

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Huron-Manistee NF

REPLY TO: 2610 Cooperation

September 24, 1973

SUBJECT: Cooperative Study of the Kirtland's Warbler Winter
Habitat



TO: Regional Forester, R-9

Enclosed are two copies of Bruce Radabaugh's report on his activities in the Bahamas in 1973.

It appears that Radabaugh has demonstrated a technique for finding and observing the Kirtland's Warbler on its winter habitat. The greatest problem in using this technique is the apparent wide dispersal of the winter habitat throughout the some 700 islands of the Bahama archipeligo. Thus, a one person or small group effort would never be capable of developing a comprehensive picture of the winter range situation.

However, Radabaugh's effort has given us a place to start. If progress is going to be made on the studying of the winter habitat situation, it is going to take an effort equal to the immensity of the area involved. If this is the case, the next step would be to organize a large scale winter habitat survey. This effort would be larger and more complicated than the nesting ground survey.

It would take at least 25 two man crews working from two to four weeks to make a significant sampling of the area. Transportation from island to island is one of the larger problems. However, with Forest Service and Bureau of Sports Fisheries and Wildlife aircraft and Bureau and National Audubon Society boats, and careful planning, the crews could be shuttled from island to island.

It may sound like quite an effort, but not an impossible one.

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Enclosure

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REPORT OF A TRIP TO SOME CENTRAL AND SOUTHERN
ISLANDS OF THE COMMONWEALTH OF THE BAHAMAS
IN SEARCH OF KIRTLAND'S WARBLERS FROM
5 JANUARY TO 3 APRIL 1973

Submitted by Bruce E. Radabaugh

INTRODUCTION

The following is a report on field work carried out on certain islands in the Commonwealth of the Bahamas between 5 January and 3 April 1973. These studies constituted a continuation of work carried out in the Bahamas between 7 February and 14 April 1972,

The principal purposes were the same in both years:

1. to observe and assess recent habitat changes;
2. to find Kirtland's Warblers* if possible;
3. to correlate the Kirtland's Warbler winter requirements with habitat changes and make any necessary recommendations to the appropriate authorities.

The general techniques were also the same in both years. As many islands as possible were visited in the time available. As much as possible of each island visited was sampled on foot. A tape recorder, for playing back songs of the Kirtland's Warbler, was used along many miles of trails in the hope that Kirtland's Warblers (at least the males) would approach and be observed. Such a survey provided ample opportunity to note habitats and habitat changes on the islands visited.

There are about 700 large and small islands in the Bahamas archipelago. The total area is about 4,400 square miles. The bulk of this area consists of 13 larger islands. It seemed reasonable to begin a sampling of the Bahamas with these larger islands (although Kirtland's Warblers have been found on small -- and large -- islands in the past).

In 1972 I visited: Grand Bahama, Abaco, Andros, New Providence, and Eleuthera. The first four-named are "pine islands" -- i.e., they are more or less covered with Caribbean pine (*Pinus caribaea*). Eleuthera, and the islands listed immediately below, support no pines. In 1973 I worked Exuma, Long, San Salvador, Cat, Crooked, and Ackling Islands. Original plans for 1973 also included Mayaguana and Inagua, but these plans failed due to unforeseen difficulties.

A total of 800 hours was spent in the field in the combined 1972 and 1973 work.

Please refer to the 1972 report for details of work in that year as well as certain background material on the Kirtland's Warbler.

*--Scientific names for bird species appear in Table 1.

ACKNOWLEDGMENTS

All the organizations contributing grants and assistance towards the 1972 field work also contributed to the 1973 effort. These organizations were: The National Audubon Society, the New York Zoological Society, and the Oakland Audubon Society (formerly the Pontiac Audubon Club).

A grant for the 1973 work was also contributed by the United States Forest Service.

A tape recorder and a camera were purchased for this project by the Oakland Audubon Society and loaned to me in both years.

Again, I thank Alexander Sprunt, IV, Research Director for National Audubon, for his handling of many details during the 1973 field work. He was mainly responsible for coordinating the funds from the various contributing organizations.

My thanks go also to Michael Lightbourn, Treasurer of the Bahamas National Trust in Nassau for attending to many details during a number of visits to Nassau. He expedited all in-coming funds, arranged for critical repairs on the tape recorder, and showed a continuing interest in the work as it progressed.

