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**PROCEEDINGS**  
OF THE  
**LINNAEAN SOCIETY**  
OF  
**NEW YORK**



For the Three Years Ending  
March 1977

Date of Issue: August 1977

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No. 73

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**LINNAEAN SOCIETY**  
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## EDITORIAL COMMITTEE

Members who participated in editing this issue of the *Proceedings* were: Berry Baker, Eugene Eisenmann, John Farrand, Jr., and Mary LeCroy. The Committee wishes to thank Alice Oliveri for typing manuscripts.

Catherine Pessino, *Editor*



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# Breeding Populations of Terns and Skimmers on Long Island Sound and Eastern Long Island: 1972-1975<sup>1</sup>

DAVID DUFFY

By 1972, it had become apparent to many working on colonial seabirds that the nesting terns and skimmers of Long Island were being increasingly exposed to a broad spectrum of pressures that might be causing severe changes in their populations. Polychlorinated biphenyls (PCB's) had been implicated in birth deformities of Common and Roseate Terns (*Sterna hirundo* and *S. dougallii*; Hays and Risebrough 1972). Mercury had been linked to feather loss in young terns (Gochfeld 1971). Egg shell thinning had been noted at several colonies in the area (Hays, pers. com.; pers. obs.); such thinning is believed to be caused by derivatives of DDT (Wiemeyer and Porter 1970; Peakall 1970). Further pressure on tern populations had come from invasions of nesting sites by rats, development of recreational beaches, human harassment, and natural succession rendering colony sites unfit for nesting.

For all of these factors there were only scattered and often anecdotal accounts of acute situations. What, if any, long-term effect there might be for the tern populations was unknown. Were Common and Roseate Terns holding their own? Or were they, instead, retreating to a few, safe colonies as their populations declined? Little as we knew of Commons and Roseates, we knew even less of what was happening to Least Terns (*Sterna albifrons*) and Black Skimmers (*Rynchops niger*). It was evident that population estimates were necessary to assess the health of the four species and to determine which pressures were most severe and most needed alleviating.

In 1972, A. Poole and I undertook a survey which covered tern and skimmer colonies on Long Island, N.Y.—east from Lloyd Neck on the

<sup>1</sup>This paper is dedicated to three members of The Linnaean Society, Roy Latham, Christopher McKeever, and LeRoy Wilcox, who pioneered in the study of Long Island's colonial seabirds.

north shore and east from Watch Hill, Fire Island, on the south shore, as well as much of the north shore of Long Island Sound. The survey was made by car, with a small boat to reach islands. In all but one case, counts were made of colonies renesting after Hurricane Agnes, which washed out many nests on 22 June. Following the storm, we visited 11 colonies in the second week of July, four in August, and four in both July and August. Other workers helpfully provided information on 11 colonies we either did not visit or visited only after the peak of breeding.

During 1973 and 1974 there was no organized census. Data are included whenever gathered in the course of other work.

In 1975, W. Webb and I surveyed the same area using a high speed boat. During the last two weeks in June we visited most of the colonies of eastern Connecticut, Peconic Bay, Block Island Sound and Napeague Bay. During the third week in July we surveyed the south shore of Long Island west to Watch Hill, and during the last week of July the north shore of Long Island and parts of western Connecticut. Again, other investigators provided us with additional information on colonies we could not visit.

We used a variety of methods to census colonies, depending on the species involved, the weather, the time available and the stage of the breeding cycle at each colony. These methods are presented in the Appendix. The sections following contain estimates for each colony based on the census material in the Appendix. Additional information on the type of substrate, extent of vegetation, evidence of predation, and sources of disturbance are presented when available.

For convenience in mapping and presenting the data, the colonies are divided into five groups (Fig. 1). This is not to suggest that these divisions represent discrete subpopulations. We still know little of the movement of nesters between colonies or geographic areas.

- I. The Connecticut Coast and Fishers Island
- II. North Shore of Long Island, east of Centre Island
- III. South Shore of Long Island, east of Watch Hill, Fire Island
- IV. Peconic Bay, Long Island, east to Shelter Island
- V. Extreme eastern Long Island and western Block Island Sound, except Fishers Island

In the following sections, each colony is preceded by an arabic number corresponding with the colony's location on the detailed map of each region (Figs. 2—6)

## The Colonies

### I. The Connecticut Coast and Fishers Island (Figure 2a, b)

1. *Sandy Point, Little Narragansett Bay.* Colony Size, 1973: Commons—five pair; 1975: Least—15 pr. This sand island is the site of a large gull colony as well as a favorite stop for boaters. Attempts by terns to nest are likely to be brief and unsuccessful.

2. *Rock Island, Fishers Island Sound.* Colony Size, 1974: Commons—15 pr. Haeni (*in litt.*) thought that gulls probably preyed on the young soon after they hatched as there were few chicks on this bare island.

3. *Lyddy Island, Fishers Island Sound.* Colony Size, 1974: Commons—35 pr. "The island is of glacial origin; sand and gravel surrounded by large boulders in the water." (Haeni, *in litt.*) Haeni also mentions that by early July in 1974 the island was almost completely overgrown with Black Mustard (*Brassica nigra*); this heavy growth would prevent terns from reneating. One Herring Gull (*Larus argentatus*) nest was found in 1974. The island was deserted in 1975.

4. *Hay Harbor, Fishers Island.* Colony Size, 1974: Commons—15 pr.; 1975: Commons—30 pr. The colony is on the far side of a barrier island protecting a salt pond. The substrate is pebble, the nests being placed on debris and old storm-tide lines. A pair of Oystercatchers (*Haematopus palliatus*) and about 20 pr. of Herring and Great Black-backed Gulls (*Larus marinus*) also nest on the island. The site is privately owned and disturbance is generally light. If the gulls do not drive out the terns, this would be a good site to preserve.

5. *Ocean and Oyster Ponds, Fishers Island.* Colony Size, 1974: Least—four pr.; 1975: Least—two pr. The site is isolated and little disturbed. Horning (*in litt.*) states: "Least Terns have nested in a very small colony on the island for as long as I have been birding, at least 15 years."

6. *Bluff Point State Park.* Colony Size, 1975: Least—five pr. According to Craig (*in litt.*) the terns nest in at least two groups along the beach. The Mumford Cove area with four pr. is the largest: relatively undisturbed in 1975, it will be protected as a sanctuary with snow-fencing by the state in 1976.

7. *Black Rock, Avery Point.* Colony Size, 1972: Commons—35 pr.; 1975: Commons—20 pr. The island is well protected from casual human

disturbance by the extensive rocky shoals surrounding it. Gulls may be significant predators; many roost at both ends. The island is a low, bare rock possibly subject to flooding.

8. *Shore Rock, Goshen Point, New London.* Colony Size, 1972: Commons—10+ pr., Roseates—10+ pr.; 1975: Commons—90 pr., Roseates—six pr. This island is just offshore from a heavily-used beach and is occasionally visited by swimmers. Surrounding reefs discourage boaters, and landing is difficult, as the island rises sharply from the water with no beach. The island is rock with a few small patches of vegetation and extensive crevices.

9. *Waterford Island, Millstone Point.* Colony Size, 1975: Commons—60+ pr., Roseates—15 pr. This island is much like the preceding one: bare rock with very sparse vegetation and difficult to land on. Gulls roost on both ends and may be important predators.

10. *Hatchett Point, South Lyme.* Colony Size, 1974: Least—seven pr.; 1975: Least—14 pr. This small colony is protected as a refuge.

11. *North Brother, South Lyme.* Colony Size, 1975: Commons—33 pr. Another all rock island with little vegetation, this one lies in deep water but is still relatively difficult to land on. A pair of Herring Gulls nested on the south half of the island.

12. *Menunketesuck Island, off Westbrook.* Colony Size, 1975: Commons—five pr., Least—45 pr. The island is connected to the mainland at low tide but seems isolated from human disturbance. The terns nest only on the shore of the island, the interior being covered with heavy brush. The Commons nest on the northeast side, the Least in small groups wherever pockets of sand and shell have collected.

13. *Hammonasset Beach.* Colony Size, 1975: Least—one pr. The pair was nesting on a sandbar connecting Cedar Island with Hammonasset Point.

14. *Gull Rock, near Tuxis Rock, Madison.* Colony Size, 1972: Commons—present; 1975: Commons—17 pr. The colony is on a small, bare rock very difficult to land on. In 1975, Webb and I saw no terns on nearby Tuxis Island, where they have nested in the past (LaFarge, *pers. com.*).

