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Longitudinal Surveys of the Beach Nesting and Colonial Waterbirds of the Virginia Barrier Islands

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ABSTRACT

Fourteen consecutive years of data (1975-1988) from beach nesting and colonial waterbird surveys on the Virginia barrier islands, Assawoman Island through Fisherman Island, revealed fluctuating numbers of adults of the 27 species surveyed. Consistency of personnel, survey techniques, and timing have been essential elements in the quality of this project. Factors effecting species counts such as nesting stage, habitat, numerical density and weather are discussed. Species which show trends of population increase are herring, laughing and great black-backed gulls, and great egret. Species which seem to be declining are cattle egret, little blue heron, tricolored heron and black-crowned and yellow-crowned night heron, glossy ibis, royal, common, Forster's, gull-billed, and least tern and black skimmer. Several species seem to show shifts in their breeding site selections. Cattle egrets seem to be moving away from barrier island sites to large colonies at Walker's Marsh at Chincoteague, Virginia. Herring and great black-backed gulls seem to be showing less use of marsh spoil islands (tumps) for nesting and more use of the barrier island dunes. Common and Forster's terns may also be nesting more away from the barrier islands.

INTRODUCTION

At the request of The Nature Conservancy a survey of the Virginia barrier islands, was conducted in 1975 to establish a data baseline for the number and distribution of beach nesting and colonial waterbirds (Williams, 1975). In this analysis 1975 data were compared to historical records. It was apparent that no consistent body of information for these birds existed for Virginia. With the support of the Virginia Coast Reserve of The Nature Conservancy and the Non-game Wildlife And Endangered Species Fund of the Virginia Department of Game and Inland Fisheries, the surveys have continued for 14 consecutive years, providing an extraordinary set of data for the Mid-Atlantic Coast.

Colonial and beach-nesting waterbirds serve as potential bioindicators. Their patterns of nesting distribution may reflect responses to naturally occurring phenomena such as barrier island growth, attrition, or relocation. These patterns may also signal unnatural disturbances from human intrusion during all or part of the nesting season. Changes in species numbers may be indicative of changes in environmental quality directly affecting reproductive success. Thus, a close, consistent, and systematic survey of these species over many years provides information

for management and possible intervention, such as the efforts initiated for piping (*Charadrius melodus*) and Wilson's plovers (*Charadrius wilsonia*) recovery.

Although several atlases for colonial waterbirds have been published since 1975 (Erwin, 1979; Erwin and Korschgen, 1979; Osborn and Custer, 1978) the data presented here provides the most comprehensive study for Virginia.

METHODS AND MATERIALS

The best survey technique depends on the nature and size of the colony and/or species involved. All of the islands were walked completely. These are: Assawoman, Metompkin, Cedar, Dawson Shoals, Parramore, Sandy, Chimney Pole Marsh, Hog, Rogue, Cobb, Little Cobb, Wreck, Ship Shoal, Godwin, Mink, Myrtle, Smith and Fisherman. For solitary nesters such as oystercatchers and piping and Wilson's plovers, birds were tallied as they were encountered. Careful effort was made to avoid count duplication in situations where several pairs may have been occupying adjacent nesting territories.

Colonial beach nesting species were counted from a distance with the aid of binoculars. An attempt was made to record the total number of adults for each species before the birds flushed. In most instances, counts were done by at least two individuals, numbers compared, and a final figure derived. For many beach colonies where incubation was occurring a total nest count was also made to substantiate the total adult count. At no time were colonies subjected to visitation that would have rendered eggs or young vulnerable to heat or predation from gulls. In large colonies, or where young have hatched, entry into the colony was avoided.

Dune nesting species (primarily herring, laughing and great black-backed gulls) were counted several times by more than one observer, combining both numbers of ground and flying individuals to determine the colony size. Large densely-packed gull colonies, such as the one found in the dune-swale of Wreck Island, involved meticulous counts of groups of individuals in the air, and extrapolating that to the area occupied by the birds overhead.

Large mixed species heron, egret, and ibis colonies, with vegetation four to five meters in height were entered by one or more people to flush the birds occupying the colony at the time. Counters were stationed on opposite sides of the colony and communicated via radio. Birds were counted as they flushed and/or flew over the colony. Subsequently, the counters compared numbers and derived a final figure for each species. Small mixed heronries where the vegetation was no more than two meters high were tallied from the periphery of the colony. The great egret colony on the western side of Fisherman Island, was censused using a total nest count.

