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COASTAL GREAT BLUE HERON POPULATIONS OF THE MICHIGAN GREAT LAKES

by

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INTRODUCTION:

Coastal nesting Great Blue Herons choose islands and peninsulas in the Great Lakes to escape human disturbance. The very isolation the herons seek makes the knowledge of their current populations and status of interest in assessing both the health of the species and it's habitat. This study shows the changes in populations of costal and island nesting colonies of Great Blue Herons (Ardea herodius) and, incidentally, Great Egrets (Casmerodius albus) since the last complete census in 1976 and 1977 (Scharf, et al. 1978 and Scharf 1979). The realization that Great Blue Heron colony size and location is not static, but changes with the dynamics of vegetation succession hastened by bird feces has long been recognized (Weseloh and Brown 1971, Soots and Parnell 1975, Wiese 1978, Mathiesen and Richards 1978, and Scharf et al. 1978). Other factors emphasizing the need for this study are changes in land use such as urbanization, vacation home construction, and lumbering which have eliminated both inland and costal heronries.

The study area includes the entire four Michigan Great Lake coasts, the three connecting rivers, and Lake St. Clair. These coasts were searched up to 1 km inland. The location, size and changes in colonies along with the vegetation and substrate data presented here are essential to the zoning of Environmental Areas by the Michigan Department of Natural Resources, Land Resources Division.

METHODS:

I used a Cessna 180 floatplane to locate, photograph, and count heron nests from the air. Then, at most sites, I landed to make ground counts of nests, and identify and measure nest trees. While on the ground I recorded the ground cover species assessed the condition of the nest trees, recorded the substrate, and generally evaluated the status of the colony. Click-type mechanical tallying devices were used for counting both in the air and on the ground.

Nesting phenology and behavior were estimated by previous experience and also correlated with the Southern Michigan study by Cotrille and Cotrille (1958). Latitudinal differences in nest phenology required that I begin my first visit to the southerly colonies on 18 April, 1987. My last visit to the most northerly colonies was on 08 July, 1987. In each case, the goal was to visit each colony twice. The first visit was timed from the peak of egg laying to incubation, which was usually before heavy leaf emergence which could screen the nests from view. The second visit was during the late chick-rearing, pre-fledgling period.

The problem of layering of nests, in aerial counts, which leads to hidden, uncounted nests, even without leaves, is acknowledged. However, during this season I have found that there can be difficulty with gaining a complete count of nests from the ground caused by nest layering and the

inability of the ground observer to find far-flung nest trees. It is apparent that the nest counter on the ground could miss whole portions of a colony which can be easily seen from the air. There is also a similar nest obscuring factor due to the layering of nests viewed from the ground. Therefore, the use of combined aerial and ground counts, as with most of the colonies reported here, is probably the best technique for overall accuracy.

Black and white 35 mm film with 125 ASA was used for maximum contrast of nests in aerial photography. Most photos were taken on the first or second pass over a heronry to photograph the greatest numbers of birds present in the colony. Photos were usually taken at an altitude of 150 to 250 m above the ground and the plane was banked to give as near a vertical view of the colony as possible. Over 200 exposures were taken. Thirty two of the better quality photos representing a wide variety of colonies were printed, and accompany this report (Table 5). The rest of the negatives are catalogued and available as prints upon request.

A diameter breast height (DBH) tape was used to measure nest trees. The spacing of nest trees was measured with a 10 m rope and, where applicable, the rope was used to establish 100 m^2 quadrants to quantify the density of the understory herbs and shrubs. The quadrant technique was used

less than anticipated this year because of the many extremely, sparsely vegetated colonies, and others which were so dense with woody vegetation that they made portions of the colonies inaccessible.

RESULTS:

Population Trends:

Coastal and island Michigan Great Blue Heron populations have shown a 70.8% increase (Table 1) since the last census ten years ago (Scharf et al. 1978 and Scharf 1979). Occupancy rates in colonies were nearly complete. Seldom were there nests which could be identified as abandoned either from the air or ground (Table 4). Active nests are identified because of their fecal whitewash or the presence of eggs, chicks, or incubating adults. In addition, only two colonies have been abandoned since 1976-77. They are Stoney Island in the Detroit River, which has been changed by industrial activity and Scammon point, which may have been affected by recent residential construction in the nearby Drummond Island area (locations on Tables 1 & 2 and Figure 1).

The turnover rate (Erwin 1977 and Erwin et al. 1981) calculated for the entire study area is only 5.2% per year for the ten year interval since the last census. This turnover rate indicates a stable to growing population. I

find further analysis of the sub-regional increases by turnover rate misleading because of the large population growth in new colonies, but it can be seen, by scanning Table 1, that new colonies are concentrated in two sub-regions. One of the sub-regions of population increase extends from the Eastern Mackinaw Straits area of Lake Huron up the St. Mary's River to Bay Mills Island in Lake Superior, just west of Sault St. Marie. The other increasing sub-region includes most of the colonies numbered 27 thru 35 in Northern Lake Michigan from the Straits west to the Green Bay - Bay de Noc (Tables 1 & 2).

At colonies where increases in numbers of herons have occurred, there appear to be two mechanisms of increase within the colony. In southerly area, such as Dickinson and Hesterman Islands, which have long-lived, mature hardwood nest trees and relatively rich deep soils there has been a trend toward greater numbers of nests per tree; up to 10-12 nests in some cases. In more northern colonies, where short-lived trees are rooted in shallow, loose, sandy or rocky soils, colony expansion has been by expanding the area to more individual trees. Ultimately, however, the causes of this increase must indicate the availability of foraging habitat, and the degree of protection the species enjoys. It is unknown, at present whether the growth in coastal colonies may be at the expense of declining inland populations.

Individual Colony sites:

The results of vegetation analysis and site by site evaluation are given in Table 4.

DISCUSSION AND CONCLUSIONS

Whether or not, the present trend toward increasing coastal heron populations is due to their continuing legal protection and the maintenance of foraging habitat, or because of increasing human pressure and disturbance at inland sites, I endorse the recommended buffer zone of 250 m around nesting colony sites to support the vegetation and accessibility by the herons (Short and Cooper 1985), as a minimum comfort zone for the birds. The recommendation of a 100 m buffer around foraging areas seems logical, but the lack of documentation to support it in Michigan, and relative isolation of the wetlands involved in this study combined with other legal protection for wetlands makes specific protection for heron foraging improbable.

In some instances, the flight distances to foraging sites of the island nesting herons may be as far as 10-20 km. Gibbs et al. (1987) have shown the positive correlation between island heronries in Maine and the proximity of wetlands. They also speculate that food competition between colonies limits their size. The flight distances to forage and extreme isolation of the heronries described here serve to underscore the importance of these sites to the

maintenance of the species in Michigan coastal waters. That is, many of these colonies represent the last resort for nesting herons, if pressures develop on mainland colonies. In such a worst case scenario recreation on the islands and near the foraging areas would have to be curtailed to maintain their productivity. The absence of islands and coastal wetlands explains why the area along the central to southeastern Lake Michigan Coast has no coastal heronries.

One of the unexpected findings of this study is the apparent stability of the vegetation and age of the trees in some of the more southerly colonies. The toxic effects of feces apparently is not of great importance to long lived tree species such as oak, hickory, and maple. The shorter lived species such as aspens and birch, are more susceptible to over fertilization, and in northern areas where they are important nest trees, the soils are shallower and more porous which leads to more frequent blown downs.

The health of coastal heronries seems assured at present with a few exceptions noted in Table 4. Most of the exceptions represent the development of vacation homes, boating, fishing, and hunting activity in or near heronries. While these are acceptable human pursuits, it is doubtful whether they are necessary in area which could destroy nesting or foraging habitat of this important native bird species. Continued monitoring of this resource is important

to insure its perpetuation and stop intrusions before the damage is irreparable. Monitoring is done regularly in Maine (Gibbs et al. 1987), Minnesota (Mathieson and Richards 1978), Montana (Thompson 1982), and Pennsylvania (Dunn and Brucker 1986).

LITERATURE CITED

COTTRILLE, W.P., and B. D. COTTRILLE. 1958. GREAT BLUE HERON: BEHAVIOR AT THE NEST. University of Michigan Museum Zoology. Ann Arbor. Misc. Publ. 102.

DUNN, J. P. and E. BRUCKER. 1986. PROJECT ANNUAL REPORT COLONIAL NESTING BIRD SURVEY. Pennsylvania Game Commission 5 p.

GIBBS, J. P., S. WOODWARD, M. L. HUNTER, and A. E. HUTCHINSON. 1987. DETERMINANTS OF GREAT BLUE HERON COLONIES DISTRIBUTION IN COASTAL MAINE. 104:38-47.

MATHIESEN, J. and A. RICHARDS. 1978. STATUS OF GREAT BLUE HERONS IN THE CHIPPEWA NATIONAL FOREST. THE LOON. 50:104-106.

SCHARF, W. C., G. W. SHUGART, M. L. CHAMBERLIN. 1978. COLONIAL BIRDS NESTING ON MAN-MADE AND NATURAL SITES IN THE U.S. GREAT LAKES. Rep. WES-TR-D-78-10. U.S. Army Eng. Waterw. Exp. Stn. Vicksburg, Miss. 140 pp.

SCHARF, W. C. 1979. NESTING AND MIGRATION AREAS OF BIRDS OF THE U.S. GREAT LAKES (30 April to 25 August, 1976). U.S. Fish and Wildlife Serv. Off. Biol. Serv. FWS/OBS-77/2. 113 pp.

SHORT, H. L. and R. J. COOPER. 1985. HABITAT SUITABILITY INDEX MODEL: GREAT BLUE HERON. U.S. F.W.S. Washington, D.C. Biol. Rep. 82. (10.99). 23 pp.

SOOTS, R. F., and J. F. PARNELL. 1975. ECOLOGICAL SUCCESSION OF BREEDING BIRDS IN RELATION TO PLANT SUCCESSION ON DREDGE ISLANDS IN NORTH CAROLINA ESTUARIES. Univ. North Carolina Sea Grant Program Publ. UNC-75-27. North Carolina State Univ., Raleigh. 91 pp.

THOMPSON, L. S. 1982. A 1979 CENSUS OF GREAT BLUE HERON COLONIES IN MONTANA. Proc. Mont. Acad. Sci. 41:23-27.

WEELSOW, D. V. and R. T. BROWN. 1971. PLANT DISTRIBUTION WITHIN A HERON ROOKERY. Am. Midl. Nat. 86:57-64.

