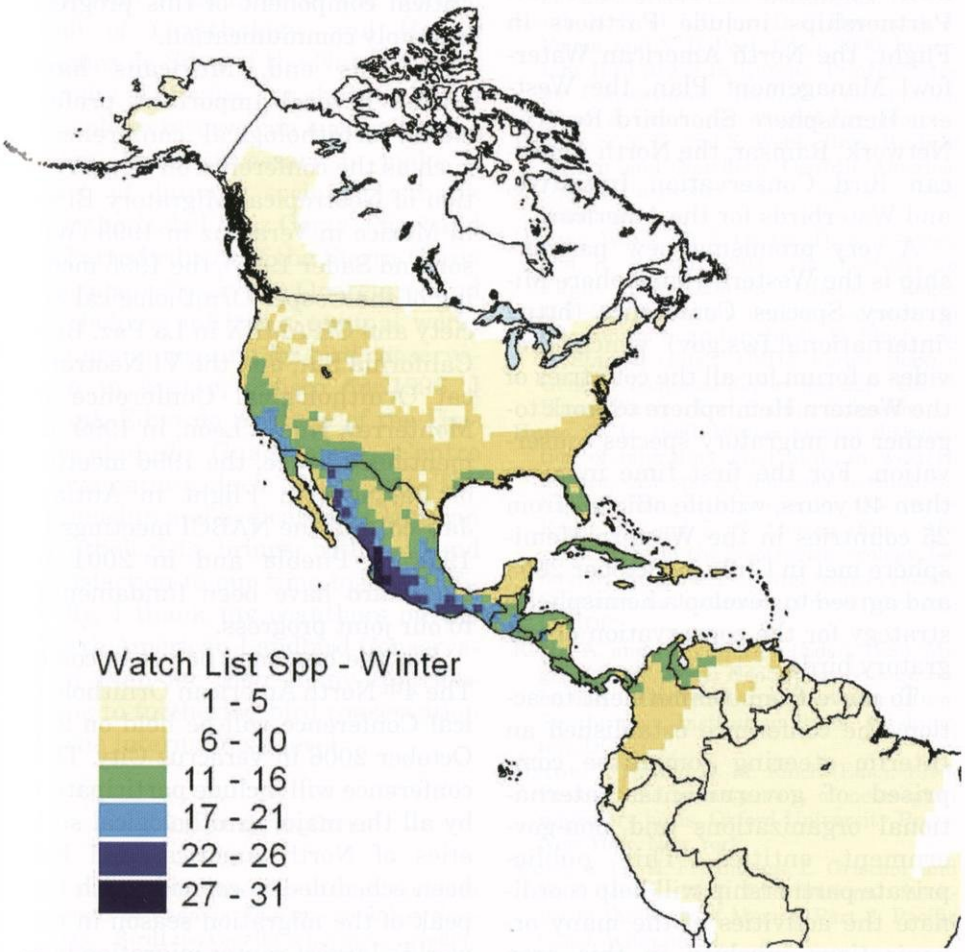


Figure 10. Species richness during winter of the 100 species of landbirds on the Partners in Flight Watch List.

currently working with México and should be considered in the development of new projects. Non-governmental organizations include the Cornell Lab of Ornithology, American Bird Conservancy, Rocky Mountain Bird Observatory, The Nature Conservancy, National Audubon Society, Conservation International, World Wildlife Fund, BirdLife International, and Bird Studies Canada. Federal agencies include the U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geologic Survey, and Canadian Wildlife Service. Partnerships include Partners in Flight, the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, Ramsar, the North American Bird Conservation Initiative, and Waterbirds for the Americas.

A very promising new partnership is the Western Hemisphere Migratory Species Conference (http://international.fws.gov) which provides a forum for all the countries of the Western Hemisphere to work together on migratory species conservation. For the first time in more than 40 years, wildlife officials from 25 countries in the Western Hemisphere met in Chile in October 2003 and agreed to develop a hemispheric strategy for the conservation of migratory birds.

To move from commitment to action, the conference established an Interim steering committee comprised of governments, international organizations and non-government entities. This public-private partnership will help coordinate the activities of the many organizations involved in this area and facilitate implementation of concrete measures to safeguard migratory birds from the Arctic to Antarctica. All are welcome to join this partnership.

Conclusions

The Mexican ornithological community has moved rapidly over the last few years, not only to advance bird conservation within México, but to also inform the rest of North American about the needs and opportunities we share. An absolutely critical component of this progress is simply communication.

To this end, Mexicans have hosted several important professional ornithological conferences, such as the conference on Conservation of Neotropical Migratory Birds in México in Veracruz in 1993 (Wilson and Sader 1995), the 1995 meeting of the Cooper Ornithological Society and CIPAMEX in La Paz, Baja California Sur, and the VI Neotropical Ornithological Conference in Monterrey, Nuevo León, in 1999. As mentioned above, the 1996 meeting of Partners in Flight in Autlan, Jalisco, and the NABCI meetings in 1998 in Puebla and in 2001 in Querétaro have been fundamental to our joint progress.

But the best may be yet to come. The 4th North American Ornithological Conference will be held on 2–7 October 2006 in Veracruz City. This conference will include participation by all the major ornithological societies of North America, and has been scheduled to coincide with the peak of the migration season in the world's largest raptor migration bottleneck. Most importantly, this will

present an unprecedented opportunity to meet the people and learn about the opportunities to conserve Mexican birds and habitats. Everyone should plan to attend.

Acknowledgments

For playing premier roles in both advancing bird conservation in México and in stirring interest and increasingly involving the U. S. and Canada in this endeavor, I thank Humberto Berlanga of CONABIO, Eduardo Iñigo-Elias of the Cornell Lab of Ornithology, and Hector Gomez de Silva of the National University of México. For showing how a biosphere reserve can succeed on the many levels necessary to make it part of human society, I thank Martha Isabel Ruiz Corzo (Paty) and Roberto Pedraza of the Sierra Gorda Biosphere Reserve in Querétaro. And for helping initiate a seminal working group meeting for bird conservation in Autlan, Jalisco, in 1996, I thank Eduardo Santana of the Universidad de Guadalajara, Centro Universitario de la Costa Sur. The friendship and dedication of Mexican ornithologists brings both joy and satisfaction to our time together. Finally, I thank my coauthors on the North American Landbird Conservation Plan for their many contributions to furthering bird conservation at the international level.

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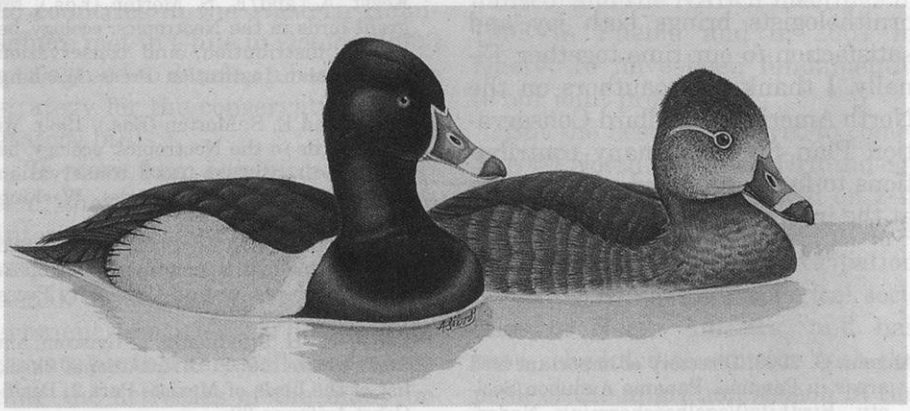

Ring-neck Duck, pair

Radar Ornithology: Implications for a New Technology

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Since World War II, birds, bats, and bugs—the biodetections that appeared on military radar and subsequently on weather radar—have been considered a nuisance to be filtered out. Because they appeared at night and disappeared at dawn and were wispy and ethereal the detections of migrating birds on radar were termed "angels" by early radar technicians. After WWII, biologists began to see the value of this tool of war for analysis of bird migration, when previously only by watching the face of the full moon could one visualize nocturnal migrants. Using these early radars eventually led to the discovery that migrants did indeed fly over the Gulf of Mexico, as had been assumed for years. Years of stored, poor-definition, unfiltered radar imagery were available only to serious researchers by the 1970s. Radar ornithology received international attention when Sidney Gauthreaux, through analysis of these stored records, reported that the Gulf Coast arrival frequency of Neotropical migrant swarms had declined by 50% since the 1960s.

With real-time unfiltered radar images of the new WSR-88D Doppler radar available 24 hours a day on the Internet from any of the 158 radar stations, the armchair observer can with a little bit of tutoring, practice, and detective work see some of the grandest displays of bird migration as they occur. In Wisconsin, nocturnal migration occurs from the last week of February through mid-November with a break from about 15 June–15 July. Nexrad radar provides a direct, quantifiable, color based imagery method to determine intensity of migration, density of birds on nights during migration, and their direction of flight. Occasional isolated flocks of diurnal migrants are also detected. The radar sends out an electromagnetic pulse and then listens for a change in intensity on the return as well as listening for a phase or frequency shift in the pulse. This feature of Nexrad, the Doppler shift, produces the radial velocity image allowing one to see the direction and speed of the detected targets. During peak migration in May and September density can be as high as 250,000

birds per cubic kilometer. Using average speeds of migrants one can estimate a Migration Traffic Rate. This has been estimated to be over 3 million birds crossing the southern border of Wisconsin per hour on a typical May night of migration and as high as 30 million crossing during the 3 or 4 heaviest nights.

This tool can now be used by biologists to monitor evening exodus of migrant swarm departures. These are correlated with maps of the departure areas to determine high quality habitat for migrants based on the location of highest exodus concentrations resulting in a management plan for this habitat. Long term monitoring of frequency and intensity of migrant swarms is also possible. The nightly effects of weather and migration are also obvious to the casual radar observer and we are beginning to see how nocturnal migrants use the Mississippi Valley and its excellent daytime habitat as well as how they negotiate the potential water hazards presented by the Great Lakes. When migrants know they are over water, they will ascend to heights greater than when they are over land. This usually is seen on Nexrad at dawn but can sometimes be observed upon evening take-off. The implications of this technology for future bird monitoring and conservation efforts are enormous as habitats become fragmented and hazards for migrants increase. Knowing how birds move over the Great Lakes allows planners to emphasize land management practices that result in protected and productive habitat for migrants in need of the first available landfall.

There is no better way to introduce high school and undergraduate science students to both a computer exercise and bird migration in a classroom situation than through Nexrad. Archived images allow retrieval of the previous night for analysis throughout the day. On-going projects asking specific questions can teach the scientific method as well as intermediate mathematical analysis of data.

Nexrad Link

The on-line site "Bird Migration and Movements on Nexrad Doppler Radar from Wisconsin and the Western Great Lakes" provides quick links to real time radar imagery sites, tutorials, and resource sites as well as providing a focus on movements of migrants through Wisconsin.

http://my.execpc.com/CE/5F/idzikoj/nexrad/nexweb/nexrad.htm

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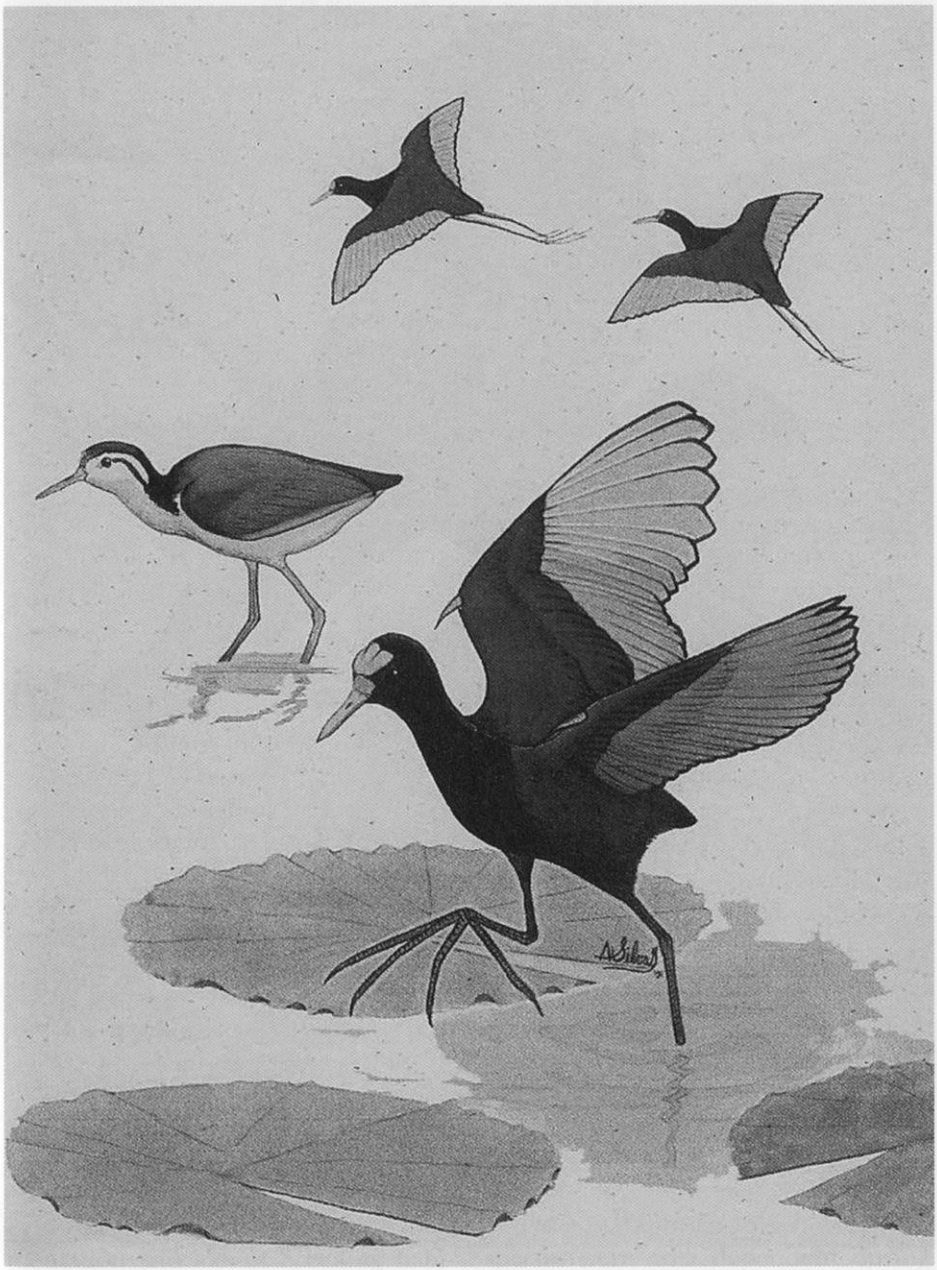
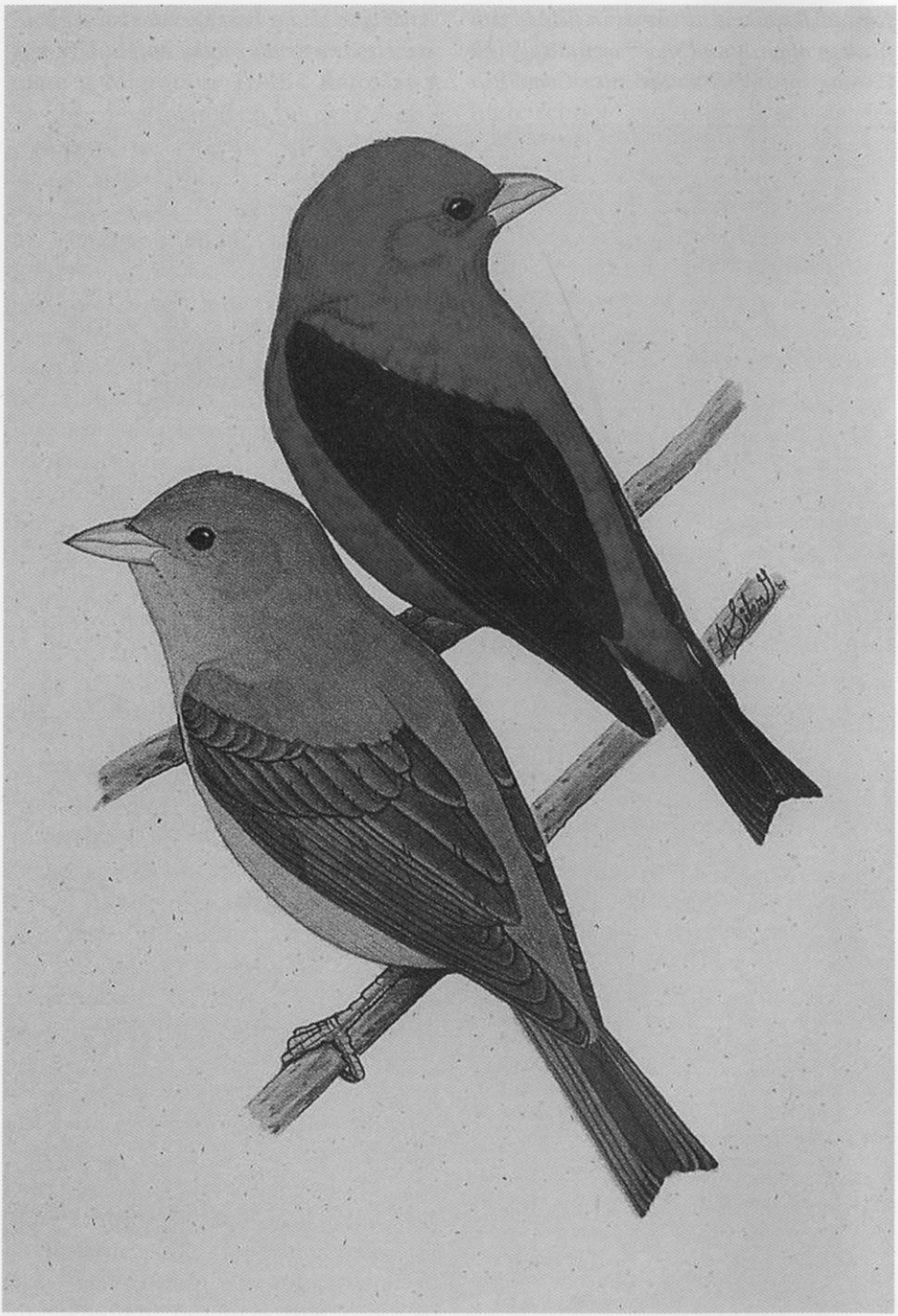
John Idzikowski is an expert in field identification of birds and radar ornithology. He is one of WSO's Records Committee Archivists and a Past President of the Society. He is currently on the staff at UW-Milwaukee.



Northern Jacanas



Scarlet Tanager, pair

Wintering With the Neotropical Migrants

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Most of the insectivorous songbirds that nest in the United States and Canada must migrate to the tropics for the winter months. From specimens in museums we have a general idea of where each species spends the winter, but little information is available concerning the winter habitats required by each species or the consequences when natural habitats are fragmented or destroyed.

By the 1970s the Breeding Bird Survey (Robbins et al. 1986), as well as local long-term studies, were showing that continental populations of several common Neotropical migrants were declining. Although these declines could be explained in terms of fragmentation and loss of breeding habitat, some observers insisted that loss of tropical rain forest in Latin America must be the primary reason why migratory species were showing greater rates of decline than were resident species.

To quantify the effect of habitat loss through fragmentation, Robbins, Dawson, and Dowell (1989) conducted a five-year study of breeding bird populations at 469 study points in 271 forest tracts ranging in size from <2 ha to >1500 ha in Maryland and adjacent states. Although the area sampled at each point was exactly the same, most migratory species were consistently less common as the area of the plot declined, establishing that most forest species were area dependent during the breeding season.

Initiation of Collaborative Tropical Studies

In 1983 the U.S. Fish and Wildlife Service sponsored a workshop at Patuxent to which the heads of wildlife departments in Caribbean and Latin American countries were invited. In the following year, sponsored by the Office of International Affairs, Robbins and Dowell began collaborative winter studies in various tropical American countries. In each country we worked with persons from the wildlife department or a non-government organization, and each winter we took volunteer bird banders with us to assist in the banding, the point counts, the vegetation surveys, and the training of the host biologists.

Methodology was the same in each country. We ran 16 nets for three days at each study site, conducted point counts at 10 points within the same area, and did surveys of the structure of the vegetation (James and Shugart 1970) at three of the sample points. Initially we compared birds in small forest fragments with those in extensive forests of the same habitat to determine effects of forest fragmentation on wintering migrants (Robbins et al. 1989).

In January and February of 1984 we visited large and small tracts of mangrove forest and mature limestone forest in Puerto Rico, arid coastal scrub and mature forest in the Dominican Republic, arid scrub and mature forest in Jamaica, and cloud forest in Costa Rica. In each instance we found that North American migrants were wintering in both the small and large forests, and that the numbers of many species were actually higher in the small fragments. We noticed also that most of the native tropical species were avoiding the small fragments and disturbed areas (Robbins et al. 1988).

Migrants Not Area Sensitive in Winter

Thus, forest interior resident birds in the tropics select large forest tracts rather than small forest fragments, just as the migratory forest interior specialists do during their breeding season in the United States and Canada. However, when the Neotropical migrants are on their wintering ground they are not constricted by threats of nest predation and nest parasitism, so they select under-utilized habitat fragments where there is less competition for food. Many species of migrant songbirds are equally at home in winter in plantations of citrus or cacao as in primary forest, except that the thrushes and the ground-feeding warblers such as Ovenbirds and Kentucky Warblers prefer mature forest. (See Tables 1 and 2 for scientific names)

High Rate of Return for Wintering Migrants

The following year we returned to some of our study sites in Jamaica, hoping we would recapture some of our banded birds. We were not disappointed. Of 20 Black-and-white Warblers we had banded in 1984 at Round Hill and Kemp Hill, we recaptured half in 1985 in just three days of netting at each site. And of nine Worm-eating Warblers banded in 1984 we recaptured four in 1985. This showed not only that the warblers had survived the previous winter in both the large and the small sites, but that they had a

strong urge to return to the same wintering sites and were able to navigate successfully to their breeding ground and return.

South America

In 1985 we studied mature rain forest in Henry Pittier National Park in Venezuela and in scrub forest nearby. As in the West Indies and in Central America, the migrants in northern South America were primarily in small isolated tracts of forest that the resident forest species avoided. Although several common migrants winter almost exclusively in South America (Connecticut (*Oporornis agilis*), Cerulean (*Dendroica cerulea*), and Blackpoll (*D. striata*) Warblers, Red-eyed Vireo (*Vireo olivaceus*), Gray-cheeked Thrush (*Catharus minimus*), Veery (*C. fuscescens*), and cuckoos (*Coccyzus* spp.), for example), the great majority of migratory songbirds winter in Mexico and northern Central America. Because we caught very few migrants in Venezuela, our subsequent work centered in eastern Mexico, Belize, and Guatemala.

Shade and Sun Coffee

In 1988 there was a moratorium on foreign travel. We took the opportunity to study birds in sun coffee and shade coffee plantations in Puerto Rico. The difference is dramatic. Shade coffee is grown under the undisturbed canopy of primary forest, so most of the normal forest birds are present. For production of sun coffee, however, the original forest is cleared. Few if any tall trees remain, and the coffee is exposed to full or nearly full sunlight. There may be many birds feeding in sun coffee at times, but they are primarily seedeaters (*Sporophila* spp.) and other seed-eating species. In our Puerto Rican sample, Northern Parula (*Parula americana*) was the only migrant that was observed as frequently in sun coffee as in shade coffee.

In southern Mexico we drove hundreds of miles in search of undisturbed forest to study. We finally arrived at a really remote Indian village, Santa Maria Chimalapa, in the State of Oaxaca. We appealed to the tribal council for permission to study two sites for three days each. Being suspicious of our intents, they held a powwow of all the adult males in the village and finally granted permission for two days. At the end of two days they welcomed us warmly and said we could stay as long as we wished. From a distance, the forest looked undisturbed, but upon examination, the entire area for miles around had been planted in shade coffee. As we pointed out in our report to the local community, "In spite of intensive use of the forest for growing of coffee, the retention of the canopy and protection from grazing and erosion have permitted most of the typical forest bird species to survive . . . ." We complimented the community on their conservation practices, and made suggestions for retaining the high natural diversity of the area.

Yucatan Peninsula

In the Mexican State of Campeche on the Yucatan Peninsula, we were invited to conduct our studies on a 10,000 hectare cattle ranch as an ap-

praisal of its value to wildlife populations. Our initial survey was expanded into a longer study by colleague Deanna Dawson, Paul Wood, and others, with the result that a large portion of the ranch has been made a wildlife sanctuary by the owners.

Effect of Conversion to Agriculture

In Belize our focus was initially on the forest habitats. Then we sampled a wide variety of agricultural habitats to see which croplands the migrants use when the native forest is converted to other uses. We sampled rice, sugar, cacao, mangos, bananas, grapefruit, and oranges as well as pastures, and active and abandoned milpas. We used satellite imagery to help locate study sites and to measure the extent of native and disturbed habitats. The citrus and cacao habitats were especially rich in use by Neotropical migrants, as were rice and lightly grazed pasture. On the other hand, mango plantations and commercial plantations of bananas were nearly birdless. Extensive fields of sugar appeared not to be used by birds, but upon setting banding nets in sugar that was ready to be burned and harvested, we found the sugar fields were being heavily used by Orchard Orioles (*Icterus spurius*), Common Yellowthroats (*Geothlypis trichas*), Baltimore Orioles (*I. galbula*), American Redstarts, and Indigo Buntings, and also had good numbers of Least Flycatchers (*Empidonax minimus*), Ovenbirds, and Magnolia Warblers.

Mapping Abundance at a National Scale

From our study sites throughout the small country of Belize, we were able to sample birds in all the major habitats, using the same procedures in each. From our three days of banding at each site we could estimate the minimum number of birds of each species present within the five hectares sampled by our 16 nets and convert these to birds per square kilometer. From our ten point count samples we could estimate densities of treetop birds that are not sampled by the nets (figuring that ten circles of 30 m radius equals 1/35 km^2, and birds detected only beyond 30 m radius would represent 3 individuals per km^2). And finally, for rare species found that were not trapped or detected during the point counts, we assigned a default estimate of one individual per square kilometer. Using this information we prepared a map for each species showing distribution and relative abundance throughout Belize (except for the Maya Mountains along the Guatemala border for which there is no access by road).

We used the same density information to calculate minimum national wintering population figures for the common species (Table 1). The beauty of these estimates is that they are repeatable. At any time, studies of one or more habitats can be repeated the same way and estimates can be refined or updated.

Guatemala Studies

Just as we were completing our studies in Belize, we had an opportunity to

Table 1. Minimum winter populations in Belize

Species	Minimum population (millions)
Red-capped Manakin (*Pipra mentalis*)	3.26
Red-throated Ant-Tanager (*Habia fuscicauda*)	3.13
Rufous-tailed Hummingbird (*Amazilia tzacatl*)	2.91
Gray Catbird (*Dumetella carolinensis*)	2.78
Ochre-bellied Flycatcher (*Mionectes oleagineus*)	2.05
Tawny-winged Woodcreeper (*Dendrocincla anabatina*)	2.03
Ovenbird (*Seiurus aurocapilla*)	1.98
Magnolia Warbler (*Dendroica magnolia*)	1.69
Wood Thrush (*Hylocichla mustelina*)	1.67
Kentucky Warbler (*Oporornis formosus*)	1.48
Hooded Warbler (*Wilsonia citrina*)	1.39
American Redstart (*Setophaga ruticilla*)	1.37
Black-and-white Warbler (*Mniotilta varia*)	1.19
White-eyed Vireo (*Vireo griseus*)	1.04
Worm-eating Warbler (*Helmitheros vermivorum*)	0.99
Indigo Bunting (*Passerina cyanea*)	0.96
Northern Waterthrush (*Seiurus noveboracensis*)	0.96

visit a new reserve at Sierra de las Minas, high in the Guatemala mountains. This trip was immediately followed by a request from another Guatemala organization, FUNDAECO, to assist with an evaluation of their conservation project at Cerro San Gil on the Atlantic slope. By the time we arrived in Guatemala the next year, there was also an invitation to conduct studies at Monterrico on the Pacific coast of the same country. This was a great opportunity to get a cross section of winter bird populations across the continent in a single trip, so we sampled mangroves and dry forest along the Pacific Ocean, cloud forest at two elevations in the highlands, and Atlantic rain forest at three lower elevations, all within sites designated for protection. We had expected primarily western migrants along the Pacific, eastern migrants along the Atlantic slope, and a mixture in the cloud forest. Actually, few migratory species were found in the cloud forest and few western species on the Pacific coast. Instead, the common birds along the Pacific coast were Ovenbird, Yellow-breasted Chat (*Icteria virens*), and the expected Tennessee Warbler (*Vermivora peregrina*). The western migrants were primarily in the mid levels of the interior.

Monitoring

Guatemala proved to be an exceptionally attractive place to work, with non-government organizations educating the local residents and establishing protected areas throughout the nation, and with university students eager to participate in wildlife activities. In 1991 we established the first three study sites along the Tower Road to the Guatel towers on Cerro San Gil (962 m.), which is a fascinating isolated mountain on the Caribbean coast, and in subsequent years more than two dozen additional study sites have been established on and near the mountain. Long-term monitoring stations in disturbed as well as undis-

turbed areas are documenting population changes, as are a network of Breeding Bird Survey routes through the lowlands surrounding the mountain. The roadside routes consist of 30 5-minute stops a half mile (0.8 km) apart with two people observing and one recording.

Local Movements

A series of banding stations at different elevations along Tower Road has demonstrated movements of birds among different sites, some resident species moving as far as 1.8 km between years. Large birds tend to move farther than smaller birds in the same family, as would be expected. What was not expected, however, was that not a single migrant has been recorded moving from one study site to another, even though some sites are no more than a half kilometer apart. Once a migrant has established a winter territory it returns to the very same spot.

Elevational Distribution

By having study sites along an elevational gradient from sea level at Cerro San Gil to 2,300 m at Sierra de las Minas we can view a profile of changes in abundance of both resident and migratory species. A Guatemalan student believed that the resident species were threatened by the migrants, which were competing for the same limited resources. However, when we plot closely related birds by elevation, we find that the migrants are filling in at elevations where they do not compete with closely related resident species. The Wood Thrush, for instance, winters at low elevations where the only other forest thrush is the uncommon White-throated Robin (*Turdus assimilis*). The other resident forest thrushes (two species of solitaires, *Myadestes* spp., and three species of Nightingale-Thrushes, *Catharus* spp.) winter almost entirely above 1,000 m. Likewise, most of the migratory warblers winter at elevations below 1,000 m, where the only resident warbler is the Golden-crowned (*Basileuterus culicivorus*). The other resident warblers live above 1,000 m.

