2011

The National Bird Count in 2011 in Aruba

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Sponsors of the First National Bird Count in Aruba in 2011:

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Introduction and background

The first Aruban National Bird Count took place on March 18, 2011. Between 07.00 and 09.00 a.m. many enthusiasts, children and adults from all ages, recorded over a time span of 15 minutes all birds they could possibly see in their home garden. The Bird Count is an initiative from the Aruban Birdlife Conservation Foundation, and was carried by the Minister of Economic, Social and Cultural Affairs. The Department of Culture designed, arranged and sponsored the printing of the bird count forms, organized the information and press events and took care of the distribution and collection of the bird count forms. The Central Bureau of Statistics assisted at a final stage with the analyses of the collected data. There is a growing need for data on the birds of Aruba. According to the Aruban Birdlife Conservation Foundation, a number of bird species are under serious threat of extinction, however, only anecdotal information on the distribution and abundance of birds on Aruba is available. The National Bird Count aims to help in several ways. Firstly, it will provide information about the presence (or absence) of a number of bird species in the inhabited areas and, secondly, it will help to raise environmental awareness and commitment in all segments of the society.

The natural environment in Aruba is characterized by an arid landscape with sparse vegetation dominated by columnar cacti, thorn bush and low scrubs and trees. Aruba is situated at about 70° W Longitude and 12.5° N Latitude. From roughly northwest to southeast the island stretches about 31 km in length and up to 9.4 km at its widest point. Its surface is slightly tilted towards the northeast creating a surf line with elevated coral terraces from the sea. The leeward southwest coast, facing the South American plateau is calmer and offers long stretches of sandy beaches and a few remnant pockets of mangrove. The inland is hilly and characterized by fields with mostly batholitic quartz-diorite and gabbro as well as an elevated area with volcanic rock where the dry river beds run deeper as well (most of which is the National Park Arikok). Some lush vegetation is found most year round in the cooler and moister parts along these deeper dry-river beds. Flat limestone terraces and/or limestone depositions are found in the surrounding areas towards the coast, all of which originated from below sea level. Along the Southwest coastline we find offshore reef islets from coral beach rock and grown predominantly by small shrubs or mangrove vegetation. Some of these are important breeding grounds for terns[1] and other seabirds and Reef Islands Oranjestad and Reef Islands San Nicolas have been defined as 'Important Bird Areas' (IBA). Influenced by the nearly constant Northeast trade winds, the tropical sun and the occasional downpours of rain, the vegetation may be more or less abundant. Under the influence of global weather systems, long-term patterns seem to exist as well. When there is rain outside the two rainy seasons in wet years, the island is green most of the time, but similarly, prolonged periods with little or no rain during dry years can create a very harsh environment for plant and wildlife as well. Near the west coast a small wetland area (*Bubali Plas*) has been formed from treated water from a sewage treatment facility. The area turned into an attractive location for many migratory bird species and is one of the four IBA's. Along the same coastline there are a few Saliñas (former saltwater pans) that were originally open

[1] Ten species of terns are recorded as breeding in Aruba. This makes Aruba unique in the world. The Cayenne Tern, The Sooty Tern and the Brown Noddy breed in Aruba in large numbers. It is estimated that up to one third of the world's population of Cayenne Terns breed in Aruba.

to the sea but commonly fill with rainwater during the rainy season. The areas deserve little attention but attract typical birdlife, and that's why Saliña 'Tierra del Sol' earns its status as 'Important Bird Areas' as well. One other large interesting site at the west coast is an inlet to the sea (*Spaans Lagoen*) that, about 1 km inland, flattens into a wide tidal mud plain and swamp area that during the rainy seasons swells with rainwater from streams. The lagoon is mostly grown by Mangrove trees and is a breeding site for many species. The area has officially gained conservation status as a '*Ramsar Wetland Site'* in 1980.

In Aruba, it is not possible to define a typical urban or suburban environment. Large parts of the island are inhabited and most of the houses come with a garden, except for the inner city center of Oranjestad and San Nicolas. Gardens largely vary in size and in type of vegetation. Some have the typical vegetation of Aruba with low trees, cacti or shrubs, be it overgrown by grasses, and others may be landscaped with sometimes exotic plant species and artificial ponds. There may be large fruit trees or simply a few potted plants in a corner of a cemented floor. In between houses we still find large overgrown terrains that have not yet found their final destination or that may remain as rocky plots with sometimes large boulders. These overgrown places actually form open corridors for many birds and other species as they interconnect with the Aruban backcountry. Thus, the current Aruban connectivity of ecosystems provides food for birds that feed on nectar, seeds, fruit, or, insects or larger prey. This green infrastructure offers a wider variety in niches as ever before.

Along the shorelines we observe pelicans, frigate-birds, terns, gulls, plovers, sandpipers and several other Caribbean, South- and North American passage migrants, as well as a number of 'winter' visitors. Likewise, near the pockets of freshwater, we observe different species of cormorants, ducks, coots, gallinules, grebes, egrets and herons. In the interior we find the permanent dwellers, like humming birds, parakeets, and other species that are the subject of the National Bird Count. Aruba harbors over 200 different bird species. Although somewhat outdated, the most detailed and complete overview of Aruban birds is the book on the 'Birds of the Dutch Antilles' (written in two languages, Dutch and in English) by Prof. Voous in 1955. The *Checklist of the Birds of Aruba, Curacao and Bonaire* (Prins et al., 2009) and the Princeton Field Guide 'Birds of Aruba, Curacao & Bonaire' (de Boer et al. 2012) are more recent but excellent overviews of the birds in Aruba. The Aruba of today, offers a mosaic of wild[2] and urbanized environments that can support not only the endemic but offers opportunities to exotic plant and animal species as well.

Over the years, the birds of Aruba have faced a number of challenges and changes in their environment. After subsequent logging the natural wood vegetation in colonial times and

[2] The term '*wild*' area will be used frequently in this report. In practice, Aruba does not have any primary state wild areas as in most areas some kind of human disturbance has taken place in the past. However, the long stretches near and along the North coast and the National Park Arikok and in a few other locations have been 'untouched' for a long time and can be considered 'wild nature environments'. In this account, we will also use the term '*rural'* or '*overgrown'* area to designate those places that have become untouched more recently but where housings is found, often distributed along the few roads. These areas slowly go in transition to the more '*urban'* areas, where overgrown pockets of land have become relatively sparse.

early nineteenth century, the island became more bare and eroded. Goats and donkeys were released to provide meat and transportation for the vessels that anchored in these times. The herds grazed much of the island and thus gave the countryside its characteristic open appearance. In the nineteenth century, part of the island was intensely cultivated for the Aloe production and Aruba kept most of its open wide views with many stone and cacti fences. Since then, the population has grown in fast pace, in particular during the last two decennia when the number of inhabitants increased by 50%. The recent rapid development in many parts of Aruba went together with another change in its character and the destruction of most of the cacti and stone fences. Even some smaller seasonal dry-river beds had to make way for new construction projects. The last in this series of habitat changes is the advance of residences in the former overgrown pockets of land that were still to be found behind the ribbon development along roads.

The effect of such change on the island bird populations is not easily understood. Some species may be better able to adapt than others and may even find new opportunities whereas others suffer from the habitat destruction and loss of suitable nesting or roosting sites (Harms and Eberhard, 2003). A few endemic species of birds may even deserve special protection, like the Burrowing Owl (Athene *cunicularia arubensis*), the Caribbean or Brown-throated parakeet (Aratinga *pertinax arubensis*) and the Crested Bobwhite (Colinus *cristatus)*. Due to a combination of habitat loss and fragmentation, capture and increased predation, these and other species may find difficulty in adaptation. In the midst of the last century, the Yellow-shouldered Parrot (Amazona *barbadensis*) became locally extinct, and we have to take measures to prevent this from happening again with other species.

The Boa *constrictor* is a relative newcomer in Aruba, and recognized as an invading species. Recent studies (Reinert et al, 2007) show that its diet comprises respectively 40% of small mammals, 33% of lizards and 27% of birds. Since its discovery in 1999, southeast on the island, this snake is seen in almost every corner of the island and it seems to thrive quite well. On a number of islands nearby (St. Lucia, Dominica and Isla Margarita) the Boa is said to co-exist with the local fauna although the (long-term) impact on the avifauna is not yet fully understood. Elsewhere, for instance on 'Isla Cozumel' in Mexico, the Boa *constrictor* has been held responsible for the decline in numbers of local parrots (Romero-Nájera et al, 2007). Now, on Aruba, many are aware of its threat and many fear dwindling or even extinction of a number of the larger (bird) species here as well. Our aim for the next National Bird Count is to additionally collect data on the Boa in or near the housings in order to get a better insight into its encroachment towards the inhabited areas.

The National Bird Count is an attempt to collect much needed information on birds, and although its data may not serve the scientific database, it provides convincing information on the abundance of some birds in the inhabited areas and it may raise awareness for the fragility of the Aruban ecosystems and nature in general. It aims to grow more understanding and respect for the Aruban nature among locals, be it in a National park or in the own backyard. The bird count creates a unique opportunity to participate, observe and reflect on nature that is so close to home and still so unknown to many …..

How to count?

Similar to the methodology of national bird counts abroad (for instance the 'Christmas Bird Count'; Bock et al., 1981) the goal was to obtain a large number of geographically distributed observations of a selected number of bird species during a defined short period in time. With the local participation and observation in the home garden, information about the occurrence of fifteen of the more common and known bird species was collected. Recordings were made on an attractive and colorful form that showed the images of the fifteen bird species. The front page provided all necessary information to fill in the forms in a correct manner such that all observations were to be collected in a similar manner. Leaflets were predominantly distributed through schools, but some supermarkets and offices extended a helping hand with the distribution as well. A copy of the form is attached in the Appendix.

The instruction was to complete a 15 minute observation in the home backyard or any convenient location between 7.00 and 9.00 a.m. on March 18, 2011. The goal was to record as many birds as possible from the pre-selected fifteen species during the given time frame (see table 1). Ad libitum, recordings of additional bird species could be added to the observation in separate at the back of the leaflet. The National Bird Count was advertised in local newspapers, on radio and on TV and through social media channels. After completion, the forms were collected in special boxes that were made available at some public governmental offices.