15. *Falkners Island, off Guilford.* Colony Size, 1972: Commons—400 pr., Roseates—30 pr.; 1975: Commons—700 pr., Roseates—30 pr. Falkners Island is certainly the most important tern colony along the Connecticut coast. It has in the past been protected by the presence of the Coast Guard, which manned the lighthouse. The lighthouse has burned down, however, and been replaced by an automated light requiring no



personnel to remain on the island. It is not known what this may mean for the future of the colony.

The terns nest on the shores of the island, below three- to five-meter bluffs which create a raised plateau of the interior of the island. The principal cause of reproductive mortality seems to be erosion. During rainfall, the clay washes down around nests and then dries, cementing the eggs to the ground. When the adult terns are unable to roll their eggs they apparently desert them. In nests where only one egg of the three is cemented, the other two eggs are incubated and hatch successfully.

No gulls currently nest on the island, but there is a gull colony at Goose Island, one kilometer west. The withdrawal of the Coast Guard may well lead to colonization by gulls.

If a means could be found to stabilize the banks, and if the island can be protected, Falkners should remain the major tern colony of Connecticut.

16. *Big Mermaid, Branford Harbor*. Colony Size, 1975: Commons—30 pr. This is yet another small rock island with no vegetation. A pair of Herring Gulls also nested. M. Male found abundant evidence that the site had been used as a launching place for fireworks on 4 July.

17. *Milford Point, Milford*. Colony Size, 1971: Least—three pr.; 1972: Least—six pr.; 1973: Least—20 pr.; 1974: Least—20 pr.; 1975: Least—did not nest. Dennis Varza, who has been monitoring this site since 1971, considers it unprotectable and subject to much human disturbance.

18. *Long Beach, Stratford*. Colony Size, 1972: Least—20 pr.; 1973: Least—35 pr.; 1974: Least—80 pr.; 1975: Least—50 pr. The colony became protected in 1974. By August 1975, the area had become overgrown with grasses, and attempts are being made to control this condition. Additional details on this, Varza's main study colony, are provided by Varza (1975).

19. *Norwalk Islands, Norwalk*. Colony Size, 1972: Commons—12 pr.; 1975: Least—five pr. The 1972 colony was subject to heavy gull pressure and is believed to have been unsuccessful (*vide de la Torre*).

20. *Bluff Island, Cos Cob*. Colony Size, 1974: Commons—60 pr.; 1975: Commons—60 pr. It is interesting to find two colonies so far west on the Sound (see also Diving Island, below). The site is a rock island, with relatively thick vegetation on top. The terns nest all over the island—in vegetation, crevices, and out in the open. The site is posted by the Greenwich Audubon Society.

21. *Diving Island, Cos Cob*. Colony Size, 1975: Commons—20 pr.

This is a small, rock island located well inshore. J. Farrand (pers. com.) reports that on the second trip to the two islands there was evidence of gull predation on young and probably also on eggs. Gulls were frequent in the area.

## II. The North Shore of Long Island, East of Centre Island (Figure 3a, b)

1. *Mattituck Inlet*. Since the hurricane in 1972, Least Terns do not seem to have nested here. Both sides of the inlet are subject to heavy human use and would not make a good site.

2. *Mt. Sinai Harbor*: It was reported in *American Birds* (1975, 29: 135) that: ". . . the phenomenal 600+ pair [Least Tern] colony from Eaton's Neck has not been wiped out as many thought: it seems to have been dispersed from Lloyd's Neck east to Mt. Sinai Harbor."

In 1975, Webb and I were unable to find this colony or any possible site for a colony of that size in the harbor. The barrier beaches are very heavily used by bathers, and either geese or swans nest on the only other likely island in the harbor.

3. *Port Jefferson Harbor*. Colony Size, 1975: Commons—100? pr., Least Terns—20+ pr. This colony, on the west side of the inlet, remains unsurveyed. Our work, although late in the season, indicates that this colony may be even larger than the estimates given above.

Human disturbance may be heavy at times. When Webb and I visited, there were about a dozen tents along the shore facing the harbor, 50 meters or so from the colony. There were also extensive tire tracks and foot prints. We found a dead rat in the middle of the colony. If further census work shows this colony to be as large as expected, it would be an important one to protect.

4. *Flax Pond (Crane's Neck Pond), Crane's Neck*. Colony Size, 1975: Least Terns—five pr. The area is posted, although this is probably ignored. The birds nest on the east side of the inlet, along the upper beach.

5. *Stony Brook Harbor*. Information is insufficient for estimating either the 1972 or 1975 colony sizes. We do know that Commons and Least Terns nested in both years. This may be one of the larger colonies on the north shore of Long Island. The birds seem to nest on various spoil islands along Porpoise Channel and at the mouth of the Harbor (Least Terns). Human disturbance seems light.

6. *Nissequogue River, Smithtown Bay*. S. Ruppert (*in litt.*) indicates



that she has heard from other sources of a colony at the mouth of the Nissequogue. It is not known which species are present.

7. *Crab Meadow, Northport*. Colony Size, 1973: Least—50 pr. Ruppert (*in litt.*) states that this site is “reputed to have been a Least Tern nesting area of many years duration.” Apparently the first year they failed to breed was 1975. The site is posted by the Town of Huntington and monitored by Ruppert and others.

8. *Sand City, Eatons Neck*. Colony Size, 1972: Commons—27 pr., Least—600+ pr., Skimmers—two pr.; 1973: Commons—35 pr., Least—73 pr.; 1974: inactive; 1975: Least—225 pr. This is probably one of the most remarkable Least colonies on the east coast. We have been fortunate in having Ruppert to discover, record, and protect the colony’s fluctuating populations. The 1972 colony was far larger than most Least colonies. It was also strikingly successful. The 865 nests marked in 1972 contained 1,178 eggs and produced 765 chicks large enough to be banded with adult-sized bands. Only 144 young were found dead, and only 55 of these had been banded. This is in striking contrast to the complete failure of the 73 nests at the same site in 1973. Part of this failure was caused by the presence of large numbers of immature Great Black-backed Gulls (Ruppert, pers. com.). After 1974, when no nesting attempt was made, the Least returned in force. However the Town of Huntington has now planted dune grass to stabilize the peninsula, and this may force the terns out.

The site is posted as a nesting sanctuary, but human disturbance, especially on weekends, is intense. In 1972 one-third of the colony was lost to campers. More details of the productivity and biology of the colony will be presented by Ruppert (*in prep.*).

9. *East Neck (the southeast sandspit of Lloyd Neck)*. Colony Size, 1973: Least—30 pr. Ruppert (*in litt.*) states, “We have had only from 10 to 50 nests on that heavily used beach and, of that, less than a dozen chicks fledged in any year from 1972 to 1975.”

10. *Caumsett State Park, Lloyd Neck*. Colony Size, 1972: Least—two pr.; 1973: Least—120 pr.; 1974: Least—150 pr.; 1975: Commons—24 pr., Least—180 pr. The colony is situated on a posted barrier beach inside a park with restricted access. Disturbance is probably rare, since the site is hard to reach from land.

11. *Centre Island, Oyster Bay*. In early June, 1973, Cioffi (*in litt.*) saw six adult Least repeatedly settling on scrapes in the sand. There were no nests. Human use of the area, which is adjacent to a public parking lot,

increased in the days immediately following his observations and he did not see the terns there again, either in that year or in 1974 and 1975.

### III. South Shore of Long Island, East of Watch Hill, Fire Island (Figure 4)

1. *Watch Hill, Fire Island*. Colony Size, 1972: Commons—one pr., Leasts—75 pr.; 1973: Leasts—170 pr.; 1974: Leasts—55 pr.; 1975: Leasts—55 pr. This is probably the best-protected colony in our area. Although immediately adjacent to a busy marina and recreation area, signs, snow-fencing and the active interest of the National Seashore personnel are effective deterrents to disturbance. Ron Rozsa of the staff has been instrumental in obtaining this protection and provided the population counts.

2. *John Boyle Island, Great South Bay*. Colony Size, 1972: Commons—310 pr., Skimmers—?; 1973: Commons—300 pr., Skimmers—10 pr.; 1975: inactive. It was evident in 1972 that the island was fast becoming too overgrown for nesting. The island is posted by the Town of Brookhaven and is surrounded by extensive shallows. In 1972 I noticed several rats although I saw no evidence of rat predation on the terns. I saw no rats in 1975. Were it possible to reduce the vegetation, particularly the *Phragmites*, and to make sure the rats are extirpated, this island would once again be excellent for a tern colony.

