Feeding areas and relative abundance of the American Flamingo along the coast of Venezuela

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THE POPULATIONS OF THE AMERIcan Flamingo (*Phoenicopterus ruber ruber*) can be grouped into five breeding areas: the northern part of the Caribbean, Inagua (Bahamas), Cuba and the Yucatan (Mexico), the southern part of Bonaire, and a small colony in the Galapagos.

Sprunt (1975) estimated that the total population for the Caribbean was 50,000–60,000 birds. Rooth (1976) estimated the southern Caribbean population that breeds in Bonaire at 10,000 birds, and de Boer (1979) suggested that this number might be the carrying capacity for the area.

An update of past research with suggestions for new areas of study.

Changes of habitat in Bonaire have taken place during the last two decades The diet of the flamingos has changed from the Gray Brine Fly (*Ephydra cinerea*) to the mollusks *Cerithidea sp* and *Cerithium sp.*, and its abundance has decreased (Rooth 1976, de Boer 1979). Besides these alterations, flamingo migration for food to the coastal areas of Venezuela has increased. Large flocks travel a minimum distance of 90 kilometers daily to reside in feeding areas along the Venezuelan coast.

De Boer and Rooth (1976) and de Boer (1979) conducted a census of the flamingos in Venezuela, covering only

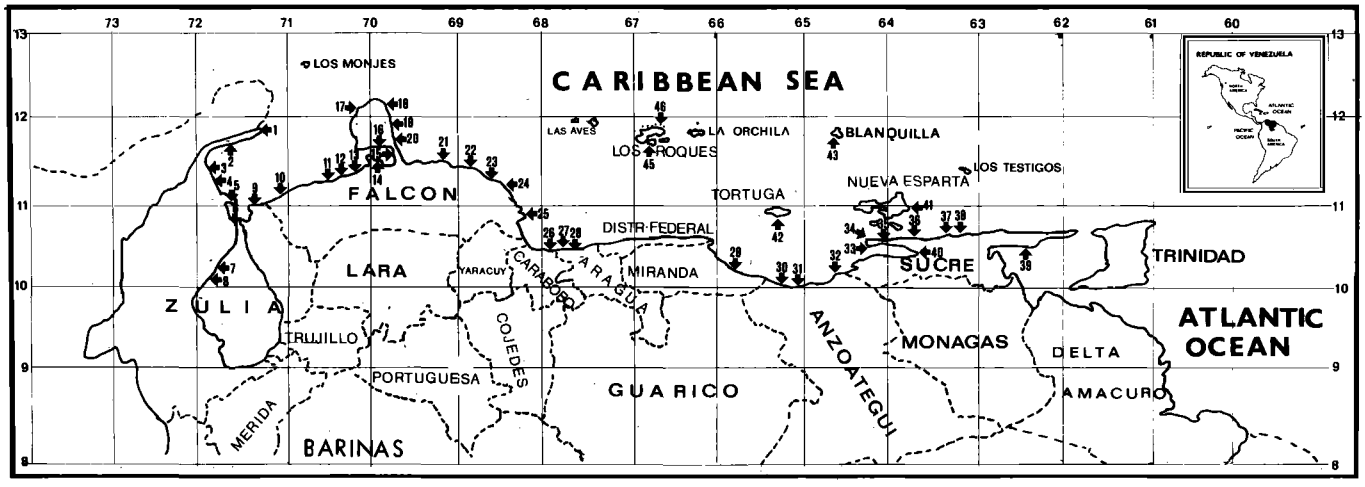

Figure 1. Map of the coastline of Venezuela. Each arrow shows the location of the feeding areas.

Photo/Alexander Sprunt, IV.

the state of Falcon, and indicating where the birds could be found outside of Falcon.

The main purpose of this study is to evaluate the suitable feeding and breeding areas of flamingos along the Venezuelan coast by aerial survey, and to provide some basic information for further studies.

METHODS

For purposes of data analysis, the country was divided into two zones: a western one, west of Los Caracas (10°38′N, 66°34′W), and an eastern zone to the east of Los Caracas. During January 2 and 3 (eastern zone and islands), and January 14 (western zone) of 1983, an aerial survey was made from Punta Castillete (11°51′N, 71°19′W) to Punta Playa (8°33′N, 60°00′W), and island regions. All possible feeding areas for each state were observed (Fig. 1) based on the biotope characteristics described by Rooth (1976), and the status of each area (by interpretation of present or future changes) was noted. When a flock of flamingos was sighted, the location was recorded and photographs of the flocks were taken to estimate the relative number of birds in the area. The mean amount of rainfall per month (mm) was analyzed for 19 stations along the coast and situated at a maximum elevation of 10 meters above sea level. An estimate of surface area (km^2) was calculated from maps with a scale of 1:200,000.

