



STINAPA BONAIRE / WASHINGTON SLAGBAAI NATIONAL PARK

**MONITORING PROGRAM FOR WATERBIRDS INHABITING THE SALINAS
LOCATED ON THE NORTHWEST OF BONAIRE, NETHERLANDS ANTILLES**

YEAR REPORT 2008



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Content

1. Introduction	page 3
2. Objectives	page 3
2.1 Main objectives.....	page 4
2.2 Secondary objectives.....	page 4
3. Study Area and Methods	page 4
4. Results and Discussion	page 5
4.1 Species diversity.....	page 6
4.2 Number of individuals.....	page 7
4.3 Bird density.....	page 9
4.4 Relative abundance.....	page 10
4.5 Temporal dynamics.....	page 14
5. Recommendations	page 16
Glossary	page 17
References	page 17

1. Introduction

It is impossible to take well founded management decisions if you do not have reliable data on the resources you are trying to manage; likewise, it is impossible to adequately evaluate the effects of your management actions without this kind of information. Consequently, in 2007 STINAPA Bonaire, the NGO in charge of the management of the national parks and other natural areas of Bonaire, Netherlands Antilles, decided to implement a Nature Management Program for the native terrestrial flora and fauna of the island. This program includes monitoring of native species and their habitats as one of its three main components, being the other two scientific research and habitat improvement.

This report shows the results of the first year monitoring waterbird populations in eight salinas located on the northwest of the island. Terms in bold font are described in the glossary.

The data obtained during this year will become the **base line data** for this monitoring program, this means that it will be the point of reference for comparison with data obtained in coming years. Additionally, these values can also be used as an indicator of habitat health; therefore, potential abrupt changes observed in future years will be considered an “environmental alarm” indicating a need for further research in order to determine causes and possible solutions of the problem, if applicable.

Most of the people involved in the 2008 surveys had little or no previous experience in birding and further training plus gaining experience in birding is one of the objectives of this year. As participants in the surveys gain experience, this monitoring program will evolve into a superior level of data collecting and analysis that will allow a better understanding of the relationships between the habitat and the species being monitored.

2. Objectives

In order to avoid confusion, it is important to remark that it is not an objective of these bird surveys to find out the estimated population numbers for the island of Bonaire of the many different bird species that inhabit the salinas, but instead to obtain data that can give us an insight on the species present at different times of the year and the trends of their local populations as well as the health of the salinas themselves.

There was never a comprehensive bird research and monitoring program implemented on the island of Bonaire, therefore many basic questions necessary for proper management remain unanswered. The main goal of the bird monitoring program being implemented by STINAPA Bonaire is to start answering some of these essential questions, for example: What resources do we have? How are the population trends? And, how are our management actions affecting the resources?

2.1 Main Objectives

- Determine the number of waterbird species present in each one of the eight salinas located on the Northwest of Bonaire at different times of the year.
- Determine the number of individual waterbirds present in each one of the salinas located on the Northwest of Bonaire at different times of the year.
- Compare the importance as a habitat for waterbirds of the eight salinas located in the North of the island.
- Determine the **relative abundance** of waterbirds in eight salinas located on the Northwest of Bonaire at different times of the year.
- Determine **bird density** in the eight salinas located on the Northwest of Bonaire at different times of the year.
- Look into changes in relative abundance of birds throughout the year (**temporal dynamics**).

2.2 Secondary objectives.

- Learn about bird behaviour and ecology during the surveys.
- Train and educate staff in bird monitoring techniques.
- Find unusual birds or species never recorded in the island of Bonaire.
- Find and identify and report birds that have been ringed somewhere else.
- Create awareness for the public about the bird life on Bonaire.

3. Study Area and Methods

The following salinas were surveyed for this study: Salina Matijs, Salina Bartol, Salina Funchi, Salina Wayaka, Salina Slagbaai, Salina Goto, Salina Tam and Salina Frans. They are located in the Northwest end of the island of Bonaire, Netherlands Antilles, 12° 15' N, 68° 22' W. The first six of them are situated within the boundaries of the Washington Slagabaai National Park. They differ greatly in size, depth, shape, basin area and water quality.

All the salinas have a relatively small area and easy access, making it easy to survey them in a short period of time (between 15 minutes and 1.5 hours), therefore the **area count** was the method selected to carry out the bird surveys. Previously to the counts a meticulous study of the areas surrounding the salinas was conducted in order to optimize the efficiency of the effort inputted in the surveys. This was accomplished by selecting strategic points along the shores that provide us with a complete visual access to the entire lagoon, or at least 90% of it, which are the cases Salina Slagbaai and Salina Goto. All the selected points were GPS recorded and exactly the same points were visited on every survey.

The salinas were visited four times a year during the first two weeks of January, April, July and October. All the surveys were done in three consecutive days and were conducted only during fair weather days, between 8:00am and 12m. Regardless of water level and time of the year all water birds found in the salinas were registered; this

includes the water, the mud flats, the rocky shores and the vegetation immediately surrounding the salina. Binoculars 8x40 and telescopes 20x-60x 82mm were used.

Even though they are not considered waterbirds the Barn Swallow and the Osprey were included in the surveys. Terrestrial birds like Tropical Mockingbirds and Yellow Warblers were commonly found in the Salinas feeding on small flies available on the shores, but were not included in the surveys

Given the large amount of species involved in these counts, it can only be expected that there is a difference in their detection probability caused by all the different sizes, colours, behaviours, and similarity among some of the species. After careful consideration of all the factors involved in the data collection and the objectives of the monitoring program, we decided against collecting the necessary data (e.g. distance and angle) to account for this variability and all species were included in the data as if they had the same detection probability (100%). Considering the equipment available and the terrain, we find very probable that most of the species included in these surveys have a detection probability of at least 90% and none of them are under 80%.

Individual small shore birds that could not be positively identified were registered as “NOID peeps”. “NOID” stands for “NO IDENTIFICATION” and “peeps” is a common term for shore birds that look extremely similar and are very difficult to identify unless you are in very short distance from them. The number of non identified bird was very low and most likely they belong to one of the species that was identified during the same survey or one of the rest during that year, therefore they were not included as an additional species from the ones already registered.

Since the same individual bird could be registered in more than one count during the same year (double counting), especially resident birds, the total number of birds counted was not used for the calculation of **bird density** or **relative abundance** values, instead we worked with maximums and minimums counts and the average for the year.

4. Results and Discussion

During the months of January, April, July and October eight salt pans in the North-western part of Bonaire were surveyed for water birds. In this reporting year a total of 5880 individuals from 35 different species were counted and identified.