I would also like to express my appreciation to Dr. Daniel S. McGeen for reading this report, prior to submission, and for his useful comments and suggestions.

My sincere thanks go to Mr. and Mrs. Garnett Ferguson, of the settlement of Brown on Crooked Island, for their help in plant identification.

Finally, I would like to express my gratitude to Mr. and Mrs. Ed Boyes who produced the record of bird songs (Songs and Sounds of Nature, "Wild Bird Songs", Volume I) from which I transcribed the Kirtland's Warbler songs.

DISCUSSION

The body of this report breaks down into three general areas:

1. details of the one Kirtland's Warbler I located -- including comments on the efficacy of using recorded song in such searches;
2. some remarks on habitats and habitat changes in the Bahama Islands;
3. information, and some general comments on other species of birds observed during this work.

A Kirtland's Warbler from Crooked Island

As already mentioned, 800 hours were spent in the field, when combining the work from both 1972 and 1973. During this time I found only one Kirtland's Warbler. This was a male observed on the same area on three days -- 11, 12, and 22 March 1973 -- towards the eastern end of Crooked Island, about one mile east of the settlement of Brown. In total, I had this male under actual observation for about one hour and 50 minutes.

He was evidently a fully developed male. There were no speckles across his breast, as might be expected with an immature male. His molt appeared complete except for a small area on the chin that was whitish instead of lemon yellow. There was a small asymmetrical black blotch on the left side of his breast that was used as an indication that the same individual was involved on all three dates of observation. The bird was not banded.

Because of this male's reaction to recorded Kirtland's Warbler song -- albeit weak -- it appears correct to term his utilized area a "territory" (as opposed to "home range" or some other designation connoting an undefended area). He approached the recorder, "chipping" loudly on 11 March. His reaction on 12 March was similar, but less strong. His reaction on 22 March* was weaker still.

The "strength" of the reaction was judged by how loudly and how persistently he "chipped", and how closely he approached the recorder -- as well as by how long his "curiosity" persisted. He never approached closer than three meters. The "boldness" towards recorded species-song, observed on the breeding grounds, was largely lacking. Even on the first, 11 March, sighting, I was very aware that he seemed intimidated by the recorded song. In fact, his reactions to the songs were just strong enough to give the impression of defense. I therefore kept the use of the recorder to an absolute minimum. Often, when he became lost to view, I simply left the territory rather than risk trying to call him up again.

The "chipping" was interspersed with "zeet" notes -- which are ordinarily interpreted as location notes. I heard no singing from this male.

Some of the winter sightings of Kirtland's Warblers on Grand Bahama in recent years have involved observations of individuals moving about on tree trunks (on mature Caribbean pines) much like a Black and White Warbler. I might add that this occurs among other species on the wintering grounds as well -- i.e., species that are not especially noted for this behavior in summer. The Crooked Island male, however, was not observed on trunks at all (the largest trunks available were probably no more than four inches in diameter -- much smaller than the larger Caribbean pines on Grand Bahama). Rather,

*--This male was not sighted on 13 or 14 March. Therefore, I proceeded to Acklins as planned. I returned to Crooked Island late on 21 March. He was probably on territory throughout this period but did not respond to the recorded song on the 13th or 14th strongly enough to be observed.

he spent most of his time -- I would estimate about 70 percent -- on the ground, actively hunting for food. This behavior is uncommon on the breeding grounds. Hunting on the ground -- or on tree trunks, for that matter -- probably represents mere opportunism. They will hunt for food wherever their immediate experience indicates they might find it. Probably the trade winds -- although not unusually strong on the days the male was observed -- were restricting the bulk of the small insects to the vicinity of the ground.

Actual food items were not identified. They were small, as appears to be the case with most of the fare of birds over-wintering in the Bahamas. For example, among many observations of the very common Palm Warbler I saw only one individual catch a "good-sized" larva (C.1 $\frac{1}{2}$ ""). I assume that most of the Kirtland's Warblers' winter diet would be animal.

I believe that the dates of observation -- spanning, as they do, 12 days -- indicate the male was "fixed" on his winter territory and was not a bird moving in spring migration. The irregular blotch on his breast may be taken as corroborating evidence that I was dealing with the same individual. The rarity of the species would also suggest this.