3. *Smith Point*. Colony Size, 1975: Leasts—30 pr. The colony is located on dredge spoil and endures moderate human traffic.

4. *Smith Point County Park*. Colony Size, 1973: Leasts—35 pr. Lauro (*in litt.*) found the colony, "west of the entrance to the high dune area at the western extreme of the park. Each spring the terns attempt to establish breeding sites in the area but they rarely succeed in raising young because of the incursion of dune-buggies and other four-wheel-drive vehicles. Each May, twenty pairs, plus or minus, attempt to breed at this locale."

5. "Unnamed Island", *One kilometer south of navigation aides # 24 and # 25, Moriches Bay*. Colony Size, 1975: Commons—300 pr., Roseates—one pr. This island is isolated from the main channel by a vast shoal and from Fire Island Beach by salt marsh. The terns nest on debris in the salt marsh, many of the nests being on old storm-tide lines. The result is a highly linear colony.

6. *West Island, Moriches Bay, south of Tuthill Point*. Colony Size, 1972: Commons—250 pr., Roseates—40 pr.; 1975: Commons—500 pr.?,

Roseates—25 pr.?, Skimmers—40 pr. This colony seems to have shifted from the east end of the island in 1972 to the west in 1975. In 1972 the birds were in fairly heavy vegetation adjoining a gull colony. The western end of the island is more open. In 1975 we did not visit the site until most of the nesting was over. The colony seems to have been successful judging from the large number of young present, presumably from this colony. On weekends, interference from picnickers and fishermen can be heavy since the colony is adjacent to a boat channel.

7. *East Island, Moriches Bay, south of Moriches Coast Guard.* Colony Size, 1972: Commons—275 pr., Least—10 ? pr., Skimmers—45 pr.; 1973: Commons—700 pr., Roseates—25 pr.; 1975: inactive. From the outside in 1972, the island seemed to support nothing but an impenetrable *Phragmites* stand. But the interior was almost completely clear of vegetation and still relatively clear in 1975. No gulls nest on the island and humans do not seem to be much of a problem. In 1972 Poole and I found eggs in piles resembling those that Austin (1948) describes as the work of rats. Rats and a raccoon (Wilcox, pers. com.) probably led to the evident move of this colony to the islands west of the inlet.

8. *Fire Island, Eastern End.* We did not visit this site in either 1972 or 1975. Chief Ranger Sherman of the Suffolk County Park Department mentioned a colony at this site.

9. *Cupsogue County Park.* Colony Size, 1972: Least—80 pr.; 1975: inactive? This Least colony was located straddling a road on the upper portion of a popular recreation beach that had many illegally unleashed dogs. The rangers were sympathetic but understaffed. In 1973, the Park authorities posted the site, but I don't know what effect that has had on the colony's survival.

10. *Tiana Beach, bay side.* Colony Size, 1972: Least—35 pr.; 1973: Least—40-50 pr.; 1974: Least—six pr. The colony is across the road from the Round Dunes Hotel. When we visited the site in 1972 it seemed a most unlikely one for a healthy tern colony. The colony was on landfill being prepared by a contractor for construction. A number of the nests were located adjacent to or between ruts in the unpaved road used by the contractor. Both Poole and I in 1972 and Gleick (*in litt.*) in 1974 found the area crisscrossed with motorcycle tracks.

11. *Tiana Beach.* Colony Size, 1973: Least—30-35 pr.; 1975: Least—30 pr. Salzman (1973) reports "dune buggy tracks right through the colony."

12. *Lanes Island, one-half mile west of Ponquogue Bridge.* Colony

Size, 1972: Commons—700 pr., Skimmers—15 pr.; 1973: Commons—840 pr., Roseates—120 pr., Skimmers—40 pr.; 1975: Commons—700 pr. I have not visited this colony. L. Wilcox (pers. com.) says that he found the colony almost destroyed a week after his 1975 visit, presumably by rats.

13. *Sandbar, just south of Black Can # 9, one-quarter mile east of Ponquogue Bridge.* Colony Size, 1975: Commons—100 pr. Most of the nests are on tidal wrack lines in the salt marsh or on a few low sandbars that form an island. The colony is immediately adjacent to the main boat channel, but the site's unattractiveness probably discourages casual visitors.

14. *Warner Island, Channel Marker # 8 on side.* 1972: inactive; 1975: Commons—115 pr., Roseates—one pr., Skimmers—one pr. The terns nest on a low sandbar and an old storm-tide line on the edge of the island, only meters away from passing boats. Gulls nest on the remainder of the island.

15. *Shinnecock Sandbar, north of the Inlet.* Colony Size, 1972: Commons—380 pr., Roseates—?, Skimmers—20 pr.; 1973: Commons—800 pr., Skimmers—40 pr.; 1975: Commons—160 pr., Roseates—one pr., Skimmers—100 pr. The island, of dredge spoil from the channel, is very low and vulnerable to flooding. L. Wilcox (pers. com.) reported that the island was inundated in 1972 during Hurricane Agnes and again in 1973. The island was also washed out in 1975 judging from the number of eggs found back in the saltmarsh. Most of the area occupied by the colony is sandy with no vegetation. Nests are located wherever there is debris or other discontinuities. The island is a favorite spot for picnickers who eat their lunches among the nests and invariably misunderstand the birds' defensive tactics.

16. *Barrier beach, east of Shinnecock Inlet.* Colony Size, 1973: Least—five pr.; 1975: colony inactive? Salzman (1973) reports four-wheel-drive activity at the site but says that it was the least disturbed of the three Least colonies he knew of in Shinnecock Bay.

17. *Middle Pond, Shinnecock Hills.* Colony Size, 1975: Least—five pr. The site is relatively secluded; nests are on the bay side of the beach that encloses the pond.

18. *Mecox Inlet.* Colony Size, 1972: Least—50 pr.; 1973: Least—100 pr.; 1974: Least—20 pr.; 1975: Least—45 pr. The following description is from Fisk (MS): "Habitat: sandy beach between inlet and public parking lot. Signs along parking lot, but no protection along perhaps 70 feet of public access to beach so colony often invaded."



#### IV. Peconic Bay, Long Island, East to Shelter Island (Figure 5)

1. *Flanders Bay*. Colony Size, 1975: Commons—50 pr., Least—25 pr. L. Wilcox (pers. com.) discovered this colony. I have not had an opportunity to visit it.

2. *Red Cedar Point, Flanders Bay*. Colony Size, 1975: Commons—five pr., Least—125 pr., Skimmers—one pr. This is a relatively isolated sand point, protected from boaters by shoals. There were some tire tracks but otherwise it was one of the most vigorous Least Tern colonies I saw in 1975.

3. *Red Creek Pond*. Colony Size, 1975: Least—six pr. This is yet another of the many small Least colonies located on barrier beaches by the inlets of small saltponds.

4. *Robins Island*. Colony Size, 1972: Commons—100 pr., Skimmers—one pr.; 1975: Commons—100 pr., Least—?, Skimmers—?. In 1972 we visited the site after the hurricane. In 1975, we learned too late that we had permission to land. As a result, the estimates for both years are very approximate. The caretaker was very efficient in protecting the colony up to 1975, when the island was sold to developers. Its future is uncertain. Wilcox (*vide* Erwin) reports an unknown number of Least nesting at New Suffolk just north of Robins Island.

5. *Bullhead Bay*. Colony Size, 1975: Least—35 pr. This site is isolated and the colony seemed successful.

6. *North Sea Harbor, Peconic Bay*. Colony Size, 1972: inactive, destroyed by hurricane; 1975: Commons—20 pr., Least—30 pr. The Commons are located on a series of small sand islands in the salt marsh west of the channel that leads into the harbor. The people living around the harbor seem to take a protective interest in the colony. The Least colony is placed on spoil set back from the main beach, east of the inlet; it is the more vulnerable of the two and had the usual tire tracks through it.

7. *Laughing Water and Indian Neck, Peconic*. Colony Size, 1972: Least—five pr.; 1975: Commons—one pr., Least—15 pr. This is a very secluded, posted sandbank. There were no tracks or other signs of disturbance.