We observed that when the water of the salinas reaches a higher level than the regular shore line, birds are very scarce. Flamingos abandon the area most likely because the water is too deep for them to find food on the bottom or the shores. In order to study the correlation between water depth and birds presence, permanent depth gauges should be installed in all the salinas that the monitoring takes place. Further, for a complete understanding of the relationship between the habitats and the waterbirds other habitat conditions that may affect the abundance of individuals and species should be included in the data collection in order to be able to carry out a more profound analysis.

A few irregular visitors were observed during the surveys. Special consideration should be given to the Cattle Egret; 5 individuals from this species were observed in the month of April and at least one of them was in breeding plumage. Cattle egrets are well known colonizers that could displace some of our breeding resident species of egrets and herons.

No new species and no ringed birds were observed in this reporting period.

4.1 Species diversity

In figure 1 we can observe a large difference in the number of species that were present on each salina. Salina Slagbaai, with 23 species was the richest in diversity and held more than twice the number of species compared to Salina Bartol or Salina Wayaka for instance.

There is a lot of room for research into the reasons of this disproportion and the answers are needed for a better understanding and management of our natural resources. Consequently, STINAPA Bonaire, together with FLASA, (Fundacion La Salle de Ciencias Naturales, Venezuela) started in 2008 a base line study of the physical, chemical and biological characteristics of the salinas. The results of this base line study combined with this waterbird monitoring program are a very desirable combination that should produce new insights of the relationships between these habitats and its avian residents.

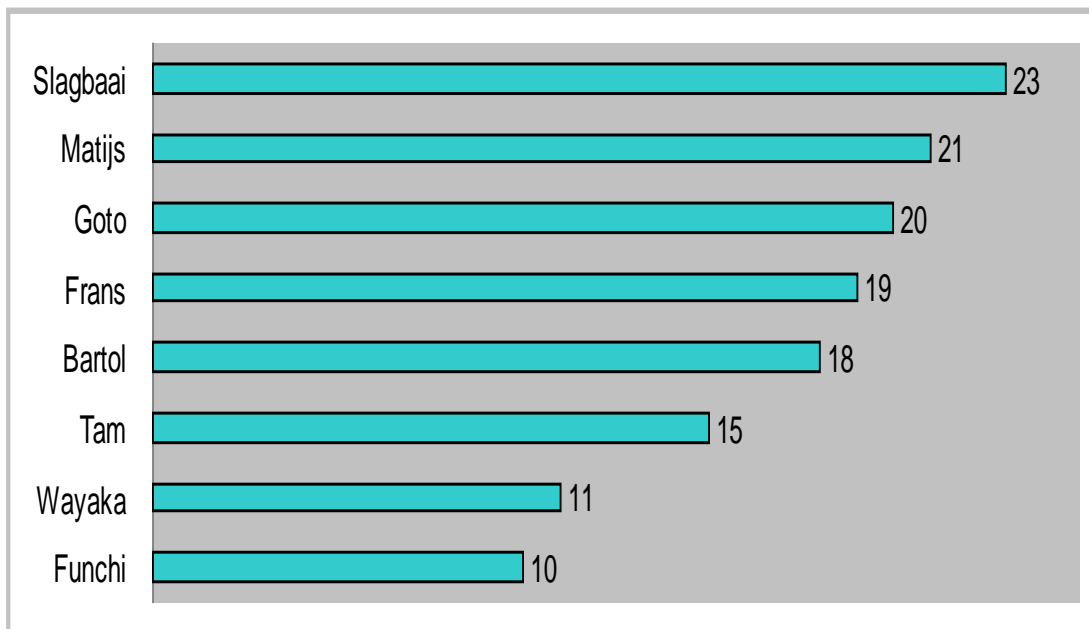


Figure 1. Number of waterbird species registered per salina

It is noteworthy that of the 35 species identified during the surveys, only 4 were observed in all of the salinas (11.4%) and none of them contained more than 66% of all

the species found. Obviously, some salinas are more appealing to some species than others, for instance we noticed during the surveys certain regularity of Neotropic Cormorants in Salina Tam and Snowy egrets in Salina Bartol. These facts emphasize the importance of protecting and preserving all of them, for example Salina Tam scores low in number of individuals and diversity when compared to the rest, but it may be of vital importance for the island population of Neotropic Cormorants.

4.2 Number of individuals

In figure 2 we can observe that the difference in the number of birds that inhabit the salinas is enormous compared to the difference among the diversity of species. It goes from more than twice to more than 25 times. It will be easy in principle to attribute this difference to the size of the Salinas, however a closer look shows that Salina Frans, for example, despite of being the smallest of all the Salinas holds almost twice the number of species than other small Salinas like Wayaka and Funchi and more than twice the number of individuals. This indicates that there is more than the sheer size involved in these differences. Again, further research and monitoring is needed for a better understanding of these habitats and the relationship with the species that they sustain.

As expected, large differences between the maximum and minimum amount of birds present in the salinas throughout the year are present. This corroborates that these habitats are used by several species of migratory birds. April was the month with the lowest number of individuals registered for all salinas except Salina Tam.

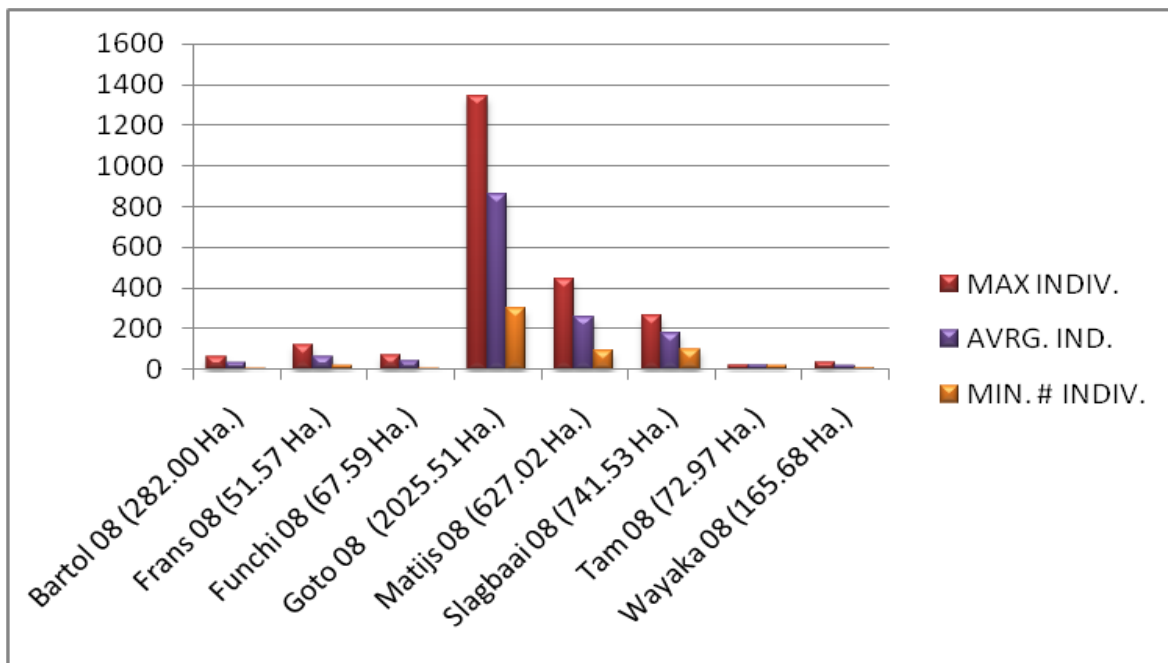


Figure 2. Maximum, average and minimum number of individuals per salina.