The timing of the survey has consistently occurred during the downy-feathered young stage of nesting for the herons, egrets, and ibis. Thus, our numbers are influenced by the absence of adults out gathering food.

For each colony, the following data were recorded on standard forms: time of day, length of visit, habitat, nesting substrate, survey technique, total adult count and nesting stage for each species. Data forms were subsequently sent to the Colonial Bird Register at the Laboratory of Ornithology, Ithaca, New York.

Every effort has been made to establish uniformity in gathering data. The survey period has consistently occurred during the third to the fourth week in June.

Islands were censused by the same individuals each year, and census procedures were standardized within the group.

RESULTS

The information provided in Table 1 is a compilation of all of the data gathered over 14 years. The numbers represent total adult counts for the entire island chain for a given year survey. Table 2 provides information on the number of years each species has been recorded as nesting on each island. Wilson's and piping plover and oystercatcher data are not included in this table since accurate counts for these species were not taken during the first 3 years of the project. The survey techniques themselves have inherent sampling error and colony dynamics over the nesting season from mid-May into July are variable, often weather-dependent. We present these data as indicators of population trends with a consistent time frame from which further study can be designed.

DISCUSSION

Although most species appear to have stable though fluctuating breeding populations within the survey area, several species deserve special attention. Cattle egrets (*Bubulcus ibis*) have shown as much as a 94% decrease from a high of 540 in 1977 to a low of 35 in 1983. However, several thousands of these birds nest annually in a colony off the causeway near Chincoteague, VA and at Walker's Marsh both of which are outside the scope of our survey area. A similar pattern of decline (89%) for black-crowned night herons (*Nycticorax nycticorax*) from 1976-1988 may also be attributable to a geographic shift in the breeding population.

Green-backed herons (*Butorides striatus*) and yellow-crowned night herons (*Nycticorax violaceus*) are not as strictly colonial as other members of the family and are therefore more difficult to sample.

The white ibis (*Eudocimus albus*) was unknown as a breeding bird in Virginia until 1977 (Frohring and Beck, 1978). Since then it has been recorded in colonies in 8 of 12 surveys. The species has probably been present each year since 1977, and those years in which it was not recorded are a result of the survey technique.

Herring gull (*Larus argentatus*) and laughing gull (*Larus atricilla*) populations seem to be stable at present. Within the context of this study it appears that both groups have numerically increased. These species may have retreated from nesting on inland marsh spoil areas in tumps to the low dunes of barrier islands where substantial beach loss has occurred. The large laughing gull numbers actually represent only one colony as of 1988, where in previous years that colony was one of several found on three or four islands. On the other hand, the great black-backed gull (*Larus marinus*) has undergone a dramatic increase in its breeding population over the last 10 years. Not found as a breeding species when the study began, the 561 recorded in 1986 seems remarkable. Whether the gull species are having an impact on the breeding efforts of other species in Virginia, as has been so well established elsewhere (Drury 1965, 1973, 1974; Nisbet, 1978; Harris, 1965; Hatch, 1970; Burger and Lesser, 1978, 1979) is unknown.

The single most revealing evidence of change from this study is the 88% decline in the population of the gull-billed tern (*Sterna nilotica*) from 1975-1987. Although modest increases were noted in 1986 and 1988, the overall decline has

been dramatic. This decline is a possible indication of an environmental problem, especially in view of the insectivorous feeding habits of this species.

Common tern (*Sterna hirundo*) numbers experienced a 45-50% decline over the last four years and may reflect a shift in the breeding population to other locations in the state, especially the Hampton Roads Bridge Tunnel where 2,178 birds nested in 1988 (R.A. Beck, unpublished).

The least tern (*Sterna antillarum*) population has shown dramatic fluctuations over the study period and although the overall Virginia population may be stable, it appears the species may be declining on the barrier islands (Beck, 1990).

Our data for royal terns (*Sterna maxima*) are conservative when compared to the number of young banded by other researchers. Our visual counts at the densely packed colonies represent the presence of attending adults and are thus subject to the same type of error addressed in sampling mixed heronries. Although the royal tern breeding locations shift, the population appears to be relatively stable.

Likewise, the sandwich tern (*Sterna sandvicensis*) population seems stable, although dramatic fluctuations between 1981 and 1984 are curious. In most instances this species can be readily counted within the royal tern colonies where they prefer to nest. However, in situations where they are few in number in a densely packed, restless colony, finding the birds is almost impossible.

