

- . 1979. Predation on females at the nest cavity and male escorting in Mountain Bluebirds. Wilson Bull. in press.
- THOMPSON, W. L. 1960. Agonistic behavior in the House Finch. Part II. Factors in aggressiveness and sociality. Condor 62: 378–402.
- WILLIAMS, G. C. 1966. Adaptation and natural selection. Princeton, New Jersey, Princeton Univ. Press.

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Status of the American Flamingo in the Dominican Republic and Eastern Haiti

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Between December 1975 and July 1976 and on 4–5 October 1977 we visited several sites of historical occurrence of the American Flamingo (*Phoenicopterus ruber*) in the Dominican Republic. Here we report on the status of the flamingo in these areas and on recent breeding records based on our observations and on those of other observers in the Dominican Republic. The locations of the records discussed below are shown in Fig. 1. Numbers following site names refer to those presented in Fig. 1.

Lago Enriquillo (14).—Apparently Lago Enriquillo has long been an important feeding and roosting area, as flamingos were reported there by early French and Spanish explorers (Buffon 1781). Vaughan et al. (1921) noted flamingos on the southern shore, and Abbott (*in* Wetmore and Swales 1931) saw 40–50 there daily. Bond (1934) observed a flock of about 300 flamingos from an airplane in July 1931 and heard local reports of 20–30 flamingos appearing every 3–4 days to feed at the west end of the lake. H. Peters (*in* Allen 1956) recorded 625 flamingos on the lake during a U.S. Fish and Wildlife Service waterfowl aerial survey in 1949. In an aerial survey on 13 January 1978, J. A. Ottenwalder (pers. comm.) estimated between 500 and 600 birds (mostly adults) in 3 groups at the mouth of Río las Marias, at the extreme east end of the lake.

We counted between 47 (9 December 1975) and 235 (22 June 1976) flamingos during 8 visits to Lago Enriquillo (Table 1). Between January and March 1976 we had reliable reports of 200 birds on Isla Cabritos (15) in the northwestern part of the lake but were unable to confirm these. During an aerial survey on 4 October 1977, we saw 275 flamingos on the lake, mostly around the mouth of the Río Bermesí at the eastern end of the lake.

Allen (1956: 65) listed Lago Enriquillo as a possible flamingo breeding site of major importance in the past. Prévost (1746–1789) recorded flamingos breeding at the lake, and Abbott (*in* Wetmore and Swales 1931) was told by locals of nesting at Lago Enriquillo in 1919. Recent flamingo breeding has not been reported in the Dominican Republic, and it is generally thought that most of the birds in the country today come from the colonies on Inagua, Bahama Islands, immediately to the north (Allen 1956: 48). Interchange between Inagua and Hispaniola has been confirmed by band returns (Sprunt 1975).

On 7 December 1975 we observed a band of 82 full-grown flamingos resting and feeding along the south shore of the lake 5 km west of Duvergé (12). Among these birds were three downy young. Two of the chicks were approximately 2 weeks old and the third was about 7 weeks old, judging from the size and plumage descriptions given by Chapman (1905) and Palmer (1962). About 1 km farther east along the south shore another group of 30 flamingos rested close to the lake edge on a broad panne. Approximately 18 birds were on nests, and several downy chicks were among the nesting group. To avoid

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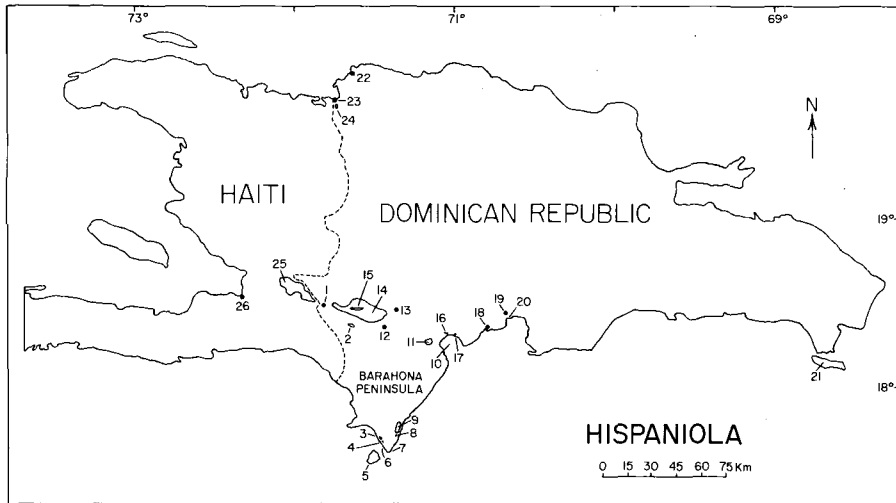