In order to help envision the individual significance of each salina and the differences amongst them as a habitat for waterbirds an importance index (figure 3) was created by simply multiplying the number of individuals by the number of species present on each.

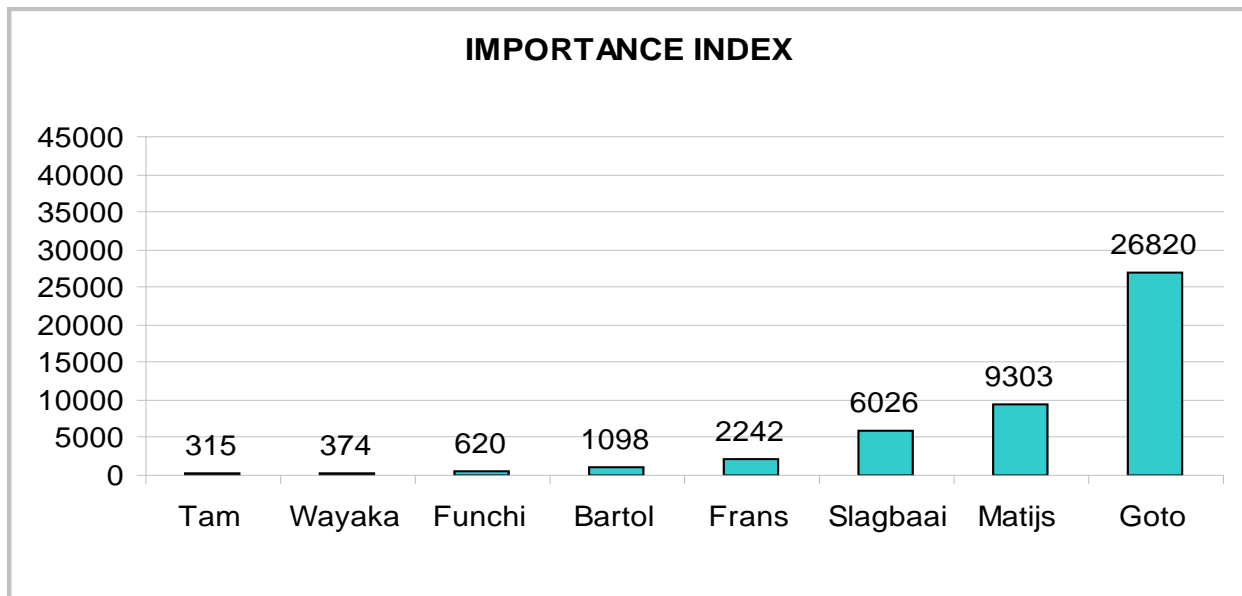


Figure 3. Importance index values of each salina as a waterbird habitat.

Before going into discussion about the importance index values, it is important to clarify that every single salina included in this study have a high conservation value and that a low number in the importance index does not imply a low value of the salina as a habitat per se. Instead, this is just an exercise to compare the salinas among themselves.

Salina Goto clearly stands out as the most important of all the salinas as a habitat for water birds, followed by Salina Matijs with only about one third of its value. Salina Goto holds almost as many birds as the rest of the salinas together. This clearly exposes the vital importance of this lagoon as water bird habitat and this should be reason enough to expand the limits of the WSNP to include the whole area of Salina Goto and its surroundings within its boundaries; not only to give the area the legal protection it deserves, but also to increase the conservation value of the park itself. Adequately, this salina, has been designated already as a **Ramsar** site.

It is remarkable that Salina Frans, despite of being the salt pan with the smallest area of all of them, it is located on the top half of the importance index; however it does not have any legal protection at the moment. Given its importance as a water bird habitat combined with its importance as a nesting site for the Yellow-shouldered parrot (*Amazona barbadensis rotsch.*), which is one of the island's flag species, one of our endemic subspecies and a bird classified as "vulnerable" by IUCN's red list, Salina Frans should be given immediate protection by both expanding the limits of the Washington Slagbaai National Park to include in its area and the nomination of the area as a **Ramsar** site.

Salina Wayaka, despite of its relative large area, has the second lowest values both in numbers of individuals and species diversity, which questions the decision taken

approximately 25 years ago to dig a channel and connect it to the sea in order to explore the possibility of exploiting the salt flat for shrimp farming. Not only the experiment failed, but it caused damage to the nearby coral reef and perhaps to the bird life. Unfortunately, there is no data available regarding water birds from the times before the decision was taken, so we will never know for sure. This is a perfect example of the importance of obtaining base line data in order to evaluate the results of management actions. Yet, 25 years later we have a similar situation today in Bonaire with two of the keystone species of our terrestrial ecosystem, the nectar feeding bats. Populations in caves located in areas like Barkadera, where development projects are planned but there is no **base line data** neither enough research has been done to accurately evaluate the potential damage to these species and their habitats. If the projects are carried out irresponsibly, there is no way to know what we are risking or what we may have lost until it is too late for repairing the damage.