Survival Rates

By recapturing more than 1500 Guatemala birds in subsequent years we have demonstrated a high survival rate for many tropical species, including some of the tiny ones. Fifty percent (0.50) survival is considered normal for most adult songbirds, but we have found adult survival rates of 0.75 ± 0.19 for Bright-rumped Attila, 0.74 ± 0.11 for Northern Bentbill, and 0.71 ± 0.15 for Scaly-throated Leaftosser in primary rain forest in Guatemala. Survival rates for the migratory species, however, are much lower: 0.58 ± 0.15 for Worm- eating Warbler, 0.49 ± 0.08 for Kentucky Warbler.

Longevity Records

Correspondingly, we hold many world longevity records for resident tropical species (Table 2), but only two longevity records for wintering migrants: 5 years, 9 months for a Yellow-bellied Flycatcher (*Empidonax flaviventris*) banded in Guatemala, and 9 years, 0 months (tie) for an Ovenbird banded in Belize (Dowell and Robbins 1998).

Table 2. Age records of birds at Cerro San Gil, Guatemala, 1992–2003

Species	Band Number	Banded	Recaptured	Age yr., mo.
Plain Xenops (*Xenops minutus*)	1790-82814	1993	1999	6,9
Scaly-throated Leaftosser (*Sclerurus guatemalensis*)	1471-99071	1992	2003	11,9
Tawny-winged Woodcreeper (*Dendrocincla anabatina*)	1471-99650	1993	2002	9,9
Olivaceous Woodcreeper (*Sittasomus griseicapillus*)	1950-99447	1996	2003	7,9
Wedge-billed Woodcreeper (*Glyphorynchus spirurus*)	2020-92400	1992	2000	8,9
Ivory-billed Woodcreeper (*Xiphorhynchus flavigaster*)	1521-57014	1995	2003	8,7
Plain Antvireo (*Dysithamnus mentalis*)	1920-83482	1995	2002	7,9
Slaty Antwren (*Myrmotherula schisticolor*)	1790-82373	1992	1998	6,9
Ochre-bellied Flycatcher (*Mionectes oleagineus*)	1950-99052	1995	2001	6,9
Sepia-capped Flycatcher (*Leptopogon amaurocephalus*)	1990-03216	1997	2003	6,9
Northern Bentbill (*Oncostoma cinereigulare*)	1790-82806	1993	2002	9,9
Stub-tailed Spadebill (*Platyrinchus cancrominus*)	1790-82835	1993	1999	6,9
Ruddy-tailed Flycatcher (*Terenotriccus erythrurus*)	1790-82871	1993	1999	6,9
Sulphur-rumped Flycatcher (*Myiobius sulphureipygius*)	1790-82418	1992	1998	6,9
Bright-rumped Attila (*Attila spadiceus*)	1471-99453	1996	2003	7,9
Thrush-like Schiffornis (*Schiffornis turdina*)	1471-99483	1996	2003	7,9
White-collared Manakin (*Manacus candei*)	2020-92347	1992	1998	6,9
Red-capped Manakin (*Pipra mentalis*)	2020-92368	1993	2002	9,9
Tawny-crowned Greenlet (*Hylophilus ochraceiceps*)	1790-82429	1992	2000	8,9
Spot-breasted Wren (*Thryothorus maculipectus*)	1571-45746	1997	2003	6,9
White-breasted Wood-Wren (*Henicorhina leucosticta*)	2061-96794	1992	2002	10,9
White-throated Robin (*Turdus assimilis*)	8071-22015	1996	2003	6,9
Red-crowned Ant-Tanager (*Habia rubica*)	1521-57070	1997	2003	6,9

Conservation Efforts Continue

Studies that we initiated in the 1990s in Guatemala are still being continued under the supervision of Alexis Cerezo. The greatest benefit of this long-term research and education program has been its support of conservation efforts by FUNDAECO and other Guatemala organizations to secure protection status for thousands of hectares of high priority sites on the Caribbean slope of Guatemala.

Acknowledgments

These studies would not have been possible without the wonderful cooperation of so many people in the host countries. We list here only one key person from each country who worked many days in the field with us, but

there were dozens of others. Dora Weyer, Belize; Juan Rodriguez, Costa Rica; Tomas Vargas, Dominican Republic; Jack Bucklin, Guatemala; Robert Sutton, Jamaica; Rosamond Coates-Estrada, Mexico; José Colón, Puerto Rico; Frank Espinoza, Venezuela.

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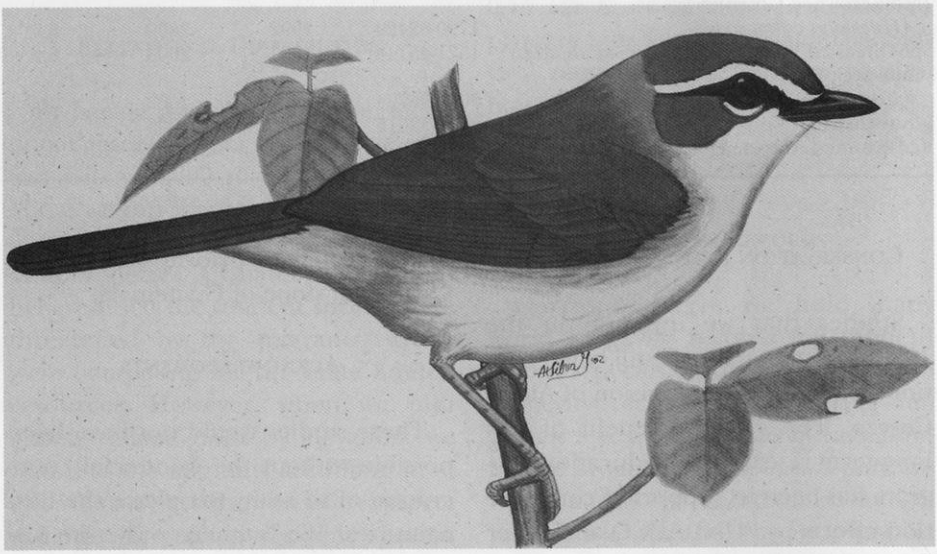
Chandler Robbins, brother of Sam, received WSO's Honorary Life Membership (now Golden Passenger Pigeon Award) in 1970. Born in 1918, Chan participated on his first Christmas Bird Count in Belmont, MA at age 16. With degrees from Harvard, George Washington, and University of Maryland, he worked for 59 years at the Patuxent Wildlife Center in Laurel, MD. A long-time bander, he banded more than 5,000 migrants on wintering grounds between 1984 and 1997. He received the Elliott Coues Award from the American Ornithologists' Union in 1997 and the Audubon Medal from the National Audubon Society in 2000. Chan has been called the Patron Saint of cooperative research projects and the Father of the Breeding Bird Survey.



Rufous-capped Warbler

Habitat Associations of Neotropical Migrants in Belize, Central America, during the Non-breeding Season

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Abstract

We studied the use of six habitats in central Belize by Neotropical migratory birds during the non-breeding seasons (December–March) of 1999–2003. Birds were captured and banded in karst hill broadleaf forest, a transition zone from a karst hill forest to an adjacent seasonal wetland, riverine forest, pine savanna, scrub-shrub, and secondary broadleaf forest. The riverine forest and transition zone were undisturbed and the other four habitats studied were disturbed. We examined habitat associations for 13 species in which 20 or more individuals were banded and found that the majority of species (10, or 76.9%) showed non-random use of the habitats

studied. Only the Magnolia Warbler, Black-and-white Warbler and Ovenbird showed random distribution across the six habitat types. We used niche breadth calculations to determine the tendency of each species to use the six habitat types studied and found that none of the species was a habitat specialist, eight were moderate habitat generalists, and five were generalists. Although some species showed clear preferences, migrants of different species utilized all of the habitats studied. This study emphasizes that it is important to work toward conserving many different habitat types in the tropics to ensure that different species of Neotropical migrants have adequate non-breeding habitat.

Introduction

Neotropical migratory birds include those species that have a large portion of their breeding population in the United States and Canada and spend the non-breeding season (North American winter) south of the Tropic of Cancer (Speicher and Greenberg 1991). Since 1950, deforestation has changed the landscape in Central and South America (Terborgh 1980, Hartshorn 1992). In the U.S., many forests and grasslands have been converted to cropland and pasture and the remaining eastern forests have been logged and are now less than 60 years old (Terborgh 1992). The decline of the populations of some species of Neotropical migratory birds was documented by Robbins et al. (1989) and Terborgh (1989). As a result of the deforestation described above, numerous investigations have been conducted in the tropics during the non-breeding season to determine the habitats that are utilized by Neotropical migrants during this time period and to determine if they are affected by the changes in these habitats.

Several studies focusing on Neotropical migrants have been conducted in Belize during the non-breeding season. Nickell (1968) banded birds for five years in second-growth and edge habitats, including the edges of citrus groves, and found that migrants readily utilized these habitats. Studies of the use of disturbed and undisturbed habitats by migrants during the non-breeding season were conducted by Lloyd-Evans (1984), Petit et al. (1992) and Kricher and Davis (1992). All found that migrants used both disturbed and undisturbed habitats. Lynch (1989) studied migrant use of a number of different habitats in the Yucatan Peninsula, including Belize, and found that the main habitat for many migrants was tropical forest. However, he found that some species of migrants were most frequently found in pastures, agricultural fields, and brushy second growth. Robbins et al. (1992) studied habitat use by migrants in Mexico, Central and South America, and the Greater Antilles, conducting research in Belize as part of this study. They found that migrants used isolated forest fragments as well as extensive forest and some agricultural habitats; however, some species of migrants were restricted to forested habitats. Mills and Rogers (1992) studied migrant use of citrus plantations during the non-breeding season in Belize and found high proportions of migrants in these habitats.

During the past ten years, the central region of Belize has been exposed to increased developmental pressures

that have resulted in significant natural habitats being converted or lost to large residential areas, citrus farms, fish farms, gravel mines, pastures, and logging (Boles 1999, Piaskowski et al. 2005a). Because of these developmental pressures and to compare our results to those of previous studies, we designed a study to examine the use of six different habitats commonly found in central Belize by migratory and resident birds. We included both disturbed and undisturbed habitats in the study. The purpose of the research was to determine the habitat associations of Neotropical migratory and resident bird species during the non-breeding season from 1999–2003. In this paper we present the results of the 1999–2003 research on the habitat associations of Neotropical migrants during the non-breeding season in Belize.

Methods

Study sites

The research was conducted on privately owned lands in six different habitats at three study sites in central Belize. The Runaway Creek Nature Preserve (RCNP) is a 2,500 ha preserve owned and managed by the Foundation for Wildlife Conservation, Inc., of Milwaukee, Wisconsin. It is located in the Belize District (17°18′05.1″N, 88°27′31.8″W) at 16 meters above sea level (m a.s.l.). The Tropical Education Center (TEC) site consisted of the Tropical Education Center of the Belize Zoo and adjacent privately owned lands. It is located in the Belize District (17°21′26.9″N, 88°32′26″W) ten km west of the RCNP site at 46 m a.s.l. and encompassed an area of approximately 438 ha. The 180 ha Chaa Creek study site (CHAA) consisted of the Chaa Creek Nature Reserve and adjacent privately owned lands. It is located in the Cayo District (17°06′15.9″N, 89°04′53.2″W) at 80 m a.s.l.

We conducted vegetation measurements in each of the six habitats at mist net locations based on the methods of Mueller-Dombois and Ellenberg (1974), Ralph et al. (1993), Howe et al. (1997), Mallory (1997) and Martin et al. (1997). We classified each habitat as disturbed or undisturbed based on visual observations of the site and on discussions with landowners regarding whether the vegetation was altered within the past ten years. We also considered the amount of human disturbance present in the study area. Except for the transition zone and secondary broadleaf forest, the remaining habitats studied were fairly uniform and nets were distributed in areas representative of that habitat. The following are descriptions of the vegetation present in each of the six habitats studied.

Karst hill broadleaf forest—The study area was located at the RCNP study site and consisted of broadleaf forest at the base of a forested karst hill. Mean canopy cover was 76.4%. Maximum tree height was 21.8 m. The dominant tree species were the black poisonwood (*Metopium browneii*), logwood (*Haematoxylum campechianum*) and give-and-take palm (*Chrysophila stauracantha*), with a few nargusta (*Terminalia amazonia*). Herb cover was <25% and consisted mainly of vines. Graminoid cover, mainly cutting grass (*Scleria bracteata*), was <25%. Leaf litter was >75%. The site was bordered on the north and south by broadleaf for-

est, on the east by forested karst hills and on the west by open pine savanna and seasonal wetland. The karst hill broadleaf forest was categorized as disturbed due to the presence of a trail cleared by hunters and their sporadic use of this trail. However, no logging or major alteration of the forest canopy was evident in this habitat.

Transition zone from a karst hill broadleaf forest to an adjacent seasonal wetland (Transition zone)—The study area was located at the RCNP study site and consisted of a transition zone from a broadleaf karst hill forest to an adjacent seasonal wetland. Nets were set in the wetland edge and at the edge of the broadleaf forest at the base of a forested karst hill. Canopy cover ranged from 6.3% in the wetland edge to 35.0% in the forest edge. Maximum tree height was 11.9 m in the forest edge and 7.4 m in the wetland edge. The dominant tree species in both the wetland and forest edge were logwood and calabash (*Crescentia cujete*), with a few mayflower (*Tabebuia rosea*) and *Pouteria* sp. in the forest edge. A few herbs, mainly vines, were present in the forest edge. Graminoid cover ranged from 5–25% in the forest edge to >75% in the wetland edge. Leaf litter was 5–25% in the wetland edge and >75% in the forest edge. The study site was bordered by forested karst hills to the north and west, by wetland on the east, and by open pine savanna on the south. The transition zone was classified as undisturbed, as there was no recent alteration of the vegetation or evidence of human disturbance in this habitat.

Riverine forest—The study area was located at the RCNP study site and consisted of riverine forest with an area dominated by spiny bamboo (*Guadua longifolia*) near the river edge. The spiny bamboo transitioned into forested areas dominated by cohune (*Atelea cohune*) and coccoloba (*Coccoloba schiedeana*), with scattered large, emergent quamwood (*Schizolobium parahybum*) trees. A few large fig (*Ficus* sp.) trees were also present along the riverbank bordering the study area, and two large fig trees (approximately 80 cm dbh) were present within the study area. A small forest gap of approximately 20 × 20 m was present near the center of the study area. A dense cover of wild cane (*Tripsacum andersonii*) bordered the eastern edge of the study area. Mean canopy cover was 88%. Maximum tree height was 45 m. Herb cover varied from few, with small cover, to 75%. The most common herbs were ferns, *Dieffenbachia* sp., *Heliconia* sp., vines and lianas. In the forest gap and in areas where the vegetation was dominated by spiny bamboo, a dense concentration of thorny vines and lianas such as haul-me-back (*Mimosa* sp.) and tear coat (*Byttneria aculeata*) were also present. Graminoid cover varied from solitary, with small cover, to 50% cover. Leaf litter with cover of >75% was present in all areas sampled. Moss cover ranged from little to <25%. The riverine forest was classified as undisturbed, as there was no recent alteration of the vegetation or evidence of human disturbance in this habitat.

Pine savanna—The study area was located at the RCNP study site and consisted of open pine savanna with areas of shrubland with pine and pine-oak forest. Canopy cover in the shrubland with pine and pine-oak forest was 80.2%. Maximum tree height was 13.9 m. Dominant trees included live oak (*Quercus oleoides*) and Caribbean pine (*Pinus caribaea*) with a few craboo (*Byr-*

sonima crassifolia), schippea palm *(Schippea concolor)* and yaha *(Curatella americana)*. Herb cover was < 25% and graminoid cover was >75%. The savanna was dry during the dry season, but temporary ponds, wetlands, and flowing water were prevalent during the rainy season. The pine savanna was classified as disturbed due to a fire that had burned the site approximately five years prior to the start of the study and occasional human disturbance by hunters.

Scrub-shrub (Also termed savanna-scrub, in Belize, this habitat is referred to as "Broken ridge.")—The study area was located at the TEC study site and consisted of scrub-shrub habitat that was interspersed with a few buildings. The canopy cover ranged from 10.2% in the more open areas to 85.4% in the more densely forested areas. Maximum tree height was 18.7 m. The dominant tree species were Caribbean pine and live oak with a few craboo, white maya (*Miconia argentea*) and wild spice (*Myrica cerifera*). Herb cover ranged from <5% to 50–75%. The most common herbs were dodder (*Cuscuta* sp.), *Philodendron* sp. and ferns. Graminoid cover was 50 to >75% and wild cane and cutting grass (*Scleria bracteata*) were the dominant species. Leaf litter ranged from 50-75% to >75%. A 1.5-acre freshwater pond was present on the southeast edge of the site. The site was bordered to the north by a seasonal stream and scrub-swamp forest. The scrub-shrub habitat was classified as disturbed as the vegetation was altered by roads and the maintenance of paths and a nature trail. It also had human disturbance; e.g., a number of buildings were scattered throughout the study area that were used regularly by students and tourists, and they often walked the paths and trails.

Secondary broadleaf forest—The study area was located at the CHAA study site and consisted of secondary broadleaf forest in which the majority of the trees had not been cleared for approximately 45 years. The forest was bordered by a pasture on the south and west. Between the pasture and the forest, an area of dense shrubs and small trees was present that had been cut less than 10 years earlier. Nets were set mainly in the broadleaf forest, but a few nets also were set in the area containing dense shrubs and trees. Mean canopy cover was 89.9%. Maximum tree height was 13.5 m. Dominant tree species included grande betty (*Cupania belizensis*), red gumbolimbo (*Bursera simaruba*), and cortes (*Tabebuia chrysantha*), with moderate fiddlewood (*Vitex gaumeri*), prickly yellow (*Zanthoxylum kellermanii*), and cohune. Herb cover was <25% and consisted of vines. Graminoid cover was <5%. Leaf litter with cover of 50 to >75% was present in all areas sampled. The secondary broadleaf forest was classified as disturbed because of the recent clearing of one part of the study area described above and alteration of the vegetation by the regular extraction of medicinal plants. Human disturbance was also present, as a horse trail passed the northern edge of the study area and was used frequently by tourists and guides.

Avifaunal Sampling

Since the study took place during the non-breeding season and territorial singing is infrequent during this time period (Lynch 1995), we utilized

a sampling technique modified from the Long Point Bird Observatory migration monitoring protocol (McCracken et al. 1993). The bird species were sampled using mist-netting, a standardized census, and casual observations. The mist-nets used in this study were nylon, 12 m × 2.6 m, of 30 mm mesh with 4 shelves. Ten to 15 ground-level nets were operated at each study area. In addition, we operated one to two nets elevated to five to seven meters (Albanese and Piaskowski 1999) in the riverine forest, pine savanna and scrub-shrub study areas. We also operated one 30 mm mesh mist-net measuring 6 m × 5.2 m to sample stratum starting approximately 21 m above ground level during one year in the karst hill broadleaf forest and two years in the riverine forest.

Monitoring was conducted for 1.5 to 3 consecutive days at each study area each month. From 1999–2001 monitoring was conducted only in February and March. From December 2001 through March 2003, monitoring was expanded and conducted from December through March. In 1999, nets were operated for six hours on most days and for up to 11 hours on a few days. From 2000–2003 nets were operated for up to 11 hours the first day of banding and then for six hours the second and third days, weather permitting. Monitoring was conducted in the scrub-shrub and secondary broadleaf forest in 1999 and, with the exception of the secondary broadleaf forest which was not studied in 2000, in all six habitats from 2000–2002. In the 2002–2003 field season monitoring was conducted only in the transition zone, riverine forest, and secondary broadleaf forest.

We standardized mist-netting capture results using mist-net hours. Mist-net hours were calculated by summing the number of hours each 12 m net was operated (one mist- net hour = one 12 m mist-net open for one hour). The total mist-net hours for each site are listed in Table 1. All North American migrants captured, except hummingbirds, were banded using a United States Bird Banding Laboratory (United States Geological Survey, Biological Resources Division) aluminum leg band. All resident birds captured, except hummingbirds, were banded with a uniquely numbered aluminum leg band. Breeding condition was determined by the presence of a brood patch (BP) or cloacal protuberance (CP), as described in Burton and DeSante (1998). Aging and sexing of North American migrants was based on Pyle (1997). Aging and sexing of residents was based on Stiles and Skutch (1989), Howell and Webb (1995) and Pyle (1997). Hummingbirds were examined before being released but were not included in the capture analyses.

To sample birds not captured in mist-nets, we also inventoried birds by visual and auditory observations using a standardized census and casual observations based on the methods of McCracken et al. (1993). The information on bird species documented by visual and auditory observations is not included in this report.

Data Analysis

We analyzed habitat associations based on the methods described in Petit et al. (1992). We performed analyses on those species for which we

Table 1. Summary of mist-netting data for the six habitats studied in Belize.

Habitat	Total mist-net hours	Total birds banded	Total birds per 100 mist-net hours	Number of migrants banded (% of total birds banded)	Number of migrants per 100 mist-net hours	Number of residents banded (% of total birds banded)	Number of residents per 100 mist-net hours
Karst hill broadleaf forest	975.28	249	25.5	79 (31.7)	8.1	170 (68.3)	17.4
Transition zone	1542.31	408	26.5	169 (41.4)	11.0	239 (58.6)	15.5
Riverine forest	3172.11	1022	32.2	446 (43.6)	14.1	576 (56.4)	18.2
Pine savanna	512.06	128	25.0	65 (50.8)	12.7	63 (49.2)	12.3
Scrub-shrub	2086.10	676	32.4	306 (45.3)	14.7	370 (54.7)	17.7
Secondary broadleaf forest	2191.48	480	21.9	179 (37.3)	8.2	301 (62.7)	13.7

had captured more than 20 individuals. Sampling effort (mist-net hours) was unequal in the six different habitats studied; therefore, we could not calculate expected mist-net captures for a given species by dividing the number of individuals captured in each habitat by the total number of captures in all habitats. Instead, we standardized expected captures based on the number of mist-net hours (h_i) spent sampling each habitat *i*. The formula used was: $E(c_i) = C \bullet h_i / H_T$, where $H_T = \Sigma h_i$. To determine if each species' habitat associations were different from the expected uniform distribution across the six habitat types, we used the goodness of fit G-test (Sokal and Rohlf 1981).

To determine the niche breadth of the species studied, we used the method of Levins (1968) as described in Petit et al. (1992). Niche breadth (B) was calculated as follows: $B = 1/\Sigma p_i^2$, where p_i is the proportion of captures of a species in habitat *i*. In this study, B values could range from 1, if a species was found in only one habitat, to 6 if a species was found in all habitats. We categorized species as habitat specialists if $B \leq 2$, as moderate habitat generalists if $B > 2$ but ≤ 4, and as habitat generalists if $B > 4$.

To determine if there was a difference in a given species' use of disturbed and undisturbed habitats, we used the χ^2 goodness of fit test (Sokal and Rohlf 1981). We standardized captures for each species by calculating the birds per 100 mist-net hours in each habitat. We then pooled birds per 100 mist-net hours for the four disturbed sites and the two undisturbed sites and calculated the χ^2 for these two variables.

Results

From February 1999 through March 2003, 1,244 Neotropical migrants of 35 species, and 1,719 residents of 110 species, were banded in the six Belize habitats studied. Table 1 summarizes the mist-netting data for each of the

six habitats studied. The proportion of migrants banded ranged from 31.7% of the total in the karst hill broadleaf forest to 50.8% in the pine savanna. Conversely, the proportion of residents banded was highest in the karst hill broadleaf forest (68.3%) and lowest in the pine savanna (49.2%).

To analyze habitat associations, we considered only those species for which we had banded 20 or more individuals. We were able to determine habitat associations for 13 species of Neotropical migrants and 23 species of resident birds. Data on the residents will be presented in a later report. The species of Neotropical migrants and number of individuals banded in each habitat is shown in Table 2. Table 2 also shows the goodness of fit G-test value and p-value that were used to determine whether a species departed significantly from random distribution across all six habitats. The majority of species (10, or 76.9%) showed non-random use of the habitats studied. Only the Magnolia Warbler, Black-and-white Warbler, and Ovenbird showed random distribution across the six habitats studied. Habitat disturbance did not affect use by the 13 species of migrants studied, as no significant difference in the use of disturbed versus undisturbed habitats was found for any of the 13 species studied (χ^2 ranged from 0.026–1.914, d.f. = 1, $p > .05$).

We used niche breadth calculations to determine the tendency of each species to use the six habitat types studied (Lynch 1992). Based on these calculations, none of the species studied was a habitat specialist, eight were moderate habitat generalists, and five were habitat generalists (Table 3).

Discussion

Mist-nets operated at ground level sample avifauna that moves within two to three meters of the ground (Remsen and Good 1996) and, as a result, our banding data are biased toward those species that move and forage within this area of the habitat. To sample other strata, we devised an elevated net system that samples areas within five to seven meters of the ground (Albanese and Piaskowski 1999) and operated one to two elevated nets in the riverine forest, pine savanna and scrub-shrub study areas. In addition, we operated one 30 mm mesh net measuring 6 m × 5.2 m to sample stratum starting approximately 21 m above ground level during one year in the karst hill broadleaf forest and two years in the riverine forest. Due to staffing changes after 2001, we were not able to operate the canopy net in the 2001–2002 and 2002–2003 field seasons. We operated the majority of our nets at ground level and may have missed capturing individuals foraging in the canopy. However, for nine of the 13 species studied here, fewer than 5% of individuals banded were captured in elevated or canopy nets. For the following four species, more than 5% of the individuals banded were captured in the elevated or canopy nets: White-eyed Vireo, 6.3%; Magnolia Warbler, 9.6%; Black-and-white Warbler, 10.4%; and American Redstart, 11.7%.

In the habitats we studied, Neotropical migrants comprised from 31.7% to 50.8% of the birds banded. The percentage of migrants found in our study is similar to a number of other banding studies conducted in Belize. In four Belize habitats Lloyd-Evans (1984) found that migrants comprised

Table 2. Number of each species banded in the six habitats studied in Belize and whether distribution across habitats departed from the expected random distribution.

Species	Total number banded	Karst hill broadleaf forest	Transition zone	Riverine forest	Pine savanna	Scrub-shrub	Secondary broadleaf forest	G-test value	p-value[c]
White-eyed Vireo *Vireo griseus*	32	5[a] (15.6)[b]	9 (28.1)	0	0	17 (53.1)	1 (3.1)	46.4099	< .001**
Wood Thrush *Hylocichla mustelina*	174	14 (8.0)	17 (9.8)	67 (38.5)	1 (0.6)	14 (8.0)	61 (35.1)	47.6253	< .001**
Gray Catbird *Dumetella carolinensis*	289	5 (1.7)	31 (10.7)	157 (54.3)	8 (2.8)	74 (25.6)	14 (4.8)	134.4113	< .001**
Magnolia Warbler *Dendroica magnolia*	115	9 (7.8)	21 (18.3)	36 (31.3)	4 (3.5)	30 (26.1)	15 (13.0)	7.7004	> .05[NS]
Black-and-white Warbler *Mniotilta varia*	48	4 (8.3)	9 (18.8)	9 (18.8)	2 (4.2)	15 (31.3)	9 (18.8)	5.7797	> .05[NS]
American Redstart *Setophaga ruticilla*	60	7 (11.7)	7 (11.7)	12 (20.0)	10 (16.7)	21 (35.0)	3 (5.0)	29.6184	< .001**
Worm-eating Warbler *Helmitheros vermivorum*	36	5 (13.9)	2 (5.6)	19 (52.8)	0	2 (5.6)	8 (22.2)	17.0987	< .01*
Ovenbird *Seiurus aurocapilla*	94	7 (7.4)	7 (7.4)	26 (27.7)	3 (3.2)	30 (31.9)	21 (22.3)	11.1894	> .05[NS]
Northern Waterthrush *Seiurus noveboracensis*	54	4 (7.4)	21 (38.9)	9 (16.7)	0	19 (35.2)	1 (1.9)	45.0367	< .001**
Kentucky Warbler *Oporornis formosus*	48	8 (16.7)	5 (10.4)	14 (29.2)	0	0	21 (43.8)	35.8290	< .001**
Common Yellowthroat *Geothlypis trichas*	89	0	18 (20.2)	22 (24.7)	21 (23.6)	28 (31.5)	0	94.2915	< .001**
Hooded Warbler *Wilsonia citrina*	81	6 (7.4)	9 (11.1)	26 (32.1)	0	21 (25.9)	19 (23.5)	10.7092	< .01*
Yellow-breasted Chat *Icteria virens*	56	3 (5.4)	8 (14.3)	16 (28.6)	9 (16.1)	20 (35.7)	0	39.1710	< .001**

[a]Number of birds of this species banded in this habitat.
[b]Percent of total birds of this species banded in this habitat.
[c]Statistical significance based on the G-test value with five degrees of freedom: **very highly significant,*highly significant, [NS]not significant. Statistical significance indicates that the species departed from the expected random distribution across the six habitat types.

Table 3. Niche breadth scores and habitat use categories for the Neotropical migrants studied in Belize.

Species	Total number banded	Niche breadth (B)	Category[a]
White-eyed Vireo *Vireo griseus*	32	2.59	Moderate generalist
Wood Thrush *Hylocichla mustelina*	174	3.40	Moderate generalist
Gray Catbird *Dumetella carolinensis*	289	2.66	Moderate generalist
Magnolia Warbler *Dendroica magnolia*	115	4.47	Generalist
Black-and-white Warbler *Mniotilta varia*	48	4.72	Generalist
American Redstart *Setophaga ruticilla*	60	4.55	Generalist
Worm-eating Warbler *Helmitheros vermivorus*	36	2.83	Moderate generalist
Ovenbird *Seiurus aurocapilla*	94	4.16	Generalist
Northern Waterthrush *Seiurus noveboracensis*	54	3.24	Moderate generalist
Kentucky Warbler *Oporornis formosus*	48	3.17	Moderate generalist
Common Yellowthroat *Geothlypis trichas*	89	3.90	Moderate generalist
Hooded Warbler *Wilsonia citrina*	81	4.11	Generalist
Yellow-breasted Chat *Icteria virens*	56	3.87	Moderate generalist

[a]We categorized species as follows:
$B \leq 2$ habitat specialist
$B > 2$ but ≤ 4 moderate habitat generalist
$B > 4$ habitat generalist

22% to 43% of the total birds banded. Kricher and Davis (1992) found that 30.1% of the total individuals mist-netted at three sites in Belize was migrants. Petit et al. (1992) found that migrants represented 28.1% to 57.7% of birds mist-netted in five habitats in Belize. Robbins et al. (1992) found that migrants represented 39% of the birds banded in native forest and 42% of birds banded in seven agricultural habitats combined (including citrus) during their work in Belize. Our results contrast with two other studies conducted in Belize in which migrants comprised a higher percentage of the birds banded. Nickell (1968) found that migrants ranged from 57.5% to 74% of the birds banded. Mills and Rogers (1992) found that migrants made up 50% to 69.1% of total birds banded in orange groves and 80.6% of those in a grapefruit orchard. The differences of the percentages of migrants in these two studies are likely due to the different habitats sampled and their focus on citrus groves.