8. *Southold, Port of Egypt Marina*. Colony Size, 1972: Commons—500 pr., Roseates—two pr., Skimmers—10 pr.; 1973: Commons—500 pr., Roseates—three pr., Skimmers—10 pr.; 1974: Commons—500 pr., Rose-

ates—?, Skimmers—12 pr.; 1975: Commons—490 pr., Roseates—six pr., Skimmers—20 pr. This is one of the healthiest and most productive colonies on Long Island. It is also in many ways one of the most interesting. The site is a sand breakwater for the Port of Egypt Marina which is not more than 20 meters away across a channel with very heavy boat traffic. The colony's very proximity to the marina apparently makes it uninteresting for boaters to visit. In addition the Leibline brothers who run the marina take an active interest in the colony even though the terns are at times a nuisance, roosting on and fouling boats.

It is worthwhile to note that A. Dove (in Davis and Morgan, 1968) reported 75 pr. of Commons and 25+ pr. of Least in 1968. By 1972, the Least had left and the first Roseates were nesting. This change in breeding species corresponds to the increase in vegetation. The Roseates nested under a large pile of stakes from 1972 to 1974. In 1975 these stakes had to be removed and the Leiblines replaced them with bushel baskets lying on their sides. The Roseates immediately adopted these for nesting and their young hid in them instead of in the grass. This method might be tried elsewhere with success.

The waters of the marina have very large baitfish populations which the terns exploit, feeding among the passing boats. In addition P. Stoutenburgh (pers. com.) reports that the terns will dive for offal thrown into the water during cleaning operations, just as gulls do. This probably ensures a food supply even when baitfish are scarce.

9. *Long Beach, Noyac and Sag Harbor*. Colony Size, 1972: Least—25 pr.; 1973: Least—20 pr.; 1975: Least—five pr. It is difficult to imagine a colony with more problems. This one is located next to a large highway near a bathing beach. Despite being posted, it is extensively used as a dog-run, and beach buggy and motorcycle course. We found several piles of eggs and the remains of ten adult and young Least—obviously the work of rats. Several other young were found run over. The colony's chances of survival are negligible.

10. *Conkling Point near Greenport*. Colony Size, 1973: Least—five pr.; 1975: inactive. Apparently isolated.

## V. Extreme Eastern Long Island and Western Block Island Sound Except Fishers Island (Figure 6)

1. *Northwest Harbor*. Colony Size, 1975: Least—90 pr. The colony seemed healthy despite the abundance of tire tracks through it. The colony

is located on sandspoil from dredging. Nests in this colony, even more than in most, are almost invisible. The chance of finding a nest was about the same as that of stepping on it.

2. *Cedar Point*. Colony Size, 1975: Least—10 pr. In both 1972 and 1973 we saw terns in the area but could not find the colony. Cedar Point is a county park and may be heavily used at times; however, when I was there disturbance at the colony was light.

3. *Sammy's Beach, Three Mile Harbor*. Colony Size, 1975: Least—55 pr. The colony is stretched out over a series of low, rolling hills made of dredge spoil. Four-wheel traffic, most of it concentrated on a "road" through the area, is the only obvious disturbance.

4. *Gull Island, Three Mile Harbor*. Colony Size, 1975: Commons—260 pr., Roseates—12 pr. The island is privately owned and well protected. We were questioned by the Easthampton Police during our visit. Vegetation is moderate, disturbance seems light; this is a very healthy colony.

5. *Great Gull Island*.

	Colony Size:	
	Commons	Roseates
1970	2500 pr.	1500 pr.
1971	2500 pr.	1500 pr.
1972	2500 pr.	1500 pr.
1973	2500 pr.	1500 pr.
1974	2500 pr.	1100 pr.
1975	2500 pr.	900 pr.

Great Gull Island has about a third of the Common population and 85% of the Roseate population in the survey area. Its importance is difficult to overestimate. The site differs from almost all of the other colony sites in that it is in an essentially pelagic environment and there is an active, long-term research project studying it.

Two problems seem to be causing increasing damage to the colony's health: plant succession and predation by gulls and night herons. Succession has pushed Roseates out of many of their nest sites, probably accounting for the drop in numbers. In 1974 and 1975, breeding of both species was virtually finished by the end of July, while in 1972 and 1973 it continued well into August. Predation seems to have been the chief, if not the only, cause of the shortening of the breeding season in those years.

The ecology and history of the island and some of the current work

have been described by Heilbrun (1970) and Hays and Risebrough (1972).

6. *Gardiners Point Ruins*. Colony Size, 1975: Commons—120 pr., Roseates—one pr. Terns were first seen on the ruins in 1974 but the site was not visited until 1975. It is one of the more spectacular tern colonies I have visited. The very small island is surrounded by swift currents, and landings must be made on an open beach. The casual visitor is further discouraged by a large sign warning of the possibility of unexploded bombs remaining from the island's former use as a bombing target. The colony is situated on top of the remains of one battery of a 19th century fort which now, after the bombings, bears a considerable resemblance to Stonehenge.

The nesting substrate is exfoliating concrete with small patches of vegetation. The lone Roseate pair and some Commons nested on a concrete "cliff" ledge above a seven-meter drop to the sea at high tide. Our initial visits showed an apparently prosperous colony. Later visits (after 3 July) showed declining numbers of young. The total absence of young, eggs, or adults after 21 July seems to indicate a major disaster occurred. We do not know if this was caused by vandals, gulls, or night herons.

Herring and Great Black-backed Gulls also nest on the island but we saw no hostile interactions to indicate that the gulls had caused the nesting failure.

7. *Bostwick Point, Gardiners Island*. Colony Size, 1970: Commons—150 pr., Roseates—12 pr., Skimmers—one pr.; 1971: Commons—226 pr.; 1972: Commons—246 pr.; 1973-1975: inactive. The colony never returned after being washed out by Hurricane Agnes in 1972. It was located on the north tip of Gardiners Island on open sand with only sparse vegetation. Before 1972, gull predation was severe. Otherwise the site is almost ideal. It is close to an abundant food supply, lacks mammalian predators, and is privately owned and protected.

8. *South Point, Gardiners Island*.

Colony Size:

	Commons	Roseates	Leasts	Skimmers
1971	66 pr.	10 pr.	10 pr.	2 pr.
1972	100 pr.	?	10 pr.	5 pr.
1973	102 pr.	59 pr.	0	6 pr.
1974	100 pr.	0?	0	10 pr.
1975	180 pr.	20 pr.	0	10 pr.



Like the colony at Bostwick, this one is located at the end of a long point. The site supports heavier vegetation, possibly providing more protection for the young from gulls and night herons. Gulls nest farther up the point and seem to be intense predators on both Skimmer and Common young.

9. *Cartwright (Ram) Island, Napeague Bay*. Colony Size, 1975: Commons—145 pr., Roseates—one pr., Skimmers—two pr. There were no nesting terns here from 1970 to 1974 although they had previously nested here as late as 1966 (T. Davis, in Davis and Heath, 1966). Since 1970 the island has lost most of its vegetation and gulls have ceased breeding.

The island is now composed of almost featureless flat sand. The terns nest near any sort of discontinuity available such as a small plant, shell, or piece of flotsam. Will and MacFarlane (pers. com.) observed frequent disturbances by what were apparently hunting Great Black-backed Gulls. The island is often visited by boaters who do not generally disturb the terns. If more cover develops, and gulls do not return as nesters, this could be an excellent colony.

10. *Acabonack*. Colony Size, 1973: Least—20 pr.; 1975: 0?. The site is on old fill and exposed to moderate disturbance (McKeever, pers. com.).

11. *Hicks Island, Napeague*.

Colony Size:

	Commons	Roseates	Leasts	Skimmers
1972	270 pr.	110 pr.	30 pr.	1 pr.
1973	135 pr.	45 pr.	?	1 pr.
1974	45 pr.	45 pr.	?	2 pr.
1975	193 pr.	33 pr.	109 pr.	1 pr.

Hicks Island is a combination of dredge spoil and natural barrier island. It is posted and only moderately disturbed by humans. The island is now owned by a real estate firm that plans to sell it to the state as parkland. Whether this will mean the island will remain in its present state or become yet another bathing beach is unclear.

A sizeable colony of gulls also exists on the island. P. Houde (1977 a and b) gathered evidence that much of the predation at this colony is due to gulls. Details of his experiments and further information on the 1975 breeding season may be found in his papers in this volume.