The Kirtland's Warbler territory was, predictably, irregular in shape. The observed territory was shaped somewhat like the continent of Africa with the long axis oriented NNW-SSE. The area of the observed territory was slightly over one acre. The longest axis measured about 106 meters, the shortest about 78 m. I am reasonably certain that additional observations of this male around the periphery of his territory would have revealed a larger utilized area (and one of different shape as well). Mayfield (1960) gives the average size of 20 breeding territories as 8.4 acres.

The territory was not otherwise rich in bird life. Only 16 other species were noted: Osprey, Peregrine Falcon, Zenaida Dove, Common Ground Dove, Bahama Woodstar, Gray Kingbird, Bahama Mockingbird, Blue-gray Gnatcatcher, Thick-billed Vireo, Black and White Warbler, Yellow Warbler, Prairie Warbler, Palm Warbler, Bananaquit, Stripe-headed Tanager, and Black-faced Grassquit.

The Osprey(s) and falcon(s) were merely passing overhead, and were seen a number of times. The other species -- each observed on almost every visit to the territory -- would have been in much closer association with the male Kirtland's Warbler. No conflicts -- or even close approaches -- between the Kirtland's Warbler and any other bird were observed. No other Kirtland's Warbler was seen. (This male was searched for, without success, not only on 13 and 14 March, but also from 23 March through the end of the month.)

The dominant plant on the territory was buttonwood*. Both "black" and

*--This and the following plant names are the Bahamian names for these plants as given to me by the Fergusons. Such names are typed with quotation marks. In some cases the spelling is simply my interpretation of the sound. I also have photographs of these plants. Alexander Sprunt informs me that many of these Bahamian names can be found in the index of BAHAMAS FLORA by Mills-paugh. I have not had an opportunity to read this book since my return. Therefore, I cannot at this time provide scientific names for these plants.

"white buttonwood" were present, with the former in greater numbers. Some of the other plants common on the territory were: "brassleeta". "Lucy bush", "cherry", "margineelee", "wild plum", "cat's paw", "madeira", "rock bush", "darlin plant", "surfeeian", and "spoon bush". There were also two species of cactus, viz., "dildoo", and Opuntia Sp.

No plant, such as a century plant or Agave, with a profusion of blossoms serving as a "food center" for both nectar- and insect-feeding birds, was present on the territory.

The dominant ground cover -- of special interest because the Kirtland's Warbler spent so much time near or on the ground -- was "Bermuda grass". There were lesser amounts of "parsley" and "broom". There was a great deal of exposed rock as well.

The shrubbery had somewhat the same configuration as do jack pines on a typical breeding territory during optimal stages -- i.e., there were "thickets" and openings. By squinting, one could visualize the "habitat gestalt" much as it appears in Michigan. The shrubbery on Crooked Island is, of course, broad-leaved.

On the larger Bahamian islands the land fairly typically rises from the sea forming a coastal ridge. Immediately inland from the ridge is a low area or "trough". Still inland from the trough the land more or less gradually rises to form the main part of the island. Depending on the depth of the trough, as well as on other factors, the habitat in this low area is variously a marsh, a mangrove swamp, a pond, or a rather dry area often dominated by palms. Existing water is brackish. Some of the ponds rise and fall with the tides.

The particular Kirtland's Warbler territory dealt with here was about 900 meters north from the sea. The trough behind the coastal ridge (a very low, broken ridge in this instance) was occupied by a mangrove swamp meandering roughly east-west parallel with the south coast of the island. The elevation inland from the mangrove only very gradually increased. Thus as one proceeded inland from the mangrove one found, successively: a band, or zone, of stunted and sparsely scattered mangrove; a zone consisting almost entirely of bare rock and Bermuda grass -- a "no-man's land" between the mangrove and the next plant association; a zone of stunted shrubbery, in which the Kirtland's Warbler's territory was located; and, finally, the taller "scrub" typical of many of the southern Bahama islands.

The plants on the Kirtland's Warbler's territory occupy, as it were, an intermediate area -- intermediate in elevation and in salinity of the ground water. The stunted habit observed here is probably due to the water being quite brackish. The buttonwoods are the commonest, tallest plants in this zone. They show evidence of being well adapted -- aside from their abundance and size -- by their ability to exude excess salt through their leaves in great quantities. They are not found farther inland (nor, of course, among the mangrove to seaward). Most of the other plants on the territory are found farther inland. However, existence in this intermediate zone appears marginal for them and they are not only stunted here, but less densely distributed than is the case only slightly farther inland.