The Caspian tern (*Sterna caspia*) is at the limits of its breeding range in Virginia (Bent, 1921). Thus, the 2-8 nesting individuals encountered each year represent a marginal breeding effort.

Our census of Forster's terns (*Sterna forsteri*) is limited to their presence in habitats adjacent to the barrier island beaches. In Virginia this species prefers to nest on *Spartina* wrack which accumulates in marshes especially along small creeks. Though we actively seek out this species, it may be unrecorded for the survey because colonies could not be located within the survey area (i.e., 1975, 1978, 1986, 1986-1988). Our data may indicate a severe decline for this species. In fact, the data may be a reflection of shifts in the location of the breeding effort that is dependent on the tidal accumulation of nesting substrate. In 1986, 29 colonies were found on the seaside of the Eastern Shore totalling 1,830 individuals. All of these colonies were on marsh or spoil, and none were on barrier islands (M. Byrd, unpublished).

Although modest fluctuations in the numbers of black skimmers (*Rhynchops niger*) are apparent, it appears that this species may be declining on the Virginia barrier islands. Given that over 1,000 skimmers nested between Wallops and Assateague Islands (K. Terwilliger, pers. comm.) in 1988 and that several hundred bred in Hampton Roads in 1988 (R. A. Beck, unpublished), the apparent decline may simply be a redistribution.

Gochfeld (1978) and Erwin (1979) pointed out a strong nesting association between nesting black skimmers and common terns. The decline in the skimmer population on the barrier islands may be directly related to the decline of the common tern previously mentioned.

A special effort to count oystercatchers (*Haematopus palliatus*) was not actually started until 1979. Numbers prior to that were either inconsistently gathered or not gathered at all. Since 1979 it seems apparent that the species is maintaining a stable population on the barrier islands.

TABLE 1. Total number of adults observed per year for 27 species of colonial and beach-nesting avian species on the Virginia barrier islands.

SPECIES	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Mean	CV
Green-backed Heron	34	32	24	4	13	43	80	44	75	60	21	12	48	7	36	66
Little Blue	148	296	276	173	57	110	206	326	100	115	213	150	75	111	168	48
Cattle Egret	482	476	540	93	278	278	306	89	35	87	242	142	134	123	236	68
Great Egret	252	364	330	99	291	255	406	551	606	659	373	411	329	423	382	37
Snowy Egret	1192	2330	1196	245	364	332	772	776	376	731	655	611	728	313	759	69
Tri-Colored Heron	860	1364	956	293	497	382	700	1004	275	415	389	436	664	254	606	53
Blk.-Crn. N. Heron	1138	2780	2317	765	1143	836	840	1456	639	973	1082	850	540	314	1120	58
Yel.-Crn. Heron	46	108	78	68	105	74	113	75	119	93	60	63	39	24	76	37
Glossy Ibis	772	2534	628	320	481	389	705	964	578	637	742	556	463	304	720	74
White Ibis	-	-	4	0	6	0	2	2	2	0	2	2	0	4	2	91
Brown Pelican	0	0	0	0	0	0	0	0	0	0	0	0	345	92	31 2	289
Herring Gull	1320	3932	2950	936	1429	2785	2312	3772	3489	1985	2403	8306	3662	3959	3089	56
Laughing Gull	3730	9810	10920	9151	17027	4920	13608	18188	9466	16383	19624	22286	18440	29680	14517	47
Gr. Blk.-Back. Gull	0	6	0	6	13	24	56	74	128	109	186	561	386	280	131	125
Gull-billed Tern	2228	2000	1092	955	737	959	1122	970	712	578	270	475	26	498	919	61
Common Tern	5218	6710	8496	3605	3347	5003	5260	3001	5219	5135	1843	2220	2240	2885	4299	43
Least Tern	766	886	1013	429	407	795	1869	550	1381	1217	717	1413	884	731	933	43
Royal Tern	4800	1330	9360	5962	3866	7326	5738	5200	8500	5772	7166	5910	6886	3656	5819	34
Sandwich Tern	18	28	30	80	2	34	34	4	140	24	18	80	20	24	38	94
Caspian Tern	2	2	2	2	2	4	2	6	4	6	2	8	8	8	4	59
Black Skimmer	7520	8811	10708	4824	5577	6970	9598	6303	5809	5233	3406	3780	3491	4448	6177	36
Forster's Tern	0	436	294	6	139	96	234	166	292	484	59	0	0	0	158	102
Oyster Catcher	528	-	-	81	1239	746	1151	1184	1223	1274	1079	1054	923	1004	957	35
Piping Plover	78	-	-	42	121	68	88	129	125	101	95	95	114	119	98	25
Wilsons Plover	58	-	-	21	51	20	41	61	52	46	18	63	64	43	45	36
Nighthawk	-	-	-	-	-	15	5	5	2	2	3	2	1	4	4	92
Horned Lark	-	-	-	-	-	-	-9	25	10	8	5	1	1	7	8	86