RESULTS

Venezuela has many areas that seem appropriate for flamingos. Lagoons, bays, and salt marshes are available during the rainy and dry season, but during dry periods the water level is a limiting factor to several invertebrates that constitute part of the diet of the birds, thus forcing them to migrate to other areas. In Venezuela, there are two rainy periods throughout the year: a long one from October to December, and a short one between May and June. Tables 3 and 4 show the wide difference in the amount of rainfall per month that can be found along the entire coast, and also the variability in the beginning and duration of each period, either rainy or dry. During the survey (January), the areas for each state were easy to see because the water level was high enough, with the exception of some areas along the peninsula of La Goajira and the islands of La Tortuga, La Blanquilla, Piritus and Coche, which are salt flats flooded only during the full rainy period.

WESTERN COAST:

State of Zulia

The waters in the study area are highly polluted. Oil spills, together with industrial and domestic waste discharges, contribute to the polluted aspect of Lake Maracaibo. Nine areas were identified as feeding centers (Fig. 1), and 60% are undisturbed (Table 1). It is the second state with the most abundant bird population, estimated at about 4836 individuals. Cienega de los Olivitos, in the northeast part of the lake, should be observed as a potential place for feeding during the entire year. This area along with Sinamaica and Gran Eneal are the biggest in the state,

Photo/M. P. Kahl/VIREO.

Table 1. Location points along the western coast of Venezuela, showing the available feeding areas, their status, and the number of birds counted.

State	*Map point*	*Locality*	*Lat.–Long.*	*Area km²*	*Status*[a]	*Stress causes*[b]	*Birds counted*
Zulia	1	Cocinetas	11°49′–71°26′	3	ND	N	0
Zulia	2	Guaraguaro	11°41′–71°37′	9	ND	N	0
Zulia	3	Cojua	11°34′–71°56′	3	ND	F	0
Zulia	4	Gran Eneal	11°19′–71°58′	158	ND	V	96
Zulia	5	Sinamaica	11°04′–71°47′	163	SD	UD	0
Zulia	6	Nueva Lucha	10°47′–71°41′	14	D	OS-UD	0
Zulia	7	Potreritos	10°19′–71°46′	4	D	OS-UD	0
Zulia	8	Lagunitas	10°06′–71°51′	5.5	SD	V	21
Zulia	9	Los Olivitos	10°48′–71°23′	150	ND	S	4.719
Falcon	10	Pta. Capana	11°06′–71°01′	2	ND	F	0
Falcon	11	Boca Zazarida	11°16′–70°28′	11	ND	F	28
Falcon	12	Pta. Codore	11°20′–70°16′	3	ND	F	0
Falcon	13	Pta. Maraguey	11°24′–70°07′	10	ND	F	0
Falcon	14	Pta. Cayama	11°26′–69°51′	40	ND	F	0
Falcon	15	Itm. Medanos	11°38′–69°46′	38	ND	F-T	0
Falcon	16	Pta. Cuara	11°42′–69°56′	8	ND	OS	0
Falcon	17	Pta. Macoya	12°07′–70°12′	7	ND	OS	0
Falcon	18	Bajarigua	12°09′–69°57′	30	D	V	0
Falcon	19	Adicora	11°56′–69°51′	21	D	UD	198
Falcon	20	Qda. Tura	11°48′–69°48′	19	ND	UD-T	0
Falcon	21	Sab. Atlas	11°28′–69°07′	4	SD	V	0
Falcon	22	Gueque	11°26′–68°53′	104	ND	A-V	542
Falcon	23	Pta. Maracara	11°21′–68°38′	5	ND	A-V	0
Falcon	24	Curamichate	11°15′–68°33′	18	ND	A-V	0
Falcon	25	Chichiriviche	10°58′–68°21′	135	D	A-UD	5.402
Carabobo	26	Patanemo	10°27′–67°55′	7	SD	T-F	0
Aragua	27	Turiamo	10°26′–67°50′	16	SD	T-F	0
Aragua	28	Guayima	10°28′–67°40′	3	SD	UD	0
Los Roques	45	Cayo Sal	11°46′–66°43′	6	ND	N	0
Los Roques	46	Canquises	11°55′–66°50′	3	ND	N	45

[a] *D = Disturbed; SD = Semi-Disturbed; ND = Non-Disturbed*

[b] *S = Sonic; V = Village; A = Agriculture; OS = Oil Spill; T = Tourist; UD = Urban Development; F = Fisherman; N = None*

Table 2. Location points along the eastern coast of Venezuela, showing the available feeding areas, their status, and the number of birds counted.