Such an intermediate zone can be found along many stretches of coast and around the perimeters of many inland low areas. These zones are narrow, however -- perhaps only 200 meters in width -- and would constitute a rather severe restriction of distribution and habitat choice for any organism limited to them. We have no evidence that the Kirtland's Warbler is so restricted. Also we have no way of knowing how typical this male Kirtland's Warbler might be relative to others of the species utilizing non-pine Bahamian islands in winter.

Such areas appear in no imminent danger as they are not in demand by man. Island farming would be impossible here. Any coastal area is in potential danger of alteration through highway construction and coastal development generally. However, many out islands, including Crooked, have undergone only very light "development" to date. The Bahamas government, looking to the future, is now drilling and capping water wells throughout Crooked Island. These wells will constitute the water supply to attract and serve future home-builders on the island. One such well was drilled on the Kirtland's Warbler territory between 15 and 20 March (but the male was present at least on 22 March).

If the Crooked Island male's reaction to recorded species song is typical of other wintering males, then this is a reasonable technique for trying to find such males in the Bahamas. It seems very likely that I would have walked past this male had he not responded to the recorded song. I must stress, however, that recorded song seemed to intimidate this male; and the use of a recorder must be used with caution. Beyond a certain point a male probably would not respond. He would simply remain silent, back in the shrubbery, and go unobserved. The possibility remains, however, that a male could be driven off his territory if this technique was overdone. Intimate knowledge of the best sources of food is a by-product of territorial behavior. A bird in a strange area could run into trouble as food is nowhere abundant in the Bahamas in winter (and particularly this past winter with a rather extended drought on the southern islands).

However, I believe the principal reason I did not find more Kirtland's Warblers was simply that there are so few on such a relatively vast area. The bulk of the islands were not visited at all. Furthermore, many portions of the islands visited were virtually inaccessible. I sampled only a very small portion of the Bahamas. It can be reasonably estimated that there were about 260 males in the Bahamas at the time I visited there in 1972. They are most likely not evenly distributed, but the average comes out at one male for every 105,000 acres.

Working backward from the 1973 census (which revealed 216 singing males on the breeding grounds), I judge that the number of males in the Bahamas during my 1973 visit was about the same as in 1972 -- and, again, about one male for about 100,000 acres.

It is quite possible that in addition to the problem of getting close enough to an individual for him to hear the recorded song -- the sound volume I had probably penetrated the scrub for about 200 meters -- some males simply do not react to the song in a manner positive enough to be observed. In this regard, it may be significant that it was mid-March when I found the one male. It is possible that mid-winter males would not respond at all to recorded song.

It would be interesting to test this hypothesis with recorded song of closely related, more common, species -- such as the Palm Warbler, and others. In any case, it seems likely that there would be a great deal of individual variation -- as there is with many other aspects in the behavior of the Kirtland's Warbler.

This Crooked Island record, incidentally, is the first for that island. Kirtland's Warblers have now been collected or sighted on at least 15 islands in the Bahamas. (This number would be minimal as it is difficult to deal with reports such as "three collected in the Berry Islands".)

Environmental Alterations:

Alteration of habitat through development, for whatever reason, has been minimal in the central and southern islands visited this past winter.

Great Exuma (including Little Exuma): A high proportion of this area is platted to subdivisions. The developers say most of the lots have already been sold. There is only a scattering of new houses built on these lots thus far -- primarily in the George Town area. A large, new subdivision is currently being put in just south of George Town. There are a few resorts on these two islands -- most of them in or near George Town.

Long Island: The Stella Maris development, towards the north end of the island, is the sole active subdivision at present. Only a handful of homes have been built on it so far. An inn, operated by this development company, is the principal resort on the island. There is a smaller resort farther north. There are no resorts as yet in the central and southern portions of the island. A small subdivision appears to have been aborted some years ago, and is now grown over, near Clarence Town in the south.

The Diamond Crystal Salt Company has a long, coastal series of salinas towards the southern end of the island in its "solar salt" (evaporative) salt production operation. This long, thin strip would probably be mangrove swamp otherwise.