English	Latin	Papiamento	Dutch	*Counts of birds*		*Counts of locations*		
				N	Rank	N	%	Rank
Tropical Mockingbird	Mimus *gilvus*	Chuchubi	Tropische Spotlijster	*2,417*	6	*735*	*81.2%*	1
Eared Dove	Zenaida *auriculata*	Buladeifi	Geoorde treurduif	*4,114*	1	*706*	*78.0%*	2
Bananaquit	Coereba *flaveola*	Barica hel	Suikerdiefje	*2,543*	3	*675*	*74.6%*	3
Bare-eyed Pigeon	Patagioenas *corensis*	Barbacoa	Naaktoogduif	*3,357*	2	*660*	*72.9%*	4
Black-faced Grassquit	Tiaris *bicolor*	Moffi	Maskergrondvink	*2,425*	5	*627*	*69.3%*	5
Troupial	Icterus *icterus*	Trupial	Oranje troepiaal	*1,429*	9	*589*	*65.1%*	6
Common Ground Dove	Columbina *passerina*	Totolica	Musduif	*2,472*	4	*580*	*64.1%*	7
Brown-throated parakeet (Caribbean parakeet)	Aratinga *pertinax arubensis*	Prikichi	Maisparkiet (West indische parkiet)	*1,514*	8	*434*	*48.0%*	8
Blue-tailed Emerald	Chlorostilbon *mellisugus*	Blenchi berde	Blauwstaartsmaragd-kolibrie	*623*	10	*355*	*39.2%*	9
House Sparrow	Passer *domesticus*	Parha di Joonchi	Huismus	*1,844*	7	*317*	*35.0%*	10
Burrowing Owl	Athene *cunicularia arubensis*	Shoco	Holenuil	*259*	11	*152*	*16.8%*	11
American Kestrel	Falco *sparverius*	Kinikini	Amerikaanse torenvalk	*167*	12	*118*	*13.0%*	12
Yellow Oriole	Icterus *nigrogularis*	Gonzalito	Gele troepiaal	*143*	13	*79*	*8.7%*	13
Ruby-topaz Hummingbird	Chrysolampis *mosquitus*	Dornasol	Muskietkolibrie	*105*	14	*61*	*6.7%*	14
Crested Bobwhite	Colinus *cristatus*	Patrishi	Kuifbobwhite (Kuifkwartel)	*78*	15	*33*	*3.6%*	15
				23,490		*905*		

Table 1 The table lists the names and frequencies of all counts and count locations per bird species.

Dissemination of the data

To ease the processing of the data of the hand-written forms, we designed a Microsoft Excel Form by which the procedure to link address locations and data to respective geographical longitude and latitude coordinates became more feasible. Due to some difficulty in reading the handwriting or because the address was incomplete or a specific sub address could not be verified, the correct geocode could not easily be determined. We were able to manually correct with reasonable certainty an 'unknown' address into a known address in 29 cases. In 26 cases we were able to use a different but nearby house number, and in 40 cases we decided to define a new address. In the latter cases the house number could not be verified and we decided that the actual recording itself was more important than the precision of its geographical location within a one to two hundred meters range. Thus, we decided to use the coordinates of the address of an already known location that was nearest to the centroid location within that street. Consequently, we may have added a small error to the location of some data (up to a few hundred meters) in about 4.4% of all cases. At a final stage we decided to eliminate a few cases as these seemingly involved double counts.
Unfortunately, in a very early stage of retrieval of the forms, an undefined number of forms were omitted from the collection because the forms were (partly) damaged or to some extent unreadable.

To visualize the findings on the map of Aruba we used the geographical information system ArcGis© 9.3.1 to present a grid tessellation of the 200x200m square areas for which the (aggregated) bird counts and count locations have been calculated. The 200x200m square areas (40.000 m^2) is thought to present still an acceptable level of detail to illustrate the distribution of a bird species in Aruba. An area of 200x200m is considerably larger than the average size of a garden on Aruba and results from the Census in 2010 reveal that the median size of the Aruban rental or property area (built-up area including garden) is approximately 600 m^2. Properties may range in size from only 12 m^2up to 80.000 m^2 but for bird observation the large properties are impossible to be covered by a single person and we assume that the actual observation area was quite smaller. As the majority of properties is medium sized, most of the actual observation areas will have fallen well within the limits of a 200x200m area.

The sum of all the turfs per form for a given bird species is defined as a single 'count'. The home garden is defined as the point of observation or 'count location'.

The map presented at right (figure 1) illustrates the total distribution of all the count locations in Aruba during the Bird Count in 2011. On the map, the square areas of 200x200 meter differ in color (they vary from yellow to red) depending on the number of count locations in an area.

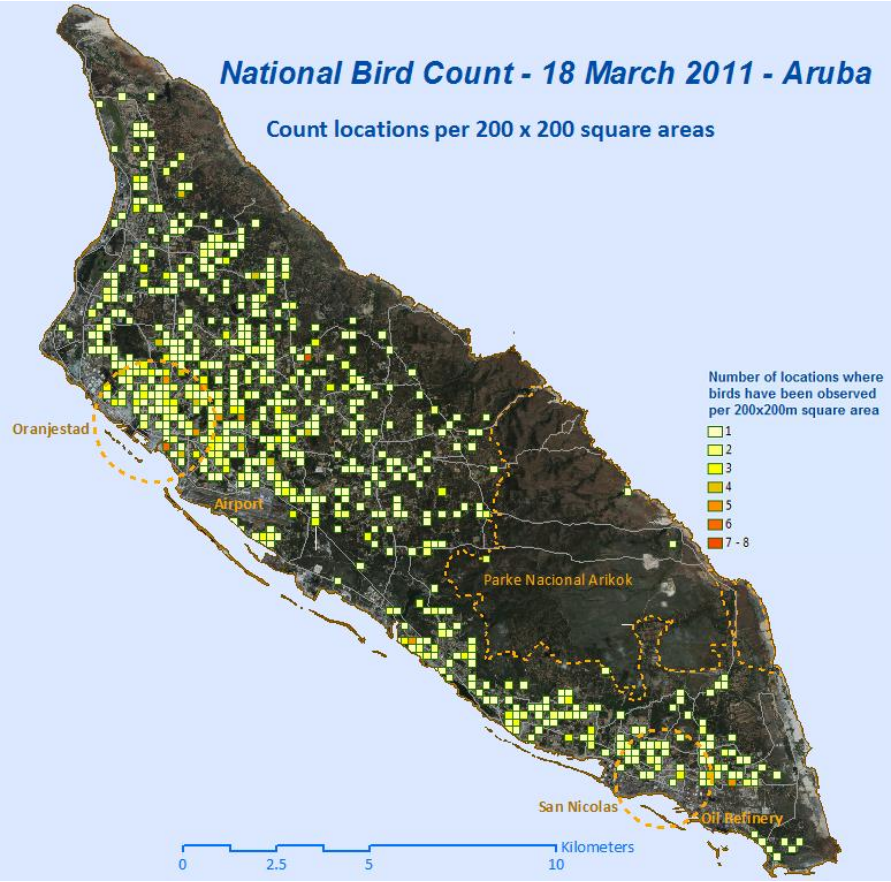


Figure 1. Overview of the locations of observation

For understanding the distribution of a species not only the presence of a bird species in a particular area is important, but also the structural absence of one of the bird species within such an area is interesting. In particular when the area includes several *count locations* that all failed to have a positive account of the specific bird species, the evidence that in that specific area this type of bird does not exist becomes more strong. Consequently, the representations as a grid will show a blue grid square when the presence of a bird species is confirmed in that area (irrespective of how many birds have been counted) or it shows an orange-red square when there are two or more count locations within that square area and *none* provided a count of the specific bird species. The scale towards more red corresponds to more such 'negative' count locations within a square. Areas in which no count locations were present at all have been left completely blank in all the map presentations. Nothing can be said about the presence of a bird species during the Bird Count in these 'blank' areas. For the list of pre-selected bird species see table 1.

A very successful first bird count

On March 18, 2011, a total of 25,055 birds were counted in 905 different locations on Aruba. Next to the 15 pre-selected bird species, totaling 23,490 counted birds, another 20 species were recorded. The findings are described in more detail below. The map in figure 1 presents a grid tessellation of all 200x200 meter square areas within which at least one count location exists. The intensity of the (green) color depicts the frequency of count locations in the given area (see legend). It is important to realize, that the National Bird Count can only provide information for a distinct part of the island as it takes place predominantly in the home garden and only provides information about the abundance of birds in the inhabited areas.

Participation of the population during this first national bird count was above expectations; despite the rainy morning. Moreover, birds have been counted all over the island and even at locations in the lesser populated areas. The excellent photo pictures on the well-designed leaflet, provided by local photographer Greg Peterson, certainly added to the overwhelming enthusiasm and involvement of the Aruban community. In a number of cases even a black and white copy was returned as the colorful leaflet with its nice overview of the most common birds in Aruba was kept at home.

Only in 4 count locations were no birds seen at all, and on 2 locations none of the original preselected 15 bird species was observed. The recordings of the 20 additional bird species covered 271 count locations, and amounted to 1,565 separate bird counts. As these additional bird species were not collected systematically we have kept only a descriptive account of these birds.