State	*Map point*	*Locality*	*Lat.–Long.*	*Area km²*	*Status*[a]	*Stress causes*[b]	*Birds counted*
Miranda	29	Tacarigua	10°15′–65°48′	125	SD	T-A	180
Anzoategui	30	Unare	10°04′–65°19′	60	SD	V-F	631
Anzoategui	31	Piritu	10°02′–65°08′	26	ND	F	3.244
Anzoategui	31	I. Piritu	10°09′–64°67′	1.5	ND	F	0
Anzoategui	32	Los Mesones	10°04′–64°47′	6	ND	S-V	474
Sucre	40	L. Campona	10°31′–63°36′	8	D	A	0
Sucre	33	Pta. Arenas	10°32′–64°16′	4	D	V-A	0
Sucre	34	Pta. Araya	10°37′–64°18′	3	ND	V	0
Sucre	35	Pta. Playa	10°38′–64°03′	4	ND	V	0
Sucre	36	Chacopata	10°42′–63°49′	7	SD	UD	1.047
Sucre	37	Guaca	10°38′–63°25′	5	ND	V	0
Sucre	38	Playa Grande	10°40′–63°17′	3	D	UD-S	247
Sucre	39	Irapa	10°33′–62°34′	—	ND	OS-V	42
Nva. Esparta	41	La Morila	10°54′–63°56′	15	ND	V-S	0
Nva. Esparta	41	Pta. Piedras	10°54′–64°06′	6	SD	V	0
Nva. Esparta	41	Boca de Palo	10°58′–64°08′	5	SD	V	0
Nva. Esparta	41	Boca de Rio	10°58′–64°11′	4	SD	V	0
Nva. Esparta	41	Manzanillo	10°56′–64°12′	2	ND	F	0
Nva. Esparta	41	Boca Chica	10°58′–64°21′	2	ND	F	0
Nva. Esparta	41	Guamachito	11°00′–64°22′	3	ND	V	0
Nva. Esparta	41	Restinga	10°59′–64°06′	16	SD	V-T	155
Nva. Esparta	41	Los Hatos	11°05′–63°58′	2.5	D	V	0
La Tortuga	42	Side N-W	10°50′–65°25′	2.8	ND	N	0
Blanquilla	43	Side N-W	11°50′–64°37′	3.5	ND	N	0

[a] *D = Disturbed; SD = Semi-Disturbed; ND = Non-Disturbed*

[b] *S = Sonic; V = Village; A = Agriculture; OS = Oil Spill; T = Tourist; UD = Urban Development; F = Fisherman; N = None*

Table 3. Mean precipitation per month in millimeters from nine stations situated along the western coast of Venezuela (Data from M.A.R.N.R., 1981).

Station	*Years*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total mean per year*
Pto. Cabello	62–80	38.4	10.7	14.1	36.8	41.3	45.4	48.6	51.9	53.4	50.5	79.4	67.0	537 6
Tucacas	53–80	72.4	22.8	24.8	61.0	70.3	64.4	62.5	92.3	74.5	135.3	239.9	180.0	1102 2
Tocuyo	63–80	60.4	30.2	26.9	68.1	52.8	55.8	67.8	69.2	84.9	149.6	207.9	189.3	1058 0
Tocopero	58–80	67.2	34.0	33.2	46.9	60.9	81.9	80.4	57.4	39.9	68.8	137.3	157.4	865 0
Adicora	54–80	33.6	14.8	8.6	15.6	21.1	18.3	21.2	20.0	26.6	52.1	95.5	77.3	404 8
Pto. Fijo	53–75	9.5	4.4	5.8	7.7	9.6	6.7	7.0	19.5	29.8	77.6	67.8	52.9	298 2
Quisiro	48–81	3.0	0.9	1.4	25.4	58.3	56.8	44.7	48.0	83.6	111.9	62.0	17.4	513 5
Sta. Rosa	77–81	70.5	144.2	260.7	189.5	212.6	114.0	67.0	66.7	86.0	165.0	124.6	115.7	1616 6
Paraguaipoa	50–81	4.1	4.4	1.8	15.0	60.7	45.9	8.9	36.8	138.9	203.8	163.4	46.6	730 4

Table 4. Mean precipitation per month in millimeters, from nine stations situated along the eastern coast of Venezuela. (Data from M.A.R.N.R., 1981).