4.3 Bird Density

Similar to the species diversity and the number of individual birds on each salina, we can detect enormous differences among them in **bird density**. Looking at the maximum, minimum and average bird densities in figure 5 we can observe that the larger values are up to 10 times as greater than the smaller ones. However, in this case not the same four salinas score high; instead Salina Funchi is one of the salinas with the top values, scoring higher than Matijs, Slagabaai and Goto. This is partially caused

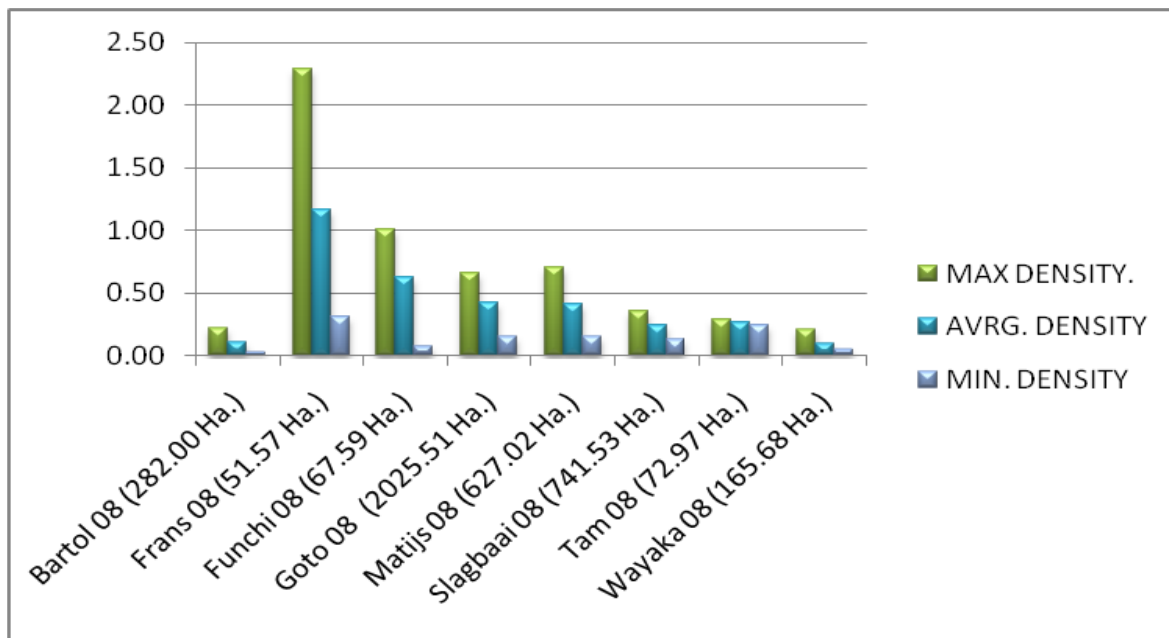


Figure 4. Maximum, average and minimum bird density on the 8 salt flats.

by its small area but certainly its habitat conditions for waterbirds have to play a very significant role as well. Once again, only additional research into the physical, chemical and biological conditions of these environments will help understand better what is behind all this.

Bird density is where the outstanding situation of Salina Frans as a high quality habitat for waterbirds is better exposed. In figure 5 we can observe that its bird density more than doubles any of the other salinas and is around 10 times larger than some of them. This situation is even more exceptional if we take into consideration that Salina Frans is one of the most influenced by human activities, for example salt extraction in the past, constant presence of humans and bird predators (cats and dogs) and major non natural alterations on its barrier with the sea in the form of a road, a very large parking space and the construction of a few small houses and structures.

4.4 Relative abundance

As expected, looking at the relative abundance charts for each salina (figures 5 to 12) and the total number for the year in all the salinas together (figure 13), the Greater Caribbean Flamingo emerge as the most abundant species inhabiting these areas, accounting for more than half of the total number birds found in our salt flats, with no other species coming close to its numbers. The remarkable characteristics of this species (color, size and behavior) provide this bird with virtually a 100% detection probability, which could be a cause for the large difference with other species, however as mentioned in section 3 of this report (Study area and methods), several other species also have 100% or very close to 100% detection probability and even if it was as low as 50%, still the Greater Caribbean Flamingo would be by far the most abundant in the salinas located in the Northwest of Bonaire.

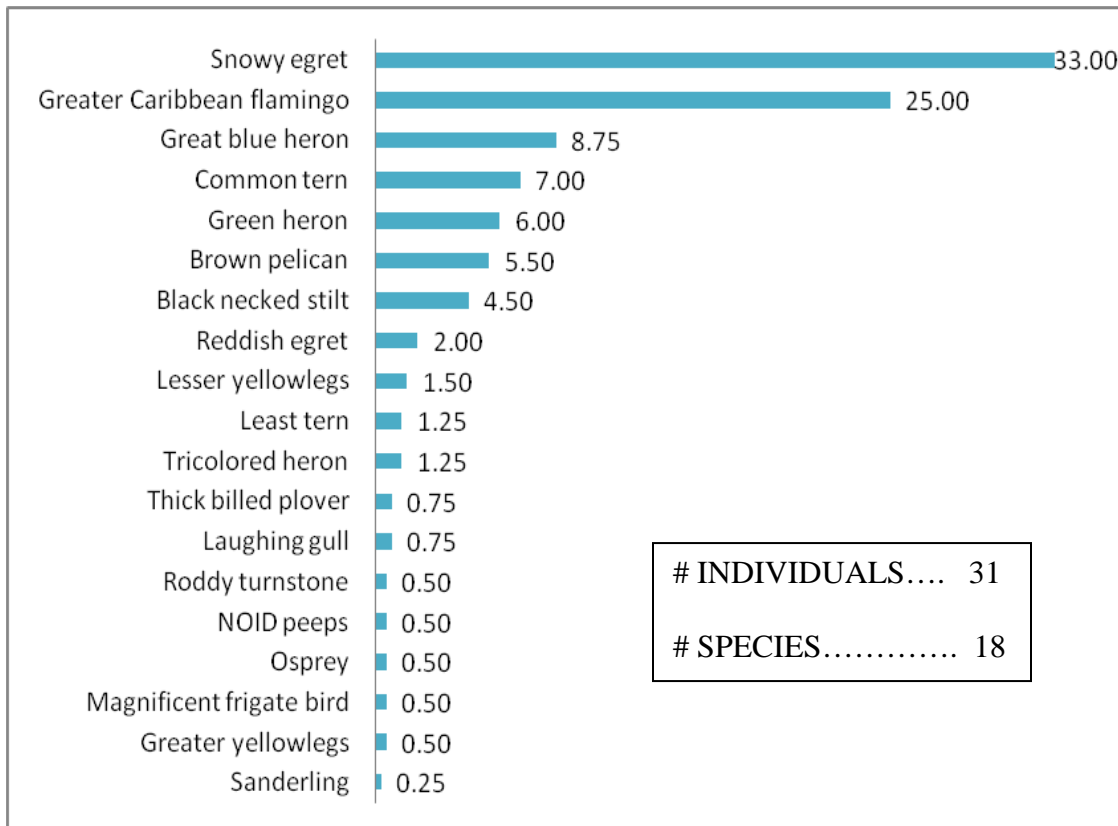


Figure 5. Year average of relative abundance of species in Salina Bartol (%).