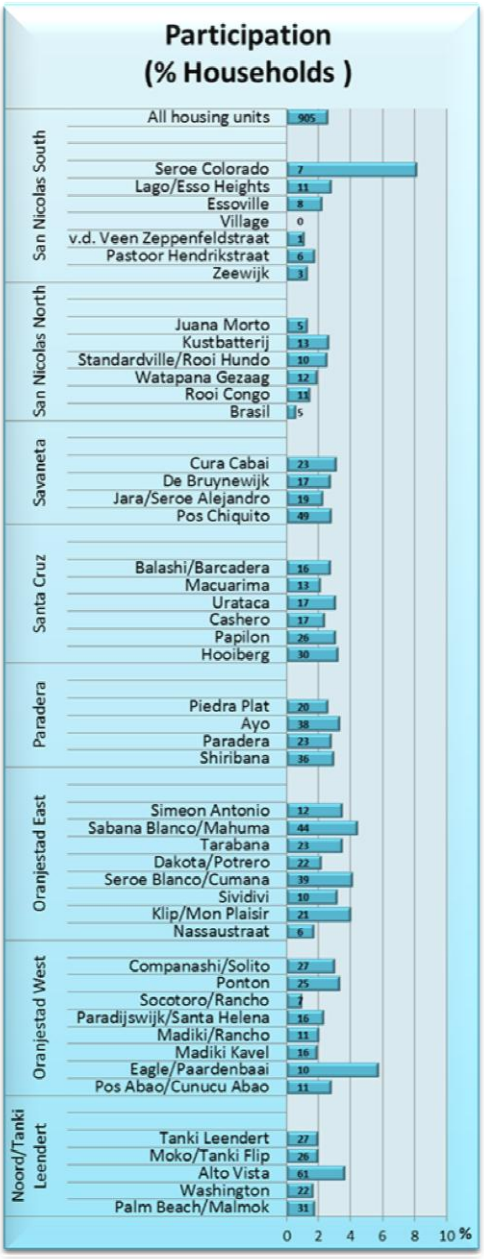


Figure 2 Percentage of households within the administrative zones that did participate in the National Bird Count in 2011. Numbers inside the bars indicate the absolute number of observation locations.

From the 2010 Aruba Census, which took place roughly five months before the National Bird Count, we knew that the total number of households at that time was 34,845. By definition, a household typically inhabits one living quarter, but one address not necessarily coincides with exactly one living quarter. Sometimes, more households may live on a single address. To make things not too complicated, we assumed that every count location coincided with only one single household even though in a few occasions this will not have been true. The address 'double counts' that we omitted from the database, as explained earlier, where only those that not only showed an exact match in address but also birds observed. We expect the error that thus might have been introduced to remain small. Given these assumptions, the participation rate during this 1st National Bird Count was estimated at 2.6% of the households on Aruba. Interestingly, this level of participation rate is reflected in most administrative zones of Aruba (see figure 2) with the exception of only a few zones in San Nicolas.

Some data on the number of observations

The results of the National Bird Count show that the *Tropical Mockingbird (Chuchubi)* is the most abundant bird species on Aruba (table 1 and figure 3). This bird is observed in 81.2% of cases, that is in 735 count locations, followed closely by the Eared Dove (*Buladeifi, 78.0%)*, the Bananaquit (*Barica hel, 74.6%)* and the Bare-eyed Pigeon (*Barbacoa72.9%).* With respect to total counts of birds however the *Buladeifi (N=4,114)* and *Barbacoa (N=3,357)* list as number 1 and 2.

On some locations, birds may have been fed and that might explain some of the larger concentrations. We included such high counts as well in our analyses, as we did not feel safe to decide when feeding may have occurred or not. Birds aggregate for the similar reasons in the wild as well.

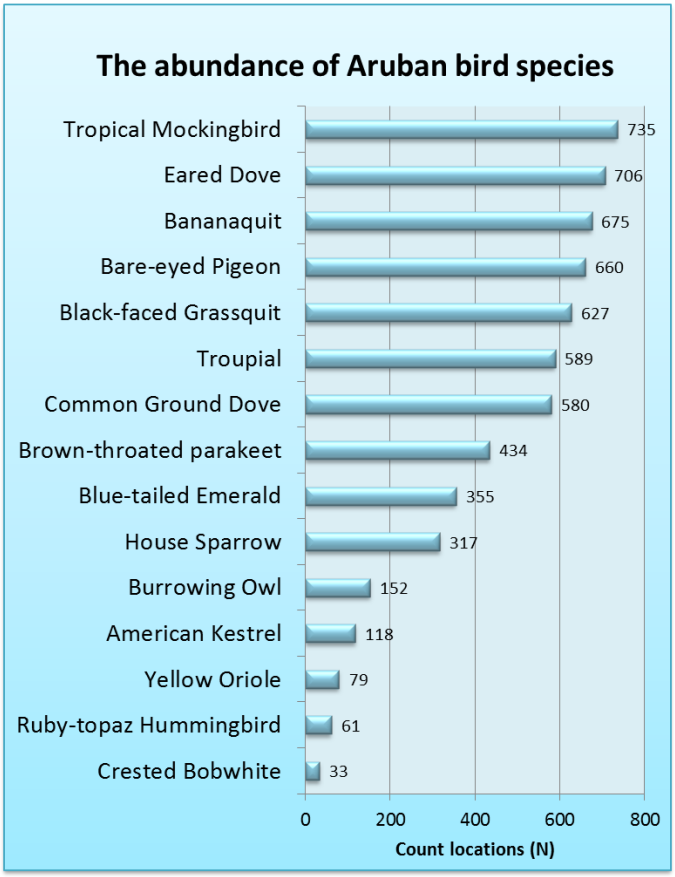


Figure 3. Frequency of 'positive' count locations per bird

The Crested Bobwhite (*Patrishi*) was observed least, i.e. in only 3.6% of cases (33 of 905). The bobwhite is a typical ground dweller and is unlikely found in the populated areas where the gardens tend to be (completely) fenced and free roaming is more demanding. However, the Bobwhite was not seen either in those places where it is to be expected, i.e. in the less populated areas where the houses are still spread out. Maybe, in these areas birds are more difficult to spot at all, but experienced and trained birdwatchers also claim that they see the *Crested Bobwhite* less frequent now than in the past. It would be very interesting to know how this bird is actually doing in the wild, outside the areas that were the subject of the bird count, and whether the findings will be confirmed at the next bird count.

What is the most common number of birds in the garden

If we watch birds, we may see them as single birds, in pairs or in small or large groups. The type of grouping behavior may be typical to the type of bird or the period in time. For instance, migratory birds tend to flock during their period of migration even when under other circumstances they are very competitive towards each other. Such traits have evolved over time and are well known to the trained observer. Below, we have evaluated the findings of the bird count in the light of such known characteristics.

For instance, gregarious birds like the House Sparrow (*Parha di Joonchi),* Eared Dove (*Buladeifi)*, Common Ground-Dove (*Totolica*), and the Bare-eyed Pigeon (*Barbacoa)* can be very tolerant towards each other and they can occur in large groups, whereas for highly territorial or otherwise competitive species, as for instance is the case of the American Kestrel (*Kinikini*), the Ruby-topaz Hummingbird (*Dornasol*) and the Blue-tailed Emerald (*Blenchi berde*), we expect observations of mostly single individuals and pairs. A similar reasoning goes for the Yellow Oriole (*Gonzalito*) and the Burrowing Owl (*Shoko*). These bird species show some form of colonial breeding as well.

The 'expected' distribution of group sizes is also what we found in Aruba during this First National Bird Count. Sightings of for instance more than five hummingbirds in the garden (in 1.6% of locations of the Ruby-topaz Hummingbird and in 1.1% of the Blue-tailed Emerald) are likely contributed to multiple sightings of one or a few individuals. The largest count of Blue-tailed Emeralds (*Blenchi berde*) was a presumed 15 birds in a single garden (figure 5), which of course, unless it was fed, is likely due to the fact that this is a very active bird that must have been counted each time a bird flies in and out of the garden. Similar explanations go for some of the high counts of other birds, as for instance the Bananaquit (*Barica hel, N=55*) and the Black-faced Grassquit (*Moffi, N=59),* although such high counts from latter raise serious doubts about the observation.

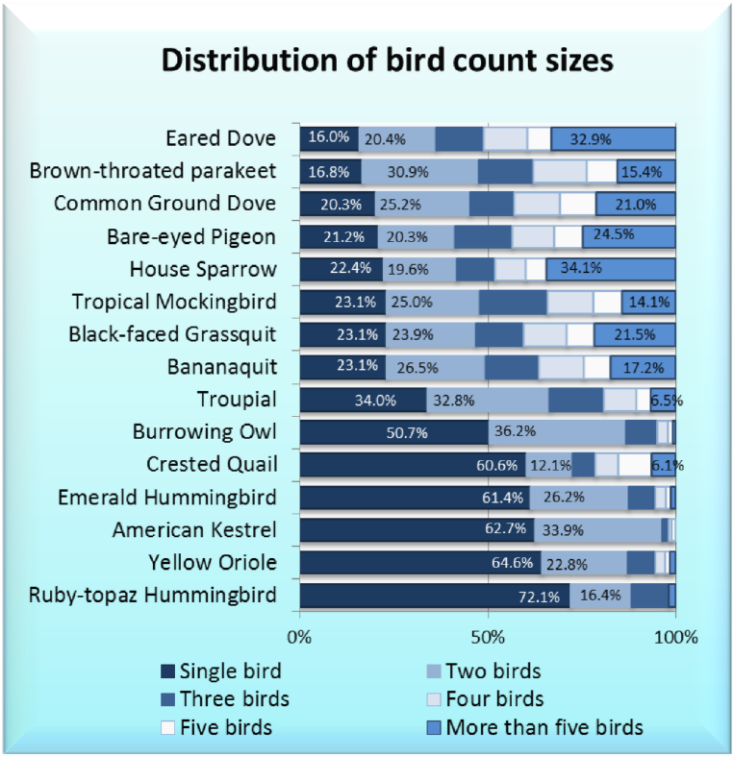


Figure 4. Percentage of all count locations in which a bird is counted as a single bird, as a pair, etc..

Figure 4 presents the percentage of locations in which a count was made of a single bird, or two birds, or three, four, five or more than five individual birds during the period of observation. Figure 5 presents the largest count that was made for each of the bird species in all observations.