TABLE 2. Number of years of nesting occurrence for each island 1975-1988. (Assawoman - AS; Metompkin - ME; Cedar - CE; Dawson Shoal - D; Paramore - PA; Sandy - SA; Chimney Pole - CP; Hog - HO; Rogue - RO; Cobb - CO; Little Cobb - LC; Wreck - WR; Ship Shoal - SS; Godwin - GO; Mink - MI; Myrtle - MY; Smith - SM; Fisherman - FI)

	AS	ME	CE	DS	PA	SA	CP	HO	RO	CO	LC	WR	SS	GO	MI	MY	SM	FI
G-B Heron		0	10	0	0	0	0	2	1	0	3	0	14	6	0	0	0	4
Little Blue	0	11	0	0	0	0	0	13	0	3	0	13	0	0	0	0	0	14
Cattle Egret	0	11	0	0	0	0	0	14	0	1	0	7	0	0	0	0	0	14
Great Egret	0	13	0	0	0	0	0	14	2	7	0	14	1	0	0	0	0	14
Snowy Egret	0	13	0	0	0	0	0	14	2	7	0	14	2	0	0	0	0	14
Tri-C. Heron	0	13	0	0	0	0	0	14	2	7	0	14	2	0	0	0	0	14
Blk-CN Heron	0	12	0	0	0	0	0	14	1	7	0	14	2	0	0	0	0	14
Yel-CN Heron	0	0	0	0	0	0	0	13	1	6	0	13	0	0	0	0	2	14
Glossy Ibis	0	12	0	0	0	0	0	14	2	7	0	14	0	0	0	0	0	14
White Ibis	0	0	0	0	0	0	0	3	0	1	0	1	0	0	0	0	0	6
Brn. Pelican	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Herring Gull	0	14	0	0	1	4	13	4	0	12	0	13	3	0	0	0	2	14
Laugh. Gull	0	13	0	0	0	2	4	1	0	3	0	14	0	1	1	0	1	8
Gr. BlkB. Gull	0	8	0	0	0	1	11	0	0	7	0	9	0	0	0	0	0	11
Gull-B Tern	2	14	8	6	4	1	3	14	0	12	7	7	14	0	0	11	13	2
Common Tern	1	14	10	12	5	3	7	14	0	14	9	11	14	0	0	12	13	10
Least Tern	4	14	14	0	3	2	0	14	0	13	3	4	14	0	0	10	13	3
Royal Tern	0	13	0	0	0	0	0	0	0	4	2	0	2	0	0	0	0	12
Sand. Tern	0	6	0	0	0	0	0	0	0	2	2	0	3	0	0	0	1	8
Caspian Tern	0	6	0	0	0	0	0	1	0	2	1	0	8	0	0	0	2	2
Blk. Skimmer	0	14	6	14	3	3	5	14	0	12	8	9	14	0	0	11	13	6
Forst. Tern	0	10	0	0	0	5	2	1	0	0	0	0	0	1	2	0	3	2

The piping plover (*Charadrius melodus*) has been the subject of much study (Williams *et. al.*, 1988; Patterson *et al.*, 1988), and appears to be rather stable as a breeding bird in Virginia. The Wilson's plover (*Charadrius wilsonia*), on the other hand, seems to show trends of stability and decline, a phenomenon that deserves further study. It should be noted that data for these two species were not gathered in 1976 or 1977.

SUMMARY AND CONCLUSIONS

Fourteen consecutive years of data from ground surveys of the beach nesting and colonial birds of the Virginia barrier islands reveal fluctuations in all populations. Sampling problems due to the nesting stage of some species and the nesting locations of others may contribute to the variation in the data. Further analysis on an island by island basis may provide insight into the population dynamics of these breeding birds.

The survey documents apparent increases in the three gull species and apparent declines in gull-billed, common and least terns, and black skimmers. Reasons behind these changes need to be elucidated for management purposes. There are indications that declines in common and least terns, cattle egrets, black-crowned night herons and black skimmers may represent shifts in the breeding locations of these species away from the Virginia barrier islands.

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