San Salvador (Watling's): The Columbus Landings Development Company controls about 75 percent of San Salvador and has big plans for developing that land -- and the many inland lakes -- into residential subdivisions, hotel sites, marinas, etc. Presently, road construction is underway in the southern part of the island for residential subdivisions. There is currently only one resort on the island, operated by the development company.

Cat Island: There is a very small subdivision towards the southwest end of the island, with a few new homes built on it. There are several resorts on the island. Otherwise the island is little developed, particularly in the north. An excellent highway now runs almost the entire length of the island. (This is likely the best road in the Bahamas outside Grand Bahama.)

Crooked Island: This island has undergone only slight development. There is a small subdivision at the west end with a few homes on it. A resort, in connection with this subdivision, nearly went out of business and is presently operating on a marginal basis. There are two Bahamian-run guest houses on the island. Flamingo Airlines recently discontinued flights into the Colonel Hill airfield. There was no regularly scheduled air service to the island while I was there. The roads on the island are presently in very poor condition.

Acklins Island: There are no subdivisions on this island. A single cottage constitutes the only public accomodation at present. The one airstrip, near Pinefield, is suitable only for smaller private planes. There is a good, new road connecting most of the settlements.

The general remarks on farming given in the 1972 report (q.v.) apply equally well to the islands visited in 1973. In terms of habitat alteration, there is even less in the central and southern islands because the proportion of these islands given over to farming is even lower than in the north. This is apparently a consequence of lower population densities and probably other factors -- greater distance from markets, etc.

A goodly number of Nassauvians are originally from the various Out Islands. There has been, and is, an influx of Bahamians from the remote islands to the population centers. Most of these appear to be younger people seeking greater employment and life opportunities. As a result many out islands -- or large portions of them -- appear to have undergone a considerable drop in population. On Crooked, especially, there are many abandoned homes. In fact, entire settlements are now represented by only a few older residents.

Instead of a diminishing number of farmers continuing to feed the growing number of town-dwellers -- as happened, in a general way, in the United States -- much of the food is imported from Florida and other places. Farming has diminished accordingly.

Far and away the most significant habitat alteration I observed in the Bahamas was the pulp-wood operation carried out by the Owens-Illinois Company on the Caribbean pines on Grand Bahama, Abaco, and Andros. The wholesale destruction of the native Bahamian pineland habitat accomplished from 1959 to date was described in the 1972 report.

I would reiterate at this point that there is a coincidence in time between this lumbering operation and the 60 percent decline in the Kirtland's Warbler population between the 1961 and 1971 censuses. I consider the hypothesis that these changes on the wintering grounds have contributed to the drop in Kirtland's Warbler numbers as still viable -- we still must address ourselves to this question and develop data that will either refute or confirm it.

Several points can be made against this hypothesis. The most cogent, perhaps, is the excellent year-to-year survival figures obtained from banded Kirtland's Warblers in two studies spanning this same period of time (my own study of a nesting group in Oscoda County, and a study by Dr. Lawrence Walkinshaw in Crawford County). If the overall population is declining from changes in habitat on the wintering grounds, why should a number of individuals -- from two random Michigan study areas -- be doing so well?

This question may be answerable, but I do not want to raise all the hypothetical points just now. One thing is certain. all the answers are not yet in. It is as true of the Kirtland's Warbler investigation as of any other biological problem that one answer raises at least two more questions.

It was the 1971 census, with 201 singing males, that revealed the startling 60 percent decline in the population of this species from the 502 singing males counted in the next earlier census of 1961. The death and re-productive rates about balanced out during the following year with 200 singing males counted in 1972.

During the 1972 breeding season several agencies -- federal and Michigan -- extended the cowbird removal program to include the bulk of the breeding population of Kirtland's Warblers. It has already been demonstrated that cowbird removal allows a greatly increased number of Kirtland's Warbler fledglings. As a result of the 1972 program it was hoped that the 1973 census would reveal a significantly higher population. The 1973 count of 216 singing males failed to reveal such an increase (the 7 percent difference is believed to be well within the error factor for these censuses).