Fig. 1. Map of the Dominican Republic and eastern Haiti showing locations of flamingo-use sites mentioned in text. Numbers refer to those on map: 1. Jimani, 2. Lago Limón, 3. Laguna Salada, 4. El Salado de Bucán Base, 5. Isla Beata, 6. Punta Bucán Base, 7. Cabo Beata, 8. Laguna de la Rabiza, 9. Laguna Oviedo, 10. Bahía de Neiba, 11. Laguna del Rincón, 12. Duvergé, 13. Neiba, 14. Lago Enriquillo, 15. Isla Cabritos, 16. Laguna de Neiba, 17. Laguna de Puerto Alejandro, 18. Puerto Viejo, 19. Azua, 20. Punta Serrano, 21. Isla Saona, 22. Monte Cristi, 23. Manzanillo, 24. Laguna de Saladilla, 25. Étang Saumâtre, 26. Port-au-Prince.

disturbing the birds, we did not approach closer than 200 m. On 9 and 12 December 1975 the two bands were still present, but when we visited the area on 9–12 January 1976, the nesting group had gone. Several adjacent parcels of land were being burned and livestock had been turned out in the flamingo nesting area. Only three chicks were observed among the flamingo flock near Duvergé.

On 5 November 1977, J. A. Ottenwalder (pers. comm.) observed 80 adult flamingos associated with about 30 nests near the outflow of the Cristóbal Canal into Lago Enriquillo, approximately 7 km east of the December 1975 nesting colony. The outcome of this nesting effort is unknown.

Étang Saumâtre (Lago del Fondo), Haiti (25).—Until recently Étang Saumâtre was an important feeding and roosting area and possibly a breeding site of the flamingo (Beebe 1927, 1928; Wetmore and Lincoln 1934). Reports we received indicated tremendous pressure on birds in this area from hunters and locals. Still, we heard of flamingos crossing over into Haiti (Étang Saumâtre) from Lago Enriquillo. In July 1975, J. A. Ottenwalder (pers. comm.) saw a group of about 30 flamingos flying from Étang Saumâtre in the direction of Lago Enriquillo. We visited the lake on 1 August 1977 and found 59 flamingos at its southeastern end. Residents said that birds were taken alive to be sold in the markets at Port-au-Prince

TABLE 1. Counts of American Flamingos made at Lago Enriquillo, Dominican Republic, December 1975–October 1977.

Date	Site	Number of birds
7 December 1975	Duvergé (5 km west)	124
9 December	Duvergé	47
13 December	Duvergé	78
10 January 1976	Duvergé	88
23 February	Jimani	194
5 March	Jimani	197
13 April	Jimani	175
15 May	Jimani	216
22 June	Jimani	235
4 October 1977	Duvergé	47
	Mouth of Río las Marías	30
	Mouth of Río Bermesí	200+

(26), and we saw four flamingos for sale there. One resident near the lake had a pair of flamingo wings drying on his fence.

L. Garrick and S. Inchaústegui (pers. comm.) observed 200–300 flamingos on the northern shore of the lake on 17 January 1976. They estimated about 8% of the group was subadult.

Lago Limón (2).—Lago Limón was formerly an important feeding and roosting area (Bond 1928, 1961; Allen 1956: 20), but the lake was drained in the early 1970's and now serves as pastureland.