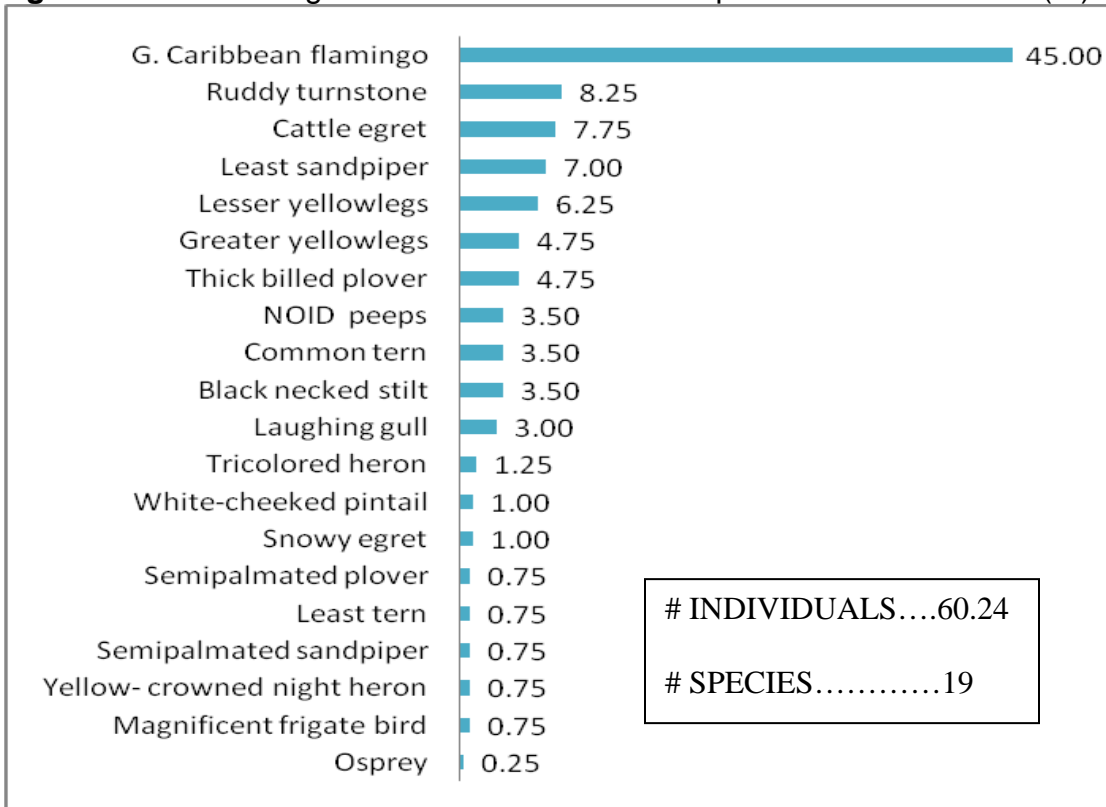


Figure 6. Year average of relative abundance of species in Salina Frans (%).

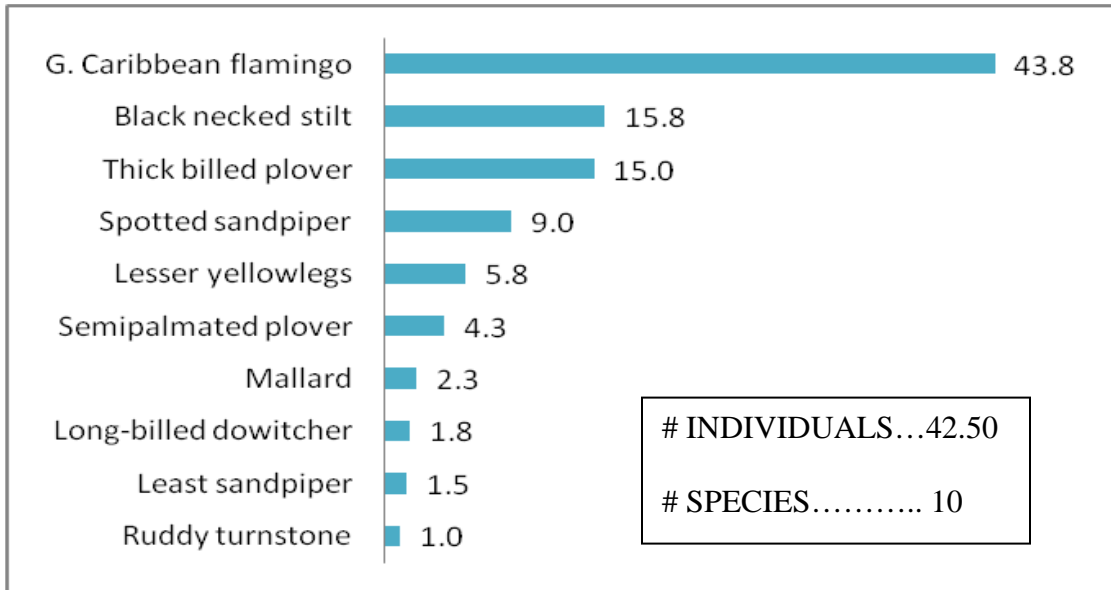


Figure 7. Year average of relative abundance of species in Salina Funchi (%).