Mayfield, in reporting the total, suggested the possibility that the population now contains a higher proportion of first year males, and that some such males may not establish territories -- and therefore may not be found singing. If so, then only next year may reveal the relative success of the cowbird removal in raising the total Kirtland's Warbler population. We do have evidence of many banded first year males breeding successfully. However, we know nothing of the proportion of first year males that successfully establish territories because we have so few returns of these birds banded as nestlings.

Kirtland's Warbler fledgling production varies considerably from year to year, even with a cowbird removal program operating as constantly as possible. It is intended that this removal will continue. I am hopeful that we will get a significant increase over the next few years. In fact, it is possible that most of the census errors either cancelled each other, or even tended to undercount, this past summer. In that case an increase of about 10 percent would be most encouraging.

However, until such time as the continuing annual censuses reveal solid gains in the warbler population -- gains supported by unequivocal figures -- we must continue to investigate all phases of the life history of this species -- including conditions on the wintering grounds. If conditions there are even partially responsible for the decline in the Kirtland's population in the last decade, then these conditions will have to be restored in order to support any additional population increase we manage to bring about through our efforts on the breeding grounds with cowbird removal, habitat creation, and the like.

Distribution and Relative Abundance of Other Species

Table 1 presents some information on the distribution and relative abundance of birds on the 11 principal islands sampled. These data, and those from many other observers, will eventually yield a clearer picture of the distribution of birds in the Bahamas.

Despite many short-comings that qualify and limit the data here presented, there are certain generalizations that may be justifiable. These general comments follow (and they are possibly already well known by many Bahamas birders more knowledgeable of their avifauna than I!)

Species that appeared to be more common in the north than the south were: Turkey Vulture, Cuban Emerald, Hairy Woodpecker, Loggerhead Kingbird, Bahama Swallow, Brown-headed Nuthatch, Red-legged Thrush, Olive-capped Warbler, Pine Warbler, and Bahama Yellowthroat. Some of these are said to be restricted to the north entirely (such as the nuthatch). Strictly latitudinal considerations are complicated by the presence of pine lands -- a distinct habitat difference -- on some of the northern islands. Thus it is impossible, without further study, to say whether species more common in the north are there because of the pines or for other reasons.

Species that appeared to be more common in the southern islands were: Yellow-crowned Night Heron, Killdeer, Lesser Yellowlegs, Least Sandpiper, Mangrove Cuckoo, and Pearly-eyed Thrasher. In this context it should be remembered that I did not visit either Mayaguana or Great Inagua.

The White-crowned Pigeon seemed to have a greater abundance in the central Bahamas -- Cat, Exuma, Long, and San Salvador. I saw only a few on islands farther north (in the previous winter) and none on either Crooked or Acklins. With regard to this species, it would have been interesting to have sampled Mayaguana and Inagua. Among the islands visited this winter, the White-crowned Pigeon was observed most often on Cat Island.

Another type of distribution is said to exist wherein a species is more abundant in the northern and southern islands and relatively less so in the central islands. Among my own observations this appeared to be the case with the Blue-gray Gnatcatcher and the Stripe-headed Tanager. It seems more than a coincidence that such a conspicuous species as the gnatcatcher was not seen at all on Eleuthera, Cat, Exuma, San Salvador, or Long Islands.

The bulk of the species that were observed on 9 or 10 of the 11 islands sampled were most likely present on all 11 islands, and went unobserved by chance alone. A few, however, are very conspicuous and their presence on all but, say, one island focuses attention on that island. For example, the Northern Mockingbird is not a retiring bird. It therefore seemed unusual that I did not see even one on San Salvador. I must conclude this species is at least uncommon on San Salvador. This species was also very uncommon on Cat Island.

Table 2 shows the number of species observed on only one island, on two islands, on three islands, etc.

There were 14 species seen on all 11 islands visited: Great Blue Heron, American Coot, Zenaida Dove, Common Ground Dove, Smooth-billed Ani, Bahama Woodstar, Bahama Mockingbird, Catbird, Thick-billed Vireo, Myrtle Warbler, Prairie Warbler, Palm Warbler, Bananaquit, and Black-faced Grassquit.