Laguna del Rincón (11).—In June 1967 A. Dod and H. Hespeneide observed flamingos on the eastern side of Laguna del Rincón (A. Dod pers. comm.). J. A. Ottenwalder (pers. comm.) found 80–100 birds at the eastern end in September 1975 and about 155 at the northeastern edge on 3 October 1976. We checked the lagoon during all months of our stay in the Dominican Republic but saw flamingos (seven) only once (10 January 1976), at the west end.

Laguna Oviedo (Trujín) (9).—Abbott (*in* Wetmore and Swales 1931) collected three flamingos at Laguna Oviedo and heard reports of breeding at the south end of the lagoon. Along with J. Cardona and J. Taapken, we checked its entire shoreline on 22 and 23 May 1976. We found 19 flamingos but no evidence of recent breeding activity. Area residents told us flamingos had not nested at the lagoon for many years.

Laguna de la Rabiza (8).—On 8 November 1977, J. A. Ottenwalder (pers. comm.) observed 12 flamingos on the lagoon.

Isla Saona (21).—Abbott (*in* Wetmore and Swales 1931) heard of flamingos on Isla Saona in 1919 but failed to find them there. We searched the island (including Laguna los Flamencos, Laguna Canto de la Playa, Laguna Tortuga, and Laguna el Cuerno) from 11 to 13 June 1976 but did not see flamingos nor evidence of recent breeding activity. Residents of the island's two settlements (Mano Juan and Catuano), however, told us that the birds regularly occurred on the island, but they did not report recent breeding there. We were also unsuccessful in locating flamingos on Saona Island during an aerial survey of all its lagoons on 5 October 1977. M. P. Kahl (pers. comm.) did not sight flamingos on the island during his aerial surveys in April 1975.

Isla Beata (5) and *Barahona Peninsula*.—Wetmore and Lincoln (1934) reported flamingos at a lagoon on Isla Beata on 10 May 1931. Wetmore also observed a group of nine off the tip of Cabo Beata (7) during the same year. We visited Isla Beata from 26 to 30 July 1977. The resident marines said flamingos were common in the lagoons and salinas on the eastern coast of the island but had not bred there since about 1971. Eggs were harvested from the nests during that year.

We found seven flamingos in a small mangrove swamp in the east. The other salinas and lagoons were checked, but no flamingos were seen. No sign of recent breeding was noted. We failed to locate birds on Isla Beata during the aerial survey on 4 October 1977.

W. Arendt (pers. comm.) found more than 200 flamingos in the mangrove lagoons on the Barahona Peninsula at El Salado de Bucán Base (4) the week following our visit to Isla Beata. We did not locate flamingos there during October 1977, but fishermen frequently told us the birds still nested in the swamps along the western coast of the Peninsula. D. Belitsky and C. Belitsky (pers. comm.) observed approximately 200 flamingos in a lagoon 2–3 km north of Punta Bucán Base (6) on 2 February and 30 November 1977. They did not see flamingos there during their manatee survey flights in March, April, June, or August 1977.

In an aerial survey on 13 January 1978, J. A. Ottenwalder (pers. comm.) observed approximately 440 flamingos in two bands at El Salado de Bucán Base. He also found nesting activity at the lagoon: in July 1977 Ottenwalder located 29 nests (inactive), and during the aerial survey on 13 January 1978, he saw 3 small nesting colonies of 19, 28, and less than 30 nests, respectively. A. Sprunt IV (pers. comm.) saw about 20 flamingos at El Salado de Bucán Base during a flight along the Barahona Peninsula coast on 31 May 1978. From the air he observed two groups, each of 50–60 nesting mounds, at Laguna Salada (3).

Azua (19) and *Neiba* (13).—Moreau de Saint-Méry (1798) reported flocks of flamingos from the "plain of Neybe" (Neiba) and near Azua. Walton (1810) also reported flamingos from the Plains of Neiba and Sallé (1857) observed birds near Laguna de Neiba (16). We checked the shore of Laguna de Neiba at approximately bimonthly intervals, and the coast and marshy areas at Puerto Viejo (18) and Punta Serrano (20), near Azua, in January, February, April, and June 1976. We did not find flamingos, although residents said the birds visited these areas regularly, and J. A. Ottenwalder (pers. comm.) observed them at Laguna de Puerto Alejandro (17) on 6 April 1975 (73 birds) and 5 February 1977 (16 birds). He had reports of small numbers of birds from Puerto Viejo during 1975 (April, August, September). The Belitskys (pers. comm.) saw two adult and four young flamingos flying along the northwestern coast of Bahía de Neiba (10) on 30 November 1977.