12. *Star Island, Montauk*. Colony Size, 1974: Commons—two pr.,

Leasts—10 pr. L. Wilcox (pers. com.) reported this colony. I have not visited it.

## Discussion

### I. The Census Numbers—Populations: 1972 and 1975

I have compared the census data from 1972 and 1975 in two ways: first, by comparing the total number of pairs and colonies in both years; and second, by comparing the number of pairs in those colonies surveyed in both years.

Using the first method, we would expect an increase in number of both pairs and colonies between the two surveys since the 1975 census was more complete. We might also expect that the colonies discovered in the more thorough survey would be the smaller and less conspicuous colonies so that a large increase in number of known colonies between the two years would result in a proportionally smaller increase in total pairs. Any decline in total pairs would seem to be evidence for a major decrease in a population.

In general the predictions are supported by the data (Table 1). Commons, Least, and Skimmers all increased in absolute numbers. Roseates, however, declined 30 percent from their 1972 number despite our finding twice the number of colonies. This may be attributed mainly to the decline at Great Gull Island. Black Skimmers also differed from the expected pattern since they had a net loss of two colonies at the same time their population increased. I believe that the 1972 census, following the hurricane, was not an accurate measure of the Skimmer population. Wilcox (in Buckley and Davis, 1973) found 210 pairs at three of the larger colonies in my census area in 1973. The difference between the two years probably represents birds that left the colony areas after the hurricane in 1972, without attempting to re-nest. The colonies lost between 1972 and 1975 were small and may merely represent the vagaries of a population at the northern limits of its range.

Using the second method of comparing only those colonies censused in both years, I would expect that a decline in number of pairs would represent an overall decline as these colonies represent a substantial proportion of the four populations.

**Table 1.** Comparison of total numbers of birds counted in all colonies in 1972 and 1975.

	1972		1975	
	No. pairs	No. colonies	No. pairs	No. colonies
Commons	6116	17	7128	31
Roseates	1704	7	1051	13
Leasts	993	16	1307	31
Skimmers	109	9	175	9

Looking at Table 2, we see that Commons and Skimmers increased while Least and Roseates declined in numbers of pairs at the same colonies between 1972 and 1975. The Common increase is insignificant, representing only a one percent difference. The Least Tern decline is greater and perhaps indicative of a gradual decline. My data are not strong evidence for this. The Skimmer increase is probably an artifact as discussed above, and again we see a decline in Roseates caused by the decrease at Great Gull Island.

Another interesting result is that the net number of colonies seems to be holding (Table 2). There is no evidence from the present data to suggest that the total number of colonies is decreasing with the populations becoming concentrated at a few large colonies.

**Table 2.** Comparison of numbers of birds in colonies censused in both 1972 and 1975.

	1972		1975	
	No. pairs at No. colonies	Colonies active in 1972, but not in 1975	No. pairs at No. colonies	Colonies active in 1975, but not in 1972
Commons	6014 at 16	5	6138 at 17	6
Roseates	1704 at 7	1	1003 at 9	3
Leasts	958 at 14	4	744 at 12	2
Skimmers	98 at 7	3	174 at 7	3

## II. The Census Numbers in Relation to the East Coast Populations

Nisbet (1973) provides the only available synthesis of the scattered tern literature. Speaking of 1972, he suggested that: ". . . the 20,000 pairs of

Common Terns now estimated between New York City and southern Maine comprise slightly less than one half of the entire East Coast population." Our population is thus about 13 percent of the total.

Again Nisbet suggests that the east coast population of Roseate Terns was about 5000 pr. in 1972. Our total of 1700 pr. represented about 33 percent of the total, mostly at one colony.

Downing (1973) reported 6000 pr. of Least Terns during a 1973 survey from Mississippi to New Jersey. Gochfeld (1973a, 1973b) indicated that the western Long Island population was about 450 pr. in 1972. If we assume 1200 pr. on eastern Long Island and the shore of Connecticut, then Long Island and Connecticut have about 1650 pr. or 27 percent of the Atlantic and Gulf populations of Least Terns. The 1200 pr. in our survey area represent about 20 percent of the total.

Skimmers, even more than Least Terns, have been ignored until recently. The only overall census attempt was that of Downing (1973). Unfortunately his method was designed for ease of replication with emphasis on mainland colonies. As Skimmers (see below) are island nesters and as I would expect colonies to be in inaccessible areas, his survey data are probably very conservative. He found 500 pr. at 13 colonies from Mississippi to New Jersey in 1973. Buckley (in Buckley and Davis, 1973) reported assorted censuses of 420 pr. at six additional colonies on the south shore of Long Island in 1973. Assuming 200 pr. in my survey area (based on Wilcox's counts in 1973 reported in Buckley and Davis, 1973) and using Downing's counts, then all of Long Island would have had almost half of the east and gulf coast populations in 1973. This is certainly an overestimate.

Connecticut and eastern Long Island are evidently major population centers for at least three of the four species. With this in mind it becomes important to consider the health of the colonies that make up the four populations and how the evolved breeding strategies of the species react to modern pressures.

### III. Breeding Strategies and Patterns of Disturbance

Lack (1967) pointed out that there are three major breeding strategies for seabirds. First, they may nest offshore on predator-free islands in dense and conspicuous colonies; second, they may make solitary and cryptic nests on the mainland; and finally, particularly among the terns and gulls, they may occupy a spectrum of intermediate points between the first two.

The eggs and nests of all four of the present species are cryptic.

Densities of Common, Roseate, and probably Skimmer nests are higher in the survey area than are those of the Least Tern, which depends on dispersal and extremely cryptic nests to prevent predators from using colonies as reliable food sources (Cullen, 1960). In addition, Commons, Roseates, and Skimmers are almost exclusively island nesters, while Least usually nest on the mainland (Table 3).

Where the Least relies on dispersal of nests to discourage predation, the other three species rely on water barriers. The Common population is centered in a number of relatively large colonies. Roseates are concentrated at one colony, Great Gull Island. Least nest in a relatively large number of small colonies. The Skimmers seem to be concentrated on islands near bays or areas of calm water, presumably necessary for skimming. These basic differences in nesting should lead to differences in the prevalence of various disturbances.

Plant succession and aerial predators seemed to be the main problem for Commons, succession for Roseates (particularly at two big colonies). For Least Terns, human disturbance was the major problem, as might be expected from their mainland nest sites on beaches. The Skimmers, concentrated in a few large colonies and with a small population, dramatically reflect problems; human disturbance and flooding seem to be major factors in what may be only a marginal population at the northern limits of the species' range.

**Table 3.** Percentage of Terns and Skimmers nesting on islands in 1975 (includes barrier beach as mainland).

	% population	% colonies
Common	98	84
Roseate	100	100
Least	16	20
Skimmer	99	88

### Conclusions

The colonies reported in this census represent an important part of the total east coast populations of the four species. While Common Terns and Skimmers seem to be holding their own in the study area, the gradual decline in Least and the sharper decline in Roseates are cause for concern. We need to know if these declines represent broad geographic trends or



merely local fluctuations. For Least Terns we do have evidence from outside this study area that the decline is general, both on the east coast of North America (Fisk, 1972, MS; Downing, 1973; Nisbet, 1973; Galli, 1975) and on the other side of the Atlantic in the British Isles (Norman and Saunders, 1969). For the Roseate Tern there is only Nisbet's work (1973), which suggests that much of the Roseate population has shifted from Massachusetts to eastern Long Island since the 1940's. More recently he has reported (1976) a decline in Massachusetts paralleling that in our area. These reports provide strong evidence for believing the Roseate decline to be a general one.

The Black Skimmer may be the species of most concern. If Downing's figures are reasonably accurate, the population is precariously small. Special efforts are needed to census and report local colonies. Efforts such as Downing's survey from Mississippi to New Jersey are heroic in extent but necessarily limited in depth. We need to know how much of the population is on relatively inaccessible or isolated islands.<sup>2</sup>

Numbers of pairs give only a potential breeding population. If productivity is zero because of disturbance or predation, even the largest colony has no value in maintaining a population. We know that disturbance is frequent at many of the colonies and, if one assumes an inverse relationship between disturbance and productivity, then productivity must be low at many of the colonies. Subjective impressions from colonies visited several times support this.