WIESE, J. H. 1978. HERON NEST SITE SELECTION AND ITS ECOLOGICAL EFFECTS. WADING BIRDS. Natl. Audubon Soc. Res. Rep. 7:27-34

TABLE 1

GREAT BLUE HURON and GREAT EGRET (GE)
COLONIES AND NUMBERS OF NESTS IN THE MICHIGAN GREAT LAKES

	COLONY NAME	LAT. AND LONG.	1976-77	1987
1.	Stoney Is.	4206-08308	14 + 29GE	0
2.	Dickinson Is.	4237-08238	57 + 2GE	113 + 22GE
3.	Hesterman Is.	4350-08326	0	125 + 6GE
4.	L. Charity Is.	4400-08328	0	0 3GE
5.	Bird Is.	4453-08320	0	3
6.	Scare Crow	4455-08320	24	27
7.	Gull Is.	4503-08314	33	55
8.	South of Calcite (Rogers City)	4525-08346	0	1
9.	Big St. Martin Is.	4558-08426	0	38
10.	Goose Is.	4555-08426	75	87
11.	Gravely Is. (Crow Is.)	4558-08414	11	9
12.	Saddle Bags Is.	4557-08402	32	32
13.	Gravel Is.	4556-08346	4	22
14.	Scammon Pt.	4556-08338	40	0
15.	Cedar Is.	4605-08345	0	28
16.	Round Is.	4606-08401	39	23
17.	Love Is.	4608-08359	0	35
18.	Roach Pt.	4612-08409	0	12
19.	Moon Is.	4613-08410	0	23
20.	Gem Is.	4626-08411	43	44
21.	Rock Is.	4623-08409	27	22
22.	Bay Mills Is.	4627-08431	0	22
23.	Williams Island	4629-08843	78	4
24.	Huron Is.	4656-0880	0	53
25.	Traverse Is.	4707-08816	62	89
26.	Waugoshance Is.	4546-08504	33	26
27.	St. Helena Is.	4552-08452	27	33
28.	Hat Is.	4547-08518	3	7
29.	W. Grape Is.	4547-08525	5	4
30.	Squaw Is.	4551-08536	0	48
31.	Epoufette Is.	4606-08513	32	21
32.	L. Hog Is.	4604-08517	0	18
33.	Big Gull Is.	4530-08643	0	19
34.	St. Vital Is.	4548-08645	6	4
35.	Round Is.	4545-08646	13	17
		TOTALS	658 + 31GE	1064 + 31GE

TABLE 2

LOCATION OF GREAT BLUE HURON COLONIES
BY TOWNSHIP AND RANGE
AND DNR AERIAL MAP AVAILABILITY

	COLONY NAME	MAP	T-R
1.	Stoney Is.		
2.	Dickinson Is.	NO	T2N, 15E
3.	Hesterman Is.	NO	T17N, 9E
4.	L. Charity Is.	NO	19N, 8E
5.	Bird Is.	YES	29N, 9E
6.	Scare Crow	NO	29N, 9E
7.	Gull Is.	YES	31N, 10E
8.	South of Calcite (Rogers City)	NO	34N, 6E
9.	Big St. Martin Is.	YES	41N, 3W
10.	Goose Is.	YES	41N, 1W
11.	Gravely Is. (Crow Is.)	YES	41N, 5E
12.	Saddle Bags Is.	YES	41N, R3E
13.	Gravel Is.	YES	41N, 5E
14.	Scammon Pt.	YES	41N, R6E
15.	Cedar Is.	YES	43N, R5E
16.	Round Is.	YES	43N, R3E
17.	Love Is.	NO	43N, R4E
18.	Roach Pt.	YES	44N, R2E
19.	Moon Is.	YES	44N, R2E
20.	Gem Is.	NO	47N, 2E
21.	Rock Is.	NO	46N, 2E
22.	Bay Mills Is.	NO	47N, 2W
23.	Williams Island		
24.	Huron Is.	NO	53N, R29W
25.	Traverse Is.	YES	54N, 31W
26.	Waugoshance Is.	NO	39N, 6W
27.	St. Helena Is.	YES	40N, 5W
28.	Hat Is.	YES	40N, 8W
29.	W. Grape Is.	NO	39N, 9W
30.	Squaw Is.	YES	40N, 10W
31.	Epoufette Is.	YES	42N, 7W
32.	L. Hog Is.	NO	42N, 8W
33.	Big Gull Is.	NO	38N, 12W
34.	St. Vital Is.	NO	39N, 20W
35.	Round Is.	NO	39N, 20W

TABLE 3

GREAT BLUE HERON
NEST TREES

	COLONY NAME	NEST TREES
1.	Stoney Is.	None
2.	Dickinson Is.	White Oak, Red Oak, Shagbark Hickory, Elm (dead)
3.	Hesterman Is.	Ash, Birch (dead), Red Maple, White Oak
4.	L. Charity Is.	Plum
5.	Bird Is.	Ash (dead)
6.	Scare Crow	Ash
7.	Gull Is.	Cherry, Ash
8.	South of Calcite (Rogers City)	Elm (dead)
9.	Big St. Martin Is.	Red Maple, Quaking Aspen
10.	Goose Is.	Birch (dead & live), Quaking Aspen, Ash, Balsam Poplar
11.	Gravely Is. (Crow Is.)	Ash, Birch
12.	Saddle Bags Is.	Birch, White Cedar
13.	Gravel Is.	Birch, Ash, Aspen
14.	Scammon Pt.	All trees down
15.	Cedar Is.	Birch, Ash, Aspen
16.	Round Is.	Birch (live & dead), Balsam Poplar
17.	Love Is.	Birch & Ash, Spruce & Cedar
18.	Roach Pt.	Balsam Poplar, Cottonwood
19.	Moon Is.	Balsam Poplar, Ash
20.	Gem Is.	Elm (dead & live)
21.	Rock Is.	Elm (dead & live), Birch
22.	Bay Mills Is.	Red Oak
23.	Williams Island	Spruce (live & dead), Quaking Aspen (live), Birch (dead)
24.	Huron Is.	White Pines
25.	Traverse Is.	Birch (live & dead), Red Maple, Quaking Aspen
26.	Waugoshance Is.	Yellow Birch, Quaking Aspen
27.	St. Helena Is.	White Birch (dead), Quaking Aspen
28.	Hat Is.	Birch
29.	W. Grape Is.	Ash
30.	Squaw Is.	Birch (dead & live), Quaking Aspen
31.	Epoufette Is.	Aspen
32.	L. Hog Is.	Aspen & Birch
33.	Big Gull Is.	Birch
34.	St. Vital Is.	Cottonwood
35.	Round Is.	White Cedar (dead) & Birch

TABLE 4

VEGETATION QUALITY AND POTENTIAL BUFFER ZONE INTRUSIONS
for
COASTAL MICHIGAN GREAT BLUE HERON COLONIES, 1987

COL #	NEST TREE SPECIES AND MEAN SIZE, (SAMPLE SIZE)	UNDERSTORY	BUFFER ZONE
1.	---------	------	------
2.	Red Oaks 60.9 cm DBH (4) White Oak 73.6 cm DBH Elm 47.4 cm DBH (3) Shagbark Hickory 55.8 cm DBH (12) Tree height: 23-30 m	Prickly Ash, Muscle Wood, Bedstraw, Moss, Violets, Nettle, 15cm water under trees in April dry by June.	Deer browsing; hunters blinds Highly populous area; Presently adequate, but needs to be monitored
3.	Red Maple 48.2 cm DBH (5) Ash 33.0 cm DBH (2) Dead Birch White Oak 35.5 cm DBH (1) Tree height: 20-28 m	Moss, Iris, Open water up to 60 cm deep, May Apple, Nettles, Grape Vines, Prickly Ash. Many Snakes	Seems safe, except for possible illegal harassment by the population of sport-fisherman.
4.	Wild Plum 10.1 cm DBH (1) Tree Height: 7 m or less	Nettle, Burdock, Herb Robert	(+,-) 24 Herring Gulls found shot here; presumably this has neg. impact on herons and egrets too.
5.	Probably Ash about 20 cm DBH Tree height: 15 m	Bare Cobble	Even though most trees are dead here, there are plenty that could hold more Great Blue Heron nests. No threat is imminent to this colony.

6.	Ash and Elm 17.7 cm DBH (2) Tree height: 15 m	Bare cobble a few Nettles and Burdock. is done	Commercial harvest of Carp trapping here, but that is after the nesting season The Double-crested Cormorants have gone from zero to 137 nests since 1976, but the herons have also increased A few (2-3) Black-crowned Night Heron usually nest here too.
7.	Cherry 16 cm DBH; and Ash 18-35 cm DBH Tree height: 4-12 m	Varies from sand and cobble to Ground Hemlock and small Choke Cherry.	Much of the former woody vegetation on this island is blown down; present nest trees are dying and Cormorants are taking others; therefore, recent increases in Great Blue Herons may be only temporary The island seems fairly safe from most human intrusions.

8.	Single large, dead Elm Tree height: 10 m	Edge of a marsh with some open water.	This nest appears to be abandoned but the foraging area and abundance of suitable nest trees make this site an attractive one for recolonization.
9.	Red Maple Quaking Aspen 15-40 cm DBH Tree height: 10-15 m	Surrounded by Cedar swamps; Some standing water.	No threats to this heronry are evident; the farm at the northern part of the island seems to have ample fire wood, and the heronry would not be suitable for logging.
10.	Live and dead Birch 35 cm DBH, some Dead Aspen 28.7 cm DBH Ash, Balsam Poplar Density 25 stems/100 m^2, and 3-4 stems Aspen/100 m^2	Some water to a depth of 45 cm; Jewelweed Nettles, Cow Parsnip, Red Elder, high bush Cranberry, White Cedar, Red Osier Dogwood, other areas are bare because of over-fertilization with feces.	The Great Blue Heron nesting area on this island has expanded greatly from 1976-77; the takeover of Cormorants of nest trees on the South end has forced the herons north to healthier trees;

10.	Continue --		I completely disagree that there is a zone which could allow a structure to be built here without significant negative impact on the bird populations.
11.	Ash and Birch	See Detailed map - this report.	Two of the nests look abandonded here
12.	Birch and White Cedar	See Detailed map - this report.	Despite the structure on this land, the heron population persists.
13.	Birch, Ash, Aspen	See Detailed map - this report.	Population has increased 5 times 1976-77 numbers.
14.	All trees down	----------	The demise of this heronry could be from the nearby residential development.
15.	Birch 26.5 cm DBH (5) Ash 28 cm DBH Aspen 25 cm DBH Balsam Poplar 22.3 cm DBH	Dense Balsam (8/100 m^2), plus Choke Cherry, White Cedar tangle, Moosewood, Currant, Violets; and Ferns; Jewelweed and raspberry under trees where whitewash hits.	Deer and beaver are eating the woody vegetation here; possibly a moose present here too! No threat to this isolated area.

16.	Elm (dead) about 30.5 cm DBH; Birch about 25.4 cm DBH Red Maple about 32 cm DBH Tree height: 15-17 m	Border of White Cedar tangle of Canada Yew and fallen trees in interior where heron nests are; See map in this report.	This is one of the few colonies which is declining in numbers; the decline is attributed to the loss of nest trees due to the death and blow down of the birch and elm; this seems to be a natural successional sequence which is exaggerated because of the shallow soils on the island. If further human development is prevented, however, this colony should persist in its reduced state for some time in the future. The rise of the Love Is. (#17) colony is probably a result of the decrease at this colony. That is, as the trees at one become unsuitable the birds moved to the most suitable nearby colony.