Northwestern Dominican Republic.—During aerial surveys, the Belitskys (pers. comm.) saw flamingos

midway between Manzanillo (23) and Monte Cristi (22) on 2 April (15–20 birds), 10 June (3 birds), and 4 August (8 birds). J. Peters (*in* Wetmore and Swales 1931) examined a skull of a flamingo taken near Monte Cristi and reported that birds were there in the fall. J. A. Ottenwalder (pers. comm.) was told by residents near Laguna Saladilla (Monte Cristi) (24) that large bands of flamingos occurred there in the past but their eggs were harvested and now only small groups of birds visit the area late in the year.

A. Sprunt IV (pers. comm.) has suggested that the recent nestings in the Dominican Republic are "satellite colonies," indicative of an expanding population in the northern Caribbean (i.e. Cuba and the Bahama Islands). U.S. Fish and Wildlife Service band recoveries (Bird Banding Laboratory, U.S.F.W.S.; A. Sprunt IV 1975 and pers. comm.) show inter-island movement between the Great Inagua Island (Bahamas) breeding colony and Cuba and Hispaniola. Movements are probable between Hispaniola and Cuba, where nesting colonies still exist (Garrido and García Montaña 1975).

It is also likely that many flamingo nestings have gone "undiscovered" in the Dominican Republic, as relatively little ornithological exploration has been conducted in the country since the 1930's, and many of the areas where flamingos still occur (e.g. El Salado de Bucán Base) are quite remote.

Human disturbance of nesting attempts has undoubtedly prevented flamingo breeding colonies from expanding in the Dominican Republic. Some of the sites chosen for nesting (e.g. Lago Enriquillo) are bound to have much disturbance due to the proximity of human habitation and activities. In Haiti flamingos are still sought for food, and, at least until recently, flamingo eggs were being harvested from breeding colonies in the Dominican Republic. Flamingos are live trapped from Étang Saumâtre, Lago Enriquillo, and El Salado de Bucán Base to be sold for display in private gardens and zoos.

Presently, there is no effective protection of flamingo breeding areas or enforcement of laws protecting the birds. We strongly urge the wildlife conservation agencies of Haiti and the Dominican Republic to take a more positive position on flamingo protection, including enforcement of laws protecting the birds and vigilance at nesting colonies in order to prevent further disturbances.

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LITERATURE CITED

- ALLEN, R. P. 1956. The flamingos: their life history and survival with special reference to the American or West Indian Flamingo (*Phoenicopterus ruber*). Natl. Audubon Soc. Res. Rept. No. 5.
- BEEBE, W. 1927. Notes on the birds of Haiti. Zool. Soc. New York Bull. 30: 136–141.
- . 1928. List of Haitian birds observed. Appendix D, *in* Beneath tropical seas. New York, G. P. Putnam's Sons.
- BOND, J. 1928. The distribution and habits of the birds of the Republic of Haiti. Proc. Acad. Nat. Sci. Philadelphia 80: 483–521.
- . 1961. Sixth supplement to the Check-list of birds of the West Indies (1956). Acad. Nat. Sci. Philadelphia.
- BOND, R. M. 1934. A partial list of birds observed in Haiti and the Dominican Republic. Auk 51: 500–502.
- BUFFON, G. L. L. 1781. Histoire Naturelle des Oiseaux. vol. 8. Paris, Imprimerie Royale.
- CHAPMAN, F. M. 1905. A contribution to the life history of the American Flamingo (*Phoenicopterus ruber*) with remarks upon specimens. Amer. Mus. Nat. Hist. Bull. 21: 53–57.
- GARRIDO, O. H., & F. GARCÍA MONTAÑA. 1975. Catálogo de las aves de Cuba. La Habana, Cuba, Academia de Ciencias de Cuba.
- MOREAU DE SAINT-MÉRY, M. L. E. 1798. A topographical and political description of the Spanish part of Saint-Domingo, vol. 1 (Trans. by W. Cobbett). Philadelphia, Printed and sold by the author.
- PALMER, R. S. (ED.). 1962. Handbook of North American birds, vol. 1. New Haven, Connecticut, Yale Univ. Press.
- PRÉVOST, A. F. (CALLED PRÉVOST D'EXILES). 1746–1789. Histoire générale des voyages, 1st ed. Paris, Didot.
- SALLÉ, A. 1857. Liste des oiseaux rapportés, et observés dans la République Dominicaine (Ancienne Partie Espagnole de l'Île St. Domingue ou d'Haiti) pendant son voyage de 1849 à 1851. Proc. Zool. Soc. London, 1857: 230–237.
- SPRUNT, A., IV. 1975. The Caribbean. Pp. 65–74 *in* Flamingos (J. Kear and N. Duplaix-Hall, Eds.). Hertfordshire, England, T. and A. D. Poyser.