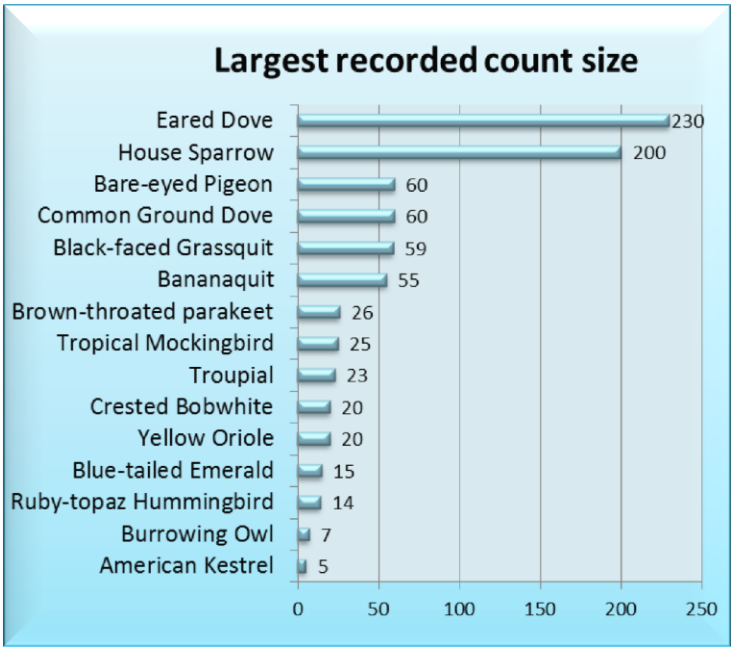


Figure 5. Largest count size recorded during the National bird Count in 2011.

We are puzzled by two bird species that we would expect to have been observed in (small) groups at least more frequently, i.e. the Brown-throated or Caribbean Parakeet (*Prikichi*) and the Crested Bobwhite (*Patrishi*). In nearly two-third of count locations, the Bobwhite is observed only as single individuals. The bird is well camouflaged and has a hideous nature, but still we would have expected to record several birds together more often. Similarly, we imagined that the parakeet would always occur in groups and even large flocks, but the Bird Count shows that small groups occurred only in one of seven cases and that half of all observations concern birds that are either flying alone or in pairs.

Strong deviations from what is common for a specific bird species may indicate that the bird may be under environmental pressure by current or local situations. The fact that birds that commonly live in small groups are mostly seen as single individuals or in pairs might be an indication that these species changed their behavior or that their numbers are dwindling. Parakeets are known to have large communal roosting sites and verbal accounts in Aruba suggest that these roosting sites have almost disappeared. Many point in the direction of predation by the Boa constrictor, particularly at these roosting sites, but the removal of nesting sites (cutting down of old and hollow trees) and capture of young from their nests may have an equal if not stronger impact on their numbers. Parakeets are known to adapt to city life as long as they find time to adapt to alternative niches, but thus far only a few birds have been seen to breed outside the wild here in Aruba. There may be an urgent need for further investigation.

Analysis of individual bird species

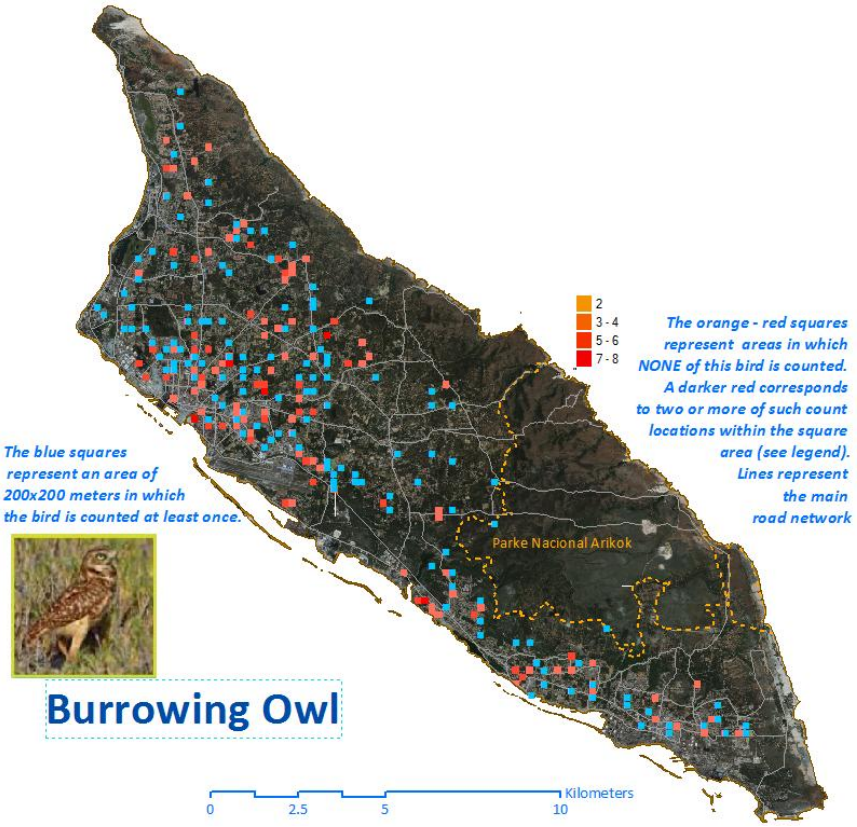
In following paragraphs we evaluate the observations from the National Bird Count for each of the bird species in more detail.

Burrowing Owl

(Shoco - Athene *cunicularia* arubensis – Holenuil)

The *Burrowing Owl* is a relatively small long-legged owl, often seen on the watch in front of their burrows. The bird feeds on small lizards, field mice and large insects and is most active at dusk. In 1951 the Shoko was considered rather rare and was seen mostly in the open stony desert countryside and never in between the housings. In 1993 the bird population was estimated at about 30 pairs (De Boer, 1993), whereas in 2010 Del Nevo (unpublished work) estimated the population at 200 pairs.

Today, the findings from the National Bird Count suggest that this bird is present at most inhabited areas. The *Burrowing Owl* was spotted in 152 different locations. In 50.7% of locations, the bird was observed as a single bird and in 36.2 % two individuals were seen. Of course there may have been some overlap in that the same individuals were recorded by different observers. Interesting is this dense distribution of sightings in the more urban areas in contrast to the more rural parts (where we would have expected to find these birds in the first place). The communal nesting sites such as have been seen near the North coast once, seem all to have disappeared.

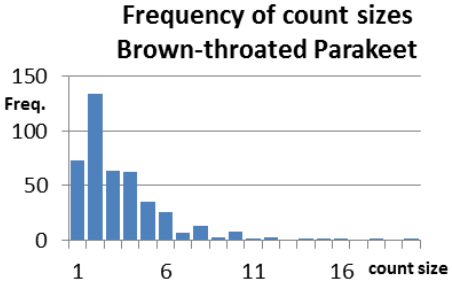


Little information is available on how the Burrowing Owl copes with the destruction of its natural habitat. The *Burrowing Owl* seems to be eager and also able to adapt to the more inhabited environment and is quite often seen close to human inhabitation; if only the bird is given some open space and relative safety. One can observe a *Burrowing Owl* dig a hole, time after time in a temporary heap of sand near construction sites or just along the road, and the owls on the golf course are well-known because they do not seem to be bothered by the surrounding activity. In other cases though, their attempts to construct a burrow are bound to fail as, unintentional at times, humans do not seem to notice (or expect) their nesting sites.

Brown-throated parakeet

(Prikichi, Aratinga *pertinax* arubensis, Maisparkiet).

The *Caribbean or Brown-throated parakeet* was described in 1955 as an abundant species that feeds on a wide variety of diets (seeds and legume, fruit from trees and cacti, corn and millet). The birds were observed feeding in very large flocks, up to a hundred individuals, whenever food was locally abundant.



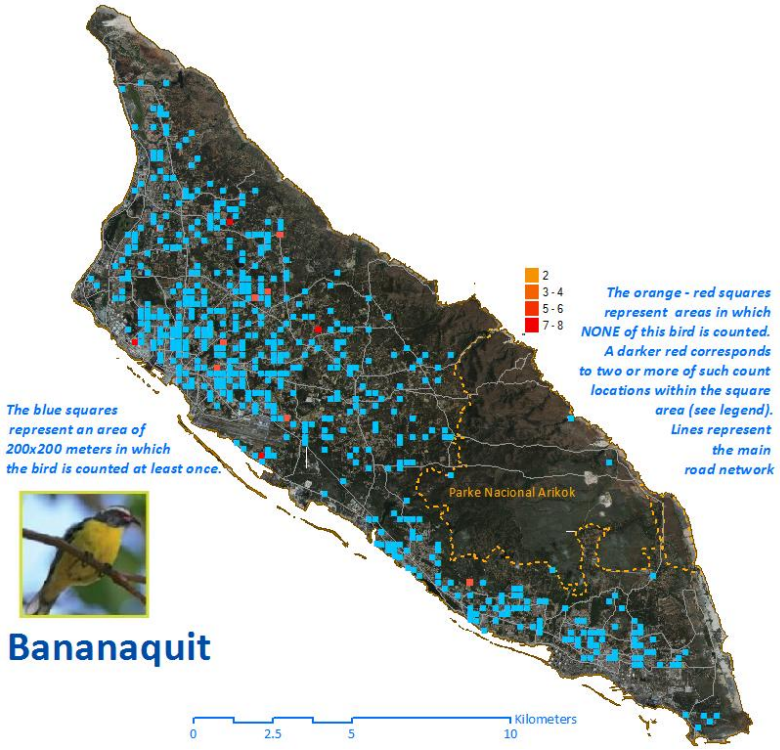
The above holds certainly no truth today. The National Bird Count suggests that the parakeet is still observed all around the island but the large flocks were not observed. In contrast, in 16.8% of cases reference was made from a single bird, and in 30.9% of observations of two birds. From all remaining count locations only in a few cases a flock size larger than seven individuals were recorded (see figure 4 and the graph next to the map illustration above). Parakeets are known by the screaming voice and conspicuous behavior when active in larger flocks. As some of the few observations of medium-sized flocks were near one another, it might be that these records actually refer to the same flock.

Bananaquit

(Barica hel, Coereba *flaveola*, Suikerdiefje)

The *Bananaquit* is an easy breeder all year round. The bird is common to all types of habitats, from gardens to thorny bushes, and eats all kinds of food, insects, fruit and nectar from flowers. Regularly it makes its nest in a potted plant or suitable spot on the porch of the house.