17.	Dead (15 of 30 trees) or dying White Birch 20-30 cm DBH A few nests in Black Spruce and White Cedar Tree height: 10-15 m	----------	This is probably the "new" colony began after decline of the previous one (#16); Cedar as the dying Birch nest trees go down there is about 1/3 of the island left to place nests in, and the herons are also nesting in the Conifer species too.
18.	Live Cottonwood 31 cm DBH Balsam Poplar 28.3 cm DBH (2) Tree height: 18-20 m	Nettle, Raspberry, Bedstraw sedge, Jewelweed, Choke Cherry, May flower, and Sweet Cicely. A border of Cedar Balsam and Alder surrounds the point and the nest tree area.	The decline in numbers in this colony is probably due to several of the large nest trees being broken in a storm. This has produced a few openings in the wooded canopy of 30-40 m^2.
19.	Ash 22.8 cm DBH (2) Balsam Poplar 25.1 cm DBH Tree height: 12-16 m	Red Osier Dogwood, Sand Bar Willow, Jewelweed and bare sand-muck. See map in this report.	This is a classic example of the shift from one colonial species (Ring-billed Gulls) which are declining as the Great Blue Herons are increasing with the succession to trees.

19. Continue --			However, this dredge material island which is subject to much wash by passing ship traffic is rapidly washing away and is only 20-30 m' wide. How long this colony will exist depends on the speed of erosion of the island. Beavers have cut down some trees at this site too.
20.	One dead Elm 78.2 cm DBH holds 27 of 44 nests. Live Elm 35.5 cm DBH has 14 of 44 nests. 2 Ash and 1 White Birch hold other nests, 25 cm DBH Tree height: 14-18.5 m	Red Osier Dogwood, Nettle & Jewelweed. See map in this report.	It is only a matter of time until the two main nest trees fall and cause a few years of decline until the other trees grow larger. No threats are seen to this colony other than tree loss.
21.	12 of 22 nests in Dead Elm 60.4 cm DBH 4 of 22 nests in Live Elm 26.1 cm DBH 3 more in Live Birch 20 cm DBH 3 more in smaller Live Elm Tree height: 12-16 m	Cow Parsnip Red Ostier Dogwood, Nettle and Jewelweed. See map in this report.	The only threat to this colony is loss of trees.

22.	Red Oak 36.8 cm DBH (4) A few Birch 22 cm DBH Tree height: 16.5 m	June berry, Choke Cherry, Thimble berry, Red Elder, Ground Hemlock, Striped Maple, Soloman's Seal, Cow Parsnip, and Bane berry.	The proximity of this island to Bay Mills tribal residences and fishing docks as well as the fact that fishing boats frequently seek lee moorings at the island make it possible to be disturbed unduly. However, the colony seemed veryvigorous this season.
23.	Live and Dead Aspen Tree height: 12 m	See photo showing proximity of the cabin in this report.	Summer home in proximity of colony maybe responsible for the drop in numbers here. Further development of residences will probably cause more damage to the herons.
24.	White pine 45.2 cm DBH Tree height: 15-17 m	Bear berry, June berry, Choke Cherry, Dwarfed Balsam, and bare granite rock.	Two groups of nests (as many as 6 per tree) 18 on west colony and 3 on east of Middle Island. 4 more nests are on Eastern smaller island. The undisturbed quality of this colony seems assured by the status as a National Wildlife Refuge.

25.	White Birch (many dead) 30.5-35.5 cm DBH Quaking Aspen 25-30 cm DBH Red Maple Tree height: 12-16 m	Spinulose tree fern, Mountain Maple, Mountain Ash, Red Elder, Canada Yew, Raspberry, Currant, Pin Cherry.	Herons have lost much habitat at the southwest point where Cormorants have taken over, but the herons have responded by moving Northeasterly and splitting into at least 3 subcolonies. Many former heron nest trees have blown down near the south-central portion of the island, still the colony continues to increase. The line for the Environmental Area shown of the DNR map should be re-drawn. A recent campsite was located near the central part of the heron colony along the shore.

26.	Quaking Aspen 40.3 cm DBH Yellow Birch 44 cm DBH White Birch 35 cm DBH Tree height: 15-17 m	Much ground dead; some bare ground, large patches of Hounds Tongue, Wood Nettle, and Yellow Rocket Some Columbine and Chickweed, Violets, moss, and Jack-in-the-pulpit.	Many trees blown down. This is probably what caused this colony to move to the northwest quarter of the island. The understory shows much stress from whitewash which is probably killing trees too. Fishing pressure is very high in this area. Even though it is State Park land, I have found Terns shot here before, and presumably that could happen with herons also.
27.	Dead White Birch Live Quaking Aspen Tree height: 16-18 m	Red Elder, Raspberry, Canada Yew, Jewelweed, and border of Cedars between the edge of the colony and the cobble shore.	As long as this island stays in an undeveloped state the continuance of the herons seems assured. They have already moved from the East end in 1976 because some of the woods either burned or were blown down.

28.	4 Birch 30 cm DBH contain 7 nests Tree height: 10-12 m	Toothwort, Columbine, Cow Parsnips, Choke Cherry, Red Osier Dogwood, Red Elderberry.	The herons are assured safety by the owners, Nature Conservancy, who have restricted access to the island. The only threat would be the loss of nest trees.
29.	Large Choke Cherry, Elm, Ash; less than 30 cm DBH Tree height: 6-10 m	Bare sand and stone, some Burdock and Cow Parsnip	The take over of nest trees by 127 Double-Crested Cormorants has probably discouraged the herons and killed many nest trees. The biggest threat here is high water and waves that wash over this island occasionally.
30.	Quaking Aspen 26.9 cm DBH (4) White Birch 23.4 cm DBH (3) Tree height: 12-15 m	Red Elder, Jewelweed, Canada Yew, Balsam Fir. See photos in this report.	I see no threat to these herons as long as development by humans is avoided.
31.	White Birch Quaking Aspen	Limestone rock Shelf substrate See photo in this report.	The rocky nature of this island seems to preclude future development. Colony is separated into 13 nests on East & 8 on West.
32.	White Birch Quaking Aspen	----------	This colony has no known threat to it.

33.	White Birch (a few dead) 25.7 cm DBH (3) Tree height: 12-16 m	Rich ground cover, Spinulose Wood fern, Red Elder, Smartweed, Squirrel corn, White Cedar, Black Spruce. Photo in this report.	This large island seems safe large numbers of Canadian Geese live in interior, and a campsite was noted there.
34.	Cottonwood 38.1 cm DBH Tree height: 16 m	Some sand, wet-marshy. See map in this report.	No threats known.
35.	Dead White Birch 27 cm DBH Dead White Cedar Tree height: 8.3-11.6 m	Large clear area with blown down White Cedar. Cow Parsnip, Nettles, Jewelweed, Canada Thistle. See photo in this report.	The chief threat to this heronry is the dead and dying trees which seem to blow down very easily in the shallow soil.

TABLE 5

KEY TO 8X10 BLACK AND WHITE PHOTOGRAPHS

	COLONY NAME	DATE OF PHOTOS AND (NUMBER)
1.	------	------
2.	Dickinson Is.	18 April, 1987 (2)
3.	Hesterman Is.	18 April, 1987 (2)
4.	L. Charity Is.	18 April, 1987
5.	------	------
6.	Scare Crow	02 May, 1987; 06 June, 1987
7.	Gull Is.	02 May, 1987 (2); 06 June, 1987
8.	------	------
9.	------	------
10.	Goose Is.	10 June, 1987
11.	------	------
12.	------	------
13.	------	------
14.	------	------
15.	Cedar Is.	16 May, 1987
16.	Round Is.	16 May, 1987
17.	Love Is.	16 May, 1987
18.	Roach Pt.	16 May, 1987
19.	Moon Is.	16 May, 1987
20.	Gem Is.	30 May, 1987 (2)
21.	Rock Is.	30 May, 1987
22.	Bay Mills Is.	30 May, 1987
23.	Williams Island	03 July, 1987
24.	Huron Is.	30 May, 1987
25.	Traverse Is.	24 May, 1987
26.	------	------
27.	St. Helena Is.	01 May, 1987
28.	Hat Is.	01 May, 1987
29.	------	------
30.	Squaw Is.	01 May, 1987 (2); 10 June, 1987
31.	Epoufette Is.	24 May, 1987
32.	L. Hog Is.	24 May, 1987
33.	Big Gull Is.	24 May, 1987
34.	------	------
35.	Round Is.	24 May, 1987