It is my belief that high productivity in the years 1969-1973 at Great Gull Island (Hays, pers. com.) and other colonies at the eastern end of Long Island and elsewhere may have acted as a source pushing terns into new colony sites which were marginal. In both 1974 and 1975, there was strong evidence that gulls and night herons helped to truncate the breeding season for Commons and Roseates so that by the end of July it was over, instead of extending well into August. Since productivity is already low at many outlying colonies, and is now reduced at what had been traditionally productive sites, I believe we can expect a slow decline in Commons and a

<sup>2</sup>Since I wrote my comments on the Black Skimmer, a number of additional surveys outside my census area have come to my attention. Soots and Parnell (1975. Ecological succession of breeding birds in relation to plant succession on dredge islands in North Carolina estuaries. *Univ. North Carolina Sea Grant Publ. UNC-SG-75-27*. 91pp.) reported 1,880 pairs of skimmers in North Carolina in 1973. Kane and Farrar (1976. Coastal colonial bird survey of New Jersey. *Occ. Paper No. 125. New Jersey Audubon* 2 (11):7-14) reported 1,000 pairs in New Jersey in 1976. Large concentrations also occur in the Chesapeake area (Erwin, pers. com.). It seems then that the birds in my census area are but a very small portion of the total United States population of this species.

continuation of the Roseate decline until such time as the disturbing factors are reduced.

Similarly, Least Tern productivity seems to be generally low, with stunning exceptions such as the Eatons Neck colony in 1972. Perhaps this species experiences occasional years and locations of high productivity that maintain the population, with unsuccessful intervening years.

Regarding Black Skimmers, we have no idea of normal productivity, or almost any other aspect of their ecology. Such details are urgently needed.

The present surveys were only two brief looks at four species totaling more than 15,000 individuals. Such work takes on greater meaning when placed in context with other surveys made at other times and other places. Thus, there is a strong need both to standardize and to contrast census methods so that comparisons are possible.

There are strong reasons to repeat this survey in the future, preferably at regular intervals. Bird clubs and natural history groups might consider such census work as a contribution that could yield important results with a relatively small investment of time and little initial expertise. With the beginning of offshore drilling, terns and other seabirds may be exposed to a number of additional pressures. If we are to ensure the continued presence of these birds in this area, we must acquire a knowledge of the species' population trends and breeding requirements.

### **Appendix: Methods and the Survey Data**

Unless otherwise noted, our surveys of colonies were made by counting nests. Those censusing would walk 12 feet apart through the colony, each person counting all nests within six feet on either side of his or her path. Such transects were repeated until the colony had been wholly covered. Usually clutch sizes and presence of young were recorded. We had had extensive experience in identifying the eggs and young of Common and Roseate Terns at Great Gull Island. However, we excluded from our counts any nests whose species was uncertain; these made up less than 1% of the total.

Deserted nests were counted when present, being identified as such only if the eggs were cracked or cold and dirty, with litter adhering to them. Counts of deserted nests are labelled *D* in the data section. Whenever possible we counted all young that had left the nests; these are listed in the column labelled *YA* (Young alive) in the data tables. We also

recorded all dead young, including those found in nests; these are entered in the column labelled *YD* (Young dead).

At some of the more protected or isolated colonies we were able to mark each nest with individually numbered tongue depressors, recording the species, clutch size and number of young as we did in the nest counts. Marked nests are labelled *M* in the data section. At some Least Tern colonies, we counted the number of incubating birds by using a telescope. Such counts are followed by *I* in the *Number of Adults* column and represent individual birds. At many Least Tern colonies, we counted the number of adults in the air as we walked through. According to P. Houde (pers. com.), there is rarely more than one adult at a nest at a time. To allow for the occasional second bird I used the method of Nisbet (1973:28) and multiplied counts of flying birds by .9 to obtain my estimate of numbers of pairs in the results section. In the present section, all counts are of individuals and are labelled *F* in the *Number of Adults* column.

In some cases, only a rough or very subjective estimate was possible. These are marked *E* and are given in pairs or number of nests. Finally, for a large group of colonies we have depended on information from others or from the literature. In some of these sources the census method was not explicitly stated, in which case the numbers given here represent pairs, with no letter following.

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# Appendix Table 1

## Common Tern Colonies: The Survey Data

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
1. Sandy Point	30 VI 73	16 scrapes	—				Haeni
	24 VI 75	0					Webb, Duffy
2. Rock Island	2 VI 74	16	—				Haeni
	2 VII 74	present					Haeni
	28 VII 74	present					Haeni
3. Lyddy Island	2 VI 74	34	—				Haeni
	2 VII 74	0					Haeni
	24 VI 75	0					Webb, Duffy
4. Hay Harbor	7 VII 74	8	2.0±.1		9	—	Agardy
	24 VI 75	22	2.0±.02		11	—	Webb, Duffy
7. Black Rock	11 VIII 72			68 F	12	—	LaFarge, Poole, Duffy
	24 VI 75	9	2.2±.32		7	1	Webb, Duffy
8. Shore Rock	11 VIII 72	7D					LaFarge, Poole, Duffy
	24 VI 75	91+4D	2.3±.01		0	—	Webb, Duffy
9. Waterford Island	24 VI 75	39+15D	2.1±.01		28	4	Webb, Duffy
	4 VII 75				14	1	Parkes, Webb, Duffy
11. North Brother	VI 72	nested, no details					Anon.
	23 VI 75	32	1.8±.01		2	2	Webb, Duffy
	4 VII 75				13	—	Parkes, Webb, Duffy
12. Menunketesuck I.	23 VI 75	5	1.6±.24				Webb, Duffy
14. Gull Rock, Tuxis	10 VIII 72	present					England, Duffy
	23 VI 75	16	1.9±.2		2	—	Webb, Duffy

Appendix Table 1 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
15. Falkners Island	28 VI 72	118 (includes Roseates)+ 44D					Richards
	8 VII 72	373	2.0±.04	1	—		Poole, Duffy
	27-29 VII 72			108			Poole
	10 VIII 72	22+62D	1.5±.14	49	17		England, LaFarge, Poole, Duffy
	23 VI 75	604+23D	1.9±.03	148	8		Webb, Duffy
16. The Big Mermaid	8 VII 75	18		16	—	Male	
19. Norwalk Islands	VI 72	12				de la Torre	
20. Bluff Island	74						<i>Am. Birds</i> 29:135
	18 VI 75	36	2.5±.1	60 pr.	32	1	Greenway, M. LeCroy, Lapham, Farrand
	25 VI 75				38		Greenway, M. LeCroy, Lapham, Farrand
	31 VII 75	29D					Webb, Duffy
21. Diving Island	18 VI 75	6	2.5±.3		23		Greenway, M. LeCroy, Lapham, Farrand
<b>II.</b>							
3. Port Jefferson	VII 74	present					Harwood
	30 VII 75			110 F			Webb, Duffy
5. Stony Brook	3 VIII 72	3D			1		England, Poole, Duffy
	30 VII 75			5 F			Webb, Duffy
8. Eatons Neck	15 VII 72	27M		54 F			Ruppert
	12 VII-15 VIII 72						Ruppert
	23 VI 73	35 M			19	2	Ruppert
	74-75	0					Ruppert

Appendix Table 1 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Sources
10. Caumsett	29 V 75	24			6		Ruppert
	30 VI 75						Ruppert
<b>III.</b>							
1. Watch Hill	72	1					Rozsa
	VII 73	2					Rozsa
	74	1					Rozsa
	18 VII 75	0					Van't Hof, Webb, Duffy
2. John Boyle Island	14 VII 72	267	1.8±.03		59	2	Poole, Duffy
	13 VII 73	300E					Wilcox ( <i>Am. Birds</i> 27:850)
	17 VII 75	0					Van't Hof, Webb, Duffy
5. Unnamed island, Moriches	18 VII 75	230+22D	1.9±.04		90		Van't Hof
6. West I., Moriches	12 VII 72	209	2.0±.03		36	2	Poole, Duffy
	2 VII 75			1,000 (incl. Roseates)			Wilcox
	18 VII 75	11	1.7±.1		524		Van't Hof, Webb Duffy
7. East I., Moriches	14 VII 72	247	2.0±.04		38		Poole, Duffy
	3 VII 73			800 F			Wilcox
	18 VII 75	0					Van't Hof, Webb, Duffy
12. Lanes Island	14 VII 72			800 F			Wilcox
	9 VII 73	840E					McGinnis ( <i>Linn. Newsl.</i> Sept. 1973)
	1 VII 75			800 F			Wilcox