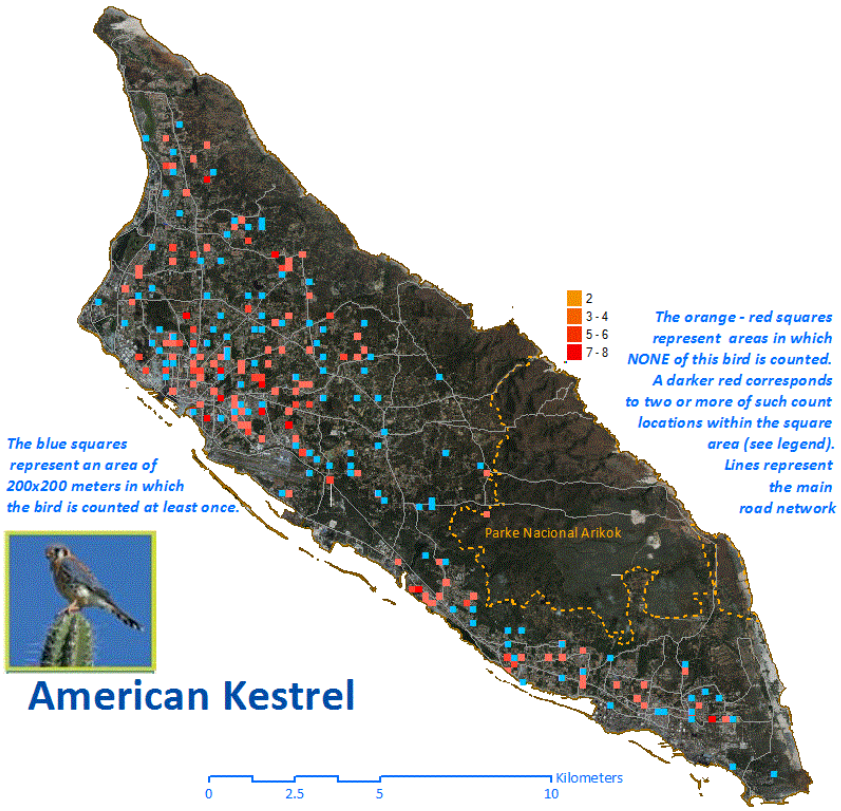
The data from the National Bird Count confirms the presence of the Bananaquit in most populated areas of Aruba. The bird was sometimes observed in multiple numbers, as the Bananaquit can feed gregariously on blossoms but also on fruit in trees. But, in just over 50% of count locations the bird was seen as a single individual or in pairs (see figure 4).



American Kestrel

(Kinikini, Falco *sparverius*, Amerikaanse Torenvalk)

The *American Kestrel* is another bird of prey that is often seen during midday on vantage points high in the trees, on columnar cacti or on a cable of the phone grid. It is the only migratory bird species in the bird count and it has come to Aruba for breeding. The American Kestrel predominantly feeds on lizards and insects.

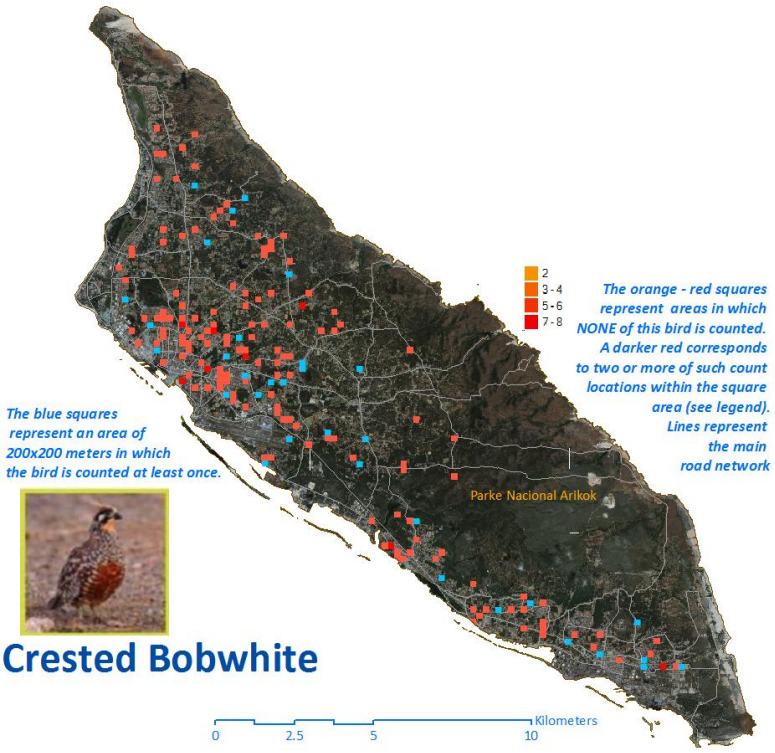


Observations of the American Kestrel during the National Bird Count were well spread over the island totaling 118 different count locations. The majority of observations (62.4 %) concerned a single bird, and in 34.2% of cases two birds were seen. It is likely that in a number of occasions nearby observers made account of the same birds as well. These birds rely on an extended home range to find their prey, so the current density of observations is surprising.

Crested Bobwhite

(Patrishi, Colinus *cristatus*, Kuifbobwhite/kuifkwartel)

The *Crested Bobwhite* feeds on seeds and fallen fruit and inhabits cactus scrub and grassland vegetation. The animal is shy and was severely hunted in the past by humans. It is also a likely prey for the Boa *constrictor*. The animal inhabits the region North of Colombia and Venezuela, including Aruba and Curacao.



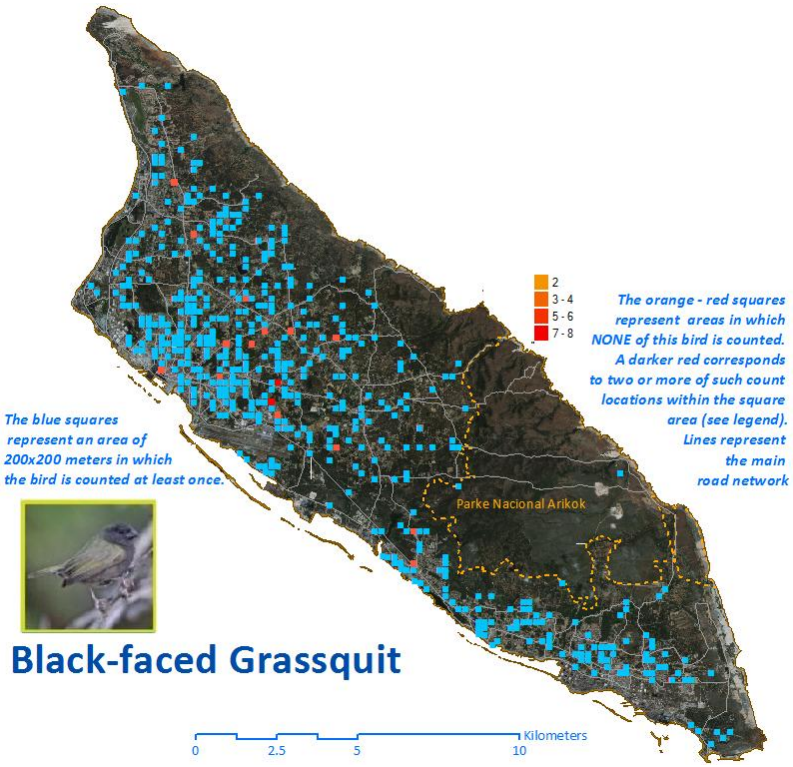
During the bird Count in 2011 the *Crested Bobwhite* was recorded as an individual bird in 60.6% of cases, although it actually is a bird that is expected to live in small family groups. Observations in Aruba during the National Bird Count were limited, but as argued before, this may be a result of the fact that the National Bird Count did not provide counts in the areas outside the home gardens.

This said it is still remarkable that we did not find any observations in the less populated areas and near the National Park Arikok. We would expect these birds specifically in these areas where terrains are less fragmented. Because of the shy nature of this bird, we have to take account that some undercount may have occurred.

Black-faced Grassquit

(Moffi, Tiaris *bicolor*, Zwartkopgrasvink)

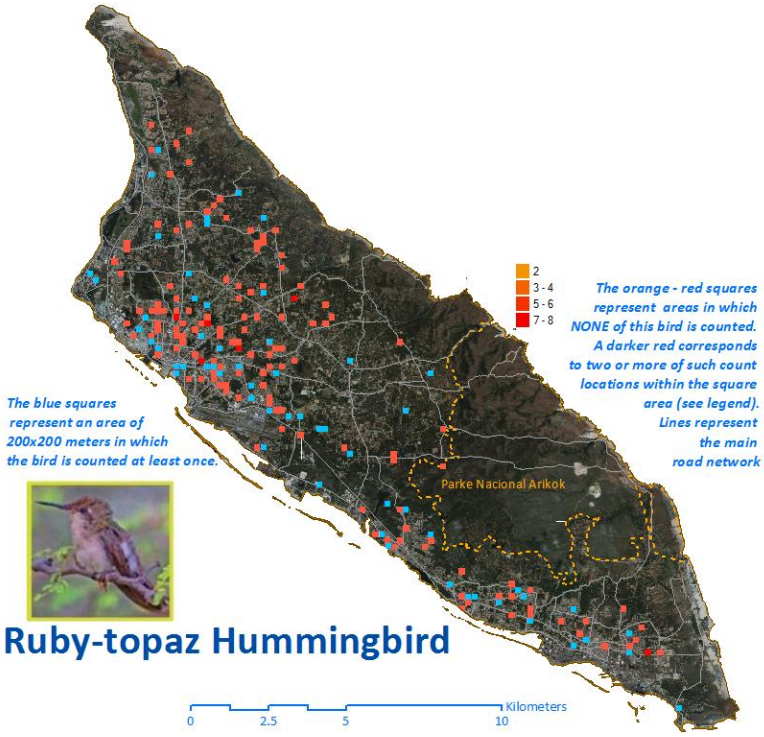
The *Black-faced Grassquit* is an equally small and common breeding bird, with a finch like beak. The bird feeds on seeds and may occur in small flocks (21.5% of observations recorded more than five birds, but in the majority of cases one or two birds were observed). The Grassquit is common to all types of vegetation.