It was of value to examine the habitat associations with the two methods utilized here, as it made it possible to view each species use of the six habitats in both ways. Based on the G-test and p-values shown in Table 2, the majority of species studied (10, or 76.9%) were not randomly distributed across the six habitat types studied, indicating that species do select habitats during the non-breeding season. Only the Magnolia Warbler, Black-and-white Warbler, and Ovenbird showed random distribution across the six habitats studied, and these species also were categorized as generalists by niche breadth calculations. Using the niche breadth calculations (Table 3), we were not able to categorize any of the 13 species studied as habitat specialists. The majority of species studied, (8, or 61.5%), were moderate habitat generalists. Five species used

more than four habitats and therefore were categorized as habitat generalists. As described above, three generalists also showed random distribution across the six habitats, but two species, the American Redstart and Hooded Warbler (Table 2), were categorized as generalists by niche breadth calculations, yet were not randomly distributed across the six habitat types as determined by the G-test value (Table 1).

Examining the percentage of individuals banded in each habitat provided information on habitat preferences for some species and indicated that the majority of individuals of some species do select habitats (Table 2). For three species, the White-eyed Vireo, Gray Catbird, and Worm-eating Warbler, the majority of individuals (>50%) was banded in one habitat type, although individuals of these species also were captured in other habitats. However, this predominant use of one habitat was not sufficient to categorize them as habitat specialists through niche breadth calculations, although all had niche breadth values less than three. For the Wood Thrush, Northern Waterthrush, and Kentucky Warbler, more than 70% of the individuals was banded in two habitats, but these species were categorized as moderate generalists by niche breadth calculations. The remaining seven species, the Magnolia Warbler, Black-and-white Warbler, American Redstart, Ovenbird, Common Yellowthroat, Hooded Warbler and Yellow-breasted Chat, were captured in four to six of the habitats studied and the niche breadth of these species ranges from 3.87 for the Yellow-breasted Chat to 4.72 for the Black-and-white Warbler.

We found that the 13 species of migrants we studied utilized both disturbed and undisturbed habitats. Previous studies (summarized in Petit et al. 1993) have shown that the number of migratory species was highest in disturbed habitats. However, it is important to note that all types of disturbance may not be beneficial for migrants. Saab and Petit (1992) found that actively grazed pastures in Belize had 50% lower species richness of both residents and migrants than abandoned pastures. Faaborg (2002) emphasized that human habitat alterations have taken place over the past 500 years in the tropics and that some migratory species may have benefited by these changes and others negatively impacted. He also states that we also need to consider resident species when planning for habitat preservation, as they are more vulnerable to disturbance and fragmentation than many species of migrants. Studying the habitat associations of both migrants and residents as we did in this study (although only the migrant data are presented here), will provide information on the habitats important to both, and allow for conservation planning for the tropical bird communities found in each habitat.

Conservation implications

The habitat associations shown in Table 2 and the non-random use of habitats by the majority of species studied reiterates that migrants cannot be viewed as a group when planning for non-breeding habitat conservation. The habitat associations of each species during the non-breeding season must be examined as we did here and also throughout their non-breeding range, as some species have shown

regional differences in habitat use (Petit et al. 1993, Faaborg 2002).

Of the 13 species of Neotropical migrants studied, six are listed as species of continental importance by Partners in Flight (Rich et al. 2004). The White-eyed Vireo, Magnolia Warbler, and Hooded Warbler are listed as Stewardship species and the Wood Thrush, Worm-eating Warbler, and Kentucky Warbler are listed as both Watch List and Stewardship species. Watch List species have "multiple reasons for conservation concern across their entire ranges," while Stewardship species "have a proportionately high percentage of their world population in a single Avifaunal Biome during either the breeding or wintering season" (Rich et al. 2004). With the exception of pine savanna, in which only two of the six species were banded, most of these species of continental importance were found in four to five of the other habitats studied (Table 2), indicating the importance of these habitats to these species during the non-breeding season.

Although Belize has retained more of its natural vegetation than other Central American countries, the development pressures described above will undoubtedly continue. To conserve habitats important to Neotropical migrants during the non-breeding season, it is necessary to share the results of research such as this with local governments, non-government organizations (NGOs), conservation and education groups, and local citizens. In this way, habitats important to Neotropical migrants during the non-breeding season can be considered in land management and development plans and preserved wherever possible. Since the start of the Birds Without Borders—*Aves Sin Fronteras* (BWB-ASF) project in Belize, we have shared results of our research with the private landowners who have allowed us to use their land as study sites, with government, NGOs, and other groups in Belize through research reports and educational outreach presentations so that the information is available to those who have a role in conservation and development planning. This also enhances the awareness of the importance of birds and their role in ecosystems.

We have emphasized that conservation of undisturbed habitats such as the riverine forest and transition zone studied here should be accorded high priority in management plans, as once they are altered, considerable time is required for regeneration. To stress the importance of conservation of riverine forests, we summarized the results of four years of avifaunal research conducted on the Sibun River in central Belize (Piaskowski et al. 2005b). This information is being condensed so that it can be printed in conservation newsletters in Belize and thus reach the general public. Pine savanna and scrub-shrub are commonly viewed as wastelands in Belize and the need for the conservation of these habitats, as well as the other habitats we studied, for the benefit of both migratory and resident birds, will be emphasized in a future publication. This publication will be a manual for private and public landowners based on our research results emphasizing the importance of birds and providing landowners with information on how to conserve migratory and resident birds by conserving habitats and plants utilized by birds. It will highlight the key role of landowners in aiding in the survival of both resident and migratory

birds and that landowners working together can save large amounts of habitat. By reaching a wide audience with this information, we hope it will be possible to conserve the habitats reported in this paper that are important to migratory birds during the non-breeding season and also to resident birds year-round.

An important component of the research was to train the Belize staff working on the Birds Without Borders—*Aves Sin Fronteras* project in the ornithological research techniques utilized, so that in the future they could design and conduct their own research as well as utilize the expertise gained to implement local conservation strategies. This goal was met and the field research from 2001–2003 was conducted mainly by the BWB-ASF Belize staff. It will be important for them to continue this research as habitats in central Belize continue to change. In addition, the relationship between the BWB-ASF Belize staff and Belizean landowners will be maintained so that both public and private landowners can be informed about the research results and use this information to conserve bird habitat.

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For more information about the Birds Without Borders—*Aves Sin Fronteras* project and our research results, visit http://www.zoosociety.org/Conservation/BWB-ASF/. For more information on the Runaway Creek Nature Preserve in Belize visit http://www.zoosociety.org/Conservation/SaveAnAcre.php

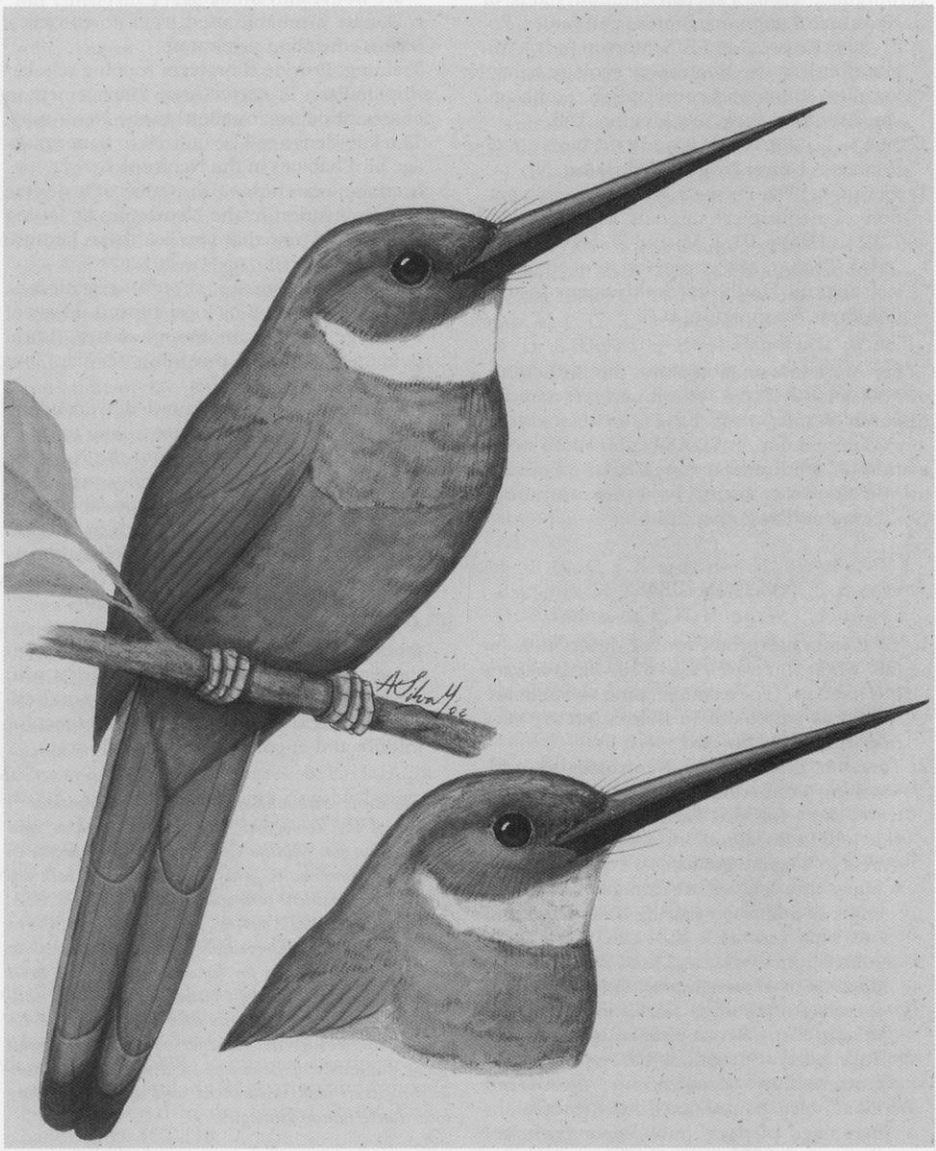
Action ideas:

1. To encourage protection of different habitats, when you travel, ask to see birds in various habitats. (For example, pine savannas are viewed as wastelands in Belize, but are very important to many bird species.)
2. Tourism: Promote the Neotropics as birdwatching destinations so that more tourists travel there for bird watching. This will provide jobs for local tour guides and encourage others to become guides.
   - Many tour guides are hungry for knowledge. In addition to giving them a tip, find out what resources they can use (books, subscriptions, etc.) and send these to them upon your return home. (Resources like these are often more readily available here than in many Neotropical countries.)
   - Take part in activities that support local conservation organizations. Sponsored hikes, bird counts and other excursions may need pledges, publicity or resources you can provide.
3. Capacity building:
   - Donate funds to assist local conservation groups and conservation projects, to help manage protected areas, and to support groups involved in bird and conservation education.
   - Provide educational resources (new or used field guides, bird books, maps, posters, cassettes, CD's and videos) to conservation groups, environmental and bird clubs, and conservation-based educational facilities. In Belize, these types of resources are not readily available.
   - Donate a reliable used truck to conservation education programs.
4. Training: Provide short-term training scholarships in Park/Protected Areas Management to conservation organizations in the Neotropics. The knowledge will be utilized to better manage bird habitats in the Neotropics.
5. Increase awareness of the value of a diverse bird population in the Neotropics by letting businesses know that you are there because of the birds.
6. Patronize businesses (hotels, restaurants, shops, etc.) owned by local citizens. Many of the large resorts are foreign-owned. Local people work there providing services, but don't share in the profits.
7. Be willing to share your knowledge of and enthusiasm for birds. If you are willing to do so and have time during a visit to the Neotropics, give an informal presentation to a local school or environmental group about migrants on their breeding grounds or another topic about which you are knowledgeable. As in the US, many people in the Neotropics don't realize why birds are important.
8. Avoid activities and products that are exploitative of wildlife and speak out about these to businesses and other tourists who might not be aware of the issue. Boycott businesses that exploit or do not show respect for wildlife and encourage others to do so.

*The Birds Without Borders—Aves Sin Fronteras*SM *project of the Zoological Society of Milwaukee and Foundation for Wildlife Conservation, Inc. began in 1996 with four major goals: 1.) research on both migratory and resident bird species in Wisconsin, USA, and Belize, Central America, 2.) application of the research results to conservation by compiling the data into recommendations for landowners on how land can be managed to benefit birds, 3.) educating children and adults about birds and 4.) training of Belizeans to conduct the research with the end result being autonomy of Belizeans in designing and conducting their own research as well as implementing local conservation strategies.*

Victoria Piaskowski has been the International Coordinator since the start of the

project. Mario Teul is the Belize National Coordinator and has been with the project since it started in Belize in 1997. Kari M. Williams has been the Project Assistant since 2000. Reynold N. Cal is the Runaway Creek Nature Preserve Manager and has been with the project since 2001.



Rufous-tailed Jacamar

Coffee Lessons, Coffee Links

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In 1916, Alexander Wetmore, ornithologist and First Secretary at the Smithsonian Institution, noticed it in Puerto Rico. Almost two decades later in Guatemala, so did the godfather of modern birding, Ludlow Griscom. The evidence was clear: songbirds in the Neotropics–both migrating birds and residents–seemed to inhabit traditional shade-grown coffee farms almost as much as they occupied existing tropical forests. Whether it was Cape May Warbler or Ovenbird in Puerto Rico, or Black-and-white Warbler and Rose-breasted Grosbeak in Guatemala, the birds were doing very well on rustic coffee farms.

It did not seem like an amazing discovery at the time. After all, traditional coffee in Latin America and the Caribbean, outside of Brazil, was usually grown in the midst of modified forest, with modest disturbance to the surrounding vegetation and good use of the shade of the overstory, the surrounding trees. Besides, back in 1916 and in 1932 there seems to have been plenty of *natural* habitat for the birds.

It was decades later, many decades later, before the implications of these observations were fully appreciated. Indeed, only relatively recently have researchers thoroughly explored the significance. In the last decade there have been a number of scholarly papers in journals such as *The Auk* and *Conservation Biology* on this very subject.

Research, particularly in northern Latin America, has shown that shade-coffee agriculture supports about as much avian biodiversity as natural forests. Other investigations, especially where shade-coffee farms were adjacent to undisturbed natural forest (serving as a de facto buffer), have produced similar encouraging results.

The Concept

Enter eco-agriculture with a twist of social awareness. It is the avoidance of pesticides and chemical fertilizer, the accumulation of leaf-litter, complex insect use, and, of course, required maintenance of the mixture of large shade trees that all combine to provide attractive bird habitat in these human-transformed coffee locations (Perfecto et al. 1996, Sherry 2000).

What a grand way to neutralize de-

forestation in Latin America and the Caribbean, where the axe and continued slash-and-burn techniques currently gobble up a disturbing amount of forest habitat. What a fine way to support hemispheric birdlife, preserving the altered-but-sufficient coffee habitats where many of our temperate birds may spend the winter. After all, in Latin America and the Caribbean, coffee is the leading source of foreign exchange. What a great idea: just suggest that we drink coffee, and lots of it. You can save those migrating orioles, warblers, tanagers as well as the local motmots, todys, and euphonias. Drink up! Easy, isn't it?

Well, not really . . .

The Problems

Yes, the evidence is incontrovertible, but there are at least four major complications:

First, there is the existence of Robusta coffee. Robusta coffee plants grow taller, are more resistant to pests and disease, and produce more fruits than standard shade-loving Arabica coffee. Robusta is grown mainly in Africa, parts of Asia, and widely in Brazil. With a caffeine content about twice that of the Arabica, Robusta is often used for instant coffee and as the main ingredient in your supermarket-grade blends. Robusta coffee does not need to be grown in the shade, and their plantations are clearly *not* havens for biodiversity.

Second, there is the element of sun coffee. The arrival in South America of a fungus, coffee leaf rust (*la roya*), in the 1970s, promoted the expansion of newer coffee hybrids, bred for sun-tolerance and for compact growth and yielding more coffee beans per tree. The flip-side is that more chemical inputs—fertilizer, herbicides, and pesticides—are required for sun coffee than in traditional cultivation, and, of course, the land is denuded of trees.

"Like the Green Revolution that was supposed to provide a miracle cure through new strains of rice, wheat, and corn, the sun coffee revolution has failed to fulfill its promise," wrote Mark Pendergrast, author of the thorough coffee history *Uncommon Grounds* (Pendergrast 1999). "Instead, it has contributed to the ecological degradation and loss of important habitat." Over 40 percent of the coffee areas in Colombia, Mexico, Central America, and the Caribbean has been converted to sun coffee. Throughout the Latin American wintering grounds of migratory birds, the natural landscape is undergoing massive changes at phenomenal rates. Not surprisingly, studies have shown that in full-sun farms, as opposed to shade farms, the number of bird species is cut by half, and the number of individual birds is cut by as much as two-thirds (Greenberg 1996).

Third, there is the problem of the prolonged coffee glut. The prices that coffee farmers receive for their beans over the past few years have included historic lows. Bumper crops in Brazil and the entry of Vietnam as a significant coffee producer have flooded the market with cheap, low-quality Robusta coffee beans, causing prices to sink. Even the "specialty market," relying on higher-quality Arabica beans, has not been immune to the plummeting prices.

The upshot is the dislocation and

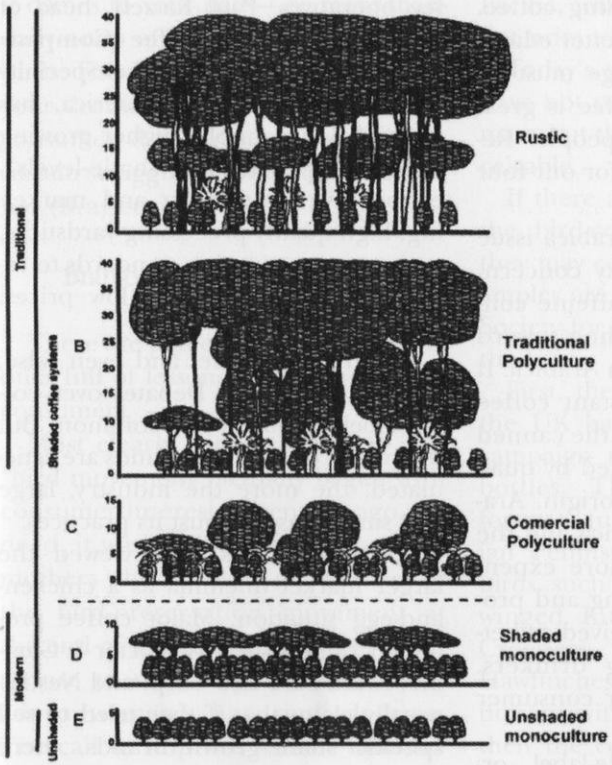

Figure 1. This diagram illustrates five different coffee-growing systems developed by M. Nolasco (1985) and co-workers. This is their "management spectrum for coffee," describing a progressive shade-gradient. Note especially the vegetational complexity, height of arboreal strata, and variety of components.

impoverishment of thousands of coffee farmers and their families in Latin America. Many of those in the coffee sector in Latin America who are not able to make the transition to marketing organic and shade-grown Arabica coffees are now abandoning coffee–and the land–sometimes selling out to speculators and even accelerating the development of cattle ranches. These circumstances are bad for people as well as birds. Moreover, the ongoing coffee glut just exacerbates the sun-vs-shade issue.

Fourth, there is the issue of the label itself. There are unremitting controversies about exactly what constitutes real shade coffee. In the 1980s, a group of Mexican coffee researchers and technicians devised a "management spectrum for coffee," describing a shade-gradient of shade as cover (Nolasco 1985, also Figure 1). This breakthrough, however, only clarified some debate limits. Controversy over what is legitimate shade-coffee, and if and how to certify it, abound. There is also the ongoing issue of truth-in-labeling. "Not all shade is equal," summarizes April Pojman of the Thanksgiving Coffee Company (Janssen 1997; Rice and McLean 1999; Greenberg 1999; McLean 2000; Pojman 2002).

The Answers

Consumer-birders, therefore, must develop into discerning shoppers. We need to become better educated

about the issues surrounding coffee. And we need to become better educators. The resulting message must be loud and clear: shade-coffee is great for birds and good for people. Responses are also available for our four problem areas:

First, the Robusta vs. Arabica issue is an awareness-and-quality concern. Robusta, with a higher caffeine content, stronger flavor, tending toward bitter, is less aromatic than Arabica. It is commonly used in instant coffee and as a price stabilizer in the canned blends; Robusta is separated by quality as well as by place of origin. Arabica coffee of Latin America and the Caribbean is generally more expensive, due to higher growing and processing costs, and is perceived as better-tasting by discerning drinkers. There is no substitute for consumer awareness.

Second, absent a shade-label, organic Arabica coffee is about as beneficial; this is because it is very hard to produce coffee outside of a shade environment without the use of some chemicals. Right now, "organic" is a stricter term than "shade-grown." Another sustainable element, "fair-trade coffee," also enters the mix. This coffee brings a fair return to those who pick and process the beans. An estimated 80 percent of fair-trade coffee is also de-facto shade-grown. (Co-op America 2000).

Third, to address the problem of the coffee glut, there is at least hope for quality-coffee operations. While nearly all gourmet/specialty coffees are Arabica, only about 10 percent of Arabicas are gourmet-quality. Maximizing that factor in Latin America and the Caribbean is the goal of visionary coffee operatives. Paul Katzeff, head of the Thanksgiving Coffee Company and a past president of the Specialty Coffee Association of America, has stressed, for example, higher growing criteria (appreciating shade-levels), cooperative production and marketing, high-quality processing yardsticks, and on-going cupping standards to retain value in periods of low prices. (Katzeff 2001)

Fourth, unreliable, and even false, labeling continues. Debates over coffee label-legitimacy are common. But the more consumer demands are articulated, the more the industry, large and small, has to adjust its practices.

Some observers have viewed the larger market dilemma as a chicken-and-egg situation. Major coffee producers (giants such as Procter & Gamble, Kraft, Sara Lee Corp. and Nestlé) usually claim that if they tried to sell specific shade-grown brands, there would not be enough produced and certified to assure a reliable long-term supply. On the other end of the production process, growers are unlikely to pursue a certified shade-grown route unless they are guaranteed some secure return. Clearly, this cycle, particularly among the "big four," must be fractured. (Recent moves at Procter & Gamble indicate that there may yet be a breakthrough.)

Still, there are expanding opportunities to find bird-compatible shade-grown coffee today, usually among the "specialty" coffees. Fortunately, it is far easier to buy shade-grown coffee now than it was five years ago. There are even increasing opportunities to buy "triple-labeled" coffee-sustainable coffee that is shade-grown, organic, *and* fair-traded.

Making an informed decision when

it comes to your daily—or more-than-daily—cup of coffee can actually save birds. The additional good news is that your decision can help create further consumer demand and can help to sustain struggling coffee communities, too (Bray et al. 2002).

Bird-conscious Consumers

There are precedents involved here, ones full of lessons for bird-conscious consumers.

Most clearly, our very origins as a "bird movement" actually began with consumer interests a century ago. Indeed, it was our bird-protecting foremothers who started it all. The rise of the bird-preservation movement at the end of the 19th century was in response to the slaughter of birds to adorn women's hats and clothing. The call to stop the feather industry was a call to thoughtful consumers. That effort gave rise to the Audubon societies. It also gave birth to protective federal legislation, an innovative refuge system, and a culture of bird appreciation (Doughty 1975, Barrow 1998).

For a more recent effort to stop unnecessary animal deaths, one need only look at the promotion of dolphin-free tuna. Fishing practices had eliminated more than six million dolphins between 1950 and 1980. That needless byproduct of tuna fishing prompted a significant consumer boycott of canned tuna in the late 1980s, one that nearly devastated the industry. Since 1990, federal law has required canners who want to label their tuna "dolphin-safe" or "dolphin-free" to shift their operations to the western Pacific, where tuna and dolphins do not swim together.

Today's sustainable coffee interests have not reached this kind of critical mass, but that eventuality is not inconceivable.

If there are additional variations of the bird-conscious-consumer theme, they may come from Europe. Two examples are from the RSPB, the Royal Society for the Protection of Birds, in the UK.

First, there is cork. Our friends in the UK have a parallel, yet smaller, campaign to promote cork in wine-bottles. That's because cork oak forests— functional farms on the Iberian Peninsula—often harbor special birds such as Booted Eagles, Black-winged Kites, Hoopoes, Short-toed Creepers, Golden Orioles, and Hawfinches, either for nesting, migration, or wintering. If cork is not sold, then the cork oak forests will be removed to accommodate cattle. Birders in the RSPB in the UK are trying to get consumers to buy wine *with* corks, not plastic tops.

Next, there is rice. The RSPB in the UK in cooperation with the Sociedad Española de Ornitología (SEO) of Spain has been promoting organic rice from the bird-rich Ebro Delta of Spain. Spain produces a quarter of all the rice grown in Europe, and the Ebro Delta, where much of the rice originates, is loaded with bitterns, egrets, herons, coots, terns, shorebirds, ducks, and wetland-associated songbirds. The delta is the second-most-important IBA (Important Bird Area) in Spain. (Much rice is planted in an unsympathetic way—with widespread pesticide use, for example—while some is organically-grown.) The RSPB has launched its own organic

bird-compatible rice as a way to help sustain these bird populations. The message is simple: buy organic Ebro Delta rice and save birds.

What's missing?

Both RSPB drives are admirable and have lessons for us.

Considering cork, one need only contrast that extremely narrow and complicated consumer-campaign potential with our much broader North American ability to ask the average American to think twice when drinking that first cub of Joe in the morning. With a minimum of 114 million adult American who drink coffee on a daily basis, one can arguably make a large impact for birds with even a small segment of the market.

The rice effort is loaded with potential, and the Ebro Delta connection is ideal. In contrast to cork—and even coffee—the market is enormous, perhaps too big to influence. Rice makes up about 10 percent of cropland worldwide. Intricate production and marketing, as well as complex strains, and varieties could complicate things. Still, rice, especially organic rice, might yet become the wetland equivalent of shade-grown coffee, but a truly ambitious campaign commensurate with the market has yet to be conceived, let alone launched.

The Europeans are doing what they can with the tools available. Most significantly, Europeans do not have a shade-coffee option for their own Palearctic-Ethiopian migrants. So in many cases, we are much better off, although organizationally encumbered. Perhaps like Goldilocks and the three bears, cork may be too small, rice may be too large, but coffee could actually be *just right* . . . at least for us.

We may realize that cutting-edge marketing, not necessarily further research and science, is required today. We could go beyond label-obsession and concentrate on pressuring all the companies to respond to growing consumer demand. We should also get beyond a persistent feeling of powerlessness that often pervades the birder community. Then, perhaps, we could match the wisdom, vision, and resolve of our bird-protection foremothers of more than a century ago.

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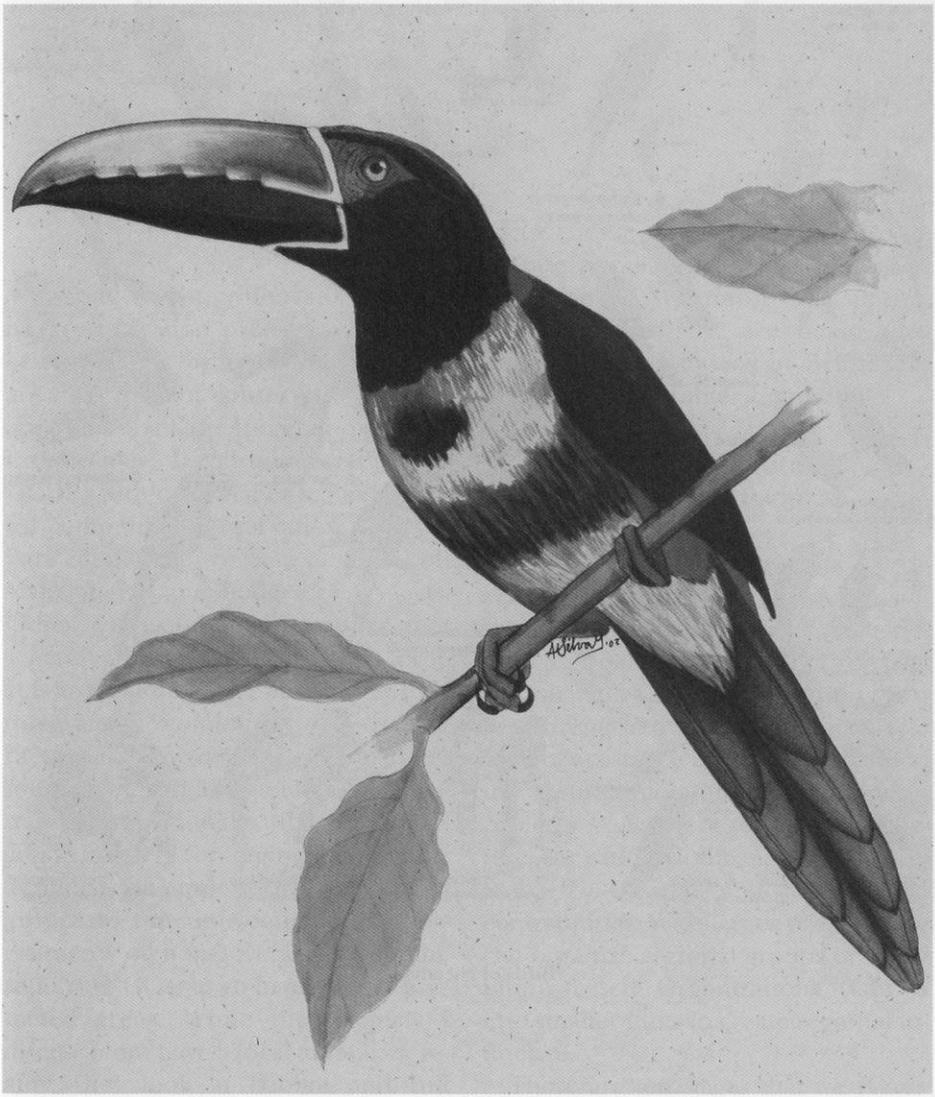
Paul Baicich has served as the editor for Birding, *the American Birding Association magazine, and as head of the ABA Conservation Department, strongly promoting Birders' Exchange and shade-grown coffee. He is a co-author of* A Guide to Nests, Eggs, and Nestlings of North American Birds *(1997). He currently works for Swarovski Birding and the National Wildlife Regue Association.*



Collared Araçari

Birds of Nicaragua

Communities Saving Wisconsin Birds: North and South

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Introduction

Despite recent critiques of community conservation projects, such projects managed by community groups are the future of conservation. Critics are confusing large Integrated Conservation and Development Projects (ICDP) with our smaller scale successful community conservation projects. Part of the controversy depends on scale of size and budget of projects. Other successful characteristics that separate the smaller successful projects are that they are holistic, they fully integrate economics without stressing them, and they see rural people as the solution, hence as potential conservationists. Additionally, these projects create models for regional influence and focus on empowering community groups to function equally with governments or non-government organizations (NGOs) as co-managers of protected areas. While the projects I discuss often have a focal animal, in reality, they look at habitat and full ecosystems as much as possible. Thus, although birds may not be the overt focus, they are a major part of the vertebrate populations to be conserved. Well over 60 Wisconsin bird species, especially warblers, are being protected by communities in Belize and Wisconsin (see Tables 1 and 2).