Appendix Table 1 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
13. Sandbar, Can 9	12 VII 72	0					Poole, Duffy
	17 VII 75	96+8D	1.9±.06		7		Van't Hof, Webb, Duffy
14. Warner Island	12 VII 72	0					Poole, Duffy
	17 VII 75	104+4D	1.6±.05		18		Van't Hof, Webb, Duffy
15. Shinnecock Sandbar	12 VII 72	379	2.2±.04	1,000 F	3		Poole, Duffy
	13 VII 73			(renewing)			Wilcox
	17 VII 75	160+29D	1.7±.05				Van't Hof, Webb, Duffy
<b>IV.</b>							
1. Flanders Bay	11 VI 75			60 F			Wilcox
2. Red Cedar Point	27 VI 75	4	1.5±.3	10 F			Webb, Duffy
4. Robins Island	VI 72	100E					Smith
	17 VII 72	0					Stoutenburgh, Poole, Duffy
	27 VI 75	100E					Duffy
6. North Sea	16 VII 72	0					Poole, Duffy
	27 VI 75	18			2		Webb, Duffy
7. Laughing Water	27 VI 75			2 F			Webb, Duffy
8. Southold	15 VII 72	289	1.97±.03		276	37	Stoutenburgh, Poole, Duffy
	7 VIII 72	15+56D			180	8	England, Poole, Duffy
	10 VII 73	500E					Carter, Hays, Duffy
	74	500E					Cormans, Cormans
	20 VI 75	487M	2.12±.04				Hays, Webb, Duffy

Appendix Table 1 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
V.							
4. Gull I. Three Mile Hbr.	26 VI 75	244M	2.15±.04	21			MacFarlane, Webb, Duffy
	71	3585M					Hays
	72	2865M					Hays
5. Great Gull Island	73	2748M					Hays
	74	2753M					Hays
	75	2874M					Hays
6. Gardiners Pt. Ruin	7 VII 72	0					Duffy
	6 VII 73	0					Duffy
	8 VII 74	present					Carter, Hays, Duffy
	19 VI 75	112	2.4±.06	7	2		Hays, Webb, Duffy
	20 VI 75	121M	2.4±.06	19	2		Hays, Webb, Duffy
	3 VII 75			68	4		M.LeCroy, Will, Webb, Duffy
	21 VII 75		"virtually no signs of colony"				Van't Hof
7. Bostwick Pt.	4 VII 70	150M					Duffy
	22 VI 71	226M					Duffy
	VI 72	246					Puleston ( <i>Kingbird</i> 22:191)
	7 VII 72	0					Duffy
	7 VII 73	0					Duffy
	8 VII 74	0					Duffy
	19 VI 75	0					Webb, Duffy

Appendix Table 1 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
8. South Pt., Gardiners I.	22 VI 71	66					Duffy
	14 VIII 72	100E					Poole, Duffy
	7 VII 73	102M	1.6±.45				Duffy
	16 VIII 74	100E					Duffy
	19 VI 75	115	2.3±.07		3		Hays, Webb, Duffy
	25 VI 75	178M	2.0±.06		5		Brash, Webb, Duffy
	21 VII 75						Webb, Duffy
9. Cartwright Island	1 VIII 75	169M	1.95±.06		15	1	MacFarlane, Ehrlich, Hays, Parkes
	2 VII 75	142	2.4±.06				Webb, Duffy
	11 VII 75				14		MacFarlane, Webb
11. Hicks Island	9 VII 72	208	2.25±.05		1		Poole, Duffy
	6 VIII 72	86+70D	1.8±.07		29		England, Poole, Duffy
	26 VI 73			150 F			Wilcox
	22 VI 74			50 F			Wilcox
	13 VI 75	107M					Houde, Biderman
12. Star Island	VI-VIII 75	193M					Houde, Biderman
	27 VI 74	2					Wilcox



## Appendix Table 2

## Roseate Tern Colonies: The Survey Data

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
<b>I.</b>							
7. Shore Rock	11 VIII 72	10D					LaFarge, Poole, Duffy
	24 VI 75	6	1.3±.21				Webb, Duffy
8. Waterford Island	24 VI 75	11	1.7±.19		7		Webb, Duffy
	4 VII 75	--			4		Parkes, Webb, Duffy
14. Falkners Island	8 VII 72	4	1.2±.07		1		Poole, Duffy
	27-29 VII 72	--			11		Poole
	10 VIII 72	4D			11		England, LaFarge, Poole, Duffy
	23 VII 75	14	1.8±.19		7		Webb, Duffy
<b>III.</b>							
5. Unnamed island, Moriches	18 VII 75			2+ F			Van't Hof
6. West Island, Moriches	12 VII 72	20	1.3±.01		1		Poole, Duffy
	18 VII 75	?		15+ F			Van't Hof, Webb, Duffy
7. East Island, Moriches	13 VII 73			25 F			Wilcox
	18 VII 75	inactive					Van't Hof, Webb
12. Lanes Island	9 VII 73	120E					McGinnis ( <i>Linn. Newsfl.</i> Sept. 73)
14. Warner Island	12 VII 72	0					Poole, Duffy
	17 VII 75	1	2				Van't Hof, Webb, Duffy
15. Shinnecock Bar	12 VII 72				1		Poole, Duffy
	17 VII 75	1	1				Van't Hof, Webb, Duffy

Appendix Table 2 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
<b>IV.</b>							
8. Southold	15 VII 72	1	1	4F	1		Poole, Duffy
	7 VIII 72				1		England, Poole, Duffy
	10 VII 73	3					Carter, Hays, Duffy
	VI 74	?					Cormans and Cormans
20 VI 75	6M	1.8±.17				Hays, Webb, Duffy	
<b>V.</b>							
4. Gull I., Three Mile	25 VI 75	12	1.9±.19				MacFarlane, Webb, Duffy
5. Great Gull Island	71	1266M					Hays
	72	1126M					Hays
	73	1229M					Hays
	74	965M					Hays
	75	733M					Hays
6. Gardiners Pt. Ruin	3 VII 75	1	1				LeCroy, Will, Webb, Duffy
7. Bostwick Pt., Gardiners I.	4 VII 70	12					Duffy
	71-75	0					Duffy, Puleston ( <i>Kingbird</i> 22:191)

Appendix Table 2 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
8. South Pt., Gardiners I.	22 VI 71	10					Duffy
	14 VIII 72	?					Duffy
	7 VII 73	59M	1.5±.56				Duffy
	16 VIII 74	0?					Duffy
	19 VI 75	20	1.3±.10				Hays, Webb, Duffy
	25 VI 75	20M	1.65±.11				Brash, Webb, Duffy
	21 VII 75	—			10		Webb, Duffy
9. Cartwright I.	1 VIII 75	8+3D	1.6±.26		3		MacFarlane, Ehrlich, Hays, Parkes
	11 VII 75	1					MacFarlane, Will
10. Hicks Island	9 VII 72	94	1.75±.05				Poole, Duffy
	6 VIII 72	68+32D	1.5±.08		55	1	England, Poole, Duffy
	26 VI 73			50F			McKeever, Wilcox ( <i>Am. Birds</i> 27:850)
	22 VI 74			50 pr.			Wilcox
VI-VIII 75	13 VI 75	29M					Houde, Biderman
		33M					Houde, Biderman

Appendix Table 3  
Least Tern Colonies: The Survey Data

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
I.							
1. Sandy Pt.	75			15 pr.			T. Hoehn
5. Ocean Pond, Fishers I.	20 VII 74			8 F			Horning
	4 VII 74			10 F			Horning
	9 VII 75			2 F			Horning
	21 VII 75			3 F			Horning
6. Bluff Point	75			5 pr.			Craig
10. Hatchett Point	74			7 pr.			Burt ( <i>vide</i> Craig)
	20 VI 75			14 I			Drennan ( <i>vide</i> Gaylord)
12. Menunketesuck I.	23 VI 75			50 F			Webb, Duffy
13. Hammonasset Pt.	23 VI 75			2 F			Webb, Duffy
17. Milford Pt.	71			3 pr.			Varza
	72			6 pr.			Varza
	73			20 pr.			Varza
	74			20 pr.			Varza
	75			0 pr.			Varza
18. Long Beach, Stratford	72			20 pr.			Varza
	73			35 pr.			Varza
	74			80 pr.			Varza
	75			50 pr.			Varza

