POPULATION ESTIMATE OF BREEDING BIRDS ON A SPOIL ISLAND IN THE INDIAN RIVER, INDIAN RIVER COUNTY, FLORIDA

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Spoil islands are formed by the piling of spoil (rock, shell, and sand) along navigable waterways during dredging operations and are common along the length of the Indian River, a tidal bay on Florida's east coast. Breeding bird populations on these islands change rather rapidly corresponding to successional changes in vegetation. Riomar Island (sometimes called Crane Island) is a spoil island located in the city of Vero Beach between the electric power plant on the west bank of the river and a residential development on the barrier island to the east. The river is approximately 0.75-mile wide in this area. The island was created in the 1940's and enlarged in the late 1950's when the Intracoastal Waterway was deepened. Vegetational development has proceeded undisturbed since then. Birds, chiefly herons, ibis, cormorants and anhingas, began to establish nesting sites in the early 1960's and pelicans began nesting there in 1968. In that year less than 50 pairs of pelicans nested and they have increased to the 1973 level of 300 pairs.

At 17th Street in Vero Beach the Florida Department of Transportation intends to construct a highway bridge across the Indian River that will pass within 200 feet of the southern tip of the island. This study should enable future investigators to assess any impact of the bridge on the island's breeding birds.

Methods

The size of the island was determined by scaled aerial photographs confirmed by pacing on the ground.

The vegetational survey was made by counting the vegetation in 20 quadrats (10m x 10m each) chosen at random. All shrubs and trees over 0.33m in height were counted and plants in the herbaceous layer, if present, were categorized as common (covered more than 50% of quad), uncommon (covered less than 50% of quad), or rare (covered less than 5% of quad).

The bird population estimate was made by counting all active nests on 7 and 8 May 1973 of the following species in each of four sections of the heronry (See Figure 1; also Table 3 for scientific names): Brown Pelican, Double-crested Cormorant, Anhinga, Great Egret, Black-crowned Night Heron, and Great Blue Heron. The nests of these species were counted accurately because they can be identified readily by their construction, location, or the presence of adults or young. Unfortunately, this method could not be used satisfactorily with some nests of the Snowy Egret, Cattle Egret, Louisiana Heron, Little Blue Heron, or White Ibis. The nests of these five species, the eggs of all but the ibis, and the newly-

hatched young of the Snowy, Cattle, and Little Blue, are similar and usually cannot be distinguished. An estimate of the number of nests for which species determination was made were counted and the proportion of each species was calculated. Then all the nests in a particular section were counted and proportioned accordingly among the species.

Results and Discussion

Riomar Island is composed of limestone spoil rock, sand, organic debris, and mollusk shells stabilized by vegetation on most of the island. It is 393m long and 167m at its widest point. The area is 28,129 sq. m or 2.81 hectares (7 acres).

Three species of plants dominate the island with importance values (Curtis, J. T., and G. Cottam. 1962. Plant Ecology Workbook. Burgess Publ. Co., Minneapolis. 193 pp.) ranging from 59.5 to 38.9 (Table 1). These are Black Mangrove (*Avicennia nitida*), White Mangrove (*Laguncularia racemosa*), and the feral, exotic Australian Pine (*Casuarina equisetifolia*), in decreasing order of importance. Four other species were less numerous, with importance values ranging from 19.2 to 7.4. These, in order of decreasing importance, were: Florida Privet (*Forestiera proulosa*), Red Mangrove (*Rhizophora mangle*), Button Mangrove (*Conocarpus erecta*), and the feral, exotic Brazilian Pepper (*Schinus terebinthefolius*). The D/d index (observed density/expected density) computed for each species indicates that all the plants were aggregated in their distribution, with the larger values indicating greater aggregation. Only one species, the Brazilian Pepper, was randomly distributed, as indicated by the nearly equal observed and expected density values (See Table 1).

The herbaceous layer consisted of four species found in the following number of quadrats: Marsh Rosemary or Sea Lavender (*Limonium carolinianum*), ten (common), Saltwort or Pickleweed (*Batis maritima*), four (common), Woody Glasswort (*Salicornia perennis*), three (uncommon), and Saltmarsh Heliotrope (*Heliotropium polyphyllum*), one (rare).

Prior to 1973 the breeding bird population was observed seasonally by Kale since 1966. No systematic effort to census the birds was undertaken other than rough estimates during occasional visits to the island to band young birds and to obtain blood samples for other research. In 1971 and 1972 estimated numbers of pairs of each species for the entire season were as follows: Cattle Egret, 2000; Snowy Egret, 1000; White Ibis, 500; Louisiana Heron, 300; Great Egret, 100; Black-crowned Night Heron, 100; Little Blue Heron, 25 in 1971, 70 in 1972.