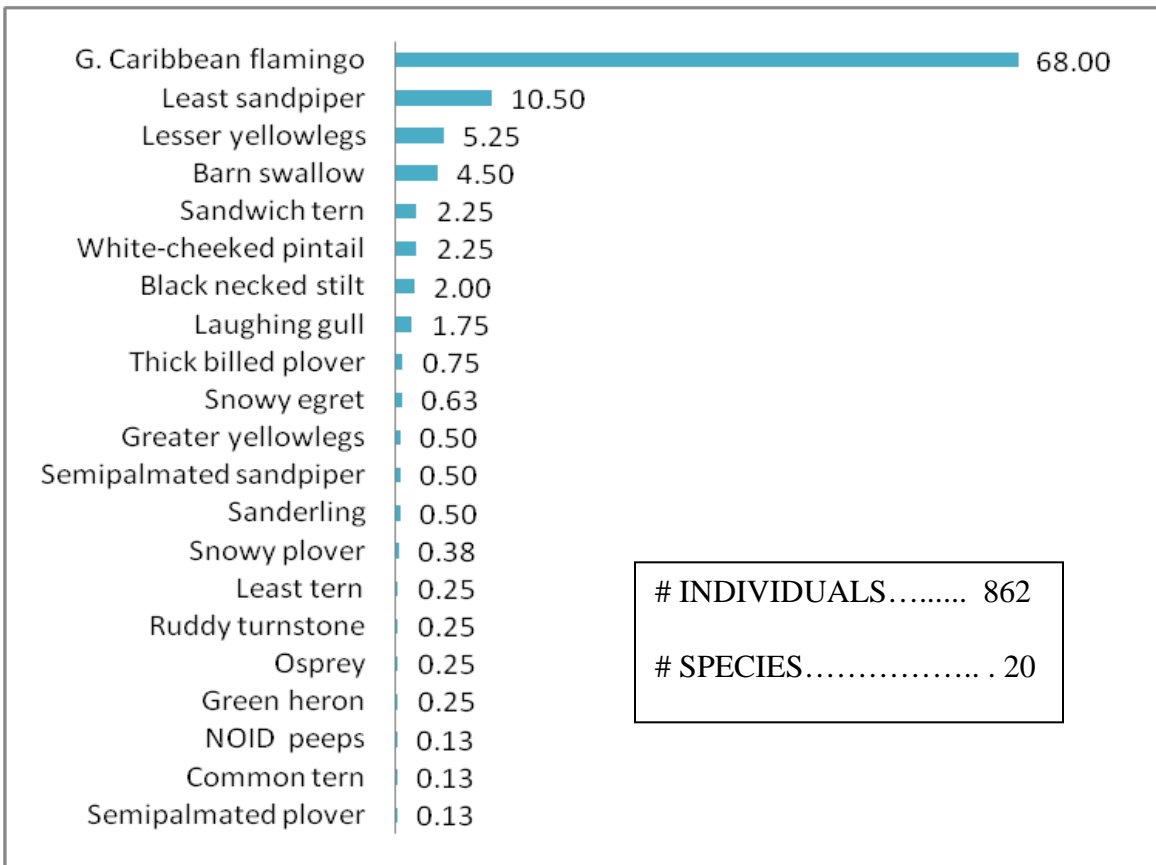


Figure 8. Year average of relative abundance of species in Salina Goto (%).

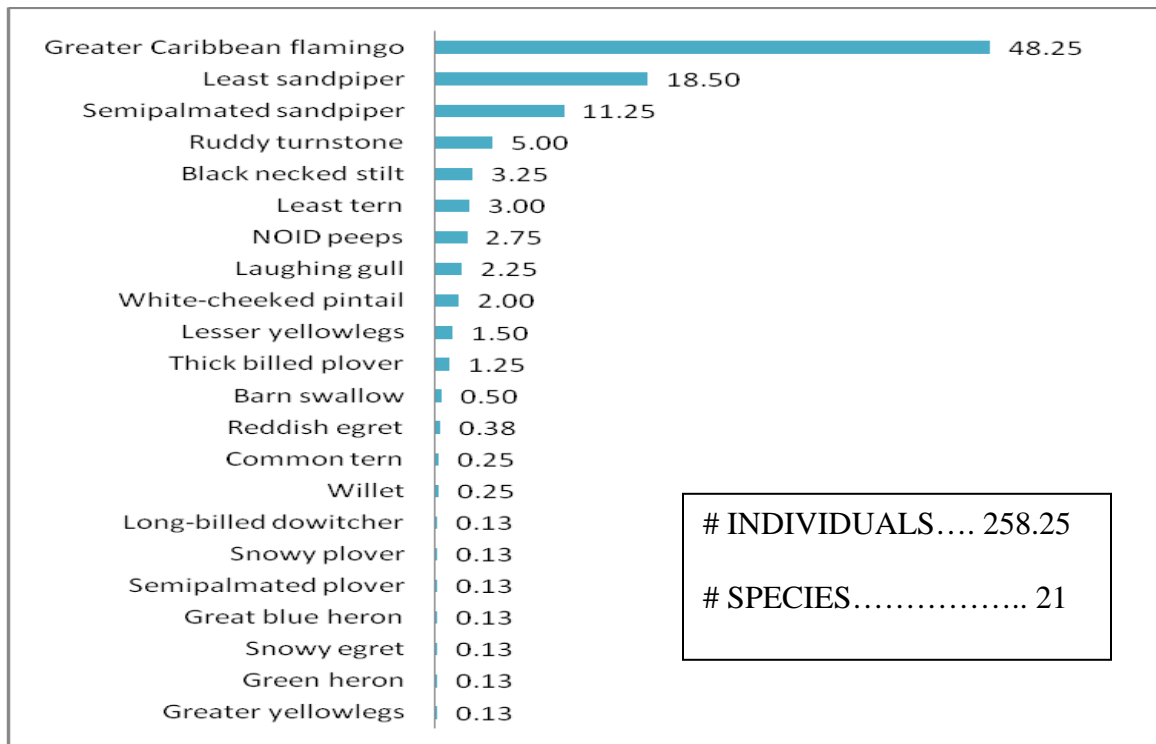


Figure 9. Year average of relative abundance of species in Salina Matijs (%).