On the other hand, there were 24 species observed on only one island: Olivaceous Cormorant (San Salvador) American Bittern (Acklins), West Indian Tree Duck (Acklins), Sharp-shinned Hawk (Eleuthera), Merlin (Cat), Ring-necked Pheasant (Eleuthera), Sora (Crooked), Upland Plover (Crooked), Western Sandpiper (Long), Ring-billed Gull (New Providence), Chuck-will's widow (Grand Bahama), West Indian Red-bellied Woodpecker (Abaco), Gray Kingbird (Crooked), Eastern Wood Pewee (Andros), Tree Swallow (Crooked), Barn Swallow (Crooked), Brown-headed Nuthatch (Grand Bahama), Cedar Waxwing (Abaco), White-eyed Vireo (Long), Magnolia Warbler (Acklins), Black-throated Green Warbler (Acklins), Kirtland's Warbler (Crooked), Black-cowled Oriole (Andros), and Song Sparrow (Acklins).

Some species are on this list by chance alone. For example, I understand the West Indian Tree Duck is common. It was probably missed largely because of its nocturnal habits (combined with my own diurnal routine).

Table 3 shows the distribution of these "single-island" species among the 11 islands. It will be noted that the Crooked-Acklins District accounted for 11 of the 24 examples. Part of this is probably due to the leading edge of spring migration passing through when I was there.

Table 1. Some general information regarding the relative likelihood of observing a given species on the islands visited in 1972 and 1973. The list consists of 143 species — 100 treated in text by Paterson (1972), and deemed by him to be the most common; and 43 others observed by me and included for the record. (Paterson lists 364 species observed in the Bahamas at least once.) The figures are percentages which, in turn, represent the number of days a species was seen on a given island relative to the total number of days that island was visited (for example, a species seen on two days on an island sampled for 10 days would be given 20 percent).

<u>Species</u>	<u>GB*</u>	<u>Ab</u>	<u>NP</u>	<u>An</u>	<u>El</u>	<u>Cat</u>	<u>Ex</u>	<u>SS</u>	<u>Lo</u>	<u>Cr</u>	<u>Ack</u>
Least Grebe (<u>Podiceps dominicus</u>)			20		25	20	20	10		15	
Pied-billed Grebe (<u>Podilymbus podiceps</u>)		15			15	20					
Audubon's Shearwater (<u>Puffinus lherminieri</u>)											
White-tailed Tropicbird (<u>Phaethon lepturus</u>)		5								5	
Double-crested Cormorant (<u>Phalacrocorax auritus</u>)							30				
Olivaceous Cormorant (<u>P. olivaceus</u>)								10			
Magnificent Frigatebird (<u>Fregata magnificens</u>)	10				40			10			
Great Blue Heron (<u>Ardea herodias</u>)	20	15	20	20	15	20	10	10	30	15	60
Green Heron (<u>B. utorides virescens</u>)			40	20	25	45	20	10	20	60	40
Little Blue Heron (<u>Florida caerulea</u>)	10	15		20	25	45	35	30	10	50	20
Cattle Egret (<u>Bubulcus ibis</u>)	20	15		30	40		35	20	20	20	
Reddish Egret (<u>Dichromanassa rufescens</u>)										50	20
Common Egret (<u>Egretta alba</u>)		15	20	10		10	20	45	20	30	
Snowy Egret (<u>E. thula</u>)	20	25	60		25	35	10	20	10	40	60

Table 1 continued - page 2

<u>Species</u>	<u>GB</u>	<u>Ab</u>	<u>NP</u>	<u>An</u>	<u>El</u>	<u>Cat</u>	<u>Ex</u>	<u>SS</u>	<u>Lo</u>	<u>Cr</u>	<u>Ack</u>
Louisiana Heron (<u>Hydranassa tricolor</u>)	20	25	20		15	55	45	30	35	70	60
Black-crowned Night Heron (<u>Nycticorax nycticorax</u>)											
Yellow-crowned Night Heron (<u>Nyctanassa violacea</u>)						10	10	35	10	20	20
Least Bittern (<u>Ixobrychus exilis</u>)				10							20
American Bittern (<u>Botaurus lentiginosus</u>)											20
Glossy Ibis (<u>Plegadis falcinellus</u>)	10	15					20				
West Indian Flamingo (<u>Phoenicopterus ruber</u>)											
West Indian Tree Duck (<u>Dendrocygna arborea</u>)											20
Bahama Duck (<u>Anas bahamensis</u>)					15			45		50	
Blue-winged Teal (<u>A. discors</u>)		15			15	10	10	30		20	20
American Widgeon (<u>A. americana</u>)	10				15		10			5	
Shoveler (<u>Spatula egyptica</u>)	10				15						
Lesser Scaup (<u>Aythya affinis</u>)	10		40		15						
Ruddy Duck (<u>Oxyura jamaicensis</u>)											
Turkey Vulture (<u>Cathartes aura</u>)	80	60		80							
Sharp-shinned Hawk (<u>Accipiter striatus</u>)					15						
Red-tailed Hawk (<u>Buteo jamaicensis</u>)	20	25		10							