Station	*Years*	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total mean per year*
Los Caracas	54–80	127.3	62.5	64.6	49.3	42.4	98.4	104.6	69.3	58.5	82.7	151.6	196.7	1102 1
Carenero	51–80	57.3	31.2	23.8	30.4	63.4	108.7	88.9	107.1	109.0	146.4	206.0	153.7	1125 8
Boca Uchire	62–80	11.6	11.3	4.3	16.8	41.2	68.9	51.0	91.9	87.6	81.0	92.4	58.8	617 0
Pto. La Cruz	49–79	5.1	4.2	2.4	7.9	29.7	87.5	94.9	92.0	59.8	44.8	32.7	22.4	483 4
Salina Araya	48–80	9.9	5.5	2.6	8.6	5.1	20.9	43.0	49.8	30.9	29.6	29.8	11.4	247 0
Porlamar	49–80	11.6	20.2	2.8	0.0	46.6	36.2	26.2	55.5	18.8	3.8	30.8	34.0	286 5
Guarique	71–80	80.0	43.7	70.4	69.4	122.6	205.7	265.6	245.6	236.2	282.7	244.2	156.8	2023 0
Guiria	51–80	35.7	21.9	19.8	18.9	54.0	116.8	126.4	126.9	117.9	102.9	90.1	73.8	905 2
Pedernales	69–80	64.5	39.5	46.6	50.7	120.7	220.2	197.5	204.4	191.3	159.0	157.1	132.1	1583 5

Photo/M. P. Kahl/VIREO.

and some isolated parts of these sites offer ideal habitat and conditions for breeding.

State of Falcon

This state has been the most extensively studied. In this survey a population of 6130 birds was observed, the biggest yet in Venezuela. Seventeen sites were identified (Fig. 1), many of them no bigger than 20 km^2 and about 70% were undisturbed (Table 1). In the majority of these areas, the water level falls to a critical point during the dry season, inducing a migration to the eastern or western coasts of the country, but not necessarily to Bonaire. The Cienega de Gueque and the Gulf of Guare are the most important sites, and although there is a reserve in the latter, habitat alterations have taken place owing to an expanding coconut exploitation effort and the pressures of tourism.

States of Carabobo and Aragua

These states have small lagoons (Table 1) with acceptable water levels throughout the year. This is due to the continuous input of water from a few rivers, and because those lagoons are in communication with the bays where they are located. These areas are subject to alterations by the construction of small recreational villages. No flamingos were seen in these states. In general, there are about 284 kilometers of coastline from these states to Cabo Codera (State of Miranda). There are neither good feeding nor breeding areas because of the mountainous terrain along the central coast.

EASTERN COAST:

State of Miranda

The eastern part of the state has large mangrove areas which, judging from appearances, are little altered although urban areas have been growing near Carenero and Tacarigua (Table 2). From Tucacas (Falcon) to Puerto La Cruz (Anzoategui) mangrove areas are healthy. In Tacarigua, where there are no problems with the water level, 180 birds were counted. De Boer (1979) suggests and I agree that this is an important area and the nearest alternative for the flamingos when the feeding areas in the state of Falcon dry up.

State of Anzoategui

This state has three main areas along its northern lowlands (Fig. 1). Most of the feeding areas have not had any perturbations except in some villages around Unare (Table 2). Flamingos were counted in Unare, Piritu, and Los Mesones (near the airport) for a total of 4349 individuals. Unare and Piritu are areas with exceptional conditions for feeding, and the lagoons also seem likely places where nests could be built. De Boer (1979) mentioned that breeding has been attempted in Unare, but no successful hatching has been reported. The entire area could be used for the flamingos, but human intrusion has been the major factor against the establishment of breeding colonies.

Photo/Alexander Sprunt, IV.

State of Sucre

Eight spots were located (Fig. 1), and 60 percent are still undisturbed (Table 2). The area with the greatest feeding potential is Chacopata, although flamingos were also counted in Playa Grande, near Carupano airport and Irapa. The area of Chacopata is still undisturbed, but surrounding areas are being leveled for human settlements and roads. Its negative influence may soon be felt in the bird populations. The states of Sucre, Monagas and Delta Amacuro face the Atlantic Ocean, with more than 150 kilometers of coastline serving as a large feeding area during low tides. Although flamingos were seen only in Irapa (Table 2), this part of the country would seem to hold a potential food resource for birds along an enormous extension of coast. Oil spills were observed in this sector during the survey.