Catalyzing Community Conservation Projects

Small community conservation projects should strive for financial, cultural, and legal sustainability and a holistic approach. Some kind of physical infrastructure will give continuity and thus strengthen the sustainability. The level of assistance that can be provided to encourage community conservation projects can be at the community level, or can work through local or regional NGOs who in turn work with communities. With larger projects one can organize regional groups or Community-based Organizations (CBOs) into smaller units to create regional influence.

There are ten stages that we (Community Conservation) have used to catalyze community conservation projects

Table 1. Forest Birds Migrating between Wisconsin and Central America

** Species that migrate from any location in Wisconsin only to CA (Greenberg and Reaser 1995; Temple and Cary 1987)*
*** Species that migrate from southern Wisconsin to winter in Belize [may winter elsewhere as well] (Greenberg and Reaser 1995; Temple and Cary 1987)*
no Species from Wisconsin that pass through Belize to winter elsewhere*
CBS indicates species found on the Community Baboon Sanctuary in Belize (Bider 1997)

*Yellow-billed Cuckoo (*Coccyzus americanus*) (CBS)
*Yellow-bellied Flycatcher (*Empidonax flaviventris*) (CBS)
*Acadian Flycatcher (*Empidonax virescens*) (CBS)
*Willow Flycatcher (*Empidonax traillii*)
*Tennessee Warbler (*Vermivora peregrina*) (CBS)
*Nashville Warbler (*Vermivora ruficapilla*)
*Northern Parula (*Parula americana*) (CBS)
*Chestnut-sided Warbler (*Dendroica pensylvanica*) (CBS)
*Magnolia Warbler (*Dendroica magnolia*) (CBS)
*Black-throated Blue Warbler (*Dendroica caerulescens*)
*Black-throated Green Warbler (*Dendroica virens*) (CBS)
*Palm Warbler (*Dendroica palmarum*)
*Bay-breasted Warbler (*Dendroica castanea*) (CBS)
*Northern Waterthrush (*Seiurus noveboracensis*) (CBS)
* Mourning Warbler (*Oporornis philadelphia*) (CBS)

**Ruby-throated Hummingbird (*Archilochus colubris*)
**Least Flycatcher (*Empidonax minimus*) (CBS)
**Great-crested Flycatcher (*Myiarchus crinitus*)
**White-eyed Vireo (*Vireo griseus*) (CBS)
**Yellow-throated Vireo (*Vireo flavifrons*) (CBS)
**Wood Thrush (*Hylocichla mustelinas*) (CBS)
**Gray Catbird (*Dumetella carolinensis*) (CBS)
** Blue-gray Gnatcatcher (*Polioptila caerulea*) (CBS)
**Tree Swallow (*Tachycineta bicolor*)
**Blue-winged Warbler (*Vermivora pinus*) (CBS)
**Yellow Warbler (*Dendroica petechia aestiva*) (CBS)
**Golden-winged Warbler (*Vermivora chrysoptera*) (CBS)
**Black-and white Warbler (*Mniotilta varia*) (CBS)
**American Redstart (*Setophaga ruticilla*) (CBS)
**Prothonotary Warbler (*Protonotaria citrea*)
** Worm-eating Warbler (*Helmintheros vermivorus*) (CBS)
**Ovenbird (*Seiurus aurocapilla*) (CBS)
**Louisiana Waterthrush (*Seiurus motacilla*)
**Kentucky warbler (*Oporornis formosus*) (CBS)
**Common Yellowthroat (*Geothlypis trichas*) (CBS)
**Yellow-breasted Chat (*Icteria virens*) (CBS)
**Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
**Indigo Bunting (*Passerina cyanea*) (CBS)
**Baltimore Oriole (*Icterus galbula*) (CBS)
**Orchard Oriole (*Icterus spurius*) (CBS)

Purple Martin (*Progne subis*)
Veery (*Catharus fuscescens*) (CBS)
Gray-cheeked Thrush (*Catharus minimus*) (CBS)
Swainson's Thrush (*Catharus ustulatus*) (CBS)
Orange-crowned Warbler (*Vermivora celata*) (CBS)
Hooded Warbler (*Wilsonia citrina*) (CBS)
Canada Warbler (*Wilsonia canadensis*) (CBS)
Summer Tanager (*Piranga rubra*) (CBS)
Scarlet Tanager (*Piranga olivacea*) (CBS)

Table 2. Migratory Birds of Concern at BAAP (Aldo Leopold Chapter, Society for Conservation Biology 1998)

Grassland Species
Upland Sandpiper (SC)—SA
Bobolink (SC)—SA
Eastern Meadowlark (SC)—NA
Western Meadowlark (SC)—NA
Grasshopper Sparrow (SC)—NA
Dickcissel (SC)—SA
Sedge Wren (W)—US

Shrub/Savanna Species
Field Sparrow (SC)—US
Vesper Sparrow (SC)—US
Brown Thrasher (W)—US
Eastern Bluebird (W)—US
Eastern Towhee (W)—NA
Clay-colored Sparrow (W)—Mex

Others
Western Kingbird ((SC)—Mex
Orchard Oriole (SC)—CA
Henslow's Sparrow (T)—NA

that may follow a gross order, though somewhat integrated chronologically. Phase 1 is identifying potential projects and obtaining some seed funding for them. Identifying a local contact or other introduction into the community is important as is identifying the conservation focus (species or ecosystem). After an initial site visit, a proposal can be created to influence the community or other levels of government and to help in pursuing seed funding. The onsite visit also allows developing contracts with local participants.

Phase 2 focuses on initiating the process of developing an organization that in the future will take over the project to focus on community conservation and development. During this phase, some priorities are set and either a volunteer or paid coordinator becomes a focal staff for the project. Initially, this may be a foreign volunteer but will eventually be a local person. Phase 3 means locating resources to help; finding staff and volunteers for this local group; and beginning preliminary training of them.

Phase 4 involves research and information gathering on community needs, sociology or anthropology of the community and area, biology of the area to be conserved, and the development of working maps of the area. Phase 5 is developing a plan for education, targeting the general public, the local community, and the group board or committee and extended organization. Education or conservation awareness should be broad-based and may include newsletters, posters, website, videos, presentations, public meetings, pamphlets, and personal word of mouth. Phase 6 is helping the community or community group to develop a management plan and operation plan (long and short term), develop infrastructure (Phase 7), implement the plans (Phase 8), and formalize the components of what has been occurring (Phase 9). Finally, in Phase 10 of the process, the catalyzing organization terminates its major role that is assumed by the local community group. The catalyzing group/persons should follow the project's progress and be ready to give support when needed and asked for.

Central America and Wisconsin Birds

While I have worked in a number of Central American countries, the focus of this paper is on a few Belize projects and lessons learned from them. The Community Baboon Sanctuary is the main example. (Reference is to the Black Howler Monkey, affectionately called "Baboon" by the locals.) Other projects such as Gales Point, Manatee and Five Blues National Park have been written about elsewhere (Horwich and Lyon 1998, 1999; McLain 1997). While not specifically focused on birds in either Belize or Wisconsin, the projects protect many Wisconsin birds and encourage studies of them (Bider 1997; Robbins et al. 1992). Species such as Gray Catbird (*Dumetella carolinensis*), Wood Thrush (*Hylocichla mustelina*), Baltimore Oriole, (*Icterus galbula*), Ruby-throated Hummingbird (*Archilochus colubris*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Indigo Bunting (*Passerina cyanea*), Black-and-white Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), Common Yellowthroat (*Geothlypis trichas*) and the Ovenbird (*Seiurus aurocapilla*) are species found in the southwestern Wisconsin forests that depend on Central America for their southern wintering range (Greenburg and Reaser 1995).

Belize Community Conservation Projects

Community Baboon Sanctuary—The Community Baboon Sanctuary (CBS) was initiated as a community sanctuary in 1985 without government involvement. The main goal of the CBS project is local protection of the howler monkey (*Alouatta pigra*) and its habitat through encouraging a stewardship ethic in landowners. The sanctuary lands are privately owned by subsistence farmers who have signed a voluntary pledge to abide by a howler conservation management plan for their lands. Details on the history and scope of the project can be found in Horwich (1990) and Horwich and Lyon (1988; 1990; 1995; 1998; 1999). In addition to the local protection of the howler, the CBS project has spread interest in howler protection countrywide. The sanctuary is managed by a board of local citizens and generates monies through ecotourism (Horwich et al. 1993b; Bruner 2002).

As a first project, it set the standard, focusing on five facets: conservation, education, research, community development, and economic development. It was based on voluntary pledges of over 150 landowners who agreed to abide by simple management plans to leave aerial paths in large milpa (slash and burn) clearings, and to leave forest along property boundaries and along the river.

The education program evolved to include a simple rural museum which was Belize's first museum, a sanctuary book that was given to schools and sold to tourists (Horwich and Lyon 1990), an education program which reaches about 3000 schoolchildren yearly who visit the CBS, foreign high school and college classes hosted by CBS, and a recently built education center equipped with computers and a small lecture hall.

The research program included population behavior and ecology of the black howlers (Lyon and Horwich 1996; Silver et al. 1999; Horwich et al.

2001), studies of the sanctuary (Hartup 1989; Bruner 1993; Hartup 1994; Bruner Lash 2003), studies of community hunting practices, and studies of the endangered Central American river turtle (Polisar 1995; Polisar and Horwich 1994). Bird studies in the CBS have specifically shown which Wisconsin species depend on Belize wintering grounds (Table 1) (Bider 1997; Robbins et al. 1992). The CBS donated howlers for a reintroduction into the Cockscomb Basin of Belize (Horwich et al. 1993a; Koontz et al. 1994) and also contributed howlers for another small release in the Cayo District of Belize.

Economic development has focused on ecotourism with guiding and crafts bringing income to local residents. Sustainability and economic benefits come from the 4–6000 yearly visitors (Hartup 1989; Bruner 1993). A sanctuary owned restaurant and a portion of guiding fees goes to support the sanctuary staff. In 1998 a Woman's Conservation Group took over management and deals directly with government, NGOs, and outside agencies.

The CBS's strongest success has been its influence on rural communities countrywide, due to major international publicity (ABC/Kane 1991; National Audubon Society 1991; Project Lighthawk 1992; Lipske 1992; Koontz 1993; Wildlife 1994). National publicity has stimulated, both directly and indirectly, dozens of community-based conservation and ecotourism programs (Bevis and Bevis 1991; Ministry of Tourism and Environment 1994, 1995; Ketchi Council of Belize and Inuit Circumpolar Conference 1997).

Sarstoon-Temash National Park—In early 1989 I visited Punta Gorda and the villages of Crique Sarco and Baranco to explain the concept of a Biosphere Reserve and ask villagers to sign petitions inviting me into the area to begin preparation for a Biosphere Reserve encompassing lands between the Temash and Sarstoon rivers on Belize's southern border. Although area residents were interested, the government politicians were not receptive to a proposal that I submitted to them. Then in 1994 the government created the Sarstoon-Temash National Park without consulting community members of the surrounding six villages who knew little about it or its boundaries.

In 1997 with the help of Judy Lumb, CC re-catalyzed the idea. Volunteers traveled to four villages to explain about the existing National Park, and encouraged attendance at the proposed meeting on community co-management of the park. The meeting, held in Barranco, was attended by the Belize Department of Forestry, other government agencies, foreign NGOs, and granting agencies, as well as members of the Mayan communities of Crique Sarco, Sunday Wood, Conejo, Midway, and Barranco, a Garifuna community. We published the transcripts of the meeting in 1998 (Anon. 1998). The meeting resulted in the creation of a steering committee of the five villages.

Later, meetings of community representatives resulted in the formation of a co-management committee for the National Park and led to obtaining small grants to form SATIIM (Sarstoon Temash Institute of Indigenous Management). SATIIM in turn obtained a $800,000 Global Environmental Fund grant to create a management plan, collect biological and tradi-

tional ecological knowledge data, and to get training for co-management (Caddy et al. 2000). SATIIM carried out an education campaign to overcome initial resistance to the National Park. Although SATIIM is an indigenous organization and claims to be community-based, it receives criticism from its village constituents who claim that the Punta Gorda based SATIIM is not representative of villagers (De Vries et al. 2003).

Wisconsin Community Conservation Projects

The Wisconsin community projects have focused on both forest and prairie habitats which are protecting at least 138 species in the Kickapoo Valley (Institute for Environmental Studies 1974; Table 1) and a number of significant grassland species in the Blue Mounds area, BAAP lands, and ornate box turtle areas (Table 2).

Ferry Bluff Eagle Council—The Ferry Bluff Eagle Council (FBEC) evolved from a working chapter of the Eagle Foundation of Cassville that went bankrupt in 1988. They incorporated in 1988 as the Ferry Bluff Eagle Sanctuary that became Ferry Bluff Eagle Council in 1990. In 1988 FBEC, had hoped to purchase Ferry Bluff, an important bald eagle roosting site. but it was instead deeded to the DNR. Erickson, President of the then Ferry Bluff Eagle Sanctuary, was familiar with the CBS and contacted me to initiate a program to form the Sauk-Prairie Eagle Sanctuary to protect eagle roosts. Sixty landowners were signed into the program with simple management plans but the program was later abandoned. FBEC developed a tourism viewing overlook at Prairie du Sac and initiated the first eagle days in 1990, jointly sponsored by the DNR, Sauk-Prairie Chamber of Commerce, and some local businesses. Ecotourism research indicated that over 10,000 tourists were spending over $618,000 in a ten week period in the Sauk-Prairie area (Van Koningsveld et al. 1994) which is now estimated to be over $750,000. Besides serving an education purpose, the FBEC engages in winter eagle monitoring and studies of radio-tracked rehabilitated eagles. They also purchased a conservation easement for lands encompassing one eagle roost and brokered another purchase of adjacent lands by the state government.

Ornate Box Turtle Conservation Project—The ornate box turtle (*Terrepene ornata ornata)* ranges from its northern-most area in southern Wisconsin southwest into Texas and northern Mexico. It inhabits a dry-mesic prairie habitat on sandy soils like the Spring Green Prairie. Since little habitat is left, it inhabits isolated pockets of remnant prairies.

When Bill Moore, a freelance writer and turtle enthusiast, approached CC in 1991, we worked with him to compile an update of areas of occurrence for the species before preparing a protection plan for them. Moore reviewed old records and began surveying the likely sites. That year he discovered a large turtle population in Rock County. Soil maps were also used to locate potential sandy prairies. Because most of the turtle habitat was on private lands, he contacted 156 landowners in 7 counties with the help of Bob Hay of the Bureau of Endangered Species. In 1992 the project was taken over by the DNR and in 1993 they began a public relations

/management project surrounding the one viable population in the state in Rock County. They worked with a group of four landowners on 90 acres to protect the turtles and improve their habitat. Three other landowners with an additional 99 acres were also contacted. In 1996 they began implementing a management plan with some landowners. Since this is the only viable population, they began translocating relict individuals to a common site to build another viable population. By 1997 they had begun a long-term relocation project and had translocated 45 turtles to the protected site and began head-starting hatchlings to be released at an older age into this population. Research using telemetry was done and turtles are now breeding in this new site.

Kickapoo Valley Reserve—In the 1960s, 144 Wisconsin farm families were displaced from their lands, covering 3468 ha, for the creation of a flood control dam by the U.S. Army Corps of Engineers, who acquired the land in 1963 (Rich, 2001). Pressure from outside environmental groups stopped the dam initiative and the dam was never built. This resulted in over 20 years of social conflict and economic stagnation while local citizens expressed their outrage at the removal of the farm families without the promised economic benefits (Van Wie 2000).

In 1991, while canoeing the Kickapoo River, Governor Tommy Thompson publicly announced that the Kickapoo Dam issue was dead. In response Community Conservation with local Kickapoo Valley residents wrote a proposal in 1992 proposing the lands as a protected area. I presented the proposal to the Kickapoo Valley Association and was requested to make a presentation to a committee working with UW extension agent Alan Anderson who had recently been appointed by Governor Thompson to research and stimulate economic activities in the Kickapoo Valley. I later worked with the committee who used the proposal to encourage the community and politicians to create the Kickapoo Valley Reserve (KVR). In 1993, government lawyers, with the help of local politicians and community members, created legislation to turn the lands over to the Wisconsin Department of Administration and create a predominantly local Kickapoo Valley Reserve Board to manage the lands. The legislation that passed in 1996 in both houses, called for up to 485 ha to be given to the Ho-Chunk Nation under the Department of the Interior to be protected for cultural reasons. Since its creation, there have been at least five evaluations of the Reserve (Burger, 1994; Conzemius and Lyon 1997; Davidson 1994; McLain 1997; Van Wie 2000).

McLain (1997) noted that the KVR's success was linked to having a coordinator in place during its formation, strong legal and financial support from the State, and research linkages to the University of Wisconsin. In addition to the state's yearly budget of approximately $170,000, the Reserve has acquired state grants and some user fees are also collected. The completion of a new education center in 2004 will provide future economic benefits from increased tourism. Research on the Reserve included studies dating back to the original dam proposal in the 1970s and later research carried out by the University of Wisconsin with maps generated by the Ho-Chunk Nation.

A community opinion survey

showed lack of support for the management of the Reserve by local communities (Conzemius and Lyon 1997). While there has been community participation at public Reserve meetings, Reserve committee meetings, and Reserve events, there has been some discouraging of selected individuals to participate. A more recent survey of adjacent landowners showed an even split of negative responses by older residents and more positive responses to the Reserve by newer residents, many who were not influenced directly by the history of the Reserve (Van Wie 2000). The Kickapoo Reserve Managing Board consists of four local members, two other valley residents, three Governor appointed experts, and two Ho-Chunk members; however, all are Governor appointed and all advisors are from the state making the Board political with some disregard of community concerns. The Reserve functions as a co-management system between the state and the Ho-Chunk Nation (McLain 1997) with a locally dominated Managing Board.

Valley Stewardship Network—The idea of a Kickapoo watershed stewardship group began when Community Conservation (CC) wrote a proposal with the West Fork Sport Club in 1994 to create a buffer area for the newly created Kickapoo Valley Reserve. This proposal led to the creation of a consortium of schools for water monitoring. In 1996 CC hired a watershed coordinator to run the program. Trout Unlimited, influenced by the original CC proposal, began an extensive two-year initiative to work with government and NGOs to strengthen the river protection. CC initiated a summer institute in 1997 to train teachers in water quality monitoring and a newsletter was begun. The school connection eventually led to a sister watershed program between Kickapoo Valley Schools and schools adjacent to the Manatlan Biosphere Reserve in Mexico. A grant to initiate GIS mapping in 1998 in the Valley schools complemented the program. The water quality monitoring program eventually involved citizen monitors. In 1999 Valley Stewardship Network was born out of the Watershed Consortium. They became an independent non-profit organization in 2002 and have since focused on helping local townships with land use planning and in compiling data on biodiversity in the Kickapoo Valley.

Blue Mounds Area Project—This project was initiated in May, 1995 by a proposal by Brian Pruka who was interested in protecting oak savannas that he had been studying in Dane and Iowa Counties in southwest Wisconsin (Pruka, 1995). The goal was to help private landowners enhance the biodiversity of non-economic species on their private lands. Beginning in 1996, support from the Wisconsin Environmental Education Board, the Madison Community Foundation, Laird Norton Foundation, the Prairie Enthusiasts, and the Wisconsin Department of Natural Resources maintained the project.

With Pruka as the initial Project Director and part time Ecological Extension Agent under an Advisory Board project membership increased to 80 members and surveys of 43 private lands were made. The program began a weekly column for the Mount Horeb Mail and carried out a public education program of workshops, presentations to area organizations, booth pre-

sentations for conferences, and radio interviews.

Although progressing well, the program still only allowed for a part-time extension agent. Frustrations with sporadic funding led Pruka to resign after mobilizing an additional group of landowners to become active in working with the project. The situation left two groups of board members with varying views on project direction in 1997. The next few months were spent integrating the old advisor board with the new volunteers to create a stronger 9 member advisory board (4 officers) with a greater number of local landowners as well as professional biologists and myself as advisor. The project still functioned under the umbrella of Community Conservation, with a temporary board.

In early 1998, the Blue Mounds Project hired Bob Wernerehl as the Ecological Extension Agent and the Advisory Board played a stronger role in directing the project. Varied education programs were attended by over 150 people and a quarterly newsletter, begun in 1995, is now circulated to over 600 area people. Land visits increased to a total of over 100 landowners and over 4000 acres. During 1999 membership doubled to about 180 members, and the newsletter was then mainly circulated to members with annual reports and other materials.

The Blue Mounds Project is now operating in a 18-township rural area of south-central Wisconsin, mainly Dane and Iowa Counties with a few sites in four adjacent counties. It has provided ecological extension services to over 100 landowners in the area. The project manager, serving as an Ecological Extension agent, does species inventories and works to encourage biodiversity and ecologically sensitive land use by private landowners. He assists landowners by providing information, seeking economic benefits, and coordinating community efforts to protect their natural resources. He identifies conservation issues by identifying uncommon animals and plants on the lands, helps to implement land management techniques, and assists landowners in seeking government subsidies, management services, and harvesting services. The lands managed include over 13,000 acres in southwest Wisconsin that are managed for prairies, woodlands, wetlands, and oak savannas. These acres include 14 plant and 3 bird species (Bell's Vireo (*Vireo bellii*), Henslow's Sparrow (*Ammodramus henslowii*), and Grasshopper Sparrow (*Ammodramus savannarum*) that are threatened or endangered. The managerial advice also includes methods of controlling invasive plant species.

Each landowner who requests a site visit is visited on their land for 3–6 hours in which the Ecology Extension Agent walks their land with them, noting the occurrence of endangered and threatened species and species of note. The landowners are given information on methods of management for these species or any other pertinent management ideas for the lands they own. After each visit the ecologist leaves them with a sketch of their lands with a rough vegetation map indicating various ecosystems on the property. Each site map is accompanied by written comments indicating a description of the ecosystems and how they relate to each other, management practices that have occurred in the past and the results of these practices, various positive features of the land,

dominant and significant species, native and invasive species, landowner's long term goals, and management recommendations. This is often accompanied by aerial photos of the lands and a letter with some of the highlights of the visit.

Environmental education is a strong element of the project, including species inventories, newspaper columns, and public workshops on land use topics. The project has had partial sustainability through donations and membership dues that have increased to about 200 members. This covers a quarter of the project's yearly budget of $20,000 for a half-time salary for the ecologist, newsletter production, and administration. Additional funds have been through grants and some consultancy fees.

Badger Army Ammunition Plant Lands—CC's involvement in BAAP lands was as a project catalyst in the early phases of the project until others took a leadership role. In late 1996, a CC board member faxed us a letter by Laura Olah of Citizens for Safe Water Around Badger (CSWAB) asking CC to sign a letter to Senators Feingold and Kohl and State Representative Klug against a strategic plan to reindustrialize BAAP for chemical based industries. Olah suggested instead that the community must come together to create a vision sensitive to community needs and the natural resources of the area.

CC began to work with CSWAB in July 1997 in an effort to develop a vision for the BAAP lands. CSWAB hosted a series of community meetings in which I spoke on community conservation and its implications for BAAP lands. By mid-November of that year the army announced the closure of Badger. CSWAB quickly followed with a community meeting about the situation and CC drew up a proposed strategy. By mid-December a CC proposal draft was complete but there was no agreement by area residents to sign on to it, and CC preferred to have resident participants. However, when representative Klug set up a month-long task force during March 1998, CC completed the proposal which was embraced by the newly formed Community Conservation Coalition for the Sauk Prairie (CCCSP) and presented to task force members. Despite an article about the proposal in the local newspaper and an invitation to task force members to hear about the vision for BAAP, timing was late and it was not considered seriously by them. However, nothing was resolved by the task force.

By the summer of 1998, Sauk County and the Ho-Chunk Nation became involved in discussions. In the summer of 1999, I participated in a seminar on the Kickapoo Reserve as a model for the BAAP lands. Community Conservation used the Kickapoo Valley Reserve as a model to help local people in the Sauk-Prairie region to create a prairie reserve from the BAAP lands.

In 2000 the General Services Administration (GSA), whose responsibility is to redistribute government lands became involved. In May 1999, Representative Baldwin and a congressional delegation obtained $100,000 for Sauk County to facilitate committee meetings to build community consensus for the reuse of BAAP lands. This committee of over 20 varied members reviewed a number of proposals at public meetings including one by CCCSP modified from CC's original proposal. The badger reuse committee came up with a final report in March 2001. Due to a major educational and research cam-

paign by CCSP, the final report supported much of the conservation related ideas of the CCCSP proposal. Research on grassland birds indicated the area as significant for grassland birds (Table 2). The BAAP situation is still unsettled but the general community under a Reuse Committee has created a plan for a conservation area to be co-managed by the State, the Ho-Chunk, and the U.S. Department of Agriculture.

Discussion—Lessons Learned

Community Conservation has catalyzed or worked with over 20 young community-based projects in nine countries, encompassing 16 cultures and over 160 villages. Over 75% of the projects have formed conservation management groups, nine of which are fully empowered and managing projects. All are ongoing after 8-20 years. Sixteen involve fully protected areas for a total of 1.2 million acres. The lessons learned have been reinforced over and over and have been exhibited in the Belize and Wisconsin projects described.

Project Initiation Lessons—In initiating and carrying out a project, individuals and volunteers are important and can make a major difference. Having a project support coordinator is a key component; the coordinator can initially be a foreigner or volunteer but must eventually become a local person, preferably in a paid position. Proposals have great power to involve community members and government agencies and can be utilized for obtaining funding. Because all projects are individual, catalyzing one depends on flexibility, seeking creative solutions, and working within the project and community resources and limitations. Finally, it is very important to monitor the project and catalyze and re-catalyze it when necessary, as led to success in the Sarstoon-Temash National Park.

Community Lessons—The main lesson from the CBS is that communities can take a leading managerial role and we must work with them on ethical and practical grounds. Their knowledge of the area and traditional indigenous knowledge can be used and integrated with formal academic knowledge. Using community members in data gathering and in making maps is useful and serves to integrate community members into the project. Raising community desire for the project and having a persistence group of community members can maintain project continuity. Having strong, reliable community leaders can be a major help but people can also be obstructionist and there is always a complexity of community problems and history that are hard to separate from the project. Thus community jealousies, that are almost always present, hamper projects. Lastly, as in the CBS and the Kickapoo Reserve, community models can have a major impact in catalyzing regional effects as they did throughout rural Belize and southern Wisconsin.

Establishing an empowered community group that can interact directly with government and other outside agencies and knows how to find and use available resources is the key to a long-term successful community conservation project. Training is a major component for creating strong community participants. A broad based community initiative is necessary from

the beginning with a striving for equity in the community that is extremely difficult to attain. Finally, an advisory board as used in the CBS can integrate educated and talented outside individuals with ties to the community.

Continuity and Sustainability Lessons—Discontinuity of resources and programs discourages community members; but projects will revive as long as the idea remains. Techniques are often replicable in various projects. The importance of models for regional influence cannot be overstated. The course of Belize conservation has been changed due to the CBS model.

Financial Lessons—Some basic level of seed and maintenance money is essential. Additionally, establishing a mechanism for a low level of financial sustainability is of great importance as was done in the CBS from guiding fees. Indeed financial discontinuity discourages the community as happened in the Gales Point, Manatee project. While ecotourism is not a panacea, it does have potential for sustaining a project and incentives for local economic gain as in the CBS and the Ferry Bluff Eagle Council.

Government Lessons—While a strong government is important in establishing a balance for co-management, politics and corruption can hamper a project. Government may also act too slow or reduce community initiative. That is why it is important to establish equality in co-management and maintain community-government communication. A main role for government is in establishing consistent, long-term laws for land use, management, and protection with concern for community and indigenous rights. The conservation of private lands can be strengthened with voluntary legal restrictions. While keeping the environment free of politics is important, it is also difficult.

NGO lessons—The main role of an NGO is as intermediary, educator, and trainer between the community and government or other outside agencies. NGOs need to strengthen the community organizations and connect them directly with the resources they need to become managers of the project. Once effective, the NGO moves to the next community. As networkers and collaborators, NGOs must use transparent communication.