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<u>Species</u>	<u>GB</u>	<u>Ab</u>	<u>NP</u>	<u>An</u>	<u>El</u>	<u>Cot</u>	<u>Ex</u>	<u>SS</u>	<u>Lo</u>	<u>Cr</u>	<u>Ack</u>
Harrier (<u>Circus cyaneus</u>)	10		20		15			20			
Osprey (<u>Pandion haliaetus</u>)	10							10	45	45	60
Peregrine Falcon (<u>Falco peregrinus</u>)										10	20
Merlin (<u>F. columbarius</u>)						10					
American Kestrel (<u>F. sparverius</u>)	55	50		20	25	65	10	75	25	15	20
Bobwhite (<u>Colinus virginianus</u>)		25	20	10							
Ring-necked Pheasant (<u>Phasianus colchicus</u>)					25						
Clapper Rail (<u>Rallus longirostris</u>)							10	25		15	
Sora (<u>Porzana carolina</u>)										5	
Common Gallinule (<u>Gallinula chloropus</u>)					15	10	10			15	60
American Coot (<u>Fulica americana</u>)	35	25	40	20	25	35	45	30	10	35	80
Common Oystercatcher (<u>Haematopus ostralegus</u>)						30	10		10	5	
Semipalmated plover (<u>Charadrius semipalmatus</u>)	10		20						20	5	20
Wilson's Plover (<u>C. wilsonia</u>)				10				20	10	35	40
Killdeer (<u>C. vociferus</u>)	35	15	20			55	35	30	35	5	20
Black-bellied Plover (<u>Squatarola squatarola</u>)	35	15	60	20	40	35	35	20	45	65	60
Ruddy Turnstone (<u>Arenaria interpres</u>)	20		40	10	15	30	10	30	20	45	60

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<u>Species</u>	<u>GB</u>	<u>Ab</u>	<u>NP</u>	<u>An</u>	<u>El</u>	<u>Cat</u>	<u>Ex</u>	<u>SS</u>	<u>Lo</u>	<u>Cr</u>	<u>Ack</u>
Northern Mockingbird (<u>Mimus polyglottos</u>)	90	90	60	100	75	20	20		30	70	100
Bahama Mockingbird (<u>M. gundlachii</u>)	10	25	20	40	100	80	65	80	55	90	100
Pearly-eyed Thrasher (<u>Margarops fuscatus</u>)								20		35	
Catbird (<u>Dumetella carolinensis</u>)	35	50	80	40	65	55	45	30	30	20	20
Red-legged Thrush (<u>Mimocichla plumbea</u>)	10	15		20	15	30					
Blue-gray Gnatcatcher (<u>Polioptila caerulea</u>)	90	65	20	90						80	100
Cedar Waxwing (<u>Bombycilla cedrorum</u>)		15									
Starling (<u>Sturnus vulgaris</u>)	10	20				10		10			
Thick-billed Vireo (<u>Vireo crassirostris</u>)	35	100	80	90	100	80	65	75	65	100	100
White-eyed Vireo (<u>V. griseus</u>)									10		
Black-whiskered Vireo (<u>V. altiloquus</u>)											
Black and White Warbler (<u>Mniotilta varia</u>)	10			10	25	20				45	
Worm-eating Warbler (<u>Helmitheros vernivorus</u>)	10					10					
Parula Warbler (<u>Parula americana</u>)	10	15		20	15				30		60
Yellow Warbler (<u>Dendroica petechia</u>)		40				30		75		65	40
Magnolia Warbler (<u>D. magnolia</u>)											20
Cape May Warbler (<u>D. tigrina</u>)	35		60	50	40	20	35	10	10	20	60