Ruby-topaz Hummingbird

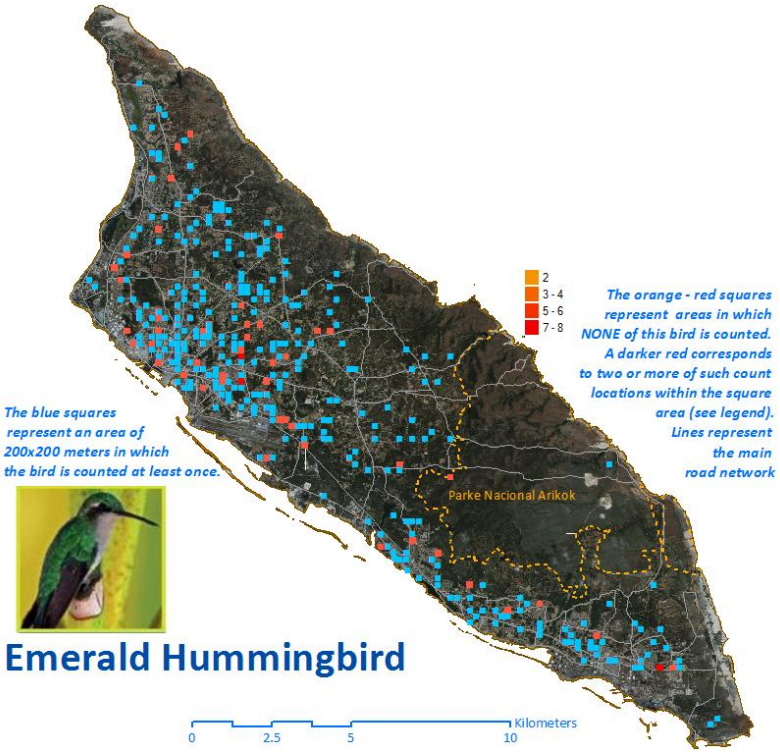
(Dornasol, Chrysolampis *mosquitus*, Rode kolibrie)

The *Ruby-topaz Hummingbird* is slightly larger than the Emerald Hummingbird but is much less abundant. The observations during the National Bird Count were scarce and mostly only single individuals were observed (72.1% of cases). The female is more inconspicuous and may be mistaken for an Emerald (or vice versa). It is remarkable that most observations were in the more populated areas though its preference was thought to be the open and wild habitats. Observations were predominantly along the Southwestern part of Aruba. The lining of some nearby count locations suggests that on occasion there may have been just one individual passing through several gardens.



Emerald Hummingbird

(Blenchi berde, Chlorostilbon *mellisugus*, Blauwstaart – smaragdkolibrie)

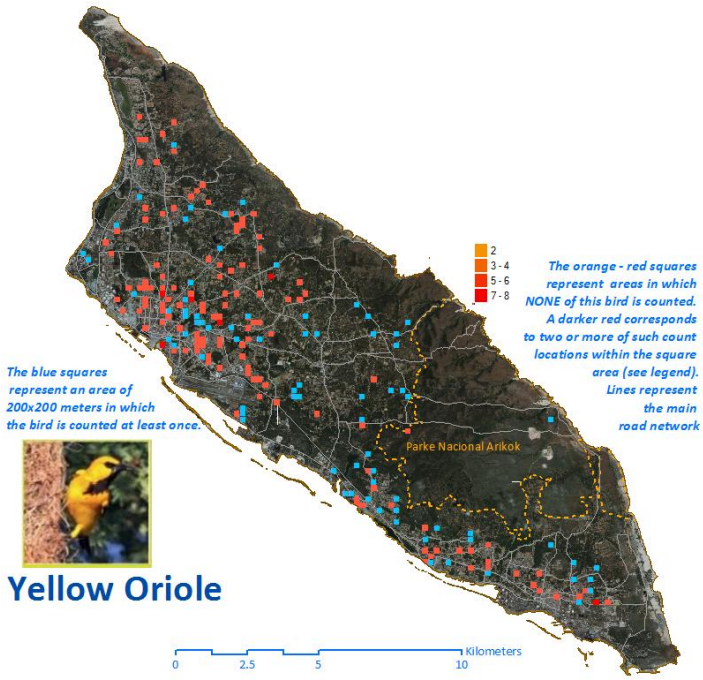


The *Emerald Hummingbird* is a completely lack of shy small bird that feeds predominantly on nectar. In total, 61.4% of observations concern single birds and this gives an idea about the territorial behavior of the (female) birds. This bird can fly and change direction very fast, and male and female are in first instance difficult to distinguish from each other. Pairs reside briefly and only for mating. The female builds the nest and breeds on her own. They clearly pass several gardens in high speed and in search for nectar. So, it would also not be surprising if the same individual was observed in different gardens. Following the results of the National Bird Count, this humming bird is widespread and frequents all types of gardens, amidst housings as well as in the more open terrain, as long as there are flowering plants. Birds typically follow the same route along nectar blossoms over and over again.

Yellow Oriole

(Gonzalito, Icterus *nigrogularis*, Gele Troepiaal)

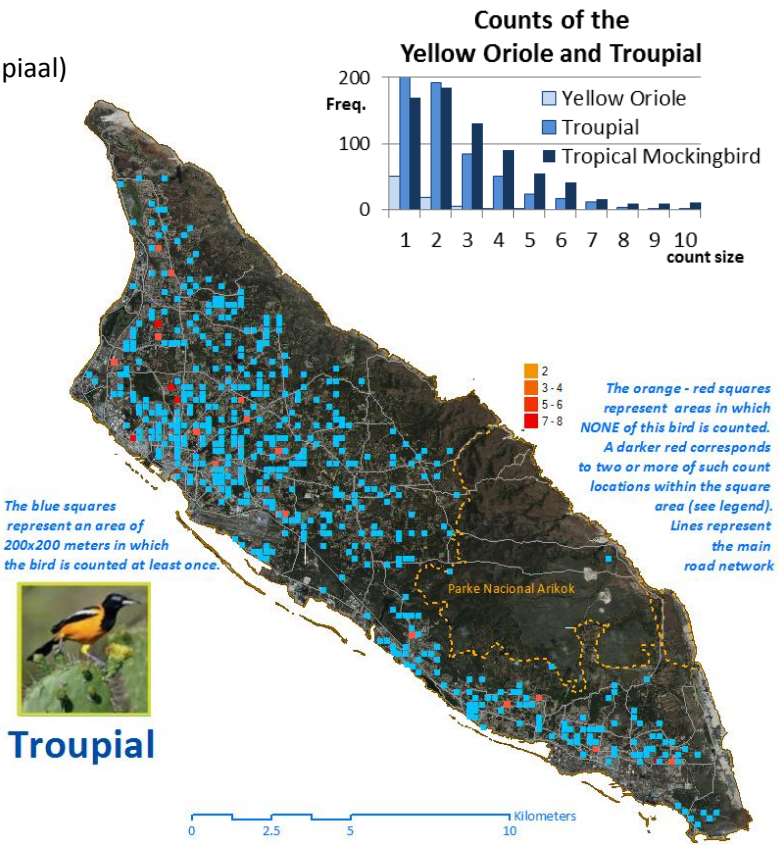
The *Yellow Oriole* is slighter in shape than the orange colored Troupial. The Yellow Oriole has always been much less abundant. The bird feeds predominantly on insects and keeps more to the dense vegetation (i.e. Mangrove) or the large flowering fruit trees. Its woven nests are long and up to half a meter, hanging from the fine branches in trees. The Yellow Oriole seems absent in major parts of Aruba. The bird was observed predominantly as a single individual (in 64.6% of cases), in contrast to the Troupial, that was often seen in pairs or in small groups. Interestingly, the Yellow Oriole was seen relatively frequent in the less populated areas and near the National Park.



Troupial

(Trupial, Icterus *icterus*, Oranje Troepiaal)

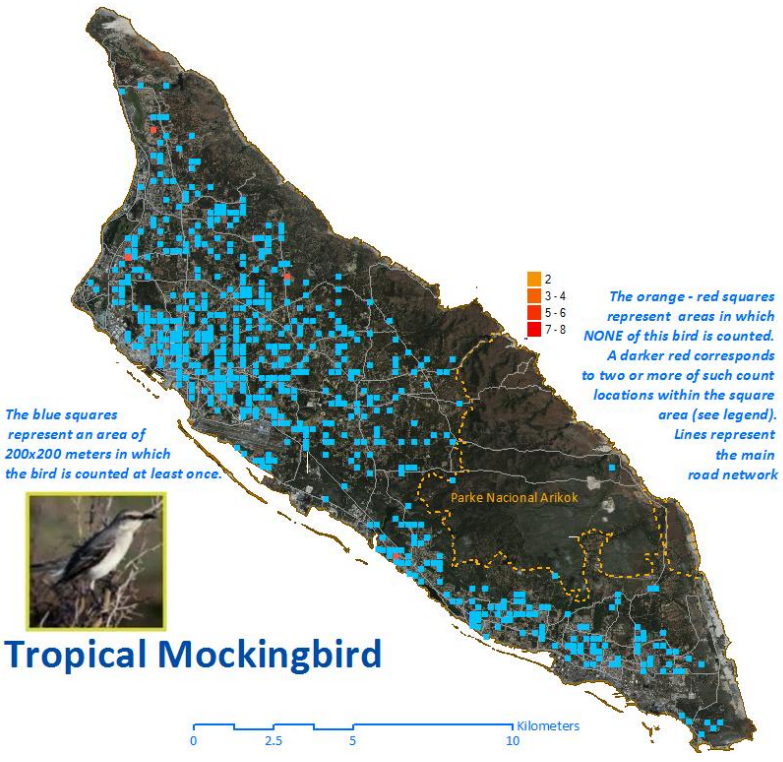
The Troupial is also a leeward breeding bird, which feeds on insects and fruit from trees and cacti. The Troupial is the National bird of Venezuela. In contrast to the Chuchubi, the black and orange colored Troupial, seldom comes to the ground and makes its nest hanging from the branches of trees. The Troupial is considered a very competitive bird and nest competing with the Yellow Oriole. The results from the National Bird Count in 2011 confirm that the Troupial is a very common bird in Aruba that can be found in all types of gardens. In comparison with the Yellow Oriole this bird was seen much more frequently. The Troupial was seen as a single bird (in 34% of cases) or as a pair (32.8%), but also in small groups. We refer to the graph above the map illustration.