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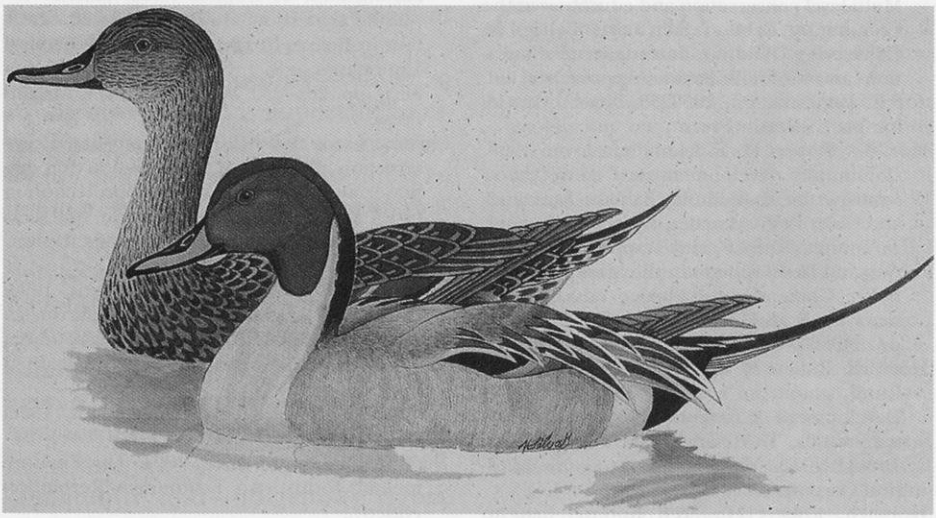

Northern Pintail, pair

Nicaragua Project for Bird Conservation Education

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Origins of the Project

The Nicaragua Project for Bird Conservation Education was an outgrowth of the One Bird—Two Habitats program in Wisconsin. It all started with a phone call from Wisconsin-Nicaragua Partners to the Wisconsin Department of Natural Resources (WDNR) suggesting creation of a program to teach Wisconsin students about Nicaragua through the vehicle of migratory birds. The result, developed by Susan Gilchrist and the WDNR in 1994, was an interdisciplinary middle school environmental education curriculum about neotropical migratory birds and the issues they face. The Nature Conservancy then took the Wisconsin curriculum to the Bosawas forest area in northern Nicaragua, where teachers adapted and translated the curriculum for use there. In 2001, Susan traveled to Mombacho in the southern part of Nicaragua, and conducted a workshop to train teachers on the use of the Nicaraguan version of the curriculum, Un Ave—Dos Habitats. During that workshop, Susan made contacts and laid the foundation for the cooperative effort that ensued.

Thanks to email dialog with the Nicaraguan contacts, Susan wrote a grant proposal to the U.S. Fish and Wildlife Service. The grant was awarded to the Wisconsin Society for Ornithology (WSO), and thus the Nicaragua Project was born. Initially the idea was to team with the Nicaraguans to create a bird education program for the schools, but after consideration, the project changed

course. It would make more sense to support dissemination of the program they already have there, Un Ave—Dos Habitats, than to invest in developing a new activity guide. Many Nicaraguan schools lack classroom supplies and basic materials for implementing any bird education program, so creating another would not advance bird conservation education very far. Instead, the Nicaragua Project focused on developing a plan for migratory bird conservation education across Nicaragua. It was our hope that focusing efforts within the scope of a plan would support the Nicaraguans to find their own direction and obtain further funding.

The Cast of Characters

The grant proposal requested funds for a workshop to bring people together, so that is where we started. Thanks to the grant, we brought four visiting expert consultants to Nicaragua: Susan Gilchrist, an education researcher with the Wisconsin Department of Natural Resources (WDNR) who is familiar with many of the bird education programs across the country; Bill Volkert, WDNR Wildlife Educator and Naturalist at Horicon Marsh and an avid eco-tourist; Susan Bonfield, who is the education coordinator for International Migratory Bird Day (IMBD) in the United States; and Jorge Botero, a bird conservation researcher with coffee growers in Colombia, South America, who did his graduate studies in Wisconsin.

The project director in Nicaragua, Maria Ignacea Galeano, invited bird conservation educators and researchers to attend the workshop and participate in the project. Although we initially expected representatives of a number of conservation organizations, all the participants had had some connection to the Fundacion Colcibolca, the Nicaraguan agency referenced in the grant. Half the participants were educators, while half were researchers. Three were adeptly bilingual and served as translators between English and Spanish speakers. On the day we arrived for the workshop, all but two of the Nicaraguans were suddenly unemployed. They were extremely dedicated and committed to following through with the project regardless of their job situations.

The Nicaraguan participants were: Maria Ignacea Galeano, environmental educator and Nicaraguan director of the project; Juan Carlos Martinez, ornithologist and former director of the Fundacion Colcibolca research team; Alejandra Martinez, ornithologist and research assistant, also an educator and naturalist interpreter; Jose Manuel Zolotoff, field researcher and director of the Partners In Flight Project for Nicaragua; Salvadora Morales, ornithologist and coordinator of the MOIS project; Edgar Castaneda, director of Chocoyero National Park; Maria Jacinta Hernandez, environmental educator; Alexandra Zamora, environmental educator; Marisol Mena, environmental educator (Figure 1.)

On-site in Nicaragua

In September 2002, we flew to Managua, Nicaragua's capitol, then traveled to the colonial city of Granada, located about an hour southeast of Managua. Here we met with some of the Nicaraguan workshop leaders to

Figure 1. The Nicaraguan Bird Conservation Education Planning Team consisted of nine Nicaraguan scientists and educators plus four visiting consultants.

review the workshop agenda, goals and objectives. This pre-workshop planning was important to be certain that everyone had similar expectations of the process and outcome of this effort.

On the following day we left the sweltering heat of Managua and Granada for the cool elevation of the Mombacho Volcano Natural Reserve, located about 20 minutes south of Granada. Mombacho is one of a series of volcanoes that punctuate the land across Nicaragua and rises more than 4,000 feet above the surrounding plain. The upper slopes of Mombacho are covered in a tropical cloudforest, or high elevation rainforest. This area of the mountain is protected as a reserve while the lower portion of the volcano has been developed for coffee plantations and other agricultural uses.

Mombacho protects a unique elfin forest. While it is very rich in its plant life there are only a few specialist bird species to be found on the summit. However, one of the most unusual denizens of this area is the endemic Mombacho salamander, *Bolitoglossa mombachoensis*. This amphibian lives among the dense vegetation of the cloudforest and is active only at night. It is found nowhere else in the world outside of this mountaintop forest.

The way to the top is an extremely steep climb up the mountainside on a one-lane switch-back road. Only heavy-

duty four-wheel drive trucks, Russian-made remnants of the Nicaraguan civil war, make the journey, and due to the fact that the road is so narrow, only one vehicle can go on the road at a time. The road was built for the installation of communication towers, but once the road made the upper reaches of the volcano accessible, the area was protected.

On the summit, we stayed in bunks at the biological station and visitor center, ate beans and rice from the kitchen, used sawdust rather than flush toilets, and took showers with chilly water from the cistern when we braved the cold. The classroom at this facility served as the location for our workshop. Here the team of nine Nicaraguans and four visiting consultants met for four days to develop a bird conservation education plan for Nicaragua.

Exchanging Information in the Workshop

During the first two days of the workshop, both the visitors and the Nicaraguan team shared information. We shared information about migratory bird conservation issues and what is being done to address the issues in the US and Nicaragua. We provided an update on Partners in Flight and the Wisconsin Bird Conservation Initiative (WBCI). The Nicaraguans identified some human activities that directly impact bird conservation: habitat destruction, especially deforestation; draining and contamination of aquatic habitats; habitat fragmentation; traffic in birds as pets; hunting, including subsistence as well as commercial and sport; protection through parks, reserves, and wildlife refuges; cultural traditions; and national, regional, and international policies.

We shared information about community education efforts in Nicaragua, Colombia, and the US. We exchanged ideas for and experiences with International Migratory Bird Day celebrations, including the Horicon Marsh Bird Festival. We discussed teaching bird conservation research and enjoyed a paper airplanes activity about bird-banding. We learned about the benefits of shade grown coffee as bird habitat from one of the world's experts.

Throughout the workshop, the agenda was spattered with an array of educational activities, which the Nicaraguans seemed to greatly enjoy. They were especially appreciative of one activity about migration that uses compasses. The activity is part of the Wisconsin One Bird—Two Habitats curriculum, but was cut from the Nicaraguan version when the program was adapted and translated, and thus was new to them.

To support the Nicaraguans in their efforts to link eco-tourism with bird conservation, Bill made a presentation on what avi-tourists are likely to look for in selecting sites for birding tours. Knowing that building eco-tourism in their country may indeed aid conservation efforts, the Nicaraguans are developing a field guide to the birds of Nicaragua. Through an Adopt-a-Bird program, they are requesting contributions to pay a talented artist to draw the birds for the field guide. [*See the About the Artist page of this issue.*]

Overall, we were impressed by the level of training and professional expertise among the Nicaraguan participants, and the degree of research they

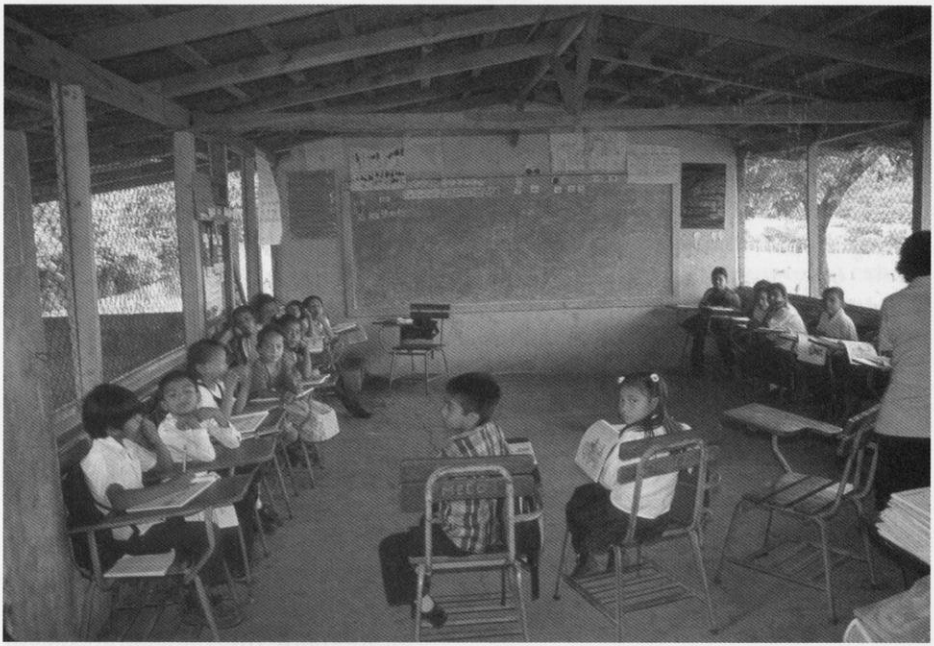


Figure 2. To establish bird conservation education in Nicaragua schools like this one, we must address the need for basic supplies and educational resources.

are undertaking in this poor Central American country. While they are well prepared to undertake the work of bird conservation, they seriously lack funding and support, particularly to initiate education programs.

Visiting Schools during the Workshop

In order for all of us to understand the Nicaraguan education system and the issues schools face, we took a field trip to visit some schools in the area surrounding Mombacho. This was a significant learning experience not only for the visiting consultants, but also for the researchers, some of whom had never visited a school themselves. Divided into small groups, we visited diverse schools.

Some schools featured children in neat uniforms seated in orderly desks inside classrooms with posters or pictures the children had drawn on the walls. In one school, students had taken a field trip to Mombacho the previous year. The students learned about native plants and animals in their own country and local efforts to protect them. In the classroom they wrote compositions about their experiences and sketched the place they visited. These student works were used for an exhibit of the flora and fauna of Mombacho.

Other schools consisted of simple walls without actual doors or glass windows, with cement or dirt floors, a paucity of furniture, and a notable absence of any school supplies or educational materials whatsoever. We visited

one poor country school that consisted of nothing more than a concrete block wall with a tin roof, located next to a cow pasture (Figure 2). The kindergarten was a 10′ by 12′ area surrounded by a three-foot concrete wall with a dirt floor. Inside was a single table with a few chairs for the students. Their only teaching materials consisted of a few educational toys which had to be taken home each night by the teachers, since several months earlier someone had broken into the tiny school and stolen the few teaching items they had. The elementary school was located adjacent to the kindergarten area and consisted of a single open-air room with two dozen old desks and a chalkboard. These schools offered no opportunity for field trips or funds for educational materials to teach conservation or environmental education subjects. The teachers focused on basic skills. Most of these students would only be attending school to the 6th or 8th grade before they would be required to work at home and help the family survive.

Seeing these schools helped us understand some of the conservation issues as well as educational constraints. It is often children and their parents from such circumstances who capture wild birds for sale. While the laws prohibit this, it is widely and openly practiced. Many of these families are poor rural farmers who still rely on slash and burn agriculture. Their awareness of conservation issues and their role in habitat destruction and the illegal pet trade are low on the list of their personal priorities, although of concern to us.

There are not enough teachers and classrooms for all the students to attend school full-time, so sometimes they attend in morning and afternoon shifts. The great need for basic supplies such as books, paper, and writing and drawing utensils is a limiting factor for getting bird conservation into the schools—teachers can't do educational activities like the ones in US schools if they have no materials. On the other hand, this lack of materials may also represent an opportunity in that teachers will likely be glad to teach whatever they receive the materials to teach. While the teachers felt that environmental education and bird conservation were interesting and worthwhile subjects, they emphasized that they lacked proper training and materials to undertake the effort in most cases.

Additionally, the education system requires that any curriculum being introduced be accepted by the Ministry of Education, as Un Ave—Dos Habitats was. The educators on the Nicaraguan bird conservation team stated their intention of gaining this important governmental acceptance for bird conservation education programs.

Developing the Plan during the Workshop

After reviewing bird conservation education efforts in Nicaragua and sharing a sampling of programs from the US during the first two days of the workshop, we turned our attention to developing a bird conservation education plan. We provided some experience in strategic planning, always remembering that the plan belongs to the Nicaraguans to devise and implement as they see fit. The entire project truly was a cooperative effort.

While we all agreed schools were a high priority for bird conservation education efforts, and the Nicaraguan environmental educators had made great strides in developing a variety of education programs, there appeared to be a lack of coordination and prioritization of these efforts. In addition, we wanted to expand notions of education beyond schools and into the community. With limited resources available, it is essential to develop a targeted approach.

The process began with brainstorming to identify key messages the Nicaraguans wanted to convey, then target audiences they wished to reach with education, and, lastly, the methods of delivery that might be used to reach the audiences. We discussed the lists, lumping and splitting items, until the following priority items were identified.

Key Messages

- Nicaragua is rich in birds.
- Humans are both the source of and the solution to problems in bird conservation.
- Birds are interesting and valuable.

The Nicaraguans identified five audiences they wanted to target: teachers, parents, forest rangers, local guides, and birdwatchers. Then they identified a variety of delivery mechanisms for conveying the selected messages to the targeted audiences. Among these were workshops, interpretive tours, birding trails, bird festivals and other events, the media, educational packets and other published materials, web pages on the internet, displays and exhibits, and more.

The Nicaraguans constructed a matrix that correlated the messages with the various audiences and identified the method by which they could be delivered to each group. Although workshops may not have been the most effective method for reaching some of these target audiences, the Nicaraguan participants decided to conduct follow-up workshops to do exactly that. At their request, the visiting consultants helped them plan these workshop agendas.

This brainstorming and discussion exercise provided the basis for the development of a comprehensive bird conservation education plan for Nicaragua. While the visiting consultants provided examples of efforts that could be included in a plan, facilitated the brainstorming and discussion, and participated directly in the process of planning, the Nicaraguans wrote the plan, since they would be the ones left to implement it.

The Nicaraguan Bird Conservation Education Plan

The plan the Nicaraguans drafted includes actions to address their bird conservation education goals:

- incorporate bird education in the curriculum prescribed by the Ministry of Education;
- provide education materials to support bird education in the schools;
- support teachers through training, consultation, and interscholastic observation tours;
- promote student participation in bird monitoring;
- establish relationships with commercial enterprises to promote bird conservation education;
- pilot a program of coffee growers

supporting bird sanctuaries through sales of bird-related products;
- capitalize on tax credits for tourist projects to avi-tourism through a network of bird sanctuaries;
- produce games and educational materials related to birds to educate through entertainment;
- distribute bird conservation information to media and invite the media to bird events;
- create birding trails with interpretation;
- create more birdwatching clubs and popularize birding.

Completing the Project

After the cooperative four-day planning workshop, the Nicaraguans worked to write their plan. However, the funding year drew to a close before we had received the completed plan and enough information to submit a final report to the funders. Due to a lack of communication complicated by language and cultural differences, we deemed it necessary to make the personal connection again. In November, 2003, Bill Volkert and Susan Gilchrist returned to Nicaragua to learn about the outcomes of the project. We were able to summarize them for the final report submitted to the U.S. Fish and Wildlife Service in January, 2004.

A written plan for bird conservation education in Nicaragua was produced. This is the primary outcome of the project, but less obvious outcomes are noteworthy as well. The participants both learned and developed some new educational activities. They conducted five follow-up workshops to reach target audiences. Two geographical areas were reached with the follow-up effort, not only Mombacho, but also Chocoyero Reserve. Although their initial planning matrix only hints at this, the Nicaraguans began to consider a broader scope of education, beyond just schools. Expressed interest in creating birding trails for ecotourism is another outcome. The Nicaraguans also planned for a media initiative and they did sponsor an International Migratory Bird Day festival. They saw the potential connection between bird banding and education, and they planned to use bird monitoring for public education. They used the visiting consultants as resources later for grant proposals the Nicaraguans authored. Through the project, we delivered donated materials such as some curriculum activity guides in Spanish, binoculars and compasses from Birders' Exchange, and a spotting scope. As an extension of the project, Bill Volkert has successfully garnered more than $2,000 from Wisconsin bird conservation enthusiasts for the Adopt-a- Bird effort. The money is needed to pay the artist to paint 600+ species of birds documented in Nicaragua, for a much-needed field guide to the birds of Nicaragua.

One key outcome is a team of scientists and educators working together. The planning workshop pulled these two arms of bird conservation in Nicaragua together for the first time. From this new union, a new conservation organization was born: ALAS (Alianza para las Areas Silvestres; the acronym "Alas" is also the Spanish word for "wings"). The members of ALAS continue to work towards bird conservation in Nicaragua.

Lessons Learned

We have examined the project, the planning process, the outcomes, and our parts in all of the above, and we would like to share some of the things we learned. Conveying the lessons we learned helps us reach the project goal of developing a model for cooperation for migratory bird conservation education across the Americas. We hope that our experiences may contribute to other cooperative projects between North America and the neotropics,

In working across cultural and national borders, it is very important to be flexible. You may have to change direction or schedule gracefully. Face-to-face contact is really essential in this kind of work. Electronic communication is wonderful, but it only complements rather than replaces getting together to communicate in person. Planning expertise is something North Americans can bring to the table, as planning is less an intrinsic part of Latin American culture. In Nicaragua, outsiders can help to bring people together, as it is harder for the local people to address the factionalism remaining from the war and the competition exacerbated by the lack of resources. Outsiders can facilitate cooperation. Wisconsin and Nicaragua are both interested in developing birding trails, so perhaps there is an opportunity for idea sharing and further cooperation around this common interest.

With few resources, the Nicaraguans can accomplish a great deal. The people we worked with are extremely dedicated and resourceful. To implement new education programs in schools, it is necessary to provide and maintain resource materials and school supplies. It isn't enough to provide materials only once. Paid staff and organizational support in Latin America is important to follow-up and bring a project to fruition and closure. Nicaraguan schedules seem to be more relaxed than the deadline driven timeline we are used to racing in the US. International communications can cause delays, especially when translations are required, so build time for this into project schedules. Success may be easier to demonstrate in a small, finite project, where the work can be done in a short time period. It is very important in cross-cultural projects to maintain communications regularly, not just at pivotal or deadline times. Funding is needed to implement plans. The final outcome of the project can only be measured following implementation of the plans, yet implementation is dependent on additional funding.

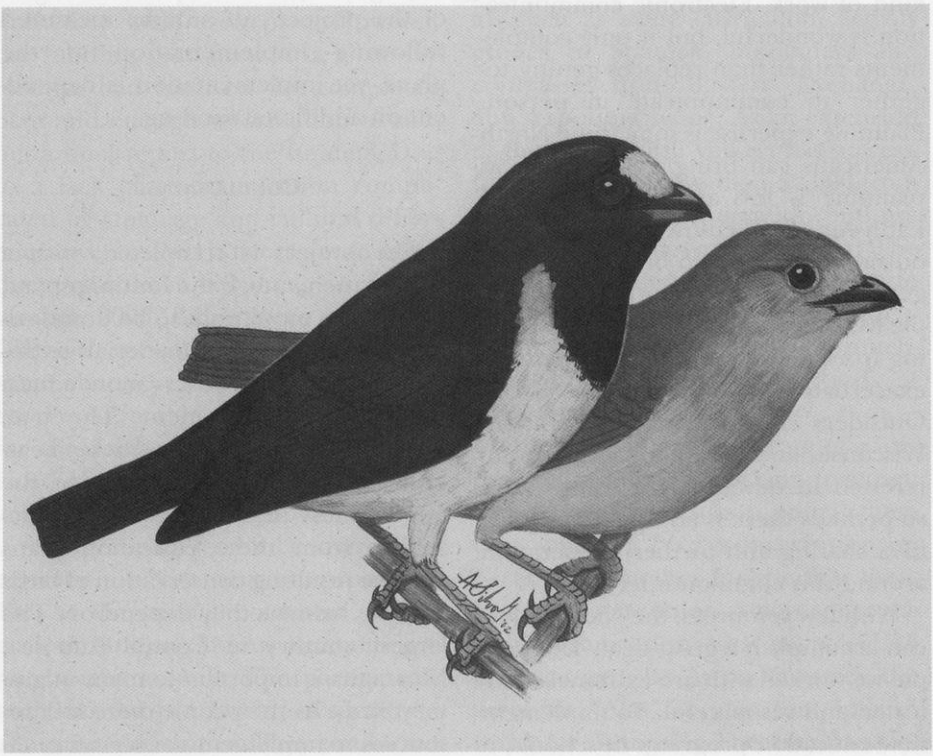
Conclusions

The project is completed, with a plan written and all the funding spent, yet there is more work to be done, education programs and materials to disseminate, and a conservation education plan to implement. The true impact of this project can not be measured except in the long-term, by the effectiveness of land use changes resulting from these education plans and the resulting conservation of birds and the habitats they depend on. The largest country in Central America, Nicaragua is important to many migratory birds. As the people there lack resources to implement conservation efforts alone, it is our responsibility to help them to protect the birds that fly

through, over-winter, or reside there. Knowing that our own conservation measures in Wisconsin will be incomplete unless we protect neotropical migrants at both ends of their annual migrations, we continue to maintain contact with our Nicaraguan colleagues and remain committed to supporting their bird conservation efforts.

William K. Volkert is a wildlife educator and naturalist for the Wisconsin Department of Natural Resources at Horicon Marsh. He has worked on conservation projects in both the tropics and the Arctic, as well as in Wisconsin.

Susan Gilchrist is currently the Environmental Education researcher at the Wisconsin Department of Natural Resources. It was the opportunity to teach that environmental issues are global that inspired her interest in migratory bird education. She developed and evaluated the interdisciplinary middle school curriculum "One Bird—Two Habitats" and provided consultation and materials review for the development of other bird education programs around the country. She is active on the Wisconsin Bird Conservation Initiative (WBCI) Outreach and Education Committee. She has presented bird education workshops in the U.S., Canada, Mexico, and Nicaragua.



Scrub Euphonia, pair

Birding in the Tropics—Hot Places, Cool Birds

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Introduction

The tropical habitats of Latin America provide some of the most exciting bird watching opportunities in the world, due in large part to the sheer diversity and superabundance of birds. Of the 150 families of birds found in the world, ninety are represented in Central and South America, with twenty-eight families considered endemic to the region. Taking into account latitudinal migrants, more than 4,000 species occur south of the United States.

Bird diversity increases substantially from northern temperate latitudes to tropical climes. For example, Wisconsin hosts 238 species of breeding birds, Belize has 575, Panama supports 880, and the tiny country of Ecuador, comparable in size to the state of Colorado, has a list approaching 1,600 species.

Birds can be found in virtually every tropical habitat, but birders in the tropics hope to encounter three "phenomena" that substantially enhance the birding experience (and provide the fodder for excellent stories!):

Fruiting trees—Due to a relatively stable climate in the tropics, trees, shrubs, and vines typically flower and fruit asynchronously. Thus, fruit is generally considered a widely available resource throughout the year. As a result, many families of tropical birds (e.g. cotingas and manakins) are almost entirely frugivorous. A tree bearing fruit can provide excellent opportunities to observe large numbers of birds that specialize in frugivory, as well as numerous additional species that eat fruit opportunistically.

Ant Swarms—Encountering a large, nomadic swarm of predatory army ants can be a thrilling experience. The parallel, advancing columns of up to one-half million individuals may stretch the length of a football field. Insects fleeing the marauding ant swarm provide an easy source of food for a variety of forest birds. Uncommon species like Ocellated Antbird, Spotted Antbird, and several woodcreepers have developed such strong

associations with ant swarms they are rarely found in the absence of ants. Thus, ant swarms provide the opportunity to see numerous species of forest understory birds, including difficult to see obligate ant swarm followers.

Mixed Flocks—No where else do flocks of birds become more diverse or complex than in the neotropics. Mixed flocks in temperate latitudes may include six to eight species of birds. By comparison, it is not unusual for mixed flock in the tropics to contain more than twenty species. The lowland forests of western Amazonia harbor flocks that contain up to seventy species of birds. Mixed flocks can be found at both fruiting trees and ant swarms, but may also be randomly encountered when one is traveling through forested habitats. While much research has been done of the behavioral ecology of mixed flocks, there is little a birder can do to prepare for what can be aptly termed as "sensory overload" as a mixed flock passes. My advice is relax and enjoy the show.

Conservation through Birding

Tropical habitats are being altered and destroyed at an accelerating pace, affecting both resident species of wildlife and hundreds of species of neotropical migrant birds that depend on tropical habitats during the winter. Urgent conservation action is required. Birders can support conservation of tropical habitats while enjoying birds by staying at eco-lodges that strongly support conservation activities. Four examples are provided.

Belize: Chan Chich Lodge is situated in the northwest corner of Belize several miles east of the Guatemalan border. The lodge is nestled within 125,000 acres of uncut, unhunted tropical broad-leaved forest. It is adjacent to the Rio Bravo Conservation Area, a 260,000 acre protected forest. Wildlife at Chan Chich is abundant and easily observed. The area contains important source populations for two species of declining cracids, Great Currasow and Crested Guan, and Ocellated Turkey, a Yucatan endemic. Rarer birds such as Tody Motmot, Ornate Hawk Eagle, and Chestnut-colored Woodpecker are also seen regularly. Chan Chich is particularly noteworthy as one of the best places in the world to see jaguar, with more than 80 sightings per year.

Panama: Completed in 1904, the Panama Canal ranks high as one of the world's great engineering feats. Since that time, forests in the canal zone have been protected to help ensure the enormous supply of fresh water necessary to operate the canal. Today, many of those forests have been designated as national parks in recognition of their significant conservation value.

Located in Soberania National Park, the Canopy Tower is an extraordinary eco-lodge that provides a birds-eye view of the tropical forest canopy. Converted from a 1960s era radar tower built to protect the canal from air attack, the Canopy Tower offers birders a wonderful tropical forest adventure. One can literally enjoy a rich cup of Panamanian coffee while standing on the roof of the tower and looking out over thousands of acres of tropical forest. Otherwise difficult to locate canopy species such as Green Shrike Vireo and the stunning Blue Cotinga are often seen from the roof, as are

soaring raptors, flocks of parrots, sloths, and monkeys. The forests of the canal zone are also widely considered the best place in Central America to encounter an ant swarm.

The lodge employs local citizens and its owner, Raul Arias, is one of the strongest supporters of the country's rapidly emerging conservation movement.

Ecuador: The tropical Andes constitute one of the biologically richest realms on the planet. Forests cloaking the slopes of the Andes are highly threatened, with rampant and accelerating deforestation resulting in the loss of thousands of acres of important habitat annually.

The Jocotoco Foundation is a highly effective, Ecuadorian-based, nonprofit conservation organization that protects habitats of the country's rarest birds. The foundation has established seven reserves throughout Ecuador. Three of the reserves have facilities that accommodate tourists.

The Tapichalaca Reserve is located adjacent to Podocarpus National Park in the Andes of southern Ecuador. The 15,000-acre property protects the world's entire known range of the Jocotoco Antpitta, a forest dwelling antpitta discovered in 1997. The reserve also supports 40+ species of flycatchers and 50+ species of tanagers. A lodge that houses up to eight birders has recently been constructed, and is replete with hummingbird feeders and a dazzling array of hummers (more than 30 species have been sighted in the reserve). A trail system invites exploration of the surrounding mid-elevation cloud forests. All revenue generated from birders staying at the lodge goes directly to the Jocotoco Foundation to help support ongoing conservation work.

East of the Andes, one finds the steamy lowlands of western Amazonia. Bird life in these forests is exceeding rich, but can be difficult to find due to the vast tracts of forested habitat and because a high number of species reside in the forest canopy.

Sacha Lodge, located on the banks of the Rio Napo, a major tributary to the Amazon, provides birders the opportunity to experience the bird life of Amazonia. The lodge is located on a cocha, an isolated oxbow of the Rio Napo. Birding from the pier has produced Hoatzin, Black-capped Donacobious, Moriche Oriole, and much more. The highlight of any trip to Sacha is a morning spent on the canopy platform, a large wooden structure located approximately 130 feet up in tree that extends above the canopy (a canopy super emergent).

Birdwatching from the platform is spectacular. Mixed species canopy flocks are regularly seen and include gaudy birds like Paradise Tanager, Opal-crowned Tanager and Gilded Barbet. Numerous species of parrots and raptors are also easily seen. Relatively recent sightings include a Harpy Eagle eating a tamarin, and all three species of hawk eagle in a single morning.