Except for the increase in Little Blue Herons, the overall impression held by Kale is that a reduction in numbers of the other heron species has occurred since pelicans began nesting in 1968. The figures in Table 2 show a rapid increase in numbers of breeding pairs of Brown Pelicans

between 1968 and 1970. This has stabilized since that year at around 300 nests. The increase in the nesting pelican population on Riomar Island and on several other nesting islands to the north in Brevard County and to the south in St. Lucie County coincides with a marked decrease in the numbers of nesting pelicans on Pelican Island National Wildlife Refuge located in the Indian River 13 miles north of Vero Beach. This decrease is attributed to periodic deterioration of the vegetative substrate of the three-acre island on which the birds nest (S. L. Wineland, pers. comm.). Parenthetically, this fairly regularly occurring phenomenon emphasizes the importance in designating and preserving presently uninhabited mangrove islands that are in the vicinity of known nesting colonies for future nesting sites. The discrepancies in estimated numbers of pelican pairs between our ground estimates and the aerial survey estimates conducted by the Game and Fresh Water Fish Commission (L. E. Williams, pers. comm.) are noteworthy. These seem caused by several factors: the date in the nesting period on which the surveys are made (pelicans breed on Riomar from January through September, with nesting peaks in April-July), visibility of nests from the air, and ability to get within view of each nest from the ground.

The total number of breeding pairs of birds on Riomar Island in early May 1973 was calculated to be 2657 and represented two orders, five families, and 13 species (Table 3). Two species, the Louisiana Heron and Snowy Egret, accounted for 66% of all breeding pairs. The Cattle Egret and Brown Pelican accounted for 24%, and the nine remaining species made up 10% of the total. Although we had previously suspected possible nesting by the Yellow-crowned Night Heron (*Nyctanassa violacea*), in the colony, 1973 was the first year that nests with eggs and young were observed. These were in Australian Pines, 30-40 feet above the ground.

An indication of how the composition of the breeding species changes seasonally was noted on subsequent visits on 7 June and on 18 and 24 July 1973 by Kale. On 7 June Louisiana Herons, Snowy Egrets, and Cattle Egrets were present in equal numbers, approximately 500 birds each, but by mid-July fewer than 100 active nests of Louisiana Herons and 300 of Snowy Egrets existed and now nearly 1000 of Cattle Egrets. Numbers of two other species also increased as the season progressed to an estimated 300 active nests of White Ibis, and 35 nests of Black-crowned Night Herons.

Summary

A vegetational survey and a breeding-bird population estimate were made in May 1973 on Riomar Island, a spoil island in the Indian River, Indian River County, Florida. The dominant plants were Black Mangrove, White Mangrove and Australian Pine. The spatial distribution of these

plants was aggregated.

The breeding populations of some birds, namely Cattle Egret, Little Blue Heron, White Ibis, and Brown Pelican, have been increasing since they initially established nesting sites on the island in the 1960's. Thirteen species made up the 2657 breeding pairs on the island in May 1973. The Louisiana Heron and Snowy Egret accounted for 67% of all the nests. Cattle Egrets and Brown Pelicans comprised 24% of the nests, and 9 other species accounted for the remainder. Later in the season Cattle Egrets and White Ibis became the dominant breeding species.