Tropical Mockingbird

(Chuchubi, Mimus *gilvus*, Caribische Spotlijster)

The *Tropical Mockingbird* is the most common bird in Aruba. This thrush-like bird is an opportunistic feeder, often seen on the ground, looking for insects, spiders, small lizards and gecko's, but also in trees and cacti, feeding on fruit, or even robbing the eggs from other small birds. The Tropical Mockingbird makes an open nest in whatever place seems suitable. Sometimes, its nest is brood-parasitized by another bird. A relative new arrival to the island, the Shiny Cowbird, (Molothrus *bonariensis)* is known for laying its eggs in the nests of other bird species. Since these strangers hatch slightly faster than their nest

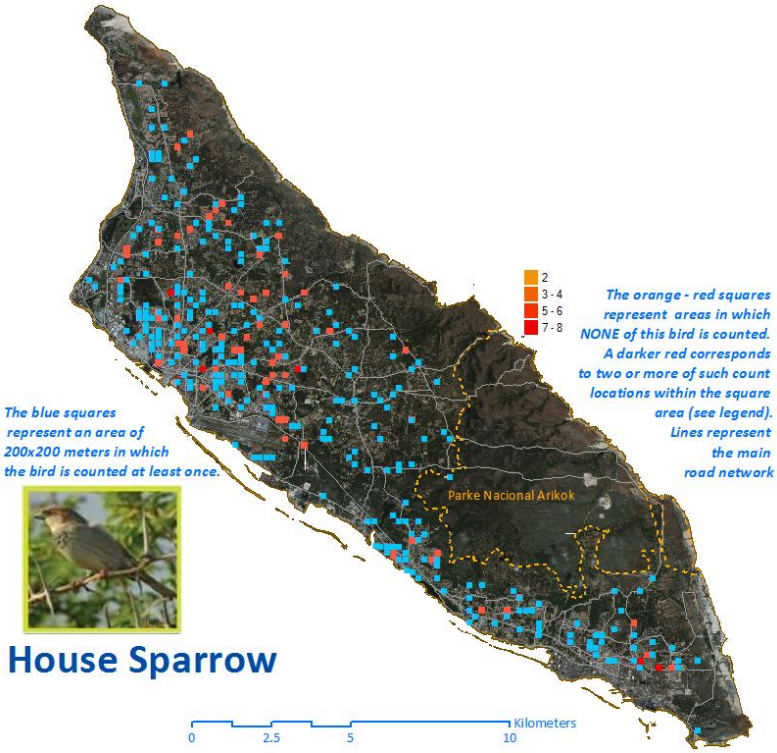


mates, their young may find a chance to remove some of the original eggs or are in favor during the direct competition for food. This results in less survival chances of the Tropical Mocking bird. Only when the young birds start to fly, the difference between the two species becomes more distinct (personal observation). The young cowbird is slighter and darker in tone. Tropical mockingbirds may live in small territories of only a few gardens, and fiercely defend it against other birds, such as birds of prey, and the Troupial in particular. The data from the National Bird Count confirm its spread all over the Island.

House Sparrow

(Parha di Joonchi, Passer *domesticus*, Huismus)

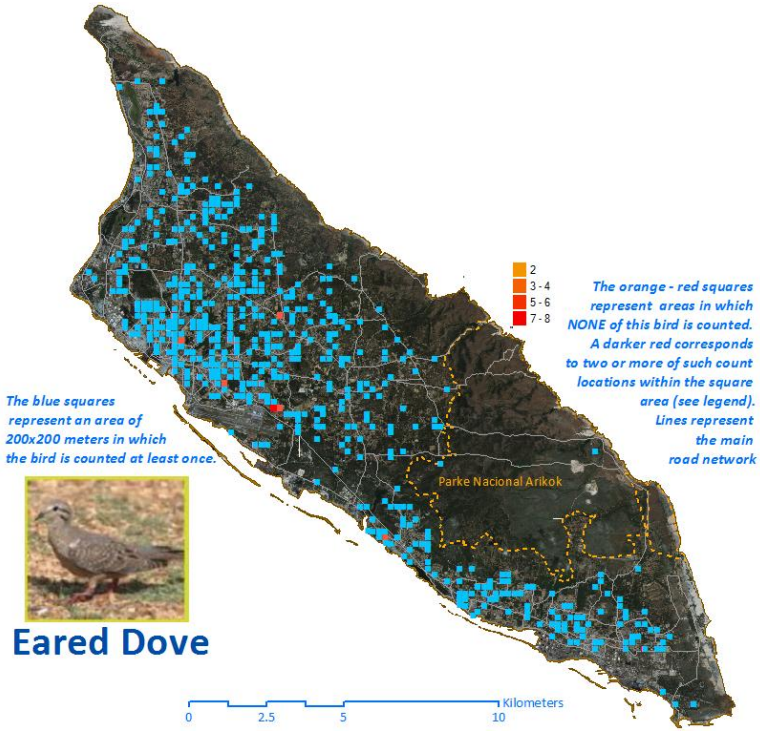
Originally, the *House Sparrow* was introduced as a cage bird in Curacao in the fifties. In 1979 the first individuals were observed on Aruba and since then they spread rapidly all over the island. The very large aggregations of house sparrows as often seen abroad are not typical for Aruba. The observations during the Bird Count illustrate how well this bird was able to adapt to local circumstances.



Eared Dove

(Buladeifi, Zenaida *auriculata*, Geoorde Treurduif)

The *Eared Dove* is a very common bird that can be seen almost everywhere, similar to the smaller *Common Ground Dove*. It is an easy breeder and feeds on small seeds on the ground. In the fifties, Voous described these birds as very shy and seen mostly in smaller groups of 5-10 individuals, mostly up in the trees. Apparently, these birds were not found near housings. Whenever approached, the doves quickly flew away. Today however, *Eared Doves* can be observed almost everywhere, sitting singly or in pairs on walls and trees near buildings; aware but not shy at all. The three dove species are observed in similar numbers (see

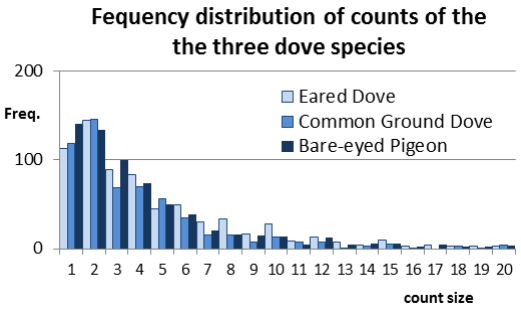


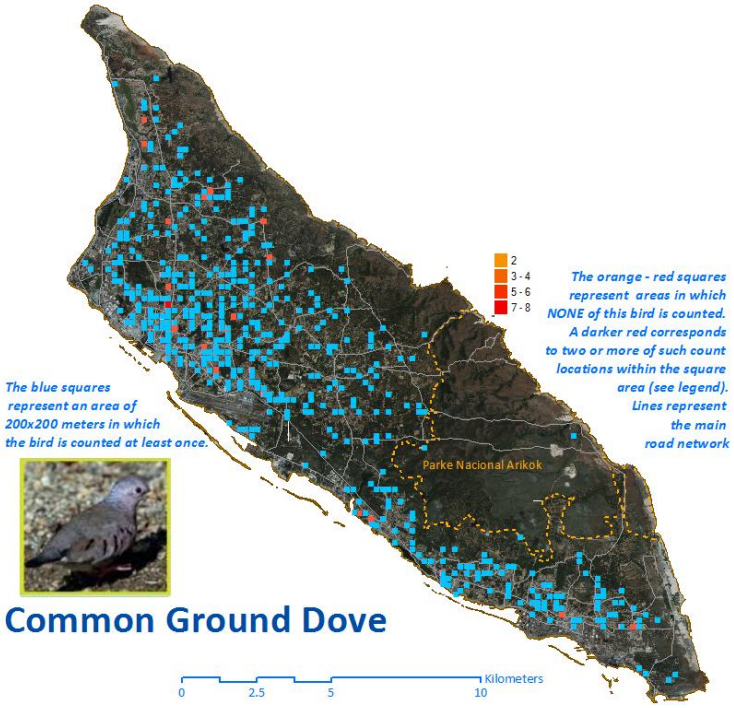
the graph at right) including the occurrence of larger flock sizes, but the majority of observations still were in pairs.

Common Ground Dove

(Totolica, Columbigallina *passerine*, Musduifje)

The *Common Ground Dove* is similar to the *Eared Dove* observed all over the island. This dove is typical for these regions. The dove has always been very abundant in the cultivated areas on Aruba as well as in thorny scrub vegetation and this situation has not changed until today.

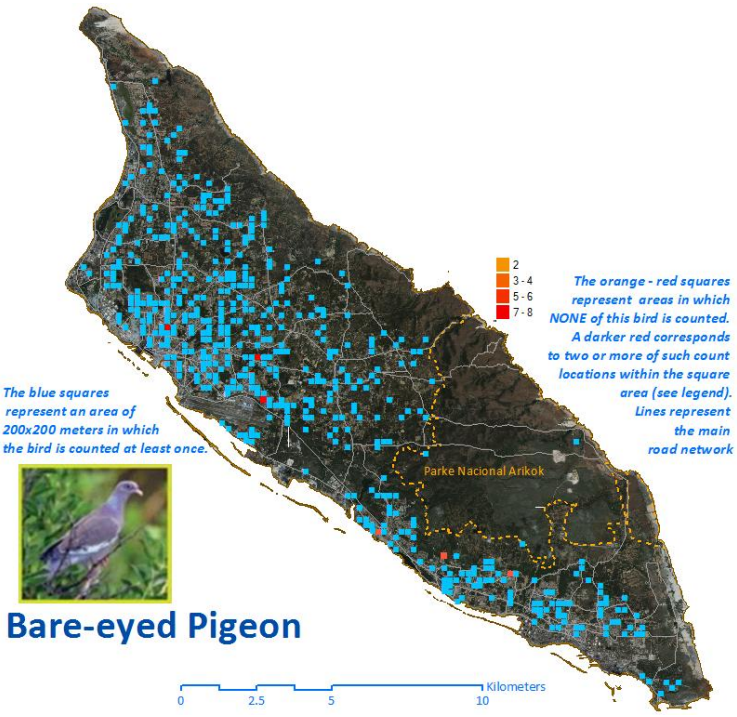




Bare-eyed Pigeon

(Barbacoa, Columba *corensis*, Naaktoogduif)

The *Bare-eyed Pigeon* was described in the fifties as a very shy large pigeon, generally arboreal, and because it had been a game bird for a long time, numbers were quite low. Nowadays, the *Bare-eyed Pigeon* is not so shy anymore and can be observed near houses. Apparently, the bird has changed its behavior, now that there is no severe hunting anymore. Like the other dove species this species can be found all over the island.