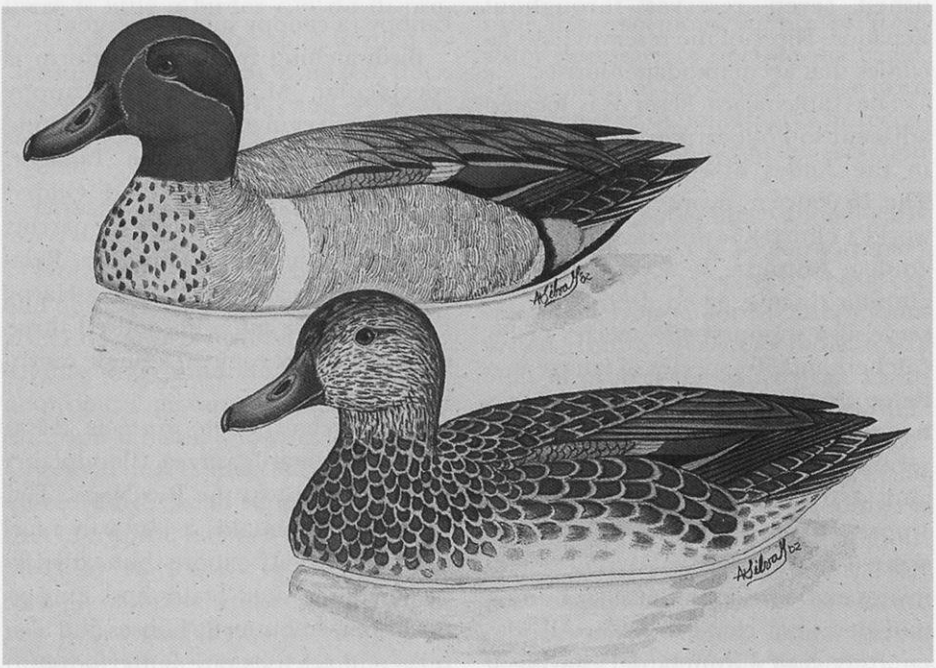
The Sacha Lodge protects 2,000 acres of primarily varzea (floodplain) forest adjacent to the Rio Napo. The lodge also maintains a butterfly rearing facility. Staff exports butterfly larvae to the United States and Europe for display in butterfly houses and also rears and releases rare butterflies into the surrounding forest.

Conclusion

Nothing compares to the sheer exhilaration of birding in the tropics. But with tropical habitats literally under siege, adventurous birders also have a responsibility to support conservation efforts. If you decide to participate in an organized tour, make sure the tour operator has a genuine commitment to conservation and is actively supporting worthwhile initiatives. When traveling alone, do your homework ahead of time. Patronize establishments that actively undertake conservation of habitat or are supportive of local or regional conservation efforts. Let the owners or managers know that is why you're staying with them. And hire local guides. Nobody knows the bush like the locals. By helping them make a living through nature tourism, they become ardent defenders of the natural resources that sustain their livelihood.

Tropical habitats are being conserved because ecologically-minded tourists are willing to spend money to experience them. As a birder, you can make a difference too. Frank Gill of the National Audubon Society said "Conservation is first born of discovery and wonder, then of understanding, and finally of action." Discover the tropics, and let conservation be your guide. The birds are counting on you.

Craig Thompson received his B.S. in Zoology from UW-Milwaukee and his M.S. in Zoology from the University of Wyoming, where he studied Burrowing Owls. He has worked for the WDNR for the past 18 years. In his spare time he studies tropical bird ecology, and organizes and leads birding adventures to Central and South America.



Green-winged Teal, pair

Chicago Bird Collision Monitors: Prospects for a Great Lakes Network

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The Chicago Bird Collision Monitors rescue birds injured from strikes, reduce collision risks for migratory birds, and salvage fatalities. We also study high-risk areas and suggest possible solutions to managers. We run a Hotline for reporting injured birds. We have created an extensive website. We've established a database to log in location of strikes (including which side of building), date, time, weather conditions, and species and status of all birds monitored. We do presentations to educate the public about this issue, we meet with architects to help design safer buildings, we call managers to get lights out and keep them out, and we decal particularly dangerous lobby windows. We are an all-volunteer, hands-on, grassroots conservation effort and we have been very successful in Chicago. We hope to help other individuals and organizations form similar campaigns.

I began monitoring birds in 2002. I had become aware of the problem of night migrating birds hitting buildings downtown, and I'd sometimes find myself trying not to look at the city as I drove past the bright lights during migration. I was afraid of what was happening down there but I had very little information until I joined Ken Wysocki on his rounds during 2002. The magnitude of the problem became clear to me as we picked up 80 dead birds in one morning in early September, well into the fall migration . . . and this was in a very small area of the Loop. It was then that I began to call building managers and to recruit volunteers for the organization I officially founded in Spring 2003—the Chicago Bird Collision Monitors. We easily had hundreds of fatalities during fall 2002 and we had few rescues as many rooftop lights stayed on the entire season. I'm proud to say that in the following years, the downtown area has grown darker and darker. Largely through our efforts, the entire downtown area now goes dark for spring and fall migration.

There are many collision hazards for migratory birds. Birds do not see glass, and they are extremely vulnera-

ble to strikes with glass when it reflects trees or sky, to glass when lit at night, and to glass framing internal greenery. As an example, there was a very bad situation with mirrored glass and a reflecting pool in Chicago. Birds were regularly hitting the glass (seeing trees reflected from 25 feet away) and drowning in the pool. It was horrific. Every year, twice a year, all types of warblers, thrushes, sparrows, and even hummingbirds were drowning in this pool. There was a small ledge against the mirrored glass and sometimes the birds would teeter there for a moment before losing consciousness and falling in. I learned to get my waders on every time I monitored this location in case I had to jump in after a bird. We did save a catbird one time. It hit the glass while we were there, landed in the water, and spread its wings to stay afloat. It looked like a surrealistic gray, feathered boat. It remained conscious with its head up until I had it in my hand. We placed the bird in a brown paper sack and rolled the top to close it. After several minutes we heard the worst squawking you can imagine as the bird "came to." This was one lucky bird. Smaller birds really didn't have a chance. I just happened by this location on another day and found 4 gorgeous warblers floating there. It was heartbreaking, and I felt that I just had to get something done about it.

This was my first real action in Chicago. After many calls and a lot of detective work, I finally reached the right person and that pond was drained immediately and has been kept dry every migration season since that call. I did not threaten this manager in any way and I did not need to show them "proof." I just told them the sad tale and asked for their help and they were happy to give it. This has been my experience with dozens of managers in Chicago. They do not need to see dead birds, and they do not need documentation. They need someone to make the case for the birds and tell them how to help. Most often, the managers of dangerous buildings know fully about the problem. They have custodial crews "cleaning up" the problem. Once managers know how to reduce risks at their buildings, they are usually more than willing to help. I have had maybe 4 reluctant managers in Chicago—out of perhaps 25 or 30. Everyone else that I have contacted is fully onboard with our program.

I have insisted on a win-win protocol with managers. We give them every opportunity to work with us, and we present our case in a collaborative framework. We need these people to help us save birds. We do not want to be at odds with them. What we have discovered has been heartwarming. We now have a network of managers, building crews, security, doormen, and office workers rescuing birds and alerting us to problem areas.

I received a hotline call in May 2003 from a landscape crew at one of our buildings downtown. They had a yellow and green bird, which I assumed was a warbler. I asked them to find a bag or box for the bird, and told them that I would be there soon. As I arrived at the location, one of the workers brought me a very small Dunkin' Donuts minis box with a handle. I took the box from him, and once I was in my car, I took a cautious peek inside. They had rescued a Ruby-throated Hummingbird. This bird was still very quiet and surely would have been

killed by the gulls or crows that circle this particularly dangerous complex if this crew hadn't rescued it. After a day's care, however, the bird recovered and was released.

Most of the birds we find can be treated and released. When a bird hits glass there are many injuries it can sustain, from traumatic head injury and bleeding in the brain to internal injuries and fractures. Sometimes birds with many of the above injuries can appear to be somewhat alert and can even fly. They can be extremely tricky to evaluate. It is important to get these birds to a federally licensed wildlife rehabber or avian vet if at all possible. Many of our birds are initially treated with an anti-concussive medication, and they have done extremely well with this protocol.

I strongly caution against what I feel is a dangerous attitude in many conservation and scientific circles. A problem building will be discovered and before I know it, several people are talking about doing a study. What this means is that they want to pick up dead birds for a season or two without doing anything to reduce the numbers of bird strikes and fatalities. I find this very distressing. I do not feel that we have the luxury at this point of doing any more fatal "studies." We have decades of scientific data on this issue, to the tune of nearly 30,000 dead birds at one famous Chicago location, a study that sadly continues to this day. We primarily monitor songbirds and woodpeckers, along with some wading birds and a few raptors. We find that American Woodcocks, Ovenbirds, and the Illinois threatened Brown Creeper are particularly susceptible to collision risks, and we have found many casualties involving other species already in severe decline, such as the Golden-winged Warbler. We know all that we need to know to greatly reduce these tragedies. I urge anyone that becomes involved in this issue to resist the urge to do further "studies" of fatalities. We need to stop the carnage, not study it.

We are fortunate to live in an area of the country that hosts a fantastic bird migration. Radar indicators show very high numbers of night migrating birds traveling over this region of the country, covering entire states on some nights and reaching well across Lake Michigan. In the morning hours, these birds begin looking for shelter and food. If they are over the Lake, they become unusually concentrated as they reach the shoreline, where they are extremely vulnerable to light hazards and glass collisions. My hope is to form a Great Lakes Network to reduce light and glass hazards and to create a darker and safer shoreline for these birds. I would not want to limit this effort to the lakeshore however. We know that these collisions are happening everywhere: in rural areas, in cities, at universities, along rivers and ponds. I am very impressed with the seriousness of the Wisconsin bird conservation community, and I am confident that you can have great success in reducing lights and other collision risks to help these birds safely cross your state.

Birds have been hitting buildings ever since high-rises were built. Birds have been circling buildings and falling by the hundreds for decades. They have been hitting our homes and falling prey to cats and other predators since glass was invented. They have been flushed from feeders only to fly into our windows. Bird strikes are one of the most critical migratory bird con-

servation issues that we face in this country, killing hundreds of millions of birds each year in the US alone. Now we have the tools to greatly reduce this toll.

Please join us in this conservation effort!

1. Move your bird feeders to within 3 feet of your windows.

2. Treat dangerous windows in your home or office:
   a. Apply decals or films, or hang streamers or artwork on the outside panes to break up dangerous reflections. It is recommended to apply these no more than 2 to 4 inches apart for best results.
   b. Use external screens or sunshades to create visible barriers. Many of these are opaque outside but invisible from the inside.
   c. Use drapes, blinds or decals to reduce the dangerous risks of transparent lobbies and walkways. Otherwise, birds will attempt to fly through these areas, especially if they can see trees on the other side of the structure.

3. Turn off lights or draw blinds at night during migration and use light colored blinds or drapes during the daytime to make windows more visible to birds.

4. Move plants away from windows or use blinds or decals to make the plant less inviting to "land" in.

5. Get your community to adopt a protocol of light reduction during migration including dimming rooftop lights, lobby lights, floodlights, and office building lights. Lights along the shore are especially hazardous.

6. Form your own rescue troop to help the injured. It is not difficult and CBCM is available to help in any way we can. Contact me at info@ birdmonitors.net or at 773. 774. 5509.

7. Spread the word about this nearly invisible but devastating conservation issue and let others know what they can do to reduce these risks.

8. Encourage bird-friendly building designs in your community. The technology exists now to create bird-friendly buildings.

9. Visit CBCM at http://www.birdmonitors.net or FLAP at http://www.flap.org for more information on how you can help.

Robbie Lynn Hunsinger is an artist and musician who has spent most of her life working as a classical oboist. She became actively involved in bird conservation in 2002 when she began monitoring bird strikes in Chicago. CBCM is a grass-roots, all-volunteer organization which has been instrumental in Chicago turning out for birds and which rescued over 400 migratory birds during fall 2004 in downtown Chicago.

50 Years Ago in *The Passenger Pigeon*

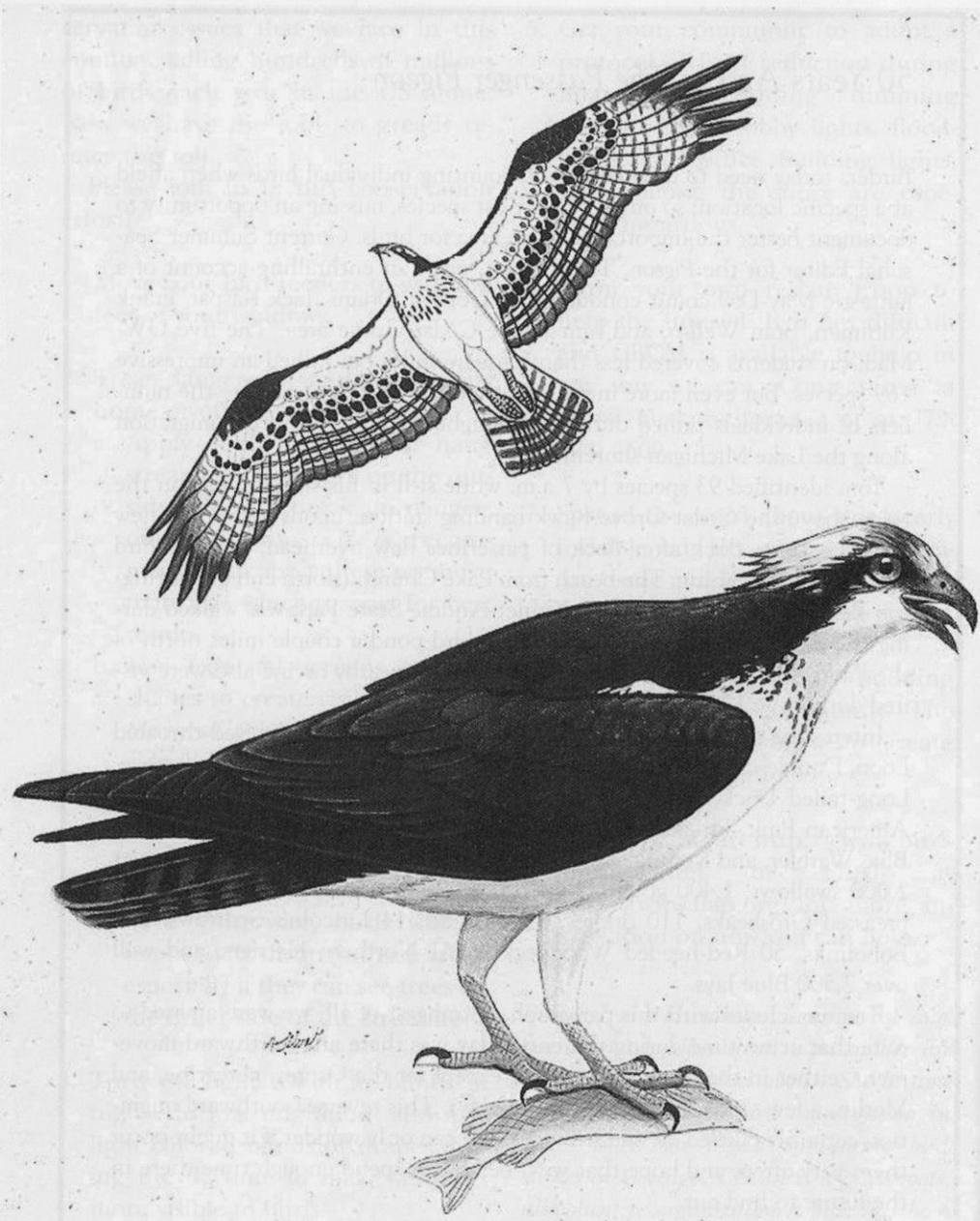
Birders today need to do a better job counting individual birds when afield at a specific location; so often we only list species, missing an opportunity to document better the importance of an area for birds. Current Summer Seasonal Editor for the *Pigeon*, Tom Soulen, gives an enthralling account of a fantastic May-Day count conducted by Gordon Orians, Jack Kaspar, Frank Kuhlman, Stan Wellso, and him in the Cedar Grove area. The five UW-Madison students covered less than 5 square miles but tallied an impressive 169 species. But even more impressive than the species total were the numbers of individuals tallied during the height of the 1954 spring migration along the Lake Michigan shoreline.

Tom identified 93 species by 7 a.m. while still in his sleeping bag on the ridge above the Cedar Grove hawk banding station. Loons and ducks flew over the Lake, flock after flock of passerines flew overhead, and the bird sounds were deafening. The beach from Lake Church (north end of Harrington Beach State Park) north to Kohler-Andrae State Park was walked during the day, and K-A Park, a small shorebird pond a couple miles north of the Park, and the Port Washington Harbor and nearby ravine also were visited during the 17-hour day.

Interesting species (updated common names used) included Red-throated Loon, Double-crested Cormorant, Green-winged Teal, Common Goldeneye, Long-tailed Duck, Osprey, Peregrine Falcon, Merlin, Hudsonian Godwit, American Pipit, Philadelphia Vireo, Olive-sided Flycatcher, Black-throated Blue Warbler, and Kentucky Warbler. The group counted or estimated over 2,000 swallows, 1,400 goldfinches, 700 cowbirds, 600 redwings, 150 Rose-breasted Grosbeaks, 110 orioles, 52 tanagers, 14 Lincoln's Sparrows, 500 Bobolinks, 50 Red-headed Woodpeckers, 61 Northern Harriers, and well over 2,500 Blue Jays.

Tom concludes with this paragraph. "Strangest of all, we were amazed to note that at no time during the entire day was there any northward movement, either in the trees or in the air, except for the Osprey, peregrine, and Merlin, a few strays, and all 2,500 Blue Jays. This reverse, southward migration certainly puzzled us, and still does. We can only wonder if it might occur there very often, and hope that we'll be able to spend enough time there in the future to find out."

Excerpt from Vol. 17 (1), 1955 by WSO Historian Noel J. Cutright, 3352 Knollwood Road, West Bend, WI 53095-9414. h. 262. 675. 2443, w. 414. 221. 2179, Noel.Cutright@we-energies.com



Osprey

The Summer Season: 2004

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The cool and wet latter part of the spring continued well into early July, when it turned dry and warm. June was 5% below normal in Outagamie County. There were no real heat waves—in fact Milwaukee had a grand total of only one day over 90°, and that came in early June. Jefferson County had 4.37″ of rain in an eleven day period in June, but only 0.54″ from July 4 to July 29. The high in Ashland County on July 4 was but 58°. June 14 saw Oconto County deluged with 2.2″ of rain, but it was bone dry there for almost the final two weeks of the season.

The so-so nature of the weather was mirrored in the birding, which with some exceptions was mostly noted as good enough, if unremarkable. For instance, of the four observers who had specific comments to make about the shorebirding, two were positive and two negative. Marty Evanson enjoyed a July drawdown on Cadiz Springs Lake in Green County, and Daryl Tessen had excellent results in the A & W Pond area in Dodge County for most of the season. However, high water at Chequamegon Bay and the Big Eau Pleine Reservoir in Ashland/Bayfield and Marathon Counties respectively largely foiled expectations there for Ryan Brady and Dan Belter.

For the fourth straight summer, the grand total for species was in the 250s, with 252 recorded for Summer 2004. Of these, details will be found in the species accounts for 184 of them. The remaining 68, all widespread and common, are summarized here. It might be of some interest to give the five species recorded in the greatest number of counties. These would be (number of reported counties in parentheses): American Robin (44), American Crow (43), Red-winged Blackbird (43), Chipping Sparrow (42), and Song Sparrow (42). Species recorded in 26 to 41 counties were: Canada Goose, Wood Duck, Mallard, Blue-winged Teal, Wild Turkey, Great Blue Heron, Green Heron, Turkey Vulture, Red-tailed Hawk, American Kestrel, Sandhill Crane, Killdeer, Ring-billed Gull, Rock Pigeon, Mourning Dove, Chimney Swift, Ruby-throated Hummingbird, Belted Kingfisher, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Eastern Wood-Pewee, Least Flycatcher, Eastern Phoebe, Great Crested Flycatcher, Eastern Kingbird, Yellow-throated Vireo, Warbling Vireo, Red-eyed Vireo, Blue Jay, Northern Rough-

winged Swallow, Black-capped Chickadee, White-breasted Nuthatch, House Wren, Eastern Bluebird, Veery, Gray Catbird, European Starling, Cedar Waxwing, American Redstart, Ovenbird, Northern Cardinal, Rose-breasted Grosbeak, Indigo Bunting, Common Grackle, Brown-headed Cowbird, Baltimore Oriole, House Finch, American Goldfinch, and House Sparrow. In the 10-25 county range were: Hooded Merganser (17), Ring-necked Pheasant (25), Bald Eagle (21), Northern Harrier (21), Cooper's Hawk (24), Spotted Sandpiper (24), Wilson's Snipe (14), American Woodcock (10), Herring Gull (14), Great Horned Owl (14), Barred Owl (17), Bank Swallow (24), and Vesper Sparrow (25).

Of the five real rarities, two were one-day wonders and two were carry-overs from the spring. In the former category, the Shillinglaws recorded Wisconsin's ninth Brown Pelican in Sheboygan County on July 13, and Mark Korducki had a brief but good look at a Mississippi Kite in Milwaukee County on June 5, the second consecutive summer for this species and about the twentieth record for the state.

Black-necked Stilts continued to entertain visitors to Horicon Marsh, most of whom came however for the one dependable, if sometimes frustrating to see, genuine rarity that first appeared after the season began: Tricolored Heron. This bird was reported, always from Fond du Lac County, between June 27 and July 16. No more than one Stilt, however, was ever reported at any one time, and towards the middle of July it was being found more consistently in Dodge, rather than Fond du Lac County, with the last report coming on July 21.

Finally, the two Chuck-will's-widows found in Vernon County in late May continued to be heard as late as June 13; there was no indication anyone ever saw either of them.

In addition to the above, we single out five species much less rare in the state but highly unusual for the season: Eared Grebe, Western Grebe, Rough-legged Hawk, Thayer's Gull, and White-crowned Sparrow.

The following species, reported more often than not in the summer, were missed: Northern Pintail, Bufflehead, Gray Partridge, Yellow-crowned Night-Heron, King Rail, Black-bellied Plover, Red Knot, Sanderling, Little Gull, Philadelphia Vireo, Prairie Warbler, Blackpoll Warbler, and Nelson's Sharp-tailed Sparrow.

Fifty-six observers or observer teams are cited in the accounts that follow. It was the second year for the "Birding Blitz" organized by Beth Goeppinger at Richard Bong State Recreation Area in Kenosha County, held this year on June 12. Ninety-five species were recorded, and numbers of individuals for species of interest, particularly grassland birds, will be found in the accounts. Forty-one of Wisconsin's 72 counties were represented by 81 reports consisting of 25 or more species each. The Tricolored Heron was undoubtedly responsible for Fond du Lac and Dodge Counties leading the way with 6 and 5 such reports respectively (Dane County also had 5). An additional 73 reports of from 1 to 24 species extended the list of "covered" counties by 10, leaving 21 with zero coverage: Lafayette, Crawford, Adams, Marquette, Green Lake, Waushara, Buffalo, Pierce, Pepin, Dunn, Eau

Claire, Chippewa, Clark, Brown (!), Kewaunee, Marinette, Polk, Taylor, Rusk, Price, and Sawyer Counties.

Reports
(1 June—31 July 2004)

Snow Goose—There have been one or two reports each of the last several years; this year, the LaValleys enjoyed one in Douglas County until June 8.

Mute Swan—Reported from Racine, Waukesha, Washington, Dane, Columbia, Dodge, Sheboygan, Door, Trempealeau, and Ashland/Bayfield Counties.

Trumpeter Swan—Present in Marathon, St. Croix, Vilas, and Ashland/Bayfield Counties.

Gadwall—Tessen found 2 in Manitowoc County on June 8. No numbers were given on the remaining 7 reports, from Sheboygan, Dane, Columbia, Dodge, Fond du Lac, Winnebago, and La Crosse Counties.

American Wigeon—A poor showing, with reports only from Ashland/Bayfield Counties, where Brady had it throughout the period.

American Black Duck—Present all season in Sheboygan (Brassers), Manitowoc (Sontag), and Winnebago (Ziebell) Counties. Also reported from Door, Vilas, Ashland/Bayfield, and Douglas Counties.

Northern Shoveler—After but a single report in 2003, rebounded to no less than 10 county reports, the most since 2000. Tessen had 4 apiece in Manitowoc and Milwaukee Counties in June, while Stutz counted 25 in Dodge County on July 18.

Green-winged Teal—Present in 13 mostly inland counties, from Walworth County in the south to Ashland/Bayfield Counties in the north. Not reported from the western part of the state.

Canvasback—One was in Milwaukee County all season (Mooney et al.). A pair was reported from Winnebago County on June 27 (Ziebell), and Tessen found an individual in Fond du Lac County the next day.

Redhead—Reported from Milwaukee, Ozaukee, Manitowoc, Columbia, Dodge, Fond du Lac, Winnebago, and Outagamie Counties, with a maximum of 62 on June 27 in Winnebago County (Ziebell).

Ring-necked Duck—Unexpected that far south were three in Monroe County on June 7 (Tessen). Persico reported breeding in St. Croix County. As expected, found also in the northern tier counties of Ashland/Bayfield, Iron, and Vilas.

Greater Scaup—Present in Manitowoc County throughout the season (Sontag). Also to be found in Ashland/Bayfield Counties (Brady).

Lesser Scaup—Tessen reported 5 in Manitowoc County on June 8. One or two birds were also present at various times during the period in Milwaukee, Sheboygan, Columbia, Dodge, Oconto, and Ashland/Bayfield Counties.

Common Goldeneye—Reported as expected from Door and Ashland/Bayfield Counties; Brady had 12 in the latter on June 8. Unusual was a June 12 report from Sauk County (A. Holschbach).

Common Merganser—Strictly northern reports, from Door, Florence, Vilas (27 individuals, June 22, Baughman), Ashland/Bayfield, and Douglas Counties.

Red-breasted Merganser—Frank still had as many as 68 offshore in Ozaukee County on June 3. Six were in Manitowoc County on June 8 (Tessen). Northern reports came from Door, Iron, and Ashland/Bayfield Counties.

Ruddy Duck—Observed in 13 counties, all to the southeast of a line through La Crosse, Outagamie, and Door Counties. The maximum count was 105 in Dodge County on July 1 (Frank).

Ruffed Grouse—Reported from 11 counties, none to the south of La Crosse, Wood, Oconto, and Door Counties.

Spruce Grouse—Baughman found a male in Vilas County on June 14, Thiessen another

one in Oneida County on June 20. Then on June 25, Thiessen managed to spot a pair in Forest County.

Sharp-tailed Grouse—The only mention came from the LaValleys in Douglas County.

Greater Prairie-Chicken—Reported twice from Portage County, first by Stutz on June 12 (a pair), then by Prestby on July 10.

Northern Bobwhite—Found in Kenosha, Rock, Green, Iowa, Dane, Richland, Sauk, and Columbia Counties well in the south, with an additional sighting somewhat farther north in La Crosse County.

Common Loon—Along Lake Michigan, birds were noted in Milwaukee County on June 14 (Bontly), Sheboygan County on June 26 (4, Tessen), and Manitowoc County on July 15 (4, J. Holschbach). Jefferson and Dane Counties had a few at least into early July (Hale and Evanson respectively). Thirteen more northern counties also recorded it, for the best total number of counties since 2001. Brady tallied 15 in Ashland/Bayfield Counties on July 19.

Pied-billed Grebe—Recorded in 23 counties throughout the state, the best total since 2000. Ziebell counted 27 in Winnebago County on June 27.

Red-necked Grebe—Most of the reported activity centered around Dodge, Fond du Lac, and Winnebago Counties. Gustafson had 4 in Dodge County on July 2. In Fond du Lac County, Tessen had 6 by July 10, with Wood reporting feeding of a juvenile on July 25. Before that, Ziebell had counted 12 in Winnebago County on June 27. Also reported from St. Croix and Sheboygan Counties; Tessen had 3 in the latter near the end of the period (July 26).

Eared Grebe—Peterson reported one from Columbia County on June 2.

Western Grebe—Wood found an individual in Dodge County on June 27; 4 other observers reported it the next day, with no further sightings received.

American White Pelican—Major counts included 705 in Dodge County July 31 (Frank), 500 in Door County July 14 (Lukes), 265 in Oconto County June 24 (Smiths), and 125 in Trempealeau County June 7 (Lesher). Also reported from La Crosse, Sauk, Jefferson, Fond du Lac, Winnebago, Manitowoc, and Ashland/Bayfield Counties.

Brown Pelican—The WSO Records Committee certified the ninth official occurrence in the state, an individual discovered by the Shillinglaws in Sheboygan County on July 13.

Double-crested Cormorant—Present in 17 counties statewide, with numbers between 250 and 350 recorded in Winnebago, Manitowoc, and Oconto Counties.

American Bittern—With the exception of St. Croix County, the remaining 13 counties where it was discovered lay to the east of Walworth, Dodge, Winnebago, Marathon, and Ashland/Bayfield Counties. Two individuals were seen in Manitowoc County (July 4, J. Holschbach) and in Dodge County (July 31, Frank).

Least Bittern—Found in Kenosha (Hoffmann), Waukesha (Gustafson), Dodge (Frank, 3, July 31), Winnebago (Ziebell, 4, June 20), Outagamie (Tessen), and Oconto (Smiths) Counties.

Great Egret—Found in 16 counties, as far north as St. Croix, Oconto, and Door Counties. Hoffmann recorded 16 in Kenosha County on July 9.

Snowy Egret—At least 2 were in Fond du Lac County for much of the season; Wood's June 27 report was the earliest given.

Tricolored Heron—The star of the summer season. It could be surprisingly difficult to find for such an ostensibly conspicuous bird, but patient observers were almost invariably rewarded with an eventual, if brief, venture by the bird into a reasonably open area. WSO reports of this Fond du Lac County bird extended from June 27 (Moretti, Wood) to July 16 (Ruhser).

Cattle Egret—Fond du Lac County viewers waiting for the Tricolored Heron to expose itself whiled away the time by counting up to 20 individuals of this species (Tessen, June 28). Also recorded in Winnebago County (Knispel, Ziebell).

Black-crowned Night-Heron—Found in 10 eastern counties. The Smiths described them as "low" in Oconto County, while Ziebell counted 210 in Winnebago County on June 13 (versus 300 on the same date in 2003). Stutz had 25 in Fond du Lac County on July 4.

Osprey—Evanson speculated that a Dane County pair was nesting. Other relatively southern sightings came from Sauk, Juneau, Fond du Lac, and Winnebago Counties. Seen in an additional 12 more northern counties, with Persico noting 5 in St. Croix County on June 5.

Mississippi Kite—Korducki's description of an unexpected brief encounter with an out-of-range individual in Milwaukee County on June 5 was accepted by the WSO Records Committee. This is the second consecutive and fifth overall summer record for the species.

Sharp-shinned Hawk—Reported from 9 counties, the southernmost being Iowa (June 3, A. Holschbach), Dane (June 24, Evanson), and Ozaukee (June 23, Frank) Counties.

Northern Goshawk—Reported this season from Forest (Ruhser), Florence (Prestby), and Door (Lukes) Counties.

Red-shouldered Hawk—Recorded in only 8 counties. Yoerger categorized a June 20 Green County report as "unusual." A. Holschbach had 9 in Iowa County on June 12. Also present in Kenosha, Sauk, Monroe, Outagamie, Oconto, and Door Counties.