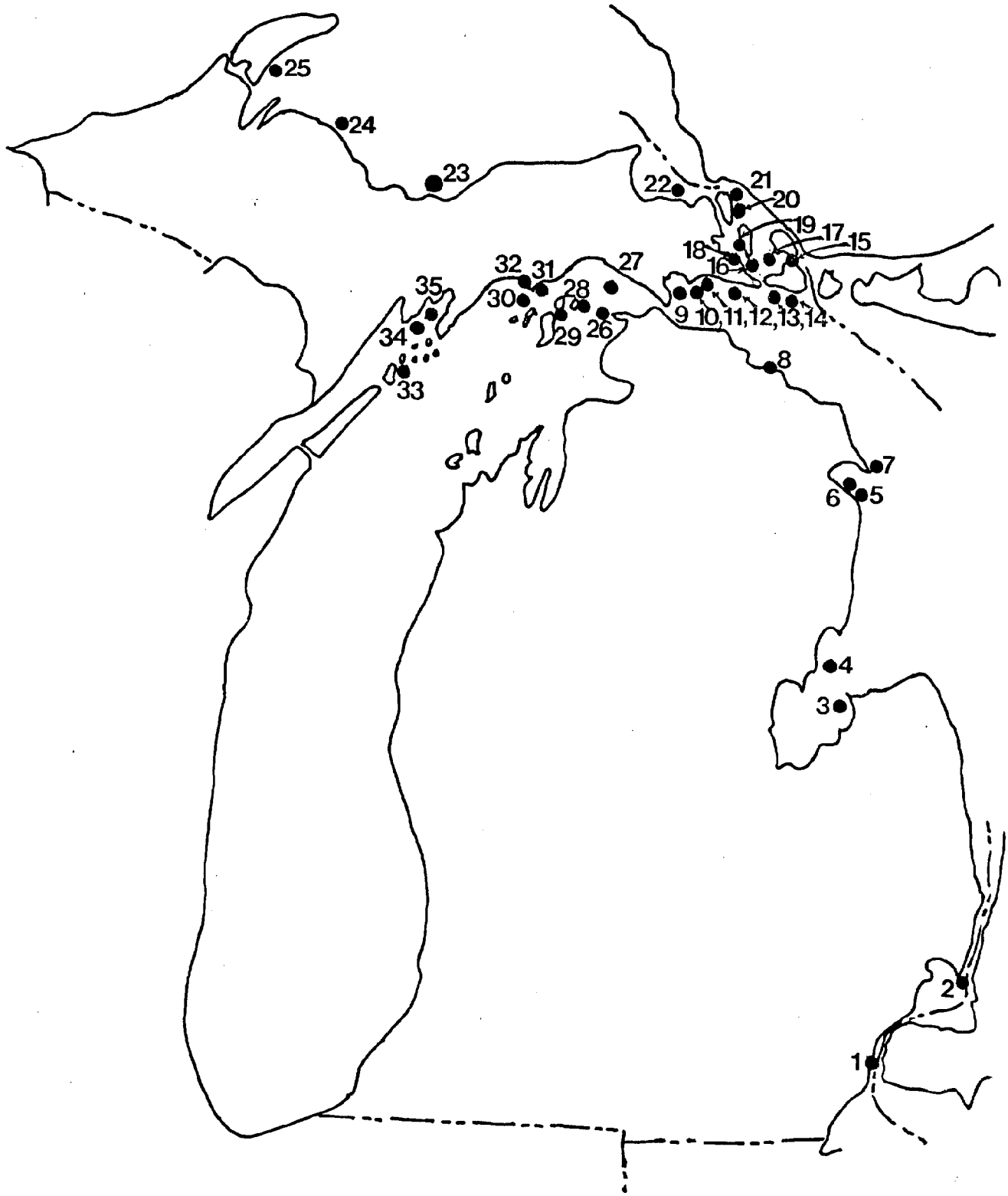
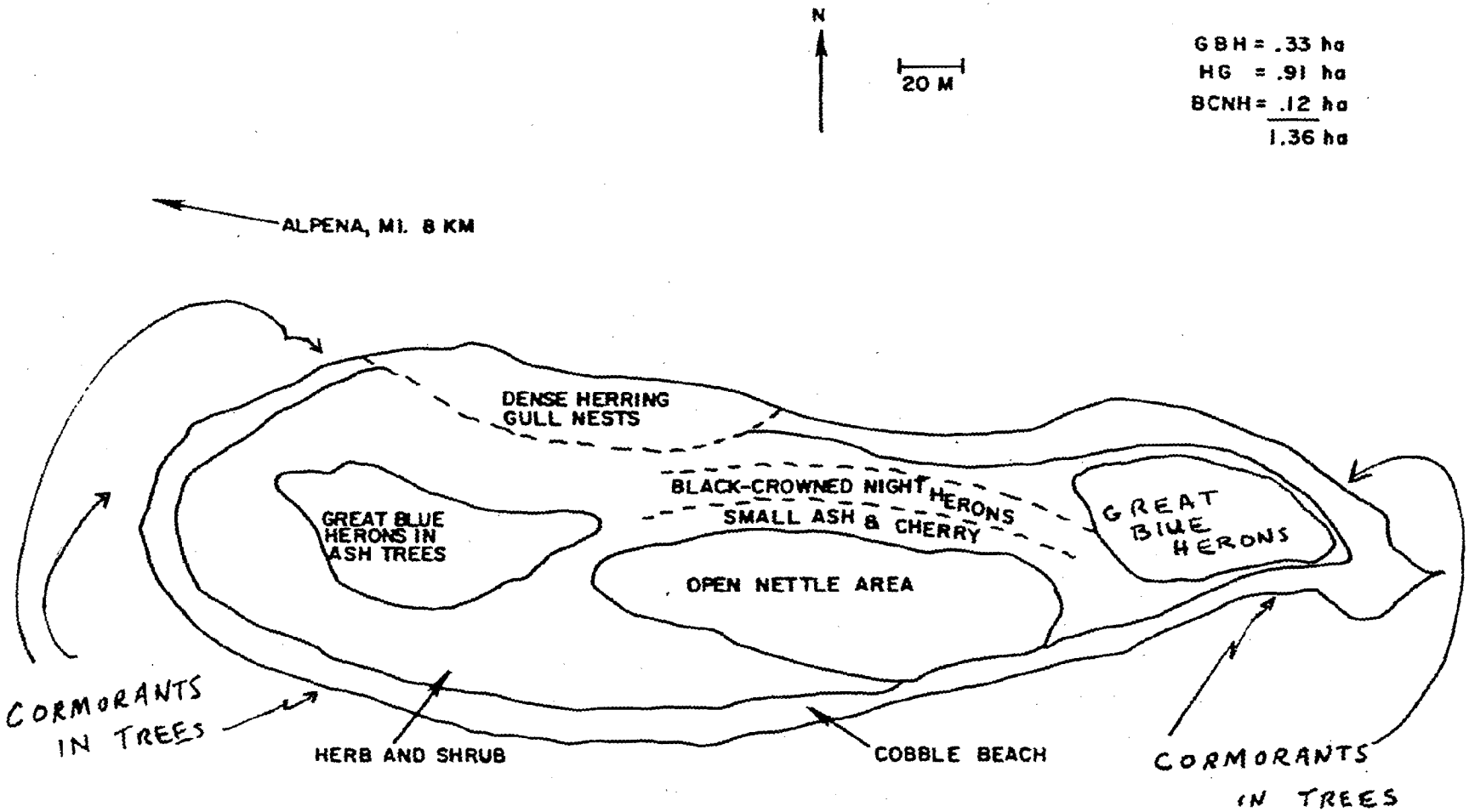
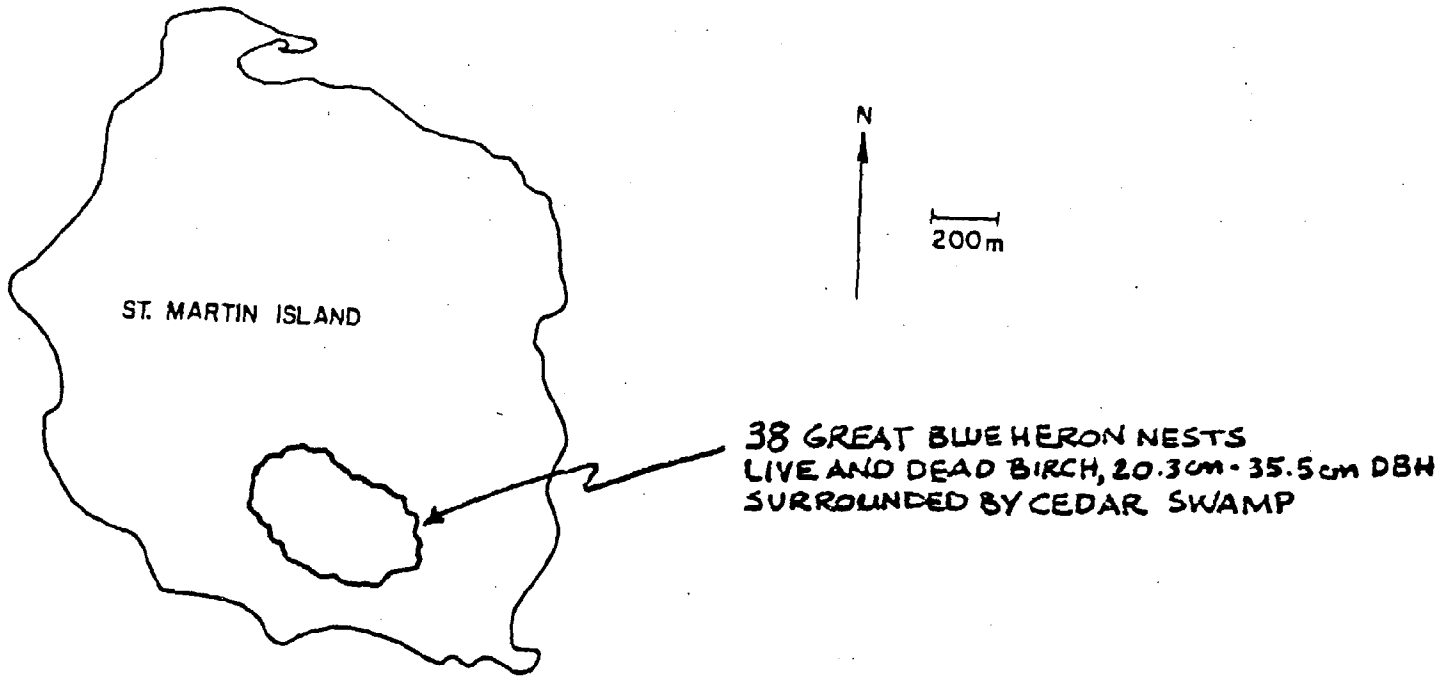