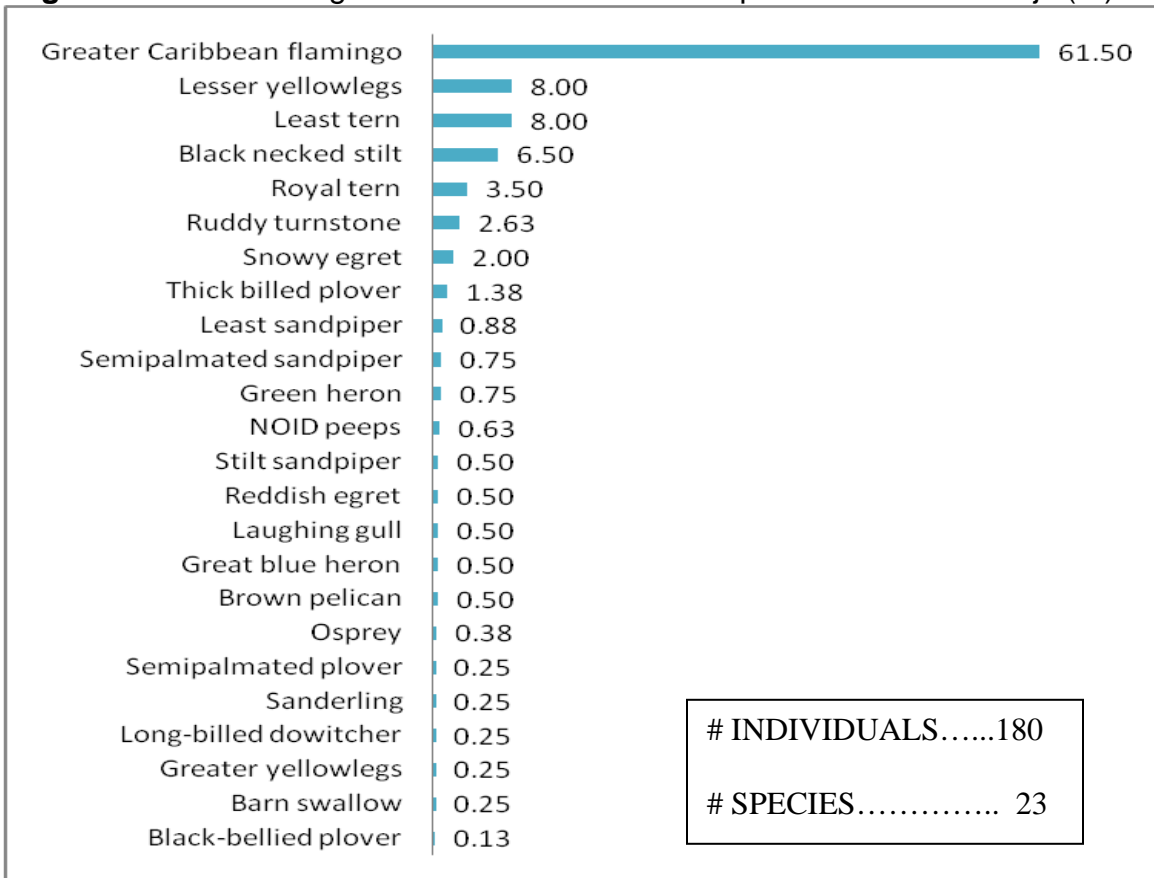


Figure 10. Year average of relative abundance of species in Salina Slagbaai (%).

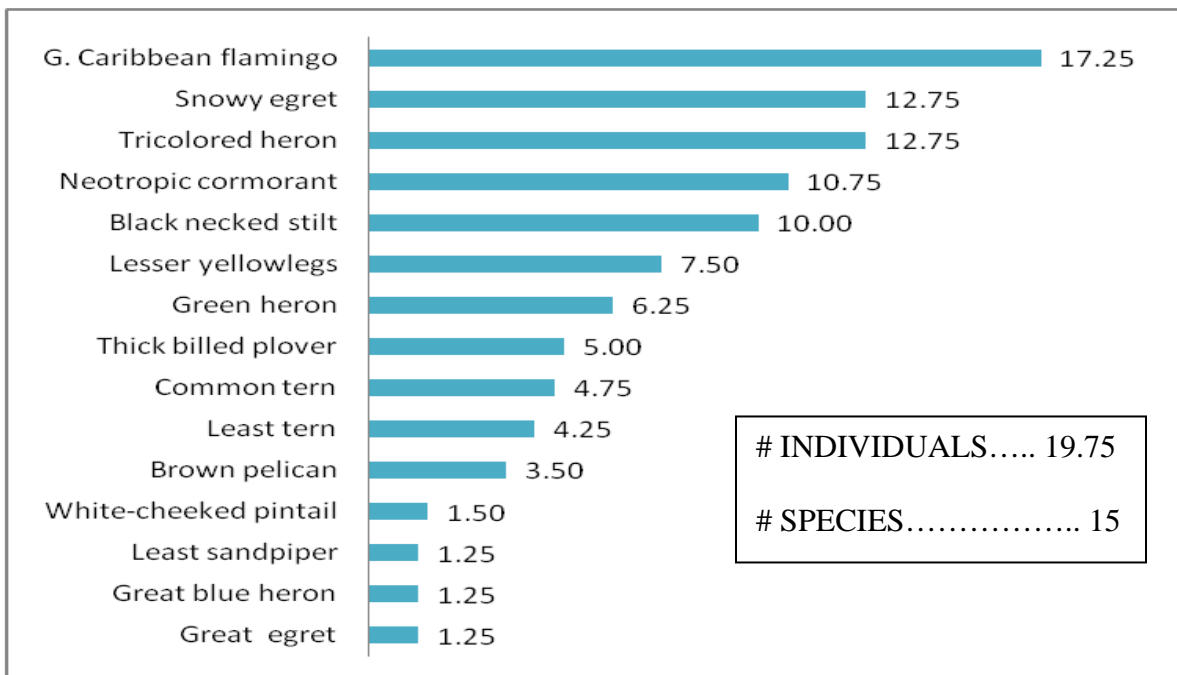


Figure 11. Year average of relative abundance of species in Salina Tam (%).

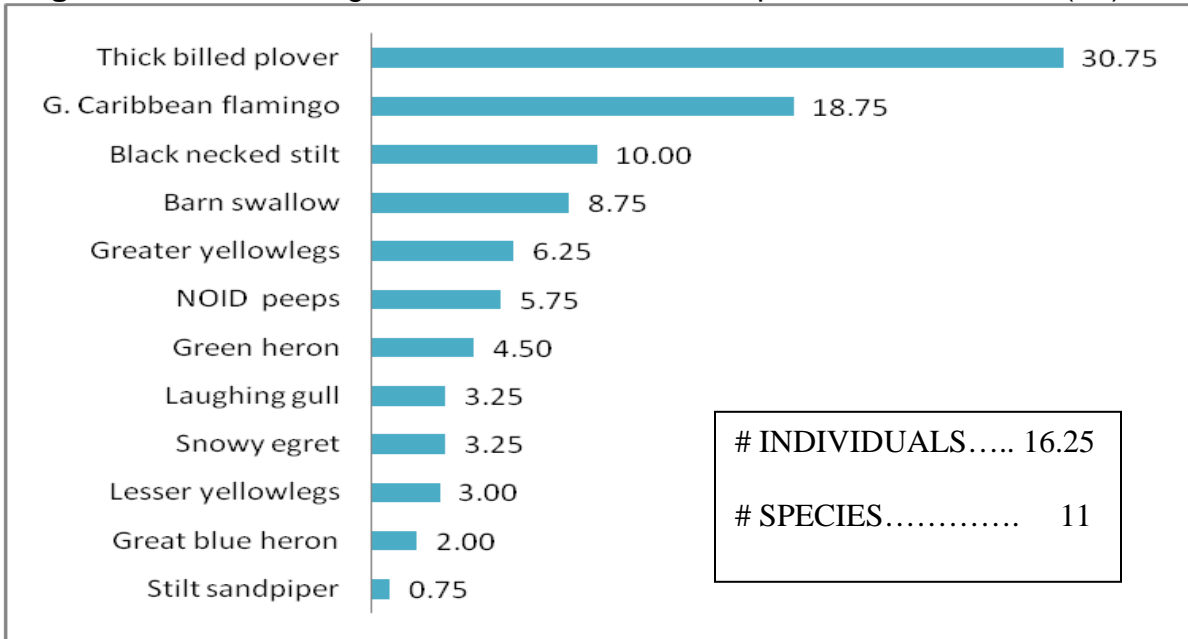


Figure 12 Year average of relative abundance of species in Salina Wayaka (%).