Broad-winged Hawk—Recorded in Dane and Sauk and 11 more northerly counties.

Rough-legged Hawk—A June 4 Douglas County report (LaValleys) was certainly late, but still within the window (running to about mid-June) of at least occasionally expected lingerers in the northern parts of the state.

Merlin—Ott reported a pair nesting in Wausau (Marathon County), prompting Belter to predict this species would soon become "the next Cooper's Hawk" of urban areas. Gustafson confirmed a fourth consecutive year of nesting in Oneida County, seeing 4 individuals there on July 23. Seen in all the northern tier counties from Douglas to Forest Counties.

Peregrine Falcon—Reported from these 7 counties: Kenosha, Ozaukee, Sheboygan, Manitowoc, Fond du Lac, La Crosse, and Douglas.

Virginia Rail—Present in 13 counties, with A. Holschbach recording 3 in Sauk County on June 12.

Sora—Reported from 22 counties, with Ziebell's 20 in Winnebago County on June 27 by far the highest number given.

Common Moorhen—Reported from a respectable 7 counties. Eleven were tallied on the Bong Birding Blitz (June 12, Kenosha County). Ziebell had 6 in Winnebago County on June 27, and the Smiths found a pair with 4 young in Oconto County on July 11. In addition, sightings came from Milwaukee, Waukesha, Dodge, and Fond du Lac Counties.

American Coot—Observed in 17 counties, as far north as Marathon and Oconto Counties. Ziebell had 54 in Winnebago County on his June 27 census. The only western county represented was La Crosse County.

American Golden-Plover—Bob Domagalski's invaluable archive of arrival and departure dates gives July 26 as the onset of this species' fall movement; this year Evanson recorded one a bit earlier (July 24) in Green County, for the only report.

Semipalmated Plover—The only report from the front end of the season was registered by the Smiths in Oconto County (2 individuals on June 1). Next appeared in Fond du Lac County on July 8 (Tessen), but with no further reports until July 16 (Manitowoc County, Sontag). Appeared in 8 more counties, with maxima of 5 in Manitowoc County (July 27, Sontag) and in Dodge County (July 31, Tessen).

Black-necked Stilt—Reported at least 7 times between June 28 and July 21 in Fond du Lac and Dodge Counties. Nobody reported more than 1 individual at a time. If only 1 bird was indeed present, it appeared to have moved its base of operations from Fond du Lac to Dodge County around July 1.

American Avocet—An individual had returned to the Coast Guard Impoundment in Milwaukee County by July 30 (Gustafson).

Greater Yellowlegs—No late spring migrants were recorded. Tessen noted the first fall migrants on July 8, in Dodge and Fond du Lac Counties. Had appeared in 9 counties by the end of the period, with Stutz estimating 50 in Dodge County on July 18.

Lesser Yellowlegs—Also not seen in June, and with Tessen again getting the earliest returnees on July 8 in Dodge and Fond du Lac Counties. He estimated an eye-popping 750 in the former county on July 31.

Solitary Sandpiper—One late departure was noted—June 5 in Ozaukee County (Frank). Then absent until July 10, when seen by the Brassers in Sheboygan County and Tessen in Fond du Lac County. Stutz had 12 in Dodge County on July 18, Sontag 8 in Manitowoc County on July 27.

Willet— Widely separated individuals showed up on July 28 in Sauk (A. Holschbach) and Door (Lukes) Counties.

Upland Sandpiper—Recorded in 13 counties, the most since 2000. Three individuals each were reported from Green (Evanson, June 4) and Kenosha (Bong Birding Blitz, June 12) Counties. The sightings split neatly into 7 southern and 6 northern counties, with a gap in the middle of the state.

Marbled Godwit— Domagalski notes "scattered records before mid-July"; this year, Peterson and Tessen had one in Fond du Lac County on July 8.

Ruddy Turnstone—Departure dates of June 3, June 8 and June 13 were given in Winnebago (Ziebell), Douglas (LaValleys), and Manitowoc (Sontag) Counties respectively. There have been early fall arrival reports every season from at least 1998 to 2003, but none this year.

Semipalmated Sandpiper— Departed Oconto (Smiths) and Ashland/Bayfield (Brady) Counties on June 1 and June 8 respectively. Returned to Dodge County on July 8 (Tessen). Appeared in 8 additional counties, with Sontag registering 11 in Manitowoc County on July 27.

Least Sandpiper—One June departure noted, June 5 in Manitowoc County (Domagalski). The same county saw the first returnees on June 26 (Sontag). Reported from 16 counties altogether, with a high count of 40 coming from Tessen in Dodge County on July 15.

White-rumped Sandpiper—Tessen reported individuals in 3 counties (Fond du Lac, Dodge, and Milwaukee) on July 10, 15 and 26 respectively.

Baird's Sandpiper—Reported only from Dodge County, from July 18 (Stutz, 2) to July 31 (Tessen, 1).

Pectoral Sandpiper—The first of 10 county reports came from Tessen in Fond du Lac County on July 8. Evanson had 9 in Green County on July 24, Tessen 50 in Dodge County on July 31.

Dunlin—Still in Manitowoc, Door, and Ashland/Bayfield Counties the first week of June. Thiessen had the only fall report (Dodge County, July 18).

Stilt Sandpiper—Arrived in Dodge County on July 15; numbers there had built up to about 20 by the end of the period (Tessen, Thiessen et al). Seen also in Dane (Martin, July 23) and Milwaukee (Gustafson, July 30) Counties.

Short-billed Dowitcher—Southbound migrants appeared in 10 counties, beginning July 8 in Dodge County (Tessen). Numbers there peaked at around 70 on July 18 (Thiessen) and had subsided to 30 by July 24 (Tessen).

Long-billed Dowitcher—A July 8 arrival date (Fond du Lac County, Peterson and Tessen) is a touch early. Tessen had 2 in Dodge County on July 17. A final report came from Juneau County on July 20 (A. Holschbach).

Wilson's Phalarope—Reports throughout the season came from Walworth, Ozaukee, Manitowoc, Dane, Dodge, Fond du Lac, Vilas, and Iron Counties. The big concentrations were in Dodge County, where numbers steadily climbed throughout the latter part of July, reaching 65 on July 31 (Tessen).

Red-necked Phalarope—A Fond du Lac County individual reported by Tessen on July 8 would be the second earliest fall arrival on record. One or 2 birds also showed up in Dodge

(Prestby, Wood et al) and Winnebago (Knispel) Counties.

Franklin's Gull—Kavanagh reported one in Dane County on June 3. Two were in Ashland County on June 12 (Stutz). One was present in Dodge County July 15–18 (Tessen et al).

Bonaparte's Gull—Three hundred birds in Manitowoc County early in the period had dwindled to 18 by July 26. An additional 250 were seen in Sheboygan County on June 26. Inland, the maximum given was 8 in Dodge County on July 15 (all observations Tessen). Also reported from Milwaukee, Ozaukee, Fond du Lac, Winnebago, Marathon, and Ashland/Bayfield Counties.

Thayer's Gull—The third (and latest) summer record was established by an Ozaukee County individual on July 1 (Frank).

Glaucous Gull—Lingered in Manitowoc County until June 8 (Sontag, Tessen).

Great Black-backed Gull—Seen in Ozaukee (Frank) and Manitowoc (Sontag) Counties the first few days of June. In Sheboygan County throughout the period (Brassers), with Tessen observing 3 on July 8. Also present all season in Door County (Lukes).

Caspian Tern—Present in 14 counties, none of them far from Lake Michigan, Superior, or Winnebago save for Sauk County. The maximum count was 30 (Oconto County, June 1, Smiths).

Common Tern—Sadly, a colony of at least 60 in Ashland/Bayfield Counties failed due to predation (Brady). Tessen estimated 150 in Sheboygan County on June 26. Also recorded in Racine, Manitowoc, Winnebago, Oconto, and Douglas Counties.

Forster's Tern—Recorded in 11 counties, Sauk County again [see Caspian Tern account] by far the farthest from a major body of water. Ziebell counted 54 in Winnebago County on June 20 for the high.

Black Tern—Twenty-three counties was the best since 2000, rebounding from only 13 in 2003. In something of an exception to the general scarcity of reports from western counties, Juneau, Monroe, Jackson, and Burnett Counties were included. Strelka observed nesting in Florence County. Stutz had 40 in Fond du Lac County on July 4 and 12 in Dodge County on July 18, with Knispel adding 21 in Winnebago County on July 11.

Eurasian Collared-Dove—Reports continued to be filed from two of its colonial outposts, in Columbia (Kavanagh, Peterson, Prestby) and Green (Yoerger) Counties, through the middle of July.

Black-billed Cuckoo—Reported from 26 counties throughout the state, with maxima of 4 apiece in Waupaca (Tessen) and Marathon (Belter) Counties on June 18 and June 19 respectively.

Yellow-billed Cuckoo—Seen in Marathon and Outagamie and 11 more southern counties, including Iowa, Richland, La Crosse, and Trempealeau Counties in the southwest.

Eastern Screech-Owl—Reported this season from Ozaukee, Winnebago, Dane, Richland, and Vernon Counties.

Short-eared Owl—The only report came from Vilas County on June 6 (Baughman).

Northern Saw-whet Owl—Thiessen's Vernon County visit on June 6, doubtless prompted by the presence of the Chuck-will's-widows there [see below], occasioned the first southern county summer report of this species in at least 7 years. The other 2 reports came from Burnett (McInroy) and Vilas (Thiessen) Counties.

Common Nighthawk—Recorded in 21 counties, but the preponderance of early June reports bespeaks northbound migrants rather than residents, sadly. Reported throughout the season only in St. Croix, Douglas, Marathon, and Vilas Counties, with dated reports between June 17 and July 7 in Barron, Dane, Winnebago, Richland, and Walworth Counties.

Chuck-will's-widow—The two individuals first discovered in late May in Vernon County were reported until June 13 (Peterson, Belter, Tessen).

Whip-poor-will—Reported from the following counties: Waukesha, Columbia, Dane,

Iowa, Juneau, Vernon, La Crosse, Door, Florence, Vilas, and Ashland/Bayfield.

Red-headed Woodpecker—Reported from 20 counties, the southwestern quarter of the state well-represented, but the northwestern quarter blank except for Ashland/Bayfield Counties. Multiple individuals (3 on June 1) indicated on only 1 report, that of the Smiths from Oconto County.

Red-bellied Woodpecker—May have ebbed a bit in its northward expansion, as (unlike some recent years) there were no reports from the regularly covered counties of Washburn, Ashland/Bayfield, and Florence.

Yellow-bellied Sapsucker—Of the 18 reporting counties, the 2 a bit outside the mapped breeding range in Robbins' *Wisconsin Birdlife* (1991) were Iowa and Columbia. The Schwalbes had a pair throughout the period in the latter county. Young were observed in Washburn (Haseleu) and Oconto (Smiths) Counties.

Black-backed Woodpecker—Represented only by a Vilas County report on June 22 (Baughman).

Pileated Woodpecker—The only one of the 22 reporting counties outside the *Wisconsin Birdlife* range was Green County, where Evanson had a June 19 sighting.

Olive-sided Flycatcher—Late migrants passed through Dane (Martin) and Marathon (Plant) Counties on June 1 and Milwaukee County (David) on June 5. Seen later in the season in Door, Vilas, and Ashland Counties.

Yellow-bellied Flycatcher—Northbound individuals were still being seen by Gustafson in Waukesha (June 1) and Racine (June 3) Counties, by Bontly in Milwaukee County (June 6) and lastly by Bruce in Winnebago County (June 8). Belter had them until June 19 in the Marathon County bogs that may constitute their southernmost breeding outpost in the state. Also recorded from 5 counties well inside the historic breeding range.

Acadian Flycatcher—Seen in 11 counties, with 7 in Juneau County on June 16 (A. Holschbach) a solid number that far north. The Smiths also reported it from Oconto County on June 2, which of course may have been an overshoot.

Alder Flycatcher—Whether breeding in southern counties or not, a good number can certainly still be found there well into June, as indicated by the 27 recorded during the Bong Birding Blitz (Kenosha County) on June 12. Also, still in Dane County on June 19 (Kavanagh) and Milwaukee County on June 25 (Bontly). And finally, A. Holschbach observed it throughout the period in Sauk County.

Willow Flycatcher—The Kenosha County June 12 Bong Birding Blitz recorded 133 individuals. Seen as far north as St. Croix, Marathon, Menominee, and Oconto Counties.

Loggerhead Shrike—A Rock County individual was seen on July 8 and again on July 11 (Paulios, Yoerger). Jacyna found one in Walworth County on July 25.

White-eyed Vireo—For the third straight year, reported well into the season in Dane County, with a report of 2 on June 12 (A. Holschbach) and 1 still present on July 7 (Thiessen). Seen in Green County on June 4 (Evanson). Notably far north was 1 in Marathon County, found by Plant on June 5.

Bell's Vireo—Found in Dane, Iowa, Richland, La Crosse, and Trempealeau Counties, all reports stemming from early June except Thiessen's July 7 Dane County one.

Blue-headed Vireo—Found in Oconto, Florence, Forest, Vilas, and Ashland/Bayfield Counties; no reports from any of its southern enclaves.

Gray Jay—Gustafson found 3 in Oneida County on July 26. Reported throughout the period in Vilas County (Baughman).

Common Raven—Sightings in Juneau and Waupaca Counties place it a bit to the south of the range as of 1991 (*Wisconsin Birdlife*), 2 individuals in Manitowoc County on June 18 (Sontag) considerably more so.

Horned Lark—Found only as far north as St. Croix, Marathon, and Florence Counties. Ziebell had 80 on June 5 in Winnebago County.

Purple Martin—North of St. Croix, Marathon, Oconto, and Door Counties, it was found only in Ashland/Bayfield Counties, where Brady had it throughout the period. The Smiths counted 60 in Oconto County on June 1.

Tree Swallow—There were 137 on the Bong Birding Blitz (Kenosha County, June 12), while Knispel counted 375 in Winnebago County on July 21.

Cliff Swallow—Stutz had 30 in Ashland County on June 12, Evanson 21 in Green County on June 28, and the Smiths 150 in Oconto County on July 18.

Barn Swallow—The high count was 85, achieved by the Smiths in Oconto County on July 18 [see previous species].

Boreal Chickadee—Reported from Forest (Thiessen), Oneida (Gustafson), and Vilas (Baughman) Counties.

Tufted Titmouse—The northeastern border of the 12-county reporting region threaded through St. Croix, Sauk, Columbia, Jefferson, and Rock Counties.

Red-breasted Nuthatch—The number of reporting counties jumped from 6 the previous summer to 20. Found everywhere except to the southwest of a line roughly from St. Croix to Rock Counties.

Brown Creeper—After bottoming out at only 3 county reports in Summer 2003, a long-term low, rebounded slightly, with reports from these 6 counties: Ozaukee, Iowa, Door, Florence, Vilas, and Ashland/Bayfield.

Carolina Wren—Summer 2003 featured a recent maximum of no less than 6 county reports; this year it was reduced to a single report, from the Schwalbes in Columbia County on July 16.

Winter Wren—The 11 reporting counties included 2 from its isolated southern enclaves (Ozaukee and Sauk Counties). Six in Marathon County on June 15 (Belter) place it a bit south of its historic breeding range.

Sedge Wren—Found in 35 counties, with counts of 120 in Winnebago County on June 5 from Ziebell and 37 in Kenosha County on June 12 from the Bong Birding Blitz.

Marsh Wren—An absence in northwestern Wisconsin largely explains the difference in the county count for this species (27) compared to the previous. Continuing the comparison, the Bong Birding Blitz had 47 Marsh Wrens, while Ziebell counted 354 in Winnebago County, albeit on a different date (July 6).

Golden-crowned Kinglet—Found in Oneida (Gustafson), Vilas (Baughman), and Florence (Strelka) Counties.

Ruby-crowned Kinglet—Has been reported now in only 1 or 2 counties for four consecutive summers, with the only report for 2004 coming from Ashland County, where Stutz saw 2 on June 12.

Blue-gray Gnatcatcher—The Kenosha County Bong Birding Blitz on June 12 recorded 61 of this species (vs. 40 in 2003). There were no reports from unusually far north.

Swainson's Thrush—Early migrants have been showing up recently in late July in southern counties; this year's July 16 report from the Brassers in Sheboygan County was even earlier. Brady recorded them from June 3 to July 21 in Ashland/Bayfield Counties, with a maximum of 7 on June 4. Baughman registered a Vilas County sighting on July 30.

Hermit Thrush—Found in 10 counties, as far south as Marathon, Oconto, and Door Counties.

Wood Thrush—The Bong Birding Blitz (June 12 in Kenosha County) located 35 individuals. Found in 28 additional counties, with no comments on abundance received.

Northern Mockingbird—Chronologically arranged, sightings came from Bayfield County on June 8 (Hoecker), Door County on June 12 (Kiles), Dodge/Washington Counties (same bird) on June 16 and 17 (Domagalski), and Milwaukee County on June 21 and 22 (Wood).

Brown Thrasher—Reported from 26 counties, with the Kenosha County Bong Birding Blitz on June 12 coming up with 23 individuals.

Blue-winged Warbler—Northerly reports came from St. Croix, Barron, Marathon, Menominee, and Oconto Counties.

Golden-winged Warbler—Seen in only 8 counties; for comparison, note the count was 25 as recently as Summer 1999! The reporting counties were Burnett, Washburn, Douglas, Ashland, Marathon, Waupaca, Oconto, and Florence, with a maximum of 8 given in Marathon County (June 19, Belter).

Blue-winged x Golden-winged Warbler—Peterson reported a "Brewster's" type in Shawano County on June 18, while Dischler had an indeterminate hybrid in Columbia County from June 2 to 16.

Tennessee Warbler—June 2 saw the last northbound migrants moving through Racine and Columbia Counties. Brady had an Ashland/Bayfield Counties sighting on June 7, while the Smiths reported an undoubtedly southbound bird from Oconto County on July 18.

Nashville Warbler—With only 9 reporting counties, a worrisomely poor showing: the numbers for 1998–2001 ranged from 20 to 23, dropping to 13 for 2002 and 2003. The range boundary as mapped in *Wisconsin Birdlife* could be retreating (global warming?), as there were no reports south of Washburn, Marathon, Oconto, and Door Counties. As for numbers, Stutz reported 8 in Ashland County on June 12.

Northern Parula—In contrast to the previous species, found this season somewhat south of the historic range, with Belter recording a seasonal first in Marathon County and Tessen detecting a Waupaca County individual. Stutz had 25 in Ashland County on June 12.

Yellow Warbler—Populations appear healthy, with two counts of over 200 individuals: in Winnebago County on June 5 (Ziebell) and in Kenosha County on June 12 (Bong Birding Blitz).

Chestnut-sided Warbler—Found in 17 counties statewide, with 10 in Ashland County on June 12 (Stutz).

Magnolia Warbler—Tag-end migrants passed through Racine (Gustafson) and Walworth (Jacyna) Counties on June 3 and 6 respectively. The other 4 reports came from within the breeding range: Douglas, Ashland/Bayfield, Vilas, and Oconto Counties.

Cape May Warbler—Seen twice (June 5, Peterson and June 16, Baughman) in Vilas County.

Black-throated Blue Warbler—An individual as far south as Dane County as late as June 19 (Martin) is an anomaly. On the other hand, with reports 6 of the last 7 years (3 individuals all season this year), the species does seem to have established a southerly enclave for itself in Shawano County (Peterson). Other reports came from Ashland/Bayfield, Vilas, Forest, and Door Counties.

Yellow-rumped Warbler—Sontag had it throughout the period in Manitowoc County, the only report from south of its historic range. Perusing earlier summer reports, one finds that 17 pairs had been recorded in Point Beach State Forest in that county in 1998.

Black-throated Green Warbler—Stutz recorded a good 100 or so on his June 12 warbler census in Ashland County. An isolated colony in Sauk County persists (A. Holschbach). Lingered late (?) in a couple of southern counties well outside its breeding range: Fond du Lac County on June 20 (Mueller) and Milwaukee County on June 21 (Bontly).

Blackburnian Warbler—Reported from 8 counties within its core breeding range, with Stutz finding 20 in Ashland County on June 12. Frank encountered a wandering male singing outside his bedroom window for one day only (July 7) in Ozaukee County. Finally, a late migrant was still to be found in Racine County on June 3 (Gustafson). No word (after 3 consecutive seasons where it had been found) from the Sauk County colony.

Yellow-throated Warbler—No reports this year from Dane or Sauk Counties. Peterson and Wood reported 2 apiece in early June in Grant County.

Pine Warbler—A. Holschbach found them in Iowa County on June 12 and throughout the period in Sauk County, where they have been reported before in summer. Otherwise, the south-

ernmost of the remaining 9 reporting counties was Waupaca County (Tessen, June 18).

Palm Warbler—Found this season in Ashland/Bayfield (Brady) and Vilas (Baughman) Counties.

Bay-breasted Warbler—Evanson encountered one in a mixed flock of early migrants on the Lake Superior shoreline in Ashland County on July 27.

Cerulean Warbler—Found (as it frequently is in summer) in Marathon County (Belter, June 12) and in 9 more southerly counties. Peterson had 5 in Grant County on June 2, A. Holschbach the same number in Juneau County on June 6.

Black-and-white Warbler—Reports from the southern half of the state were confined to a June 3 sighting in Racine County (Gustafson) and to Sauk County, where A. Holschbach noted them until June 18.

Prothonotary Warbler—Reports confined to the southwestern counties of Rock, Green, Iowa, Grant, and Trempealeau.

Worm-eating Warbler—Kavanagh (among others) reported them early in the season from Sauk and Iowa Counties.

Northern Waterthrush—The number of reporting counties has plummeted steadily, from 20 as recently as 1998 to only 6 this year: Ozaukee, Marathon, Oconto, Door, Florence, and Ashland/Bayfield. Under such circumstances, the Smith's characterization of them as "low" in Oconto County seems doubly disheartening.

Louisiana Waterthrush—Reported only from Sauk County.

Kentucky Warbler—Peterson had 6 in Grant County on June 2. Kavanagh filed a June 24 Dane County report. From outside the breeding range came reports from Milwaukee County (June 8, Bontly) and Kenosha County (July 13, Hoffmann).

Connecticut Warbler—Reports were received from Douglas, Ashland/Bayfield, and Vilas Counties.

Mourning Warbler—A notoriously late migrant, this is a species that resists easy classification of summer sightings into migrant and territorial categories. The *Wisconsin Birdlife* breeding range lies north of an arc drawn roughly from Ozaukee through Marathon to Polk Counties, with significant southern pockets in Waukesha and Sauk Counties. Outside this range, birds were being seen the second half of June in Columbia (Dischler), La Crosse (Ruhser), and Milwaukee (Bontly) Counties. The Smiths tallied 16 in Oconto County on June 6. Noted in 19 counties overall.

Common Yellowthroat—Common indeed at the Bong State Recreation Area in Kenosha County, where 242 were counted during the Birding Blitz on June 12. A week earlier, Ziebell had counted 116 in Winnebago County.

Hooded Warbler—Found in 9 counties: Kenosha, Walworth, Rock, Sauk, Milwaukee, Ozaukee, Sheboygan, Fond du Lac, and most notably Shawano County, where Peterson has noted them with some regularity in recent years. This year, he recorded one as late as July 22. Hoffmann reported nesting in Kenosha County.

Wilson's Warbler—Migrants were still being noted in three southeastern counties the first three days of June.

Canada Warbler—Bontly recorded the last northbound migrant in Milwaukee County on June 1. The Sauk County colony persists as they were seen throughout the season there. Belter had an isolated sighting in Marathon County on June 19. Otherwise, seen at various times in 3 far northern counties.

Yellow-breasted Chat—Reported into July from what have become fairly reliable areas in Kenosha (Hoffmann) and Dane (A. Holschbach, Thiessen) Counties. In addition, Gustafson saw one in Waukesha County on June 13, while Paulios had them in two locations in Rock County, one on July 8 and the other on July 11.

Scarlet Tanager—Reported from 27 counties, with A. Holschbach recording 16 in Sauk County on June 22.

Eastern Towhee—Fifty-four were tallied on the Bong Birding Blitz in Kenosha County on

June 12. In addition, A. Holschbach counted 12 in Sauk County on July 12.

Clay-colored Sparrow—Appears solidly established in the southern third of the state, though Duerksen did characterize its occurrence in Richland County as "unusual." Found also in Green, Iowa, Dane, Kenosha, Racine, and Ozaukee Counties, as well as 20 counties in its historic summer range to the north.

Field Sparrow—The Bong Birding Blitz (June 12 in Kenosha County) total was 112.

Lark Sparrow—The first significantly out-of-range summer report in many years occurred when the Smiths registered a "one-day wonder" in Oconto County on June 13. A. Holschbach reported 7 in Sauk County on June 5; another report came from Ruhser in Monroe County on July 9.

Savannah Sparrow—Widespread across the state (36 counties), with 70 counted on the Bong Birding Blitz in Kenosha County on June 12.

Grasshopper Sparrow—Detected in 16 counties, the northern boundary being formed by St. Croix, Marathon, Shawano, and Door Counties. Thirteen were reported from Sauk County on June 5 (A. Holschbach).

Henslow's Sparrow—A nearly identical distribution to that of the previous species, with just 1 more reporting county and the same northern boundary. Several observers reported 4 or 5 individuals; the Bong Birding Blitz (Kenosha County, June 12) found an encouraging 29 [vs. only 3 for Grasshopper Sparrow].

Le Conte's Sparrow—Found in St. Croix, Oconto, Oneida, Vilas, Ashland/Bayfield, and Douglas Counties.

Lincoln's Sparrow—Reported in 6 northern rim counties and in Marathon County, where Belter has had some success in recent summers locating them in bogs in the eastern part of the county. Gustafson counted 4 in Oneida County on July 26.

Swamp Sparrow—Ziebell reported 104 in Winnebago County on June 5.

White-throated Sparrow—Found in 14 counties northeast of a line through Douglas, Marathon, Fond du Lac, and Sheboygan Counties.

White-crowned Sparrow—Some kind of statistical hiccup appears to have occurred: until this year, there had only been something like five June and five July records, ever. Suddenly we had no fewer than three further sightings, all accompanied by sufficient description to indicate the observers knew this was something unusual. First, Zehner noted one in Milwaukee County on June 5. On June 10 Thiessen found one in Dane County. Finally, Keyel documented one in Racine County on July 8.

Dark-eyed Junco—Noted in Ashland/Bayfield and Vilas Counties.

Dickcissel—Sixteen reporting counties was the fewest in at least 7 years. High counts of 15 were registered in Green (Evanson, June 4) and Dane (Peterson, June 10) Counties.

Bobolink—The Bong State Recreation Area in Kenosha County suits this species just fine, as a whopping 315 were reported on the June 12 Birding Blitz. Well reported throughout the state (34 counties in all).

Eastern Meadowlark—Like the previous species, doing well in Kenosha County, with 140 reported on the Bong Birding Blitz June 12. Reported from an additional 30 counties, with Evanson giving a count of 19 in Green County on June 4.

Western Meadowlark—Reports were filed from only 10 counties, with Evanson's June 4 meadowlark census in Green County coming up however with an encouraging (by recent standards at least) 22 individuals. In addition, Stutz reported 8 in Portage County on June 12. This and St. Croix and Manitowoc Counties reports were the northernmost.

Yellow-headed Blackbird—Reported in 20 counties throughout the state, though only Ashland/Bayfield Counties were represented among far northern ones. Ziebell counted 240 in Winnebago County on June 27, with Thiessen adding 25 in Dodge County on July 18. Only 5 were located during the Bong Birding Blitz in Kenosha County on June 12. David had a sad en-

counter with a persistently begging juvenile, heard for ten minutes before being located, in Milwaukee County on June 20. It was in appropriate habitat, but no adults had been detected in this frequently visited location all summer.

Brewer's Blackbird—Recorded in 13 mostly northern counties, with reports of 3–5 in Dodge County the second half of July (Tessen, Thiessen) the only indication of a summer presence that far south in the state. Stutz had 25 in Portage County on June 12.

Orchard Oriole—Found in 15 counties, the most unusual being 3 individuals on July 4 in Oconto County, where the Smiths have recorded it 3 of the last 4 summers.

Purple Finch—Found in 13 counties, as far south as Burnett, Washburn, Marathon, Waupaca, and Manitowoc Counties.

Red Crossbill—Two reports were filed: Baughman from Vilas County on June 27 and Brady from Ashland/Bayfield Counties on July 8.

White-winged Crossbill—Reported from Ashland/Bayfield Counties (Brady on July 18) and from Oneida County (Gustafson on July 26).

Pine Siskin—Reports came from Douglas, Ashland/Bayfield, Vilas, and Door Counties.

Evening Grosbeak—The LaValleys observed parents with young at their feeder in Douglas County on July 21. Present throughout the period in Ashland/Bayfield Counties. Gustafson saw 2 in Vilas County on July 25. There were two reports from Florence County (Ruhser on June 12 and Strelka on July 19). Finally, Peterson reported 2 in Shawano County on June 24.