Fig. 1. Coastal Great Lakes Great Blue Heron Colonies - Michigan 1987

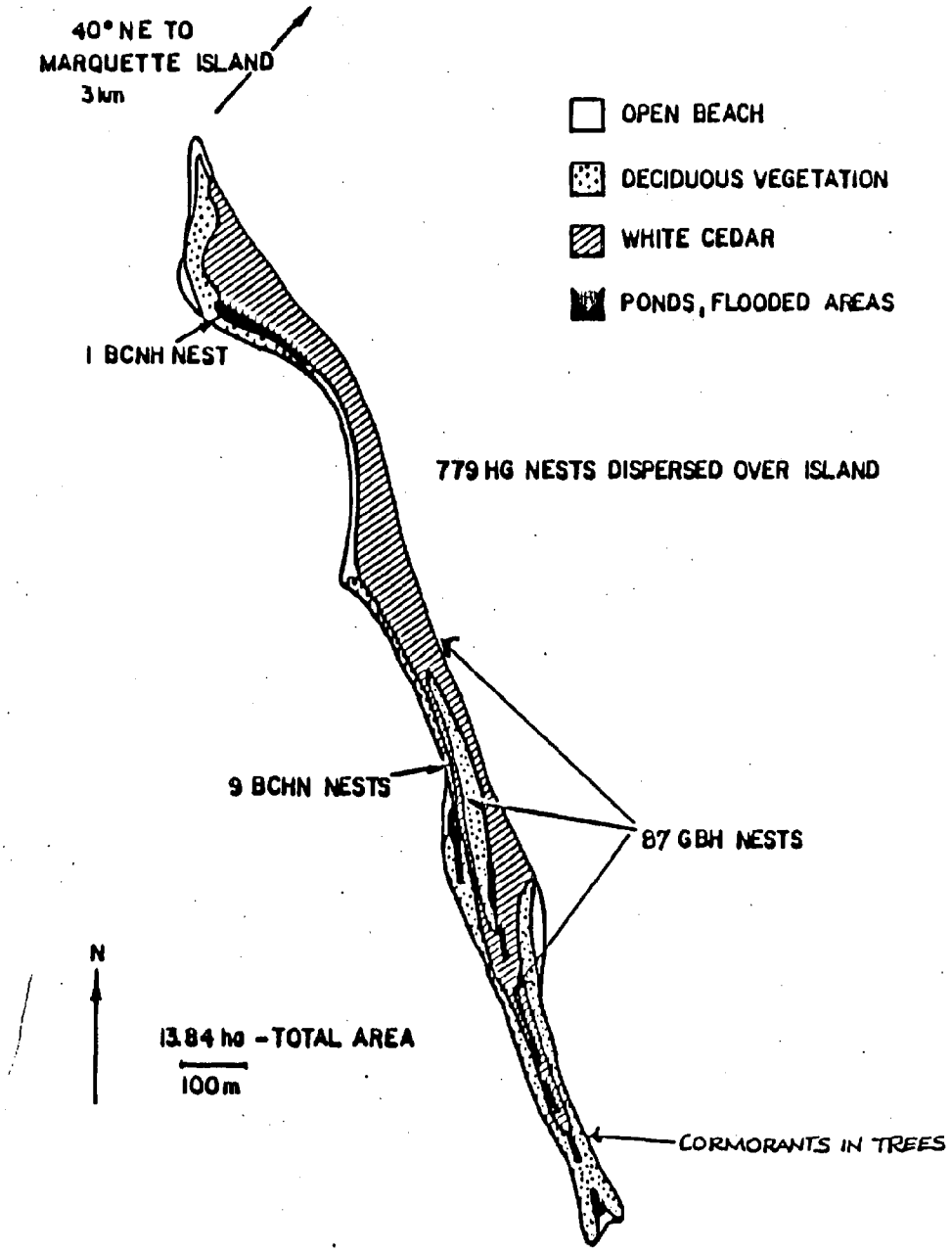


HERRING GULLS NESTS DISPERSED OVER ISLAND

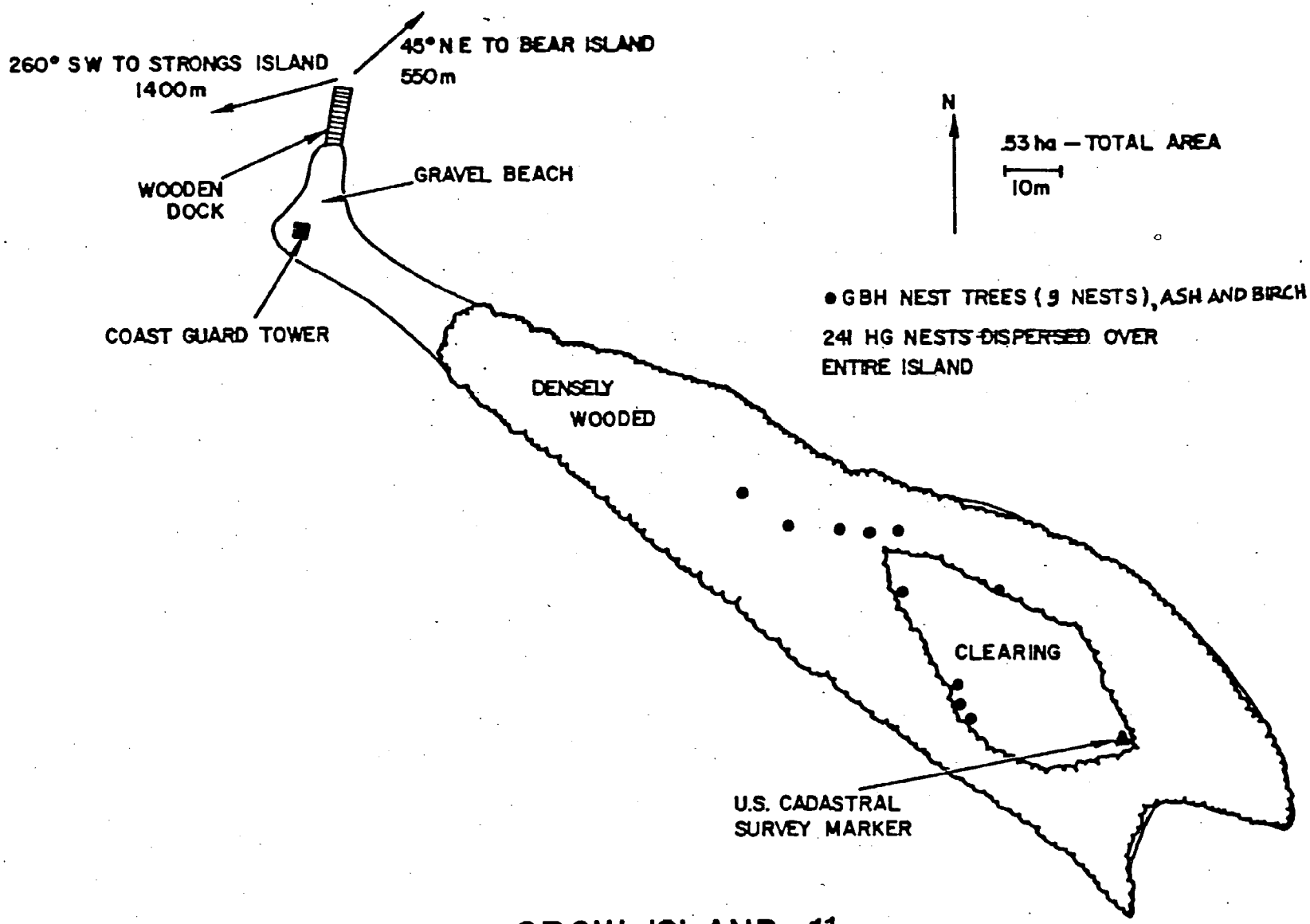
GULL ISLAND-7



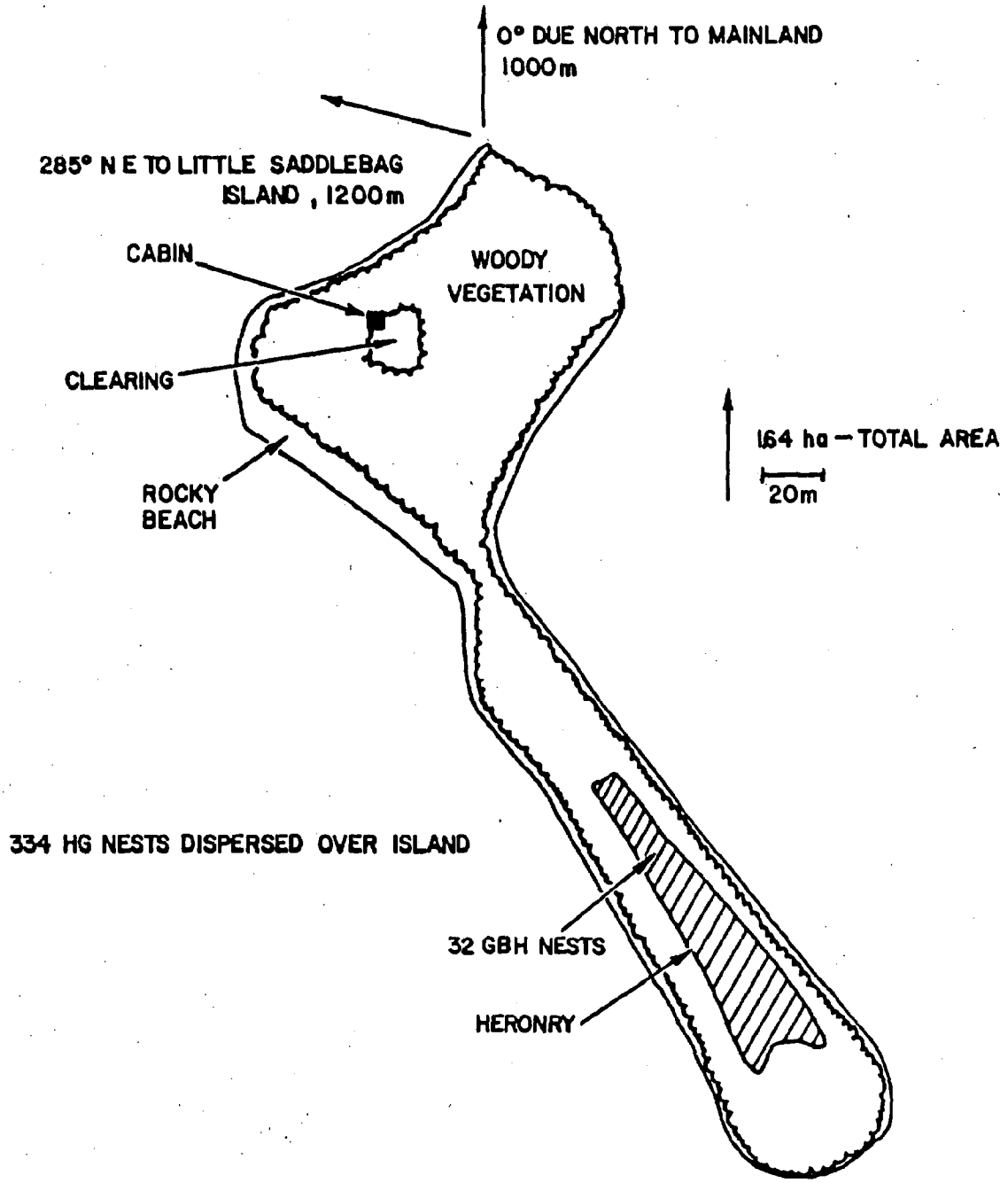
ST. MARTIN ISLAND - 9



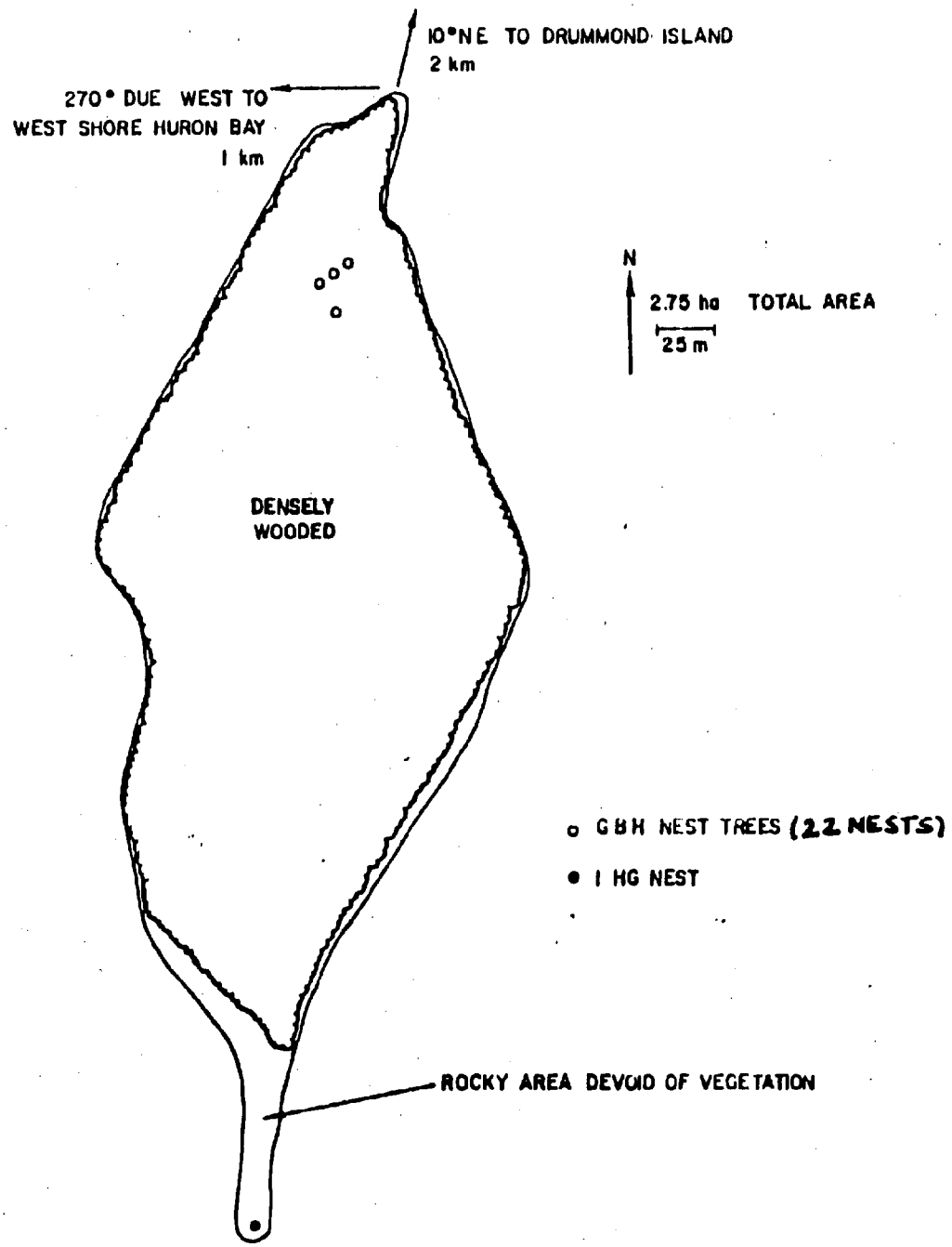
GOOSE ISLAND



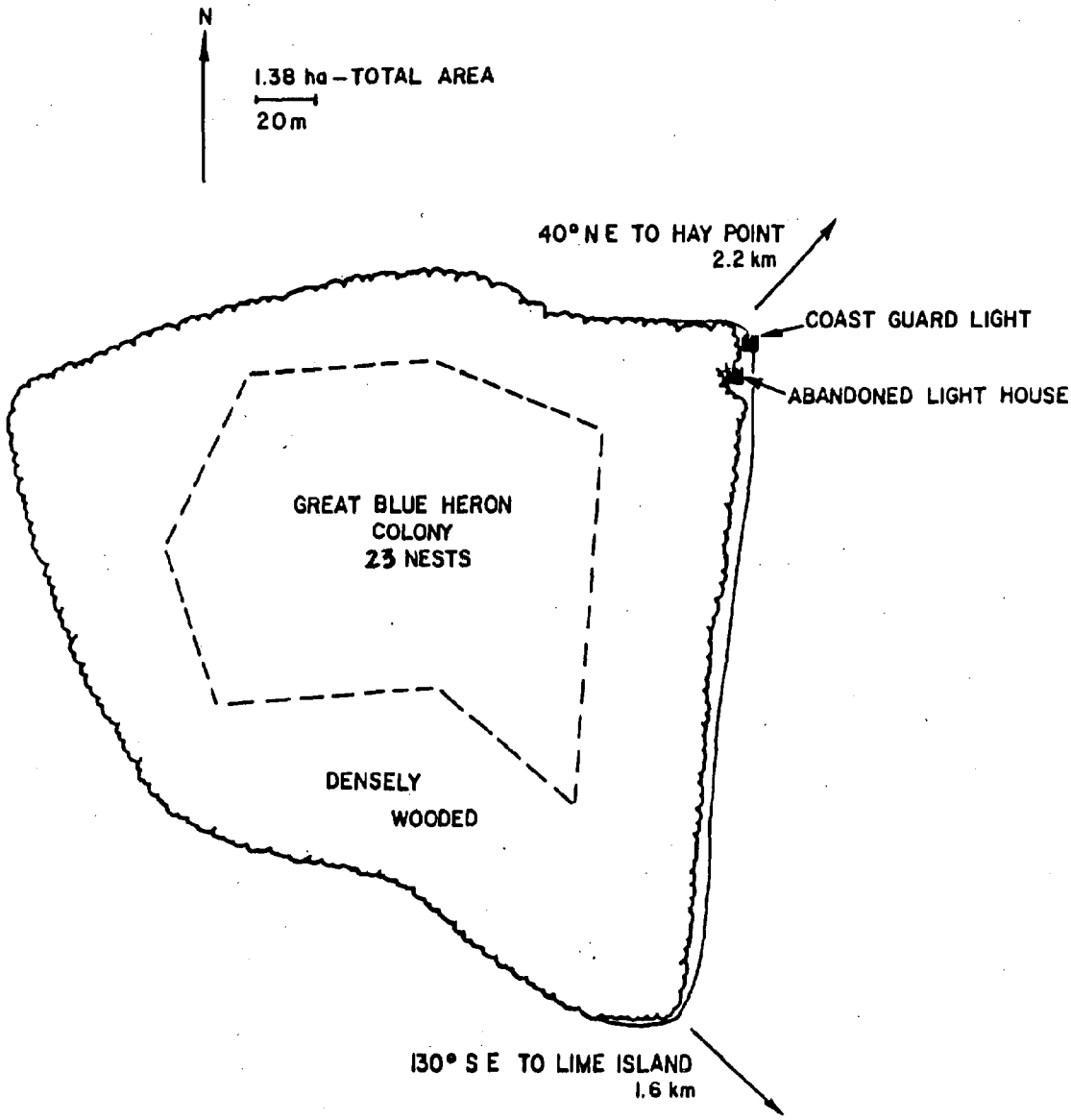
CROW ISLAND - 11