In an overall view of all the salinas (figure 13) without including the flamingo, the most abundant species were the following: Least sandpiper, Lesser Yellowlegs and Black-necked stilt. The Snowy Egret followed by the Green Heron were the most common birds from this group. All these species were registered in all the surveys, meaning that they are breeding resident birds.

4.5 Temporal dynamics

As expected, for most of the species, the minimum numbers in all the salt flats except one (Salina Tam), were obtained during the month of April, out of the migratory, nesting or the rainy season. The maximums were obtained in October and July. For most species included in these surveys, July relates to the nesting season and October to the migratory season, which overlaps with the rainy season. As resources become available, research and monitoring on the breeding and nesting activities of the species will be conducted by STINAPA Bonaire in order to have a better understanding of the populations, which should lead to a better management.

From the 35 species registered, 11 were observed in all the surveys and 2 species were observed during 3 of the 4 surveys. This is an indication of the amount of resident species. On the other hand, from the 13 species that were registered only in 1 of the surveys, 11 were registered during the month of October, this shows the migratory character of these species.

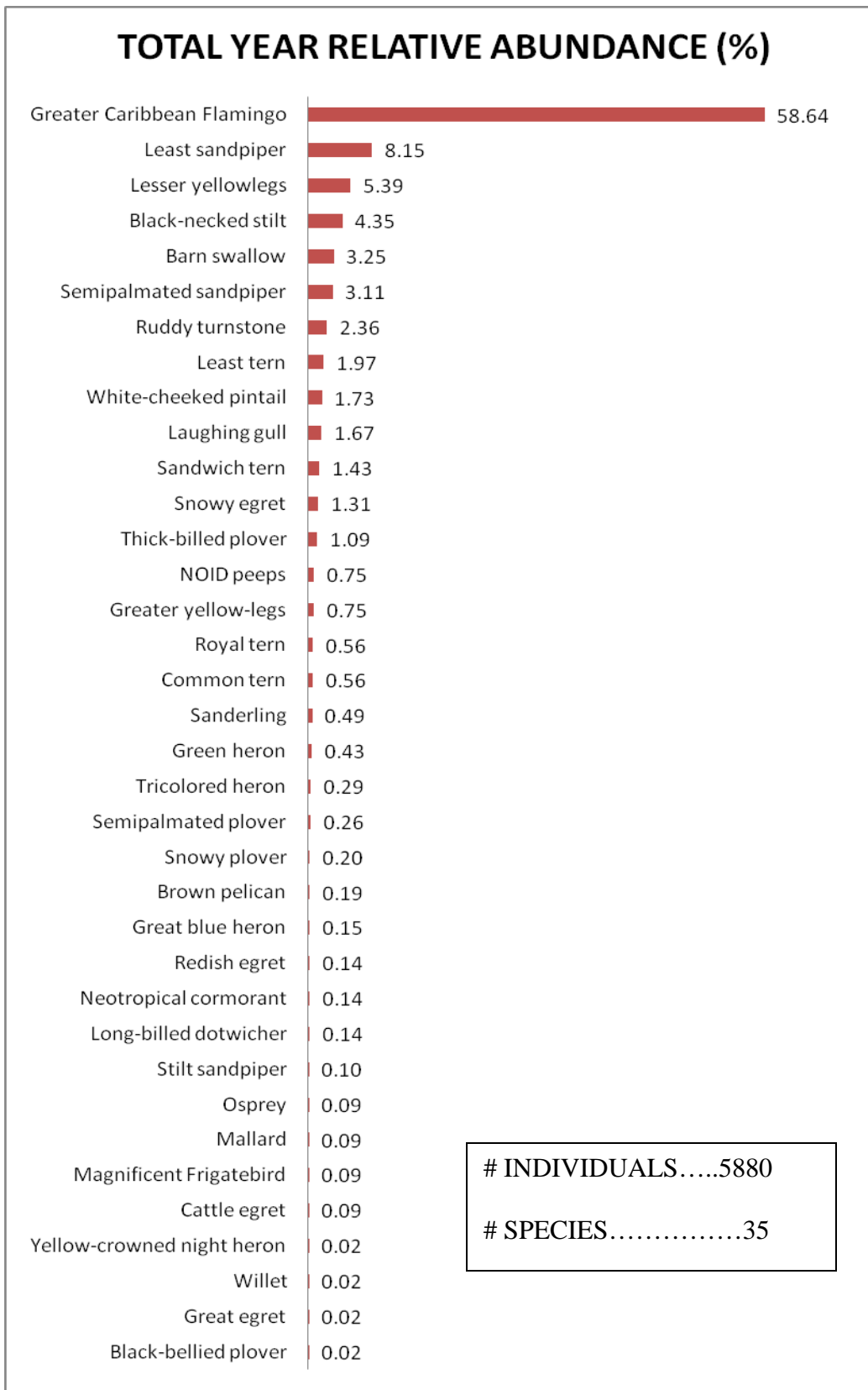


Figure 13. Total year relative abundance of species in the 8 salt flats (%).

5. Recommendations

- The boundaries of the WSNP should be expanded to include all the salinas included in this survey. This expansion will not only benefit the waterbirds but every other native species of flora and fauna as well.
- Pursue the designation of Salina Frans as a **Ramsar** site for Bonaire, given its importance as a habitat for both terrestrial and waterbirds.
- Keep collecting data for long term monitoring programs. It is fundamental for the proper management of our natural resources.
- Provide more training for the staff involved in the counts.
- Install permanent depth gauges in all the salt flats being monitored.
- Conduct more scientific research for a better understanding of the ecological functions of the salinas as a habitat for water birds
- As resources or time become available, start a monitoring program for the nesting seasons of our resident waterbirds.

Glossary

Area count: A counting method for bird surveys that consists in counting all the birds found in an entire selected area instead of counting at certain points or some transects within that area.

Waterbird habitat importance index (per salina): A value created by multiplying the number of individuals by the number of species of waterbirds present in one salina.

Base line data: The first set of data collected regarding a certain subject with the intention to use it as a reference for comparisons with new sets of data collected with the same methods.

Bird density: The numbers of birds divided by the size of the area, in this case birds per Hectare.

Ramsar: An international agreement signed by most countries of the world in which recognition of their international importance is given to selected wetlands. The name comes from the city in Iran where the convention was held.

Relative abundance: The percentage of the individuals from different species that compose the total population of animals of a similar group in a given area; in this case species of water birds.

Temporal dynamics: The changes in population numbers of a group of animals during a period of time.

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