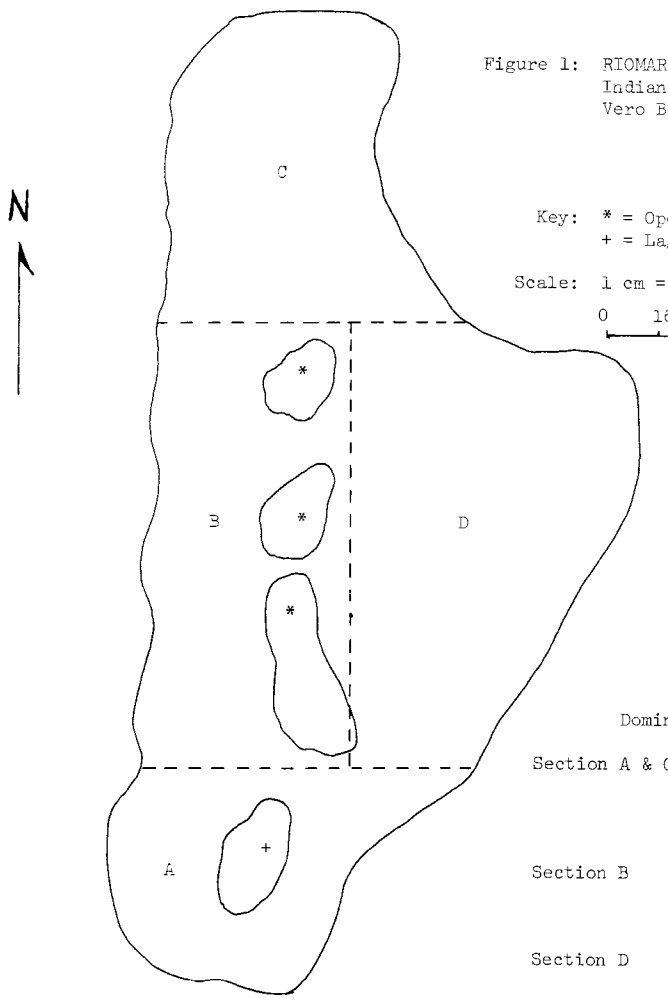

Figure 1: RIOMAR ISLAND
Indian River
Vero Beach, Florida

Key: * = Open Area
+ = Lagoon

Scale: 1 cm = 16 m
0 16 32 m

Dominant Vegetation

Section A & C - Black Mangrove
White Mangrove
Red Mangrove
Australian Pine

Section B - Black Mangrove
White Mangrove
Red Mangrove

Section D - Australian Pine
Florida Privit

Table 1. Importance values and spatial distribution of plants on Riomar Island, Indian River County, Florida from 20 quadrats of 100 square meters each. (Modified from Curtis and Cottam).

Species	No. Quadrats of Occurrence (Q)	No. of Plants (N)	Frequency[1] (F)	Observed[2] Density (D)	Expected Density (d)	D/d Index	Relative[3] Frequency (RF)	Relative[4] Density (RD)	Importance Value (RF+RD)
Black Mangrove	14	389	70%	19.5	1.20	16.3	24.6%	34.9%	59.5
White Mangrove	13	309	65%	15.5	1.05	14.8	22.8%	27.7%	50.5
Australian Pine	12	199	60%	10.0	0.92	10.9	21.1%	17.8%	38.9
Florida Privet	5	117	25%	5.9	0.29	20.3	8.7%	10.5%	19.2
Red Mangrove	5	83	25%	4.2	0.29	14.5	8.7%	7.4%	16.1
Button Mangrove	5	14	25%	0.7	0.29	2.4	8.7%	1.2%	9.9
Brazilian Pepper	3	4	20%	0.2	0.22	0.9	7.0%	0.4%	7.4
Total	57	1115							

Mean number of plants per quadrat (hectare) = 55.8 (5580)

[1] $F = \frac{Q}{20}$ [2] $D = \frac{N}{20}$ [3] $RF = \frac{Q}{57}$ [4] $RD = \frac{N}{1115}$

Table 2. Increase in breeding pairs of Brown Pelican on Riomar Island, Indian River County, Florida 1968-1973.

Year	Ground Survey	Aerial Survey[1]
1968 (no nesting prior to 1968)	<50	80
1969	100	—
1970	300	300
1971	350	450
1972	300	400
1973	295	225

1 From L. E. Williams and M. Fogarty, Fla. Game & Fresh Water Fish Commission (pers. comm.)

Table 3. Population estimate of breeding pairs of birds on Riomar Island, Indian River County, Florida, during May, 1973.

Species	Sect.* A	Sect. B	Sect. C	Sect. D	Total All Sect.	Relative Density %	Breeding Pairs/ Hectare	Breeding Pairs/ Acre
Louisiana Heron (Hydranassa tricolor)	295	476	200	14	985	37.1	351	141
Snowy Egret (Egretta thula)	106	453	219	6	784	29.5	279	112
Cattle Egret (Bubulcus ibis)	77	192	66	2	337	12.7	120	48
Brown Pelican (Pelecanus occidentalis)	55	153	87	0	295	11.1	105	42
Great Egret (Casmerodius albus)	1	64	38	0	103	3.9	37	15
Little Blue Heron (Florida caerulea)	20	11	0	40	71	2.7	25	10
Double-crested Cormorant (Phalacrocorax auritus)	29	0	12	0	41	1.5	15	6
White Ibis (Eudocimus albus)	10	0	15	0	25	0.9	9	4
Black-crowned Night Heron (Nycticorax nycticorax)	1	3	2	0	6	0.2	2	1
Yellow-crowned Night Heron (Nyctanassa violacea)	0	0	0	3	3	0.1	1	<1
Anhinga (Anhinga anhinga)	0	0	3	0	3	0.1	1	<1
Great Blue Heron (Ardea herodias)	0	0	2	0	2	0.1	<1	<1
Green Heron (Butorides virescens)**	0	0	1	1	2	0.1	<1	<1
Totals	594	1352	645	66	2657		945+	380+

* - See Figure 1.
** - Two pairs observed frequently, nests not found.

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