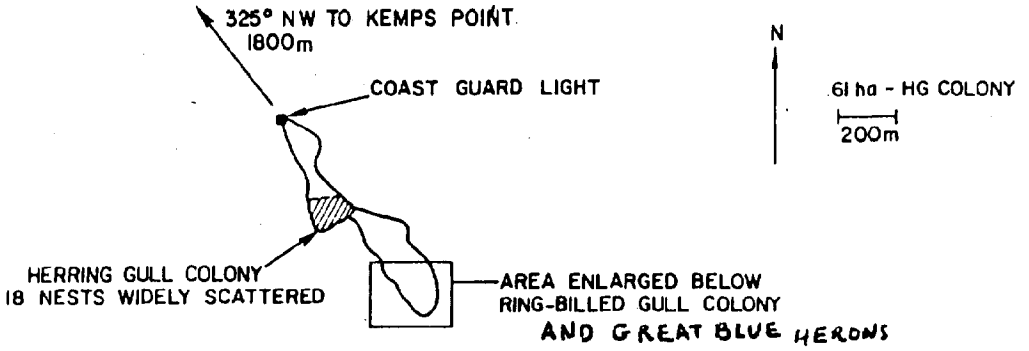
SADDLEBAG ISLAND-12

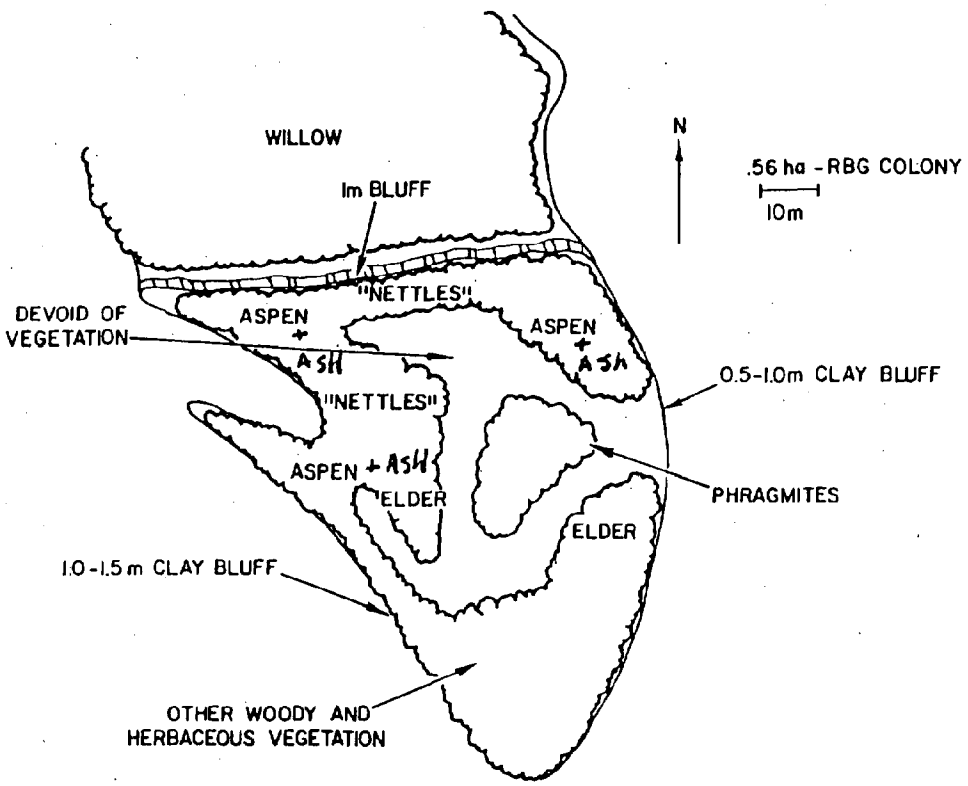


GRAVEL ISLAND - 13

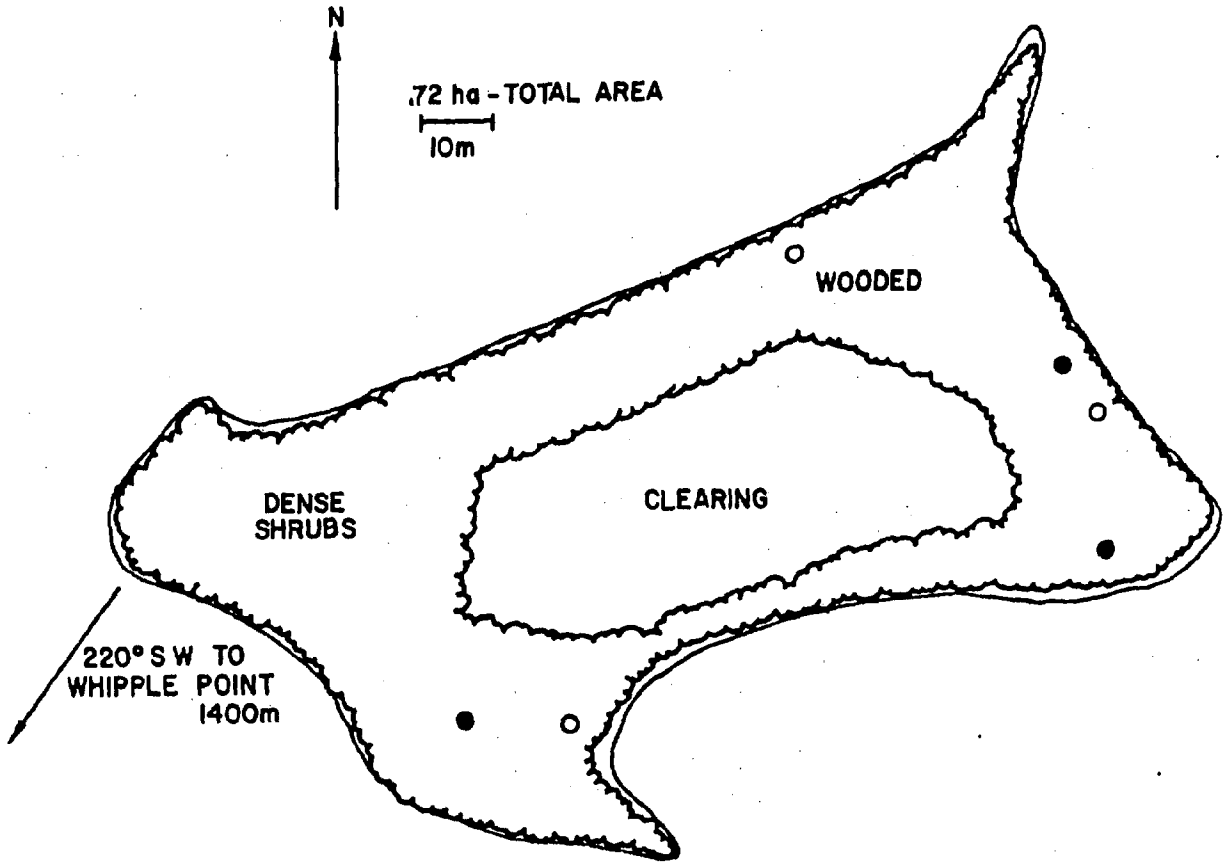


ROUND ISLAND - 16





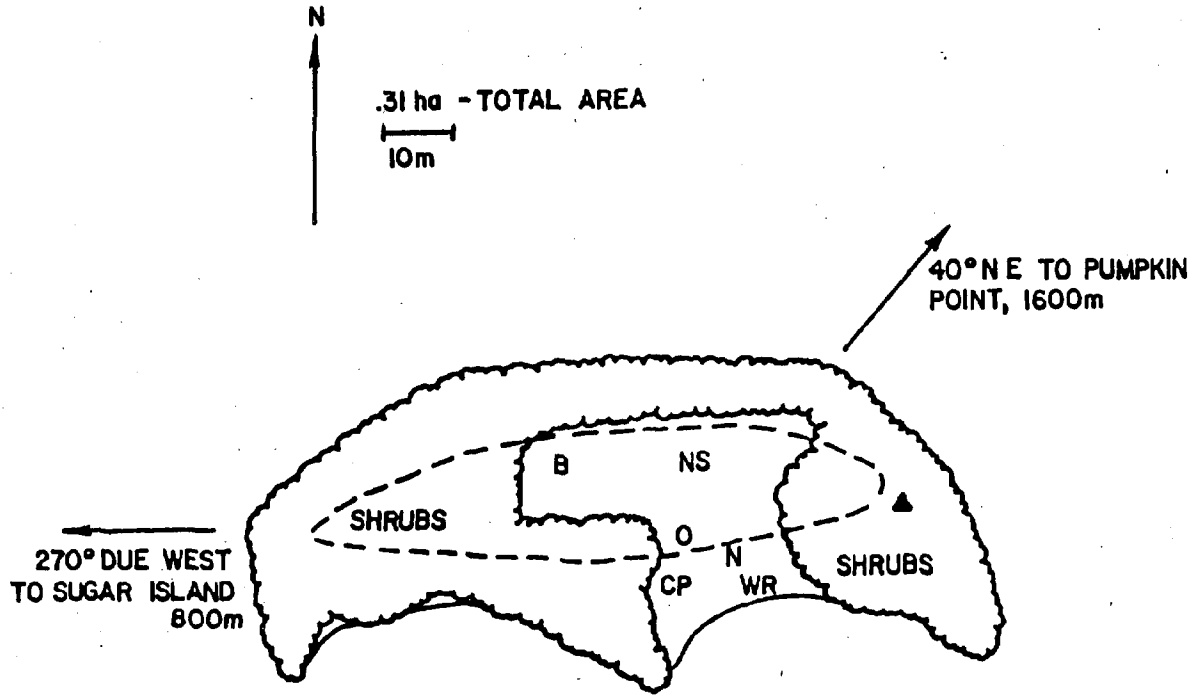
MOON ISLAND-19



○ AM. ELM
● WHITE BIRCH
} GBH NEST TREES (44 NESTS)

27 HG NESTS DISPERSED OVER ENTIRE ISLAND

GEM ISLAND-20



O AM. ELM - GBH NEST TREE (22 NESTS)