- VAUGHAN, T. W., W. COOKE, D. D. CONDIT, C. P. ROSS, W. P. WOODRING, & F. C. CALKINS. 1921. A geological reconnaissance of the Dominican Republic. Washington, D.C., U.S. Geological Survey.
- WALTON, W., JR. 1810. Present state of the Spanish colonies, including a particular report of Hispaniola, or the Spanish part of Santo Domingo. London, Longman, Hurst, Rees, Orme, and Brown, Paternoster-Row. Vol. 1.
- WETMORE, A., & F. C. LINCOLN. 1934. Additional notes on the birds of Haiti and the Dominican Republic. Proc. U.S. Natl. Mus. 82: 1-68.
- , & B. H. SWALES. 1931. The birds of Haiti and the Dominican Republic. U.S. Natl. Mus. Bull. 155.

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The Diet of the Barn Owl in Central Chile and Its Relation to the Availability of Prey

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Little information has been published about the diet of the Barn Owl (*Tyto alba*) in Chile (Johnson 1965, Schamberger and Fulk 1974, Fulk 1976). In this paper we report the prey in 1,035 pellets collected from 1974 through 1978 in 6 localities of central Chile, between 32°45'S-34°36'S and 70°31'W-71°34'W: San Felipe (N = 116), Parque Peñuelas (N = 168), Los Dominicos (N = 283), Las Vizcachas (N = 156), Talagante (N = 183), and San Fernando (N = 129). Vegetation and climate for the entire region have been documented by Thrower and Bradbury (1977). We also compared data on consumption of prey items by the Barn Owl, as estimated from their occurrence in the pellets, with the availability of prey in the field, as estimated from trapping results obtained simultaneously with pellet collection. This kind of comparison was possible for three localities of central Chile: Fray Jorge (30°30'S, 71°40'W; data

TABLE 1. Prey of Barn Owl in central Chile.

	N	%
MAMMALIA		
Rodentia		
<i>Abrocoma bennetti</i> (chinchilla rat)	50	3.7
<i>Akodon longipilis</i> (long-haired akodon)	162	12.0
<i>Akodon olivaceus</i> (olivaceous akodon)	76	5.6
<i>Mus musculus</i> (house mouse)	125	9.3
<i>Octodon degus</i> (degu)	73	5.4
<i>Oryzomys longicaudatus</i> (rice rat)	405	30.0
<i>Phyllotis darwini</i> (leaf-eared mouse)	225	16.7
<i>Rattus rattus</i> (black-rat)	108	8.0
<i>Spalacopus cyanus</i> (coruro)	8	0.6
Subtotal rodents	(1,232)	(91.3)
Marsupialia		
<i>Marmosa elegans</i> (mouse opossum)	46	3.4
Chiroptera		
unidentified	14	1.1
Subtotal mammals	(1,292)	(95.8)
AVES		
unidentified	56	4.2
TOTAL PREY	1,348	100.0
PELLETS EXAMINED	1,035	---