Contributors and Cited Observers

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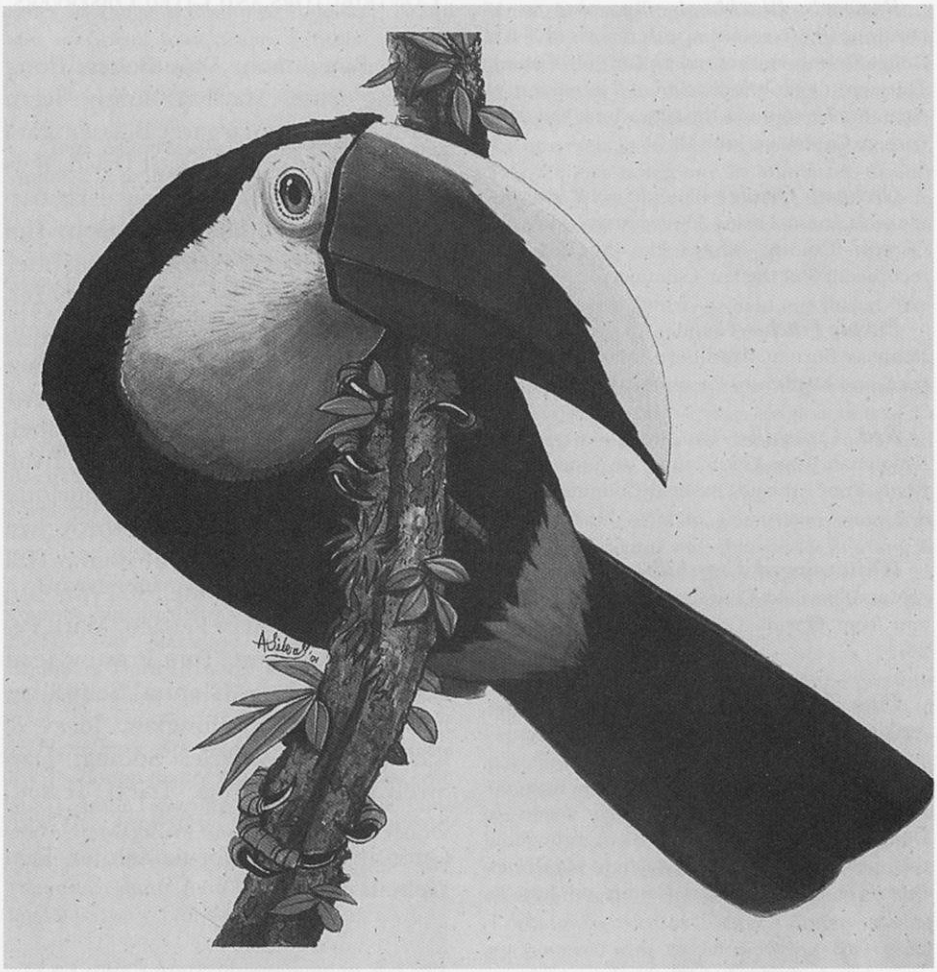


Chestnut-mandibled Toucan

"By the Wayside"—Summer 2004

Species documented include Red-necked Grebe, Western Grebe, Brown Pelican, Tricolored Heron, Mississippi Kite, Black-necked Slilt, Chuck-will's-widow, Loggerhead Shrike, White-eyed Vireo, Bell's Vireo, Northern Mockingbird, Yellow-breasted Chat, and White-crowned Sparrow.

Red-necked Grebe (*Podiceps grisegena*)

25 July 2004, Horicon Marsh, Fond du Lac County—I was pleasantly surprised to see an adult diving for minnows and feeding them to a juvenile. I had erroneously predicted that the heavy rains of spring would eliminate breeding this year because other nests I have seen during previous years were built just inches above the waterline on barely protruding mud bars. Apparently the pair I saw on June 12 were more careful about nest location. The juvenile still had a striped face, but there was a reddish hue on the upper breast. The adult appeared paler, with more worn plumage, than on the earlier date.—*Thomas Wood, Menomonee Falls, WI.*

Western Grebe (*Aechmophorus occidentalis*)

28 June 2004, Horicon Marsh, Dodge County—On the south side of Highway 49 in Horicon Marsh I scoped the ducks in hopes of finding the reported Western Grebe. It didn't take long to find a black and white grebe with a very long neck. It was pretty far away but it stayed above water most of the time, which allowed me to study it. The back was black, the throat and underparts white, and the black continued up the back of the neck and into the face. The bill was yellow, long and dagger-like. This was not a Clark's Grebe because the black clearly covered and continued below the eye.—*Tom Prestby, Wauwatosa, WI.*

Brown Pelican (*Pelecanus occidentalis*)

13 July 2004, Kohler-Andrae State Park and Sheboygan Point, Sheboygan County—First noted as a dark pelican flying north about 100 meters from shore which landed offshore in calm water. By the time we reached the parking lot, the bird had moved to the shore and was sitting and preening with a mixed flock of gulls. We approached to within about 40 meters and watched the bird in this attitude until we left. About one hour later we

stopped at Sheboygan Point and noted what was presumably the same bird sitting with a group of gulls on some rocks off shore. It tucked its head under its wing and was still for several minutes until a kayak approached. It then became alert and flew north along the lakeshore as the kayak passed.

Our notes indicate a dark pelican, generally brown in color with dark feet and a light belly. Lighter golden-brown spots were noted in the auricular area and from the crown down the back of the neck. The bill and eyes were dark brown, but the bill was somewhat lighter near the tip. When the bird flew, there was a mottled brown appearance throughout in the wings. We have seen Brown Pelicans in Texas and on the West Coast.—*Fawn and John Shillinglaw, Appleton, WI.*

Tricolored Heron
(*Egretta tricolor*)

27 June 2004, Horicon Marsh, Fond du Lac County—As I was scanning the rookery and areas in front of it with my spotting scope, a small, dark blue heron appeared. The first thing I noticed was the white crescent-shaped area around its wing. As it moved around, I was able to see the white belly and front of the neck, also white. The back and wings of the bird were a dark grayish blue, as were the head and back of the neck. The long, slender bill was yellowish. It was about half the size of the nearby Great Egrets. The heron was feeding on exposed bars. It was easily spooked when Great Egrets would fly in to where it was feeding. This caused it to fly off to other areas where there was less competition. This was my second Tricolored Heron at Horicon Marsh, having seen an individual there on August 2, 1996, as well as many in Florida and Texas.—*Anne Moretti, Dousman, WI.*

3 July 2004, Horicon Marsh, Fond du Lac County—Size was about that of a Little Blue Heron or Black-crowned Night-Heron. Legs were long and light grayish/yellowish, seeming long for a bird its size. The sides of the neck were dark blue to purple, extending into the face. The bill was thick at the base and long, orange-yellowish with a black tip. The front of the neck and belly were white. When the wings were lifted up or the bird was in flight, the underside of the wings was seen to be white, and the wing tips were dark blue. Little white tufts of feathers could be seen at the back of the head. It most closely resembled the non-breeding adult in the Sibley guide. The bird would stand around, fly a short distance, and then walk around eating fish or other small things.—*Seth Cutright, West Bend, WI.*

Mississippi Kite
(*Ictinia mississippiensis*)

5 June 2004, Milwaukee, Milwaukee County—Driving west on Burleigh Street, I observed a small to medium sized raptor come gliding over the tree tops. Its wheeling, banking flight style made it immediately clear that it was a Mississippi Kite. It was an adult bird. The underparts were medium gray and unstreaked. The head was much lighter, almost white. There was a dark line through the eye and a curved raptor beak was noted. The solid black tail was long and flared out slightly. The black wings were pointed like a fal-

con's, but the bend at the wrist was not as severe. As it passed directly overhead, I could clearly see the black tail and the slight notch in the wing from a shorter first primary. The bird continued flying to the southwest and could not be relocated.—*Mark Korducki, New Berlin, WI.*

Black-necked Stilt (*Himantopus mexicanus*)

2 July 2004, Horicon Marsh, Fond du Lac County—One bird was still present on the north side of Highway 49, where up to three had been seen in May. A very tall shorebird with black crown, cheeks, nape, back and wings; white around and above eye, at base of bill, chin, front of neck, breast and rest of undersides. Bill very thin and long (fairly straight) and black in color. Legs very long, spindly and red in color.—*Dennis Gustafson, Muskego, WI.*

18 July 2004, A and W Ponds, Dodge County—This appeared to be an adult female. There was some brown coloring on the bird's back. The bird had very long pink legs, a long black bill, and a continuous path of black feathers from the nape to the crown. These black feathers dipped down to meet the bird's eye, circling a white patch just above it. All other feathers—belly, throat, vent—were white. It was feeding in marshy mudflats with some grass mixed in. I had observed the species earlier this year at Nine Springs in Dane County, and on these same Dodge County ponds years ago.—*Aaron Stutz, Madison, WI.*

Chuck-will's-widow (*Caprimulgus carolinensis*)

2 June 2004, Dodson Hollow Road, Vernon County—I arrived at the spot shortly after 4 A.M. and almost immediately heard one bird calling from a hillside about a quarter of a mile away. Shortly after, another bird began calling from a hillside adjacent to me. The distant bird called for about ten minutes, then stopped, while the closer bird continued to call for over half an hour. All four notes of the bird's eponymous call were distinct. The accents were on the "chuck" and the "will" syllables. A distant Whip-poor-will was also heard from this location.—*Mark Peterson, Caroline, WI.*

6 June 2004, Dodson Hollow Road, Vernon County—I arrived around 8:30 P.M. Other birders, from Minnesota and Wisconsin, arrived later. The first bird commenced calling about 9:08, to our south and behind the hill. The other "responded" from across the valley. They moved around quite a bit during the next hour. Once, both were almost right next to us, so we could hear all of the call. At other times, it was very hard to hear the initial "chuck" note. There was no accent on any part of its call, in contrast to the Whip-poor-will call, which emphasizes the first and third syllables. The birds were still calling when I left around 10:00 P.M.—*Daryl Tessen, Appleton, WI.*

Loggerhead Shrike (*Lanius ludovicianus*)

11 July 2004, County Highway H, Rock County—Andy Paulios had reported seeing a Loggerhead Shrike in this area about a week earlier, so I went

in search of the bird. About a quarter of a mile past the turn of Highway H to the west I observed a shrike perched on an overhead wire. I drove past the bird, turned around and parked about thirty yards away. I was then able to observe the bird, first with my binoculars and then my scope. I noted a light gray bird with black patches on the wings and a wide black eye line. The bill was short and thick. The upper mandible was slightly longer than the lower and slightly downcurved at the tip. I would expect a Northern Shrike to have a more narrow eye line and the bill to be longer and narrower, with a strongly curved upper mandible. Also, this is the wrong time of year for a Northern Shrike to be in southern Wisconsin. I was able to compare this bird with the shrikes in my Sibley guide while the bird was still visible.—*Quentin Yoerger, Evansville, WI.*

25 July 2004, Litchfield Road, Walworth County—As I was driving down the road with Beth Goeppinger, a robin-sized bird that was mostly gray with large white wing patches landed on a fence post. Stopping fifty feet from it, we had a ten-second look with binoculars. The stubby, slightly hooked bill and the wide black mark were seen in fine detail. Across the road was a sign reading "5 acre homesites for sale." We were elated and saddened.—*Joe Jacyna, Lake Geneva, WI.*

White-eyed Vireo (*Vireo griseus*)

5 June 2004, Ringle, Marathon County—The bird was found earlier in the day by Mike Plant, and since it would be a new county bird for me, I made a fast dash out to that part of the county to try to see it as soon as possible. Arriving at the location, I soon found the bird in a young stand of aspen trees no more than ten to fifteen feet high next to the road. This was an adult bird, very plain looking by most standards for a small bird of its size. It had a gray nape, a whitish throat, and two white wing bars on a blackish shoulder area of the wings. Also seen were the bright yellow "spectacles" and the white iris in the eyes. The upper back was an olive-green color and the flanks were a pale lemon yellow. The bird did sing from time to time, and when it did, it would keep at it for several minutes before pausing for a short while.—*Dan Belter, Weston, WI.*

Bell's Vireo (*Vireo bellii*)

12 June 2004, Brooklyn Wildlife Area, Dane County—After viewing the two White-eyed Vireos, we walked back to the field where the Yellow-breasted Chat is usually found. As we were watching it, the Bell's Vireo started singing right in the same area. This bird was identified more by call than by sight, though it was seen briefly a few times in the bushes directly below the chat. All that could be discerned, however, was a dull olive bird, darker on the back and more yellowish on the sides. It was much smaller than the chat. The vireo sang several times. Its call sounds like a fast harsh warble. Whenever I hear a Bell's Vireo call, I think it reminds me of an Eastern Bluebird's call, if you were to make it a little harsher and speed it up a bit.—*Aaron Holschbach, Baraboo, WI.*

Northern Mockingbird (*Mimus polyglottos*)

21 and 22 June, 2004, Menomonee River Valley, Milwaukee County—Due to construction of the Marquette Interchange of I-94, I have been walking across the Menomonee Valley, crossing the Emmber Lane Bridge since the Sixteenth Street viaduct is closed. On June 21 I heard the calls of a Northern Mockingbird and soon located it calling from the utility pole in the city maintenance yard. The next morning I brought my binoculars and found the bird singing from the wires near the same pole. It flew across the river and began singing from a spruce tree only thirty feet from the sidewalk. I saw the gray head, white breast, dark gray wings, orangish-yellow eye and rather long black bill. Due to its position, I could not see its tail or back.

This is not a very attractive location, with a noisy maintenance yard, slaughterhouse and meat packing plant nearby, but I guess the limited vegetation growing alongside the river seemed attractive to the mockingbird.—*Thomas Wood, Menomonee Falls, WI.*

Yellow-breasted Chat (*Icteria virens*)

8 and 11 July, 2004, Rock River Prairie and Swenson Wet Prairie State Natural Areas, Rock County—On July 8, northwest of Beloit in the Rock River Prairie State Natural Area, I heard and then saw an individual in a scrubby oak within prairie/savanna remnant habitat. The bird had a gray-green back, strong yellow underparts and a strong black eye, lores and bill. The black on the lores was bordered above by a white eye ring and white line forward to the bill, which was grosbeak-sized. The bird gave typical chat vocalizations, alerting me to its presence with a series of weird tooting and laughing honks and whistles, etc.

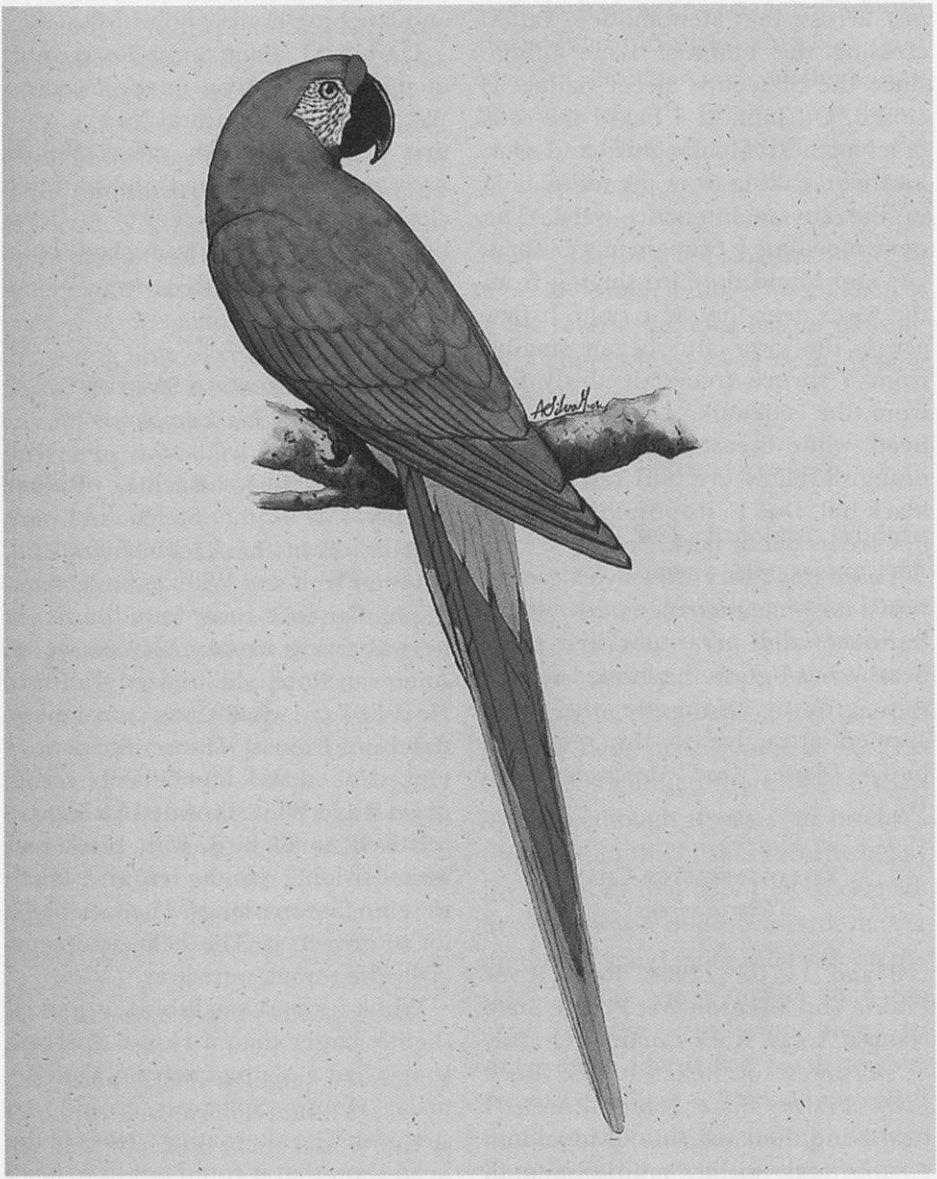
On July 11, along Smith Road south of the town of Avon in the Swenson Wet Prairie State Natural Area, I again first heard and then saw a Yellow-breasted Chat. I "pished" this bird to a clear view within ten feet of my location. It was being mimicked by a nearby Gray Catbird.—*Andy Paulios, Janesville, WI.*

White-crowned Sparrow (*Zonotrichia leucophrys*)

8 July 2004, Racine, Racine County—My brother Sasha and I were walking down the Racine Bike Trail, between Wolf and William Streets, trying to digiscope easily found birds. As he was trying to take pictures of an American Robin, he noticed this bird. He asked me what it was, as it looked different from a House Sparrow. I looked at it and immediately recognized it as a White-crowned Sparrow: a relatively small bird, with black and white striping in the crown. There were no face markings. The face had a lot of gray in it. The belly, and especially the throat, were gray.

While it was a small bird, it looked slightly larger than a House Sparrow. It also had a plain gray belly, while female House Sparrows would be streaked. The alternating stripes of the head show that it could not have been a male House Sparrow. White-throated Sparrow was eliminated be-

cause it had no yellow lores and no white throat; this was a grayer bird, while White-throated Sparrows are generally more of a brown color. I see White-crowned Sparrows every migration period as they come through Racine, having had as many as seven at one time in our backyard. Each morning during the migration period, I usually see and/or hear them before I get picked up to go to school.—*Ted Keyel, Racine, WI.*



Great Green Macaw

WSO Records Committee Report: Summer 2004

Jim Frank

WSO Records Committee Chair
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The WSO Records Committee reviewed 18 records of 7 species for the summer 2004 season, accepting 17 of them. Two additional reports from the spring season were also evaluated.

Accepted

Brown Pelican—

#2004-038 Sheboygan Co., 13 July 2004, Shillinglaw, Shillinglaw.

A dark pelican was reported, with a lighter belly and dark feet and bill. Yellowish areas were described in the auricular region and down the back of the neck and hindcrown. In flight, the brown wings were mottled in color.

This is Wisconsin's ninth accepted record.

Tricolored Heron—

#2004-039 Dodge Co., 27 June 2004, Moretti, T. Wood; 28 June 2004, M. Peterson, Tessen; 2 July 2004, Gustafson; 3 July 2004, S. Cutright; 4 July 2004, Stutz; 10 July 2004, Prestby.

This night-heron-sized bird was blue-purple in color on the head, upper breast, wings, and back. A contrasting white lower breast and belly were also described. The legs were yellowish. The bill was also yellowish, but had a black tip. In flight, the underwings were white.

Mississippi Kite—

#2004-043 Milwaukee Co., 5 June 2004, Korducki.

This small to medium-sized raptor had a light gray head and medium gray breast. The dark line through the eye was noted. The tail was black and held slightly flared. The wings were black and pointed. Finally, the first primary was relatively short compared to the other primaries.

Black-necked Stilt—

#2004-023 Fond du Lac Co, 28 June, 15 July 2004, Tessen; 2 July 2004, Gustafson; 18 July 2004, Stutz.

This tall, slender shorebird was black on the top of the head, back of the neck, mantle and wings. This con-

trasted dramatically with the white foreneck, breast, and belly. The long legs were pink. The bill was medium length, very thin, and straight.

Only one individual was seen during these summer reports, in contrast to the multiple birds reported in May and the reports to come in August(fall season).

Chuck-will's-widow—

#2004-026 Vernon Co., 2 June 2004, M.Peterson; 6 June 2004, Tessen; 13 June 2004, Belter.

This individual was identified by call only. A 3 note, 4 syllable call was described; the first note being extremely soft and at times not discernible. The second and third notes were at about the same pitch and intensity, the third with a softer trailing fourth syllable attached. A Whip-poor-will would produce a louder first note, followed by a soft second note, and a louder third note again with no trailing fourth syllable.

White-crowned Sparrow—

#2004-041 Racine Co., 8 July 2004, Keyel (photo).

This report was accompanied with photos that showed the black and white crown stripes, clean gray face, throat, and breast. The bill was pink.

Wisconsin has had five previous July records.

Old Records Accepted

Ruff—

#2004-024 Brown Co., 22 May 2004, M. Peterson.

This shorebird was Lesser Yellowlegs-sized with a gray-brown head and upper breast. The back was brown, but had a scaly pattern. Most striking was the black breast, contrasting with a white belly. The bill was gray, and about the length of the head. Finally, the legs were dull orange.

Painted Bunting—

#2004-042 Calumet Co., 4-19 May 2004, Funk, Jodar (photo).

These photos of a Painted Bunting at a feeder showed the bird to be smaller than a House Sparrow, with a dark, conical beak, blue head, red breast and light green back.

Record Not Accepted

Western Sandpiper—

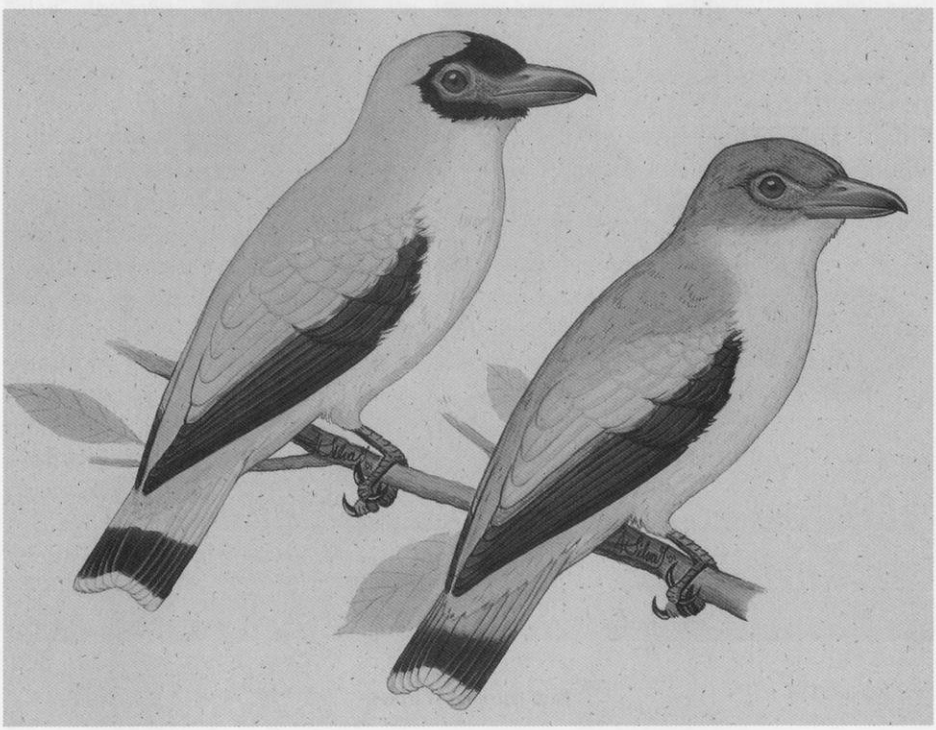
#2004-040 Dodge Co., 8 July 2004.

This bird was simply described as a peep with black legs, a "long, downcurved bill" and a slight hint of reddish on the head and scapulars. No indication of any color to the auriculars or breast markings was made.

The bills of Western and Semipalmated Sandpipers can overlap significantly in length. Typically, a Western bill would be described as drooping at the tip rather than downcurved,. a term more consistent with a Dunlin bill. Semi's can also have faint rufous coloration to the scapulars and crown. Additional information about the darker auricular area of a Semi vs. lighter in a Western and the cleaner white face and upper breast of a Western versus a Semi's smudgy upper breast would help tip the identification to a Western.

WSO and the Records Committee would like to thank Scott Baughman for lending his time and expertise to the committee's deliberations for the

past five years. Only those who have served in a similar capacity can fully appreciate the time and energy he has given to us. His position on the Records Committee has been accepted by Bill Cowart. Bill joins Bob Domagalski, Dan Belter, Mark Korducki, and Jim Frank for 2005.



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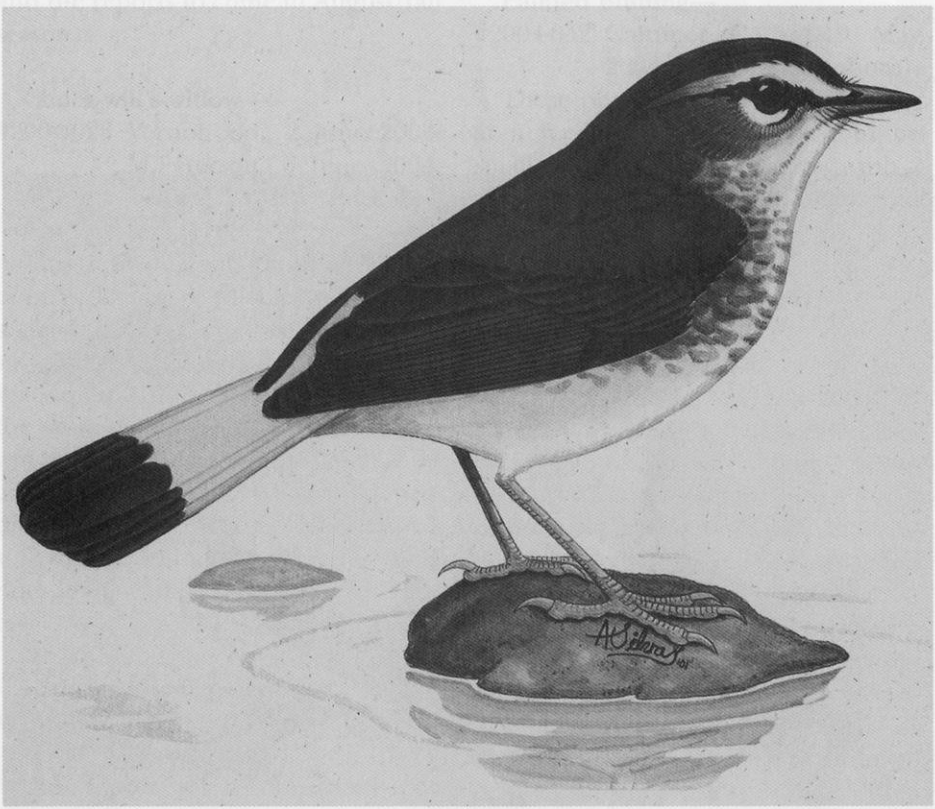


Buff-rumped Warbler

ABOUT THE ARTIST AND THE ART

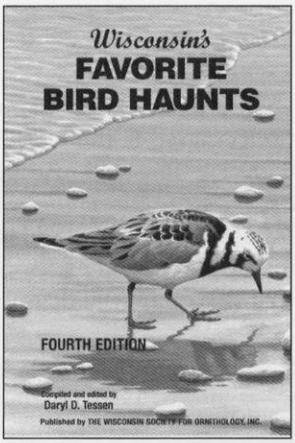
All the art in this issue of *The Passenger Pigeon*, including the cover painting of the Blue-crowned Motmot, the national bird of Nicaragua, is the work of Augusto Silva, a native of Nicaragua, who is preparing the illustrations of all the birds known to Nicaragua for the forthcoming *Field Guide to the Birds of Nicaragua.* Señor Silva works in cooperation with ALAS (Alianza para las Areas Silvestres), an alliance to work for protecting conservation areas in Nicargua—"alas" also means "wings" in Spanish. It is hoped that this guide will be published in 2006.

Augusto Silva, a native of Puerto Cabezas on the Caribbean coast of Nicaragua, depicts the Caribbean culture in most of his art. His work has been exhibited not only in Nicaragua, but also in Holland and Australia. He is highly praised as "an artist of natural history who knows how to respect the details, forms, and colors of our feathered friends," according to Juan Carlos Martínez-Sánchez of the Adopt-A-Bird program.

This project is being supported by an Adopt-A-Bird effort. Anyone interested in helping this book reach completion may adopt a species for $30.00. This amount covers the cost of painting a single species for this field guide. Checks should be made out to WSO and indicate they are for the Adopt-A-Bird project in Nicaragua. All monies collected will be sent to ALAS and the artist to cover the costs of producing this guide.

More about ALAS can be found on their website at: http://www.aves-nicaragua.org/

Checks should be sent to Christine Reel, WSO Treasurer, 2202 Sherryl Lane, Waukesha, WI 53188-3142.



Wisconsin's Favorite Bird Haunts,

Fourth Edition (2000)

Compiled and edited by Daryl Tessen with contributions from birders throughout the state. Features artwork by Thomas Schultz, David Kuecherer, Rockne Knuth, Judith Huf, and Jeannie Perry.

- Covers all 72 counties
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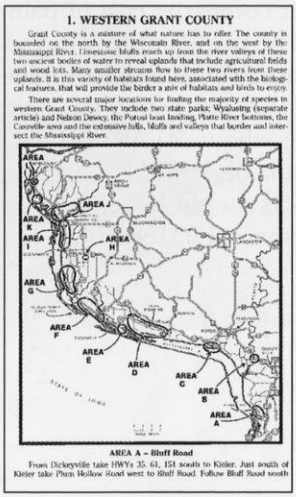
- Includes detailed directions as well as a map for each location
- Features some 45 bird illustrations, 15 of them in color
- Includes a list of 400 valid Wisconsin state species and 15 hypothetical species (current as of January 2000)


1. WESTERN GRANT COUNTY

Grant County is a mixture of what nature has to offer. The county is bounded on the north by the Wisconsin River, and on the west by the Mississippi River. Limestone bluffs reach up from the river valleys of these two ancient bodies of water to reveal uplands that include agricultural fields and wood lots. Many smaller streams flow to these two rivers from these uplands. It is this variety of habitats found here, associated with the biological features, that will provide the birder a mix of habitats and birds to enjoy.

There are several major locations for finding the majority of species in western Grant County. They include two state parks, Wyalusing (separate article) and Nelson Dewey, the Potosi boat landing, Platte River bottoms, the Cassville area and the extensive hills, bluffs and valleys that border and intersect the Mississippi River.

AREA A – Bluff Road

From Dickeyville take HWYs 35, 61, 151 south to Kieler. Just south of Kieler take Plum Hollow Road west to Bluff Road. Follow Bluff Road south

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The Wisconsin Society for Ornithology is an educational and scientific non-profit organization founded in 1939 "to encourage the study of Wisconsin birds." The Society achieves this goal through programs in research, education, conservation, and publication.

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