B BRAMBLES

NS NIGHTSHADE

CP COW PARSNIP

N NETTLES

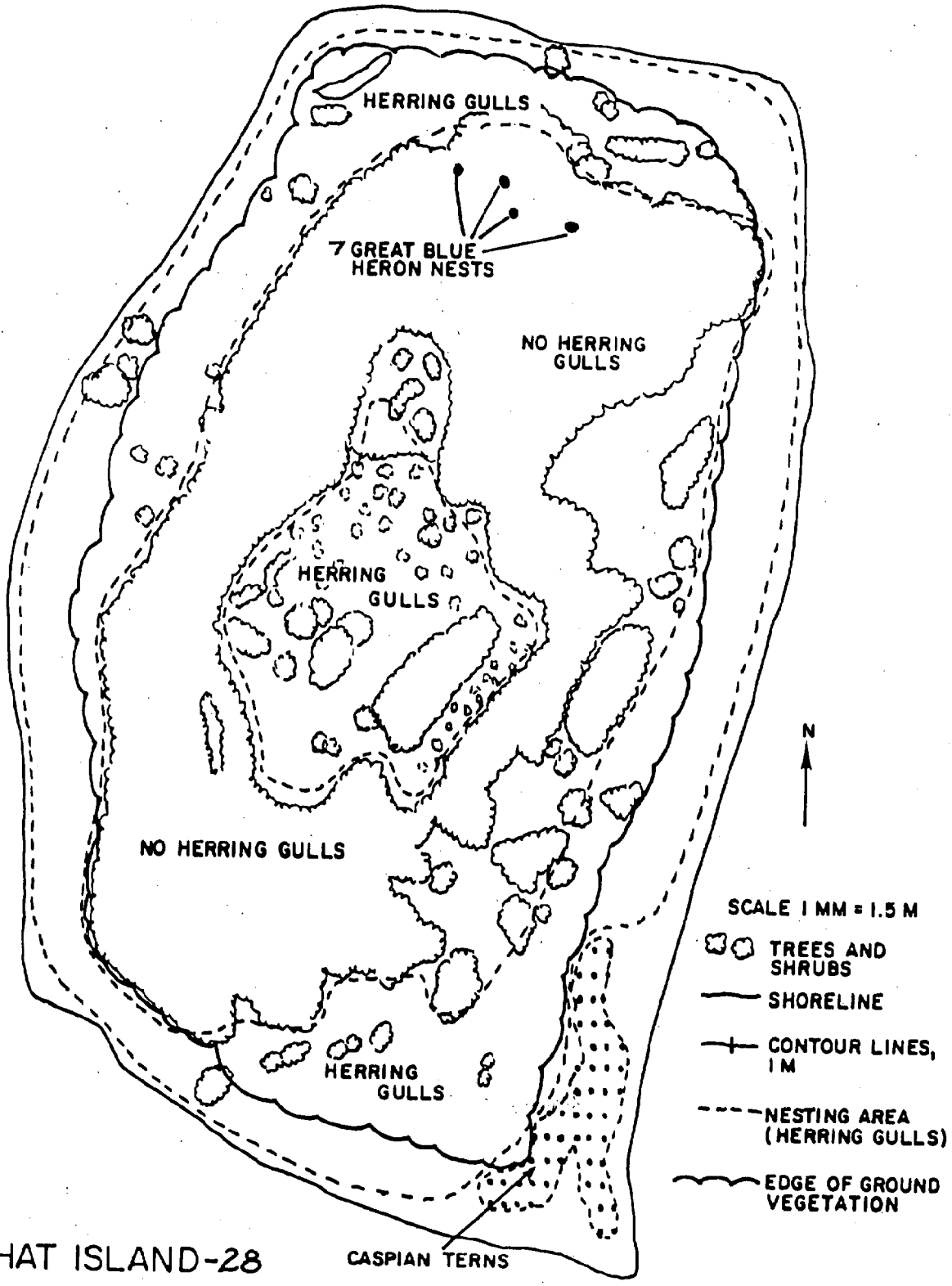
WR WILD RYE

BOULDER RIDGE

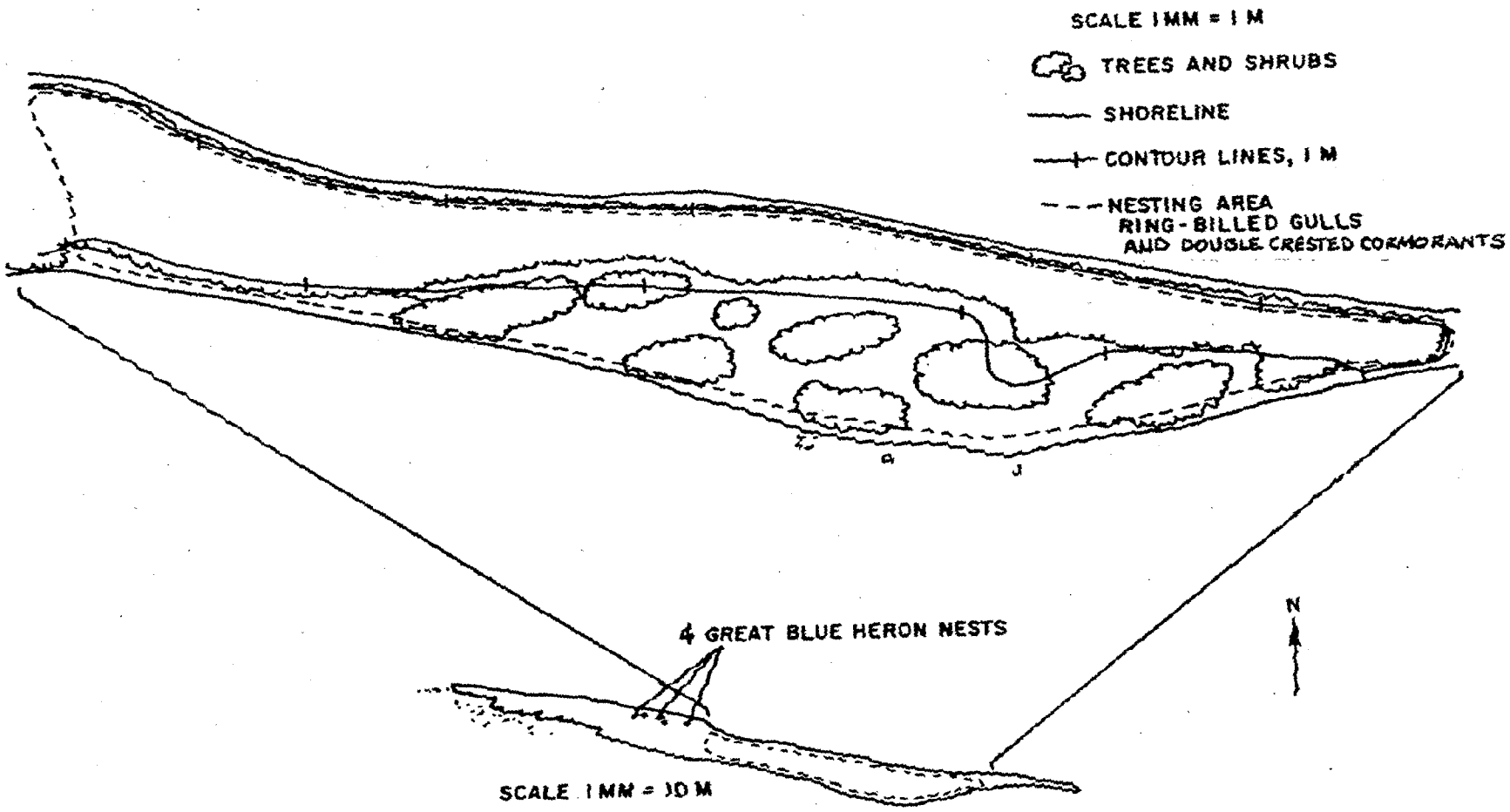
▲ INT'L. BOUNDARY COMM. MARKER

53 HG NESTS DISPERSED OVER ENTIRE ISLAND

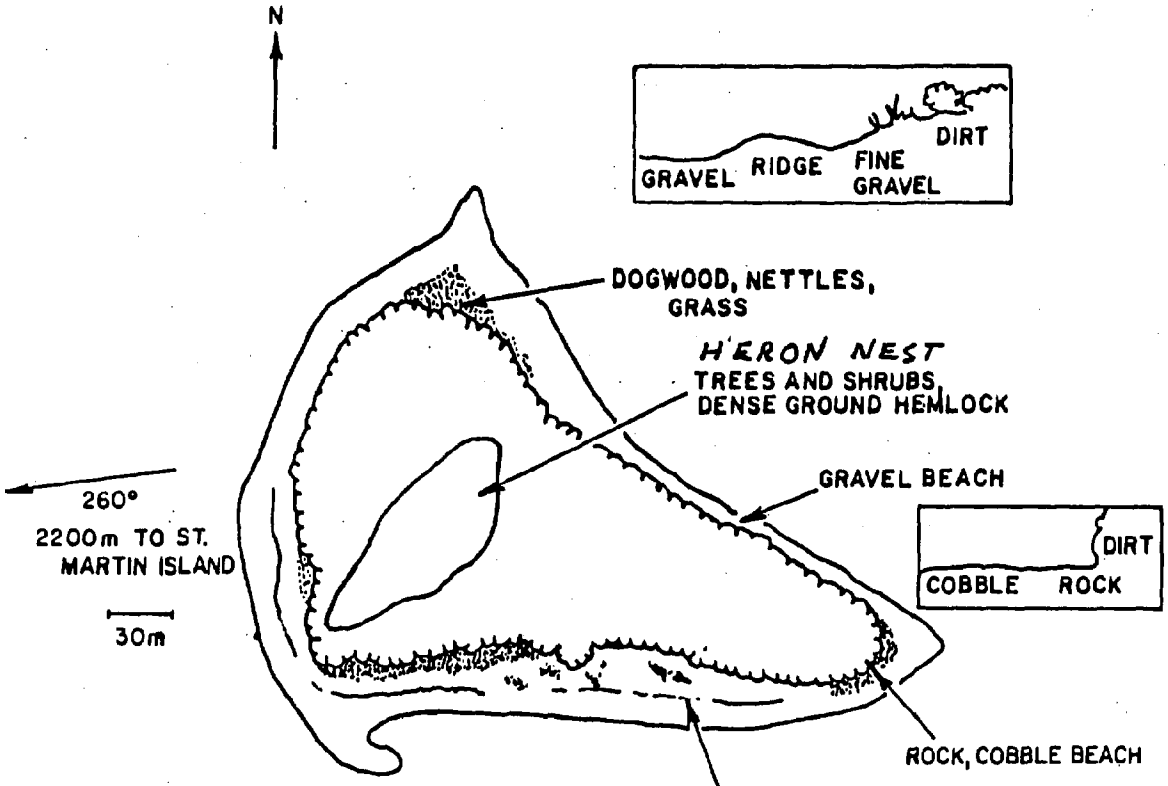
ROCK ISLAND-23



HAT ISLAND-28



WEST GRAPE ISLAND - 29

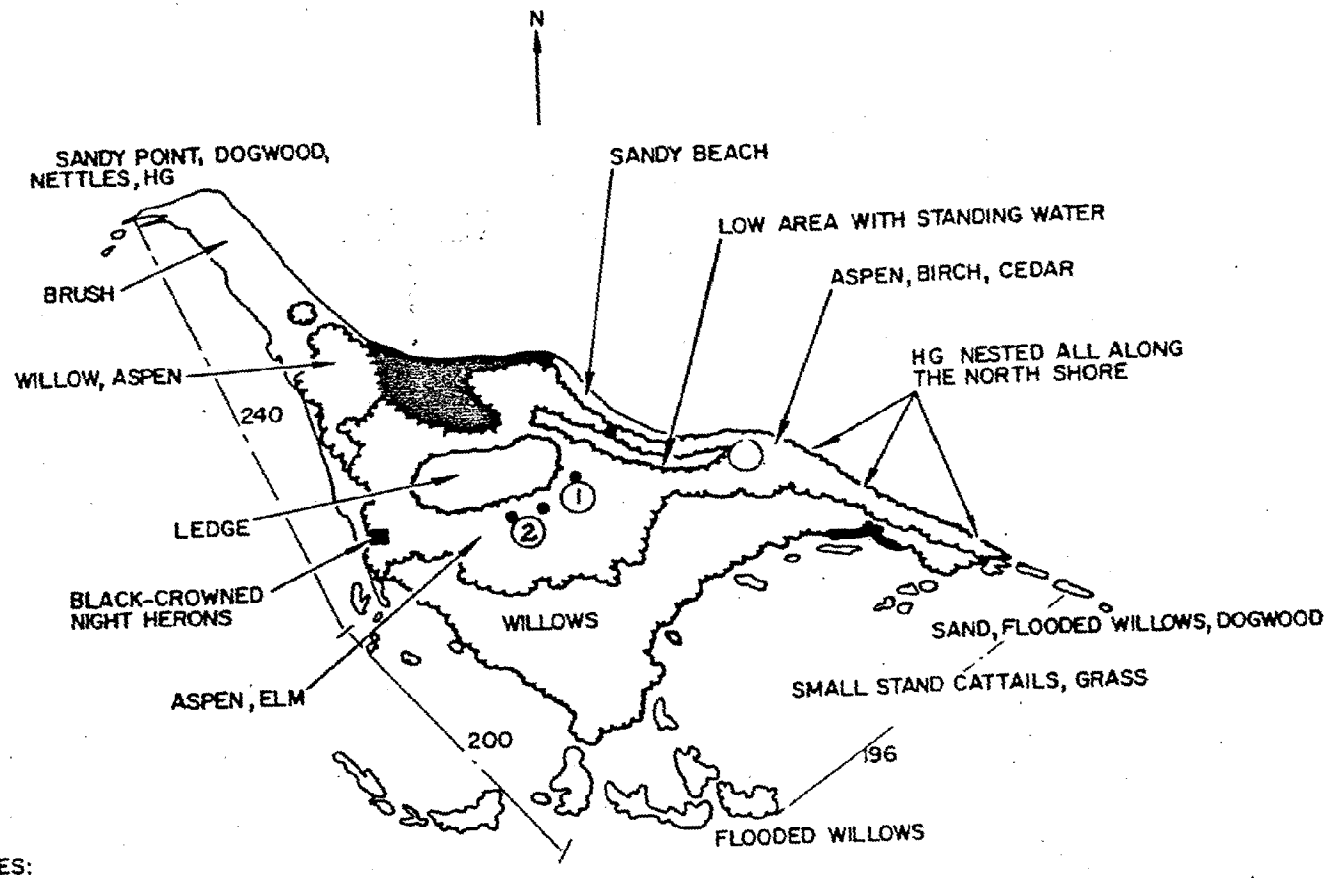


HG NESTED AROUND ENTIRE ISLAND, SOME CONCENTRATIONS ON THE NORTH TIP, SOUTH, AND WEST SIDES.