Insular regions

Margarita (state of Nueva Esparta) is the most important island of Venezuela, where nine unaltered spots were sighted (Table 2). Most of those areas have rainy periods long enough for the flamingos to live through, and similar conditions exist in La Tortuga, Los Roques, and La Blanquilla (Fig. 1). An exceptional area is La Restinga (Nueva Esparta), where water level fluctuations could allow for a constant food supply for the flamingos throughout the year. This area should be preserved for the flamingos.

DISCUSSION

These results show that a greater potential for feeding larger flamingo populations exists than that estimated by other researchers. The great variability of habitats along the coast and the differences in the amount of rainfall throughout the year may indicate that many areas are available for flamingo feeding at any given time. The total counted during this survey was about 17,071 birds along the entire length of the coast: 6065 birds were counted along the eastern coast and islands (two days of survey) and 11,006 birds along the western coast (one day of survey) Due to the fast movements of the flamingos along the coast in a few hours or days, and the day-to-day difference, the total numbers here do not represent an exact count of the flamingos along the coast of Venezuela. However, the biggest population was counted along the western coast of the country (11,006 birds) in a single day. Assuming that the birds counted in the two zones of the country could be the same population, the population for Venezuela might be estimated at 12,000 birds

That is excluding the important area of Bonaire and the areas which also have been reported, such as Colombia (Sprunt 1976), Surinam (Haverschmidt 1968) and other countries. Thus, the actual population for the southern Caribbean area could be estimated at 15,000 or more birds. This is almost double the populations previously estimated. Thus, the carrying capacity for the area cannot possibly be 10,000 birds as earlier research suggested. More aerial censuses to more precisely estimate the population in the area must be conducted to clarify the totals concerned.

Although no successful breeding colonies are known other than the ones from Bonaire, the establishment of new colonies in Venezuela could be expected because there are extensive areas where abundant food could be guaranteed. This assumes, however, that the Venezuelan Government takes an active role in protecting areas such as Gran Eneal and Los Olivitos (Zulia), Unare and Piritu (Anzoategui), Chacopata (Sucre) and La Restinga (Nueva Esparta). These areas have the greatest colonizing potential along the coast but are also the most vulnerable to human encroachment.

A bird-banding program is required for a better understanding of the migrations of young and adult flamingos along and between the coast of the nations that form the southern Caribbean. International funds could be directed toward distribution, habitat changes, diet and censusing projects, with the preservation of these remarkable creatures as the goal.

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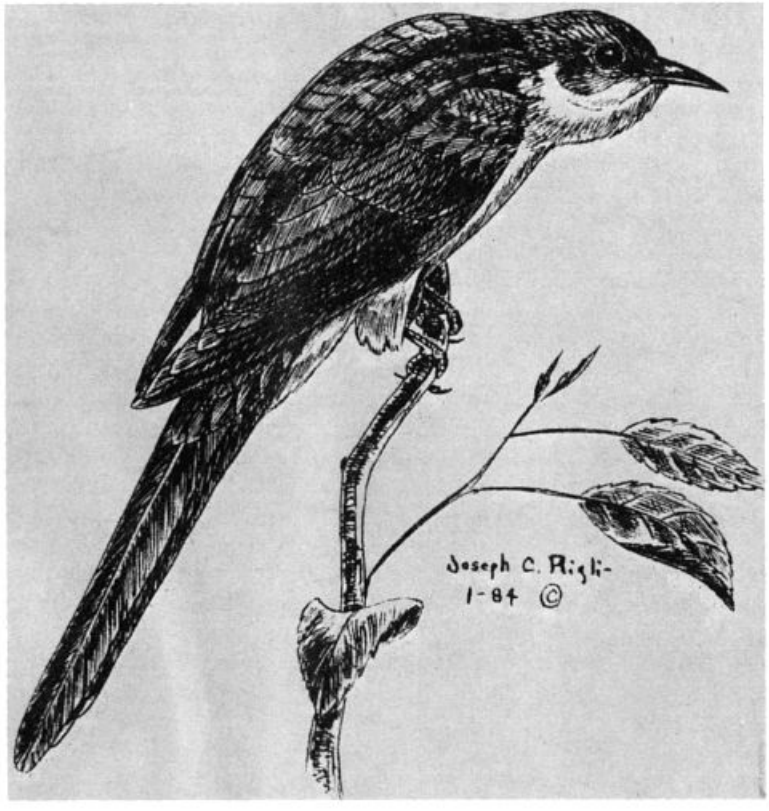

Black-billed Cuckoo (Coccyzus erythropthalmus). *Illustration/Joseph C. Rigli.*