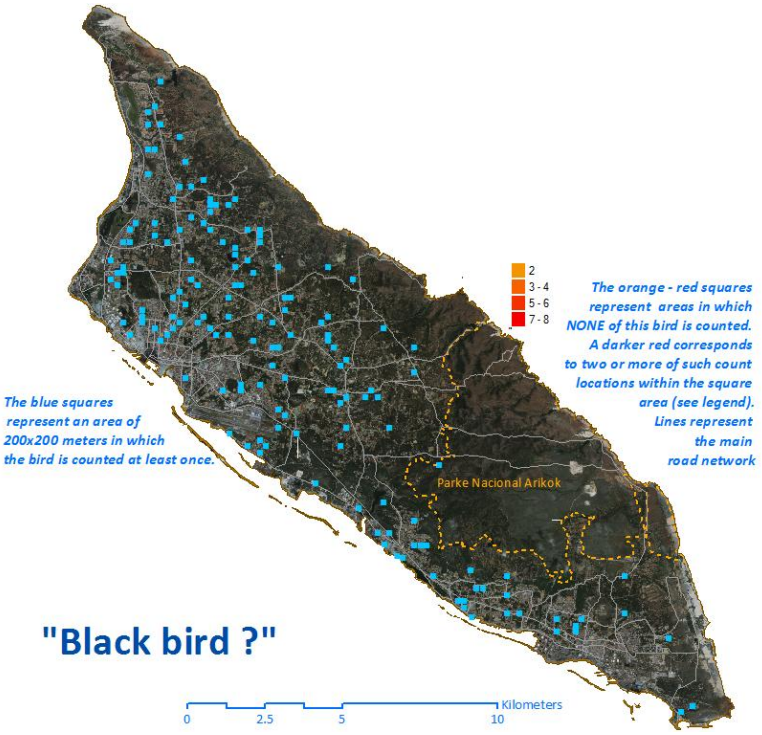


Black birds

Spread all over the island, in 172 locations, local observers reported an additional bird species *ad libitum* that was described as a 'black' bird. These records mounted to 877 birds in total. Most likely, these black birds involved one of either:

- the Shiny Cowbird [Moluthrus *bonariensis*, Glanskoevogel, Parha Vakero],
- the Carib Grackle [Quiscalus *lugubris*, Caribische Troepiaal, Zenata Caribena],
- the Groove-billed Ani [Crotophaga *sulcirostris*, GroefsnavelAni, Chuchubi Preto].

The Groove-billed Ani is not seen so frequently and is the least likely candidate for the 'black birds' that have been recorded. This bird is clearly larger than the earlier two and has a characteristic heavy beak. The Groove-billed Ani is a member of the Cuckoo family raising their own eggs, often in communal nests. Birds feed in small groups on fruit, insects and seeds, and can be seen near an open terrain, near goats or sheep, feeding.



The Shiny Cowbird is a brood-parasite and lays an egg in another birds' nest. Males are black but females are more brownish in color

The Carib Grackle is recognized by its white/light-yellowish eyes and the shape of its tail. The bird was originally imported as a few pairs from Venezuela in 1981 (Reuter, 1999) and can nowadays be found all over the island, often in large flocks feeding in the grasses. The male is darker than the female, with a shiny blue-black color. Males and females have very pronounced eyes and a dark black bill.

Final comments

The First National Bird Count was a great success and received much attention in the media. We feel content about the highly relevant information that we retrieved by the public on the basis of which we were able to distinguish the spread of the selected bird species in Aruba, i.e. we were able to make a promising coverage about the presence or absence of a particular species of bird in a given area and within a small frame of time in early March 2011. We assumed that most participants were able to recognize the different bird species in this bird count with ease. These fifteen birds are generally the best know bird species on Aruba. Still, we decided to show the results in a rather conservative manner.

But, with the results from this bird count another interesting pattern seemed to emerge, based on the distribution of some of the bird sightings and that may require further attention. Namely, the number of birds that were recorded was clearly less as what we would have expected for some of the species.

For instance, the Brown-throated Parakeet is known for its tendency to aggregate in groups and also in Aruba small flocks used to be a regular sight. Data from the bird count however suggest that nearly half of all observations concern parakeets that dwell as a single bird or as a pair and in nearly two of every three observations the number of parakeets was only three birds or less. The parakeet is still observed all over the island (in nearly half of all count locations), but in only one of every six to seven observations more than five birds have been seen together (in 67 of the 434 'positive' count locations). But, we like to follow a careful approach when interpreting these numbers. First, these records involve observations in the more populated areas in Aruba and besides, most observers were untrained and much can be said about inter-observer reliability. However, even if the proper conditions for a scientific approach were not met, and if we expect that on occasion the same birds have been observed by different observers, located near each other, than still we would not expect that consistently less parakeets were recorded as that there were actually present. So, what does this mean? Is there a problem with the parakeet population in Aruba as we find few or smaller groups than expected? Similar reasoning may go for the Burrowing Owl, the Crested Bobwhite and the Yellow Oriole. These bird species have all been seen less than expected, i.e. compared to what was supposed to have been 'common' in the past.

The fact is: We do not know! The aim of the bird count was in the first place to involve the public and raise awareness, but the data from the bird count are found to be somewhat evocative at some points. Unfortunately, earlier scientific accounts besides anecdotal information are lacking. So, similar counts in the future are highly recommended. We also advocate further investigation and more pinpointed research and action.

In short, what might explain the shift in observed behavior? Verbal accounts suggest that a decline of these bird populations that may be due to predation by the Boa *constrictor*. Birds may be killed or react and tend to reside in smaller groups due to changes in environmental pressures, including stress caused by human disturbance, capture, or the predation by the Boa *constrictor* (particularly when predation takes place near the roosting sites).

But there may be other explanations that might suffice to explain why there may have been a shift in group sizes and/or abundance. As stated already there has been a lot of habitat

destruction and habitat fragmentation in recent decennia. The number of living quarters in Aruba from 2000 to 2010 increased by nearly 20% though in the decade before it had increased already by just over 50% (from over 19.000 living quarters in 1991 to just less than 30.000 living quarters in 2000 and up to nearly 35,000 in 2010). Many 'wild' areas had to make way for new housing projects. Birds may have suffered from such changes in their natural habitat because it may go with a loss of suitable breeding-, or roosting sites, or the loss of locally and temporally abundant food sources, such as in gardens with large fruiting trees. It might well be that current flock sizes tend to follow a new pattern of distribution of such sites or food sources.

Alternatively, it might well be that parakeets simply react to new opportunities in the newly created populated areas and as a consequence spread out in these areas into smaller groups, in concurrence with for instance a different distribution of food resources.

So, there is reason for much uncertainty and debate and more focused studies are requisite. What seems to be evident is that there is influence of current environmental pressures on Aruban ecosystems and the remaining wildlife systems, that seem to be emphasized by the findings of the current bird count (be it not in a conclusive manner).

We expect that future bird counts might provide stronger support to draw conclusions whether some of the birds are in decline and others may be at rise. The more participants in the bird count, the stronger and more robust revealed patterns. Also, to safeguard our endemic subspecies, focused and systematic studies including different species and the relationship with habitat characteristics and the wider green infrastructure should be initiated, i.e. in the 'wild' areas (such as in the Arikok National Park and the countryside near the North Coast) as well as in 'overgrown' and more rural areas.

Some final notes have to be made on the quality of the data from the National Bird Count and its relevance with respect to the current findings. As stated earlier, it is important to realize that the National Bird Count is a count of a limited number of bird species that live in niches close to our homes. Thus, we should keep in mind that the situation with regard to other species and in the 'wild' versus in more rural areas of the Aruban countryside may be somewhat different from what we have learned from this bird count.
Furthermore, some of the bird observations make account of very high incidences. In some occasions, there may be a feeding spot but on other occasions the high numbers still seem strange. Some birds are very active birds that may fly in and out of the garden continuously. The untrained observer may mistakenly count such birds repeatedly and create an error in the observation. However, there is no reason beforehand to omit such records from the database. At the next Bird Count in 2013, we have included separate questions about the provision of food or water to the birds at the location where the birds are observed. In our current analyses however, we decided not to use the individual counts of birds other than to provide insight in the distribution of count sizes.

The general impression is that in Aruba many of the bird species that were described fifty years ago as relatively shy and mostly absent near the inhabited areas, are nowadays more abundant and seem to have adapted to human habitation. From verbal accounts we get the

impression that for certain bird species their numbers are in strong decline in recent years. This may very well be true in the 'wild' areas, for the reasons we have described above. We have to realize, that the bird count predominantly covers the populated areas and for the garden environments of present day Aruba, numbers as low as in the fifties do not seem to hold true. Many of the selected bird species are relatively abundant all over the island and their coverage in the populated areas is, given the hot and arid climate and the sparse natural vegetation in Aruba, not as bad as one might have guessed. One may wonder whether the garden ecosystems may have become a positive augment for certain species to the 'wild' habitats and may even serve as a kind of safe haven against for instance the Boa *constrictor*.

This said there is a concern for better understanding of the processes that currently take place in Aruba and which seem to influence the ecosystems, wildlife and flora, including the survival chances of endemic subspecies. Aruba is a relatively small island, and more so than in other places, conservation and environmental policy-makers should take the corridors and networks of fragmented and overgrown pieces of terrain together with the National Park and other protected areas into account in their decision making.

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