TOTAL AREA ABOUT, 5.47 ha

VISITED 7-2-76
1000 — 1230 HRS.

GULL ISLAND -33



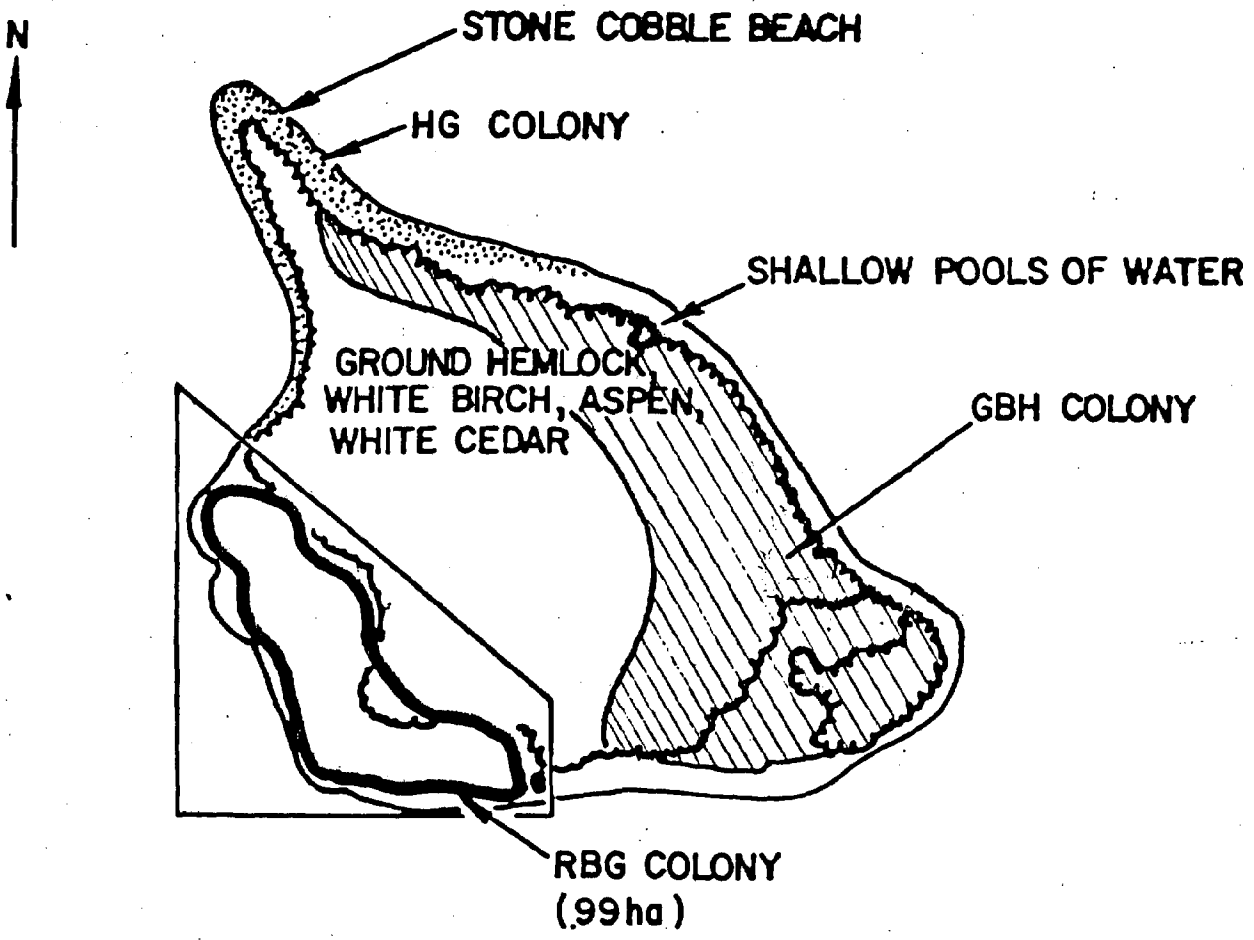
SOIL SAMPLES:

(1) GREAT BLUE HERON COLONY

(2) GREAT BLUE HERON COLONY

LOCATED: 45° 48'-86°45'
TOTAL AREA(EST): 9.76 ha
DELTA COUNTY, MICH.

ST. VITAL ISLAND-34



TOTAL AREA(EST.)-9ha
LOCATED:45°45'-86°46'

ROUND ISLAND-35

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