Appendix Table 3 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
19. Norwalk Islands	75			5 pr.			Varza
<b>II.</b>							
1. Mattituck Inlet	71	present					Stoutenburgh
	15 VII 72	0					England, Poole, Duffy
	30 VII 75	0					Webb, Duffy
2. Mt. Sinai Hbr.	30 VII 75	0					Webb, Duffy
3. Port Jefferson	73	present					Anon. ( <i>Am. Birds</i> 27:850)
	30 VII 75			8 F	2		Webb, Duffy
4. Flax Pond, Crane Neck	30 VII 75			6 F			Webb, Duffy
5. Stony Brook Hbr.	3 VIII 72	present			1		England, Poole, Duffy
	73						Buckley ( <i>Am. Birds</i> 27:850)
	30 VII 75			28 F			Webb, Duffy
7. Crab Meadow	73			50 pr.			Frenke ( <i>Am. Birds</i> 27:850)
	15 V 74	few					Ruppert
	75	0					Ruppert
8. Eatons Neck	72	865 M		600 pr. E			Ruppert
	22V-23 VI 73	73					Ruppert
	74	0					Ruppert
	75			250 F			Ruppert
9. East Neck, Lloyd Neck	73			30 pr.			Frenke ( <i>Am. Birds</i> 27:850)

Appendix Table 3 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
10. Caumsett State Pk.	25 V 72			30 F			Ruppert
	9 VI 72	2					Ruppert
	29 V 73			50 F			Ruppert
	20 VI 73	121	1.8±.04		20		Ruppert
	26 V -13 VI 74	167 M					Ruppert
	29 V 75			200 F			Ruppert
11. Centre Island	7 VI 73			6 F			Cioffi
	74 -75			0			Cioffi
<b>III.</b>							
1. Watch Hill	72			75 pr.			Rozsa
	72			100 pr. E			Duffy and Poole (1973)
	13 VI 73	169	1.8±.03		2		Rozsa
	2 VII 74	55	1.65±.06		4	1	Rozsa
	18 VII 75			58 F			Van't Hof, Webb, Duffy
3. Smith Pt.	18 VII 75			34 F			Van't Hof
4. Smith Pt. County Park	72-75			30-40 pr.			Lauro ( <i>in litt.</i> ; <i>Am. Birds</i> 27:850)
	14 VII 72				1		Poole, Duffy
7. East I., Moriches	12 VII 72	60	1.6±.06		18	3	Poole, Duffy
	18 VII 75	0?		0			Van't Hof, Webb
9. Cupsogue County Pk.	12 VII 72	18					Poole, Duffy
	73	40-50E		52 F	12		Poole, Duffy
10. Tiana Beach	4 VII 74	1		60-70 F			Salzman (1973)
				6-8 F			Gleick



Appendix Table 3 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
11. Tiana Beach	73 75	30-35E several					Salzman (1973) Bietel ( <i>fide</i> Van't Hof)
16. Barrier Beach, Shinnecock	17 VII 75	6 E		0			Salzman (1973) Webb, Van't Hof, Duffy
17. Middle Pond, Shinnecock	17 VII 75			6 F			Van't Hof, Webb, Duffy
18. Mecox	11 VII 72 73 74 24-25 V 75 17 VII 75	22		70 F 100 pr. 20 pr. 25 pr. 50 F		24	Poole, Duffy Wilcox ( <i>Am. Birds</i> 27: 850) Fisk (MS) McKeeper Van't Hof
<b>IV.</b>							
1. Flanders Bay	1 VII 75			30 F			Wilcox
2. Red Cedar Pt.	27 VI 75	14	1.8±.11	140 F			Webb, Duffy
3. Red Creek Pond	27 VI 75			8 F			Webb, Duffy
4. Robins Island	27 VI 75	?		3 F			Duffy
5. Bullhead Bay	27 VI 75			39 F			Webb, Duffy
6. North Sea Hbr.	16 VII 72 27 VI 75	0		0 30 F			Poole, Duffy Webb, Duffy
7. Laughing Water	VI 72 27 VI 75	4+	1.7±.48	5 pr. 18 F			Stoutenburgh Webb, Duffy

Appendix Table 3 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
9. Long Beach, Noyac	11 VII 72			28 F		6	Poole, Duffy
	26 VI 75			8 F			MacFarlane, Webb, Duffy
10. Conkling Pt.	10 VII 73			5 pr.			Hays
	27 VI 75			0			Webb, Duffy
<b>V.</b>							
1. Northwest Hbr.	26 VI 75	22+		100 F	1	2	MacFarlane, Webb, Duffy
2. Cedar Pt.	9 VII 72			present			Poole, Duffy
	10 VII 73			present			Hays, Carter, Obenhauer, Duffy
	26 VI 75			12 F			MacFarlane, Webb, Duffy
3. Sammy's Beach	25 VI 75			56 F			Brash, Webb, Duffy
	26 VI 75			61 F			MacFarlane, Webb, Duffy
8. South Pt., Gardiners Island	22 VI 71			15 F			Duffy
	14 VIII 72			present			Poole, Duffy
	73-75			0			Duffy
10. Acabonack	73			20 pr.			McKeever ( <i>Am. Birds</i> 27:850)
	4 VI 75			2 F			McKeever
11. Hicks Island	8 VII 71			5 F			Wilcox
	9 VII 72			32 I			Poole, Duffy
	73			0			McKeever ( <i>Am. Birds</i> 27:850)
	13 VI 75	41 M					Houde, Biderman
12. Star Island	VI-VIII 75	109 M					Houde, Biderman
	27 VI 74			10 pr.			Wilcox

# Appendix Table 4

## Black Skimmer Colonies: The Survey Data

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
<b>II.</b>							
3. Port Jefferson	73 30 VII 75	reported 0					<i>Am. Birds</i> 27:850 Webb, Duffy
5. Stony Brook	73 30 VII 75	present 0					<i>Buckley (Am. Birds</i> 27:850) Webb, Duffy
8. Eatons Neck	72 17 VII 73-75	2 0					Ruppert Ruppert
<b>III.</b>							
2. John Boyle Island	72 14 VII 73	present 10E					Poole, Duffy Wilcox ( <i>Am. Birds</i> 27:850) Van't Hof, Webb, Duffy
6. West Island, Moriches	72 12 VII 75	0 3		84 F	14	10+	Poole, Duffy Van't Hof, Webb, Duffy
7. East Island, Moriches	72 14 VII 75	35 0	2.0±.15	84 F	15		Poole, Duffy Van't Hof, Webb, Duffy
12. Lanes Island	72 14 VII 73	40E		20 F			Wilcox McGinnis ( <i>Linn. News</i> , Sept. 1973)
14. Warner Island	72 12 VII 75	0 1	4				Poole, Duffy Van't Hof, Webb, Duffy
15. Shinnecock Sandbar	72 12 VII 73	9	1.8±.36	60 F			Poole, Duffy Wilcox
	75 17 VII 75	10D+		50 F 200 F			Van't Hof, Webb, Duffy

Appendix Table 4 (continued)

Colony	Date	Nests	Clutch size	Number adults	YA	YD	Source
<b>IV.</b>							
2. Red Cedar Point	27 VI 75	2					Webb, Duffy
4. Robins Island	VI 72	1		3 F			Smith
8. Southold	15 VI 72	9	2.3±.35		2		Stoutenburgh, Poole, Duffy
	10 VII 73	10E					Carter, Hays, Duffy
	VI 74	12E					Cormans and Cormans
	20 VI 75	20M	2.6±.31		5		Hays, Webb, Duffy
<b>V.</b>							
7. Bostwick Pt., Gardiners I.	4 VII 70	1					Duffy
	22 VI 71	0					Duffy
	72-75	0					Duffy
8. South Pt., Gardiners I.	22 VI 71	2					Duffy
	14 VIII 72	5E					Duffy
	7 VII 73	6M					Duffy
	16 VIII 74	10					Duffy
	19 VI 75	8	3.4±.26				Hays, Webb, Duffy
	25 VI 75	10M	3.0±.30				Brash, Webb, Duffy
	21 VII 75	—			3		Webb, Duffy
	1 VIII 75	8	2.3±.1				MacFarlane, Ehrlich, Parkes, Hays
9. Cartwright Island	2 VII 75			3 F	2		Webb, Duffy
	11 VII 75				5		MacFarlane, Will
11. Hicks Island	9 VII 72	1	4				Poole, Duffy
	6 VIII 72	0					England, Poole, Duffy
	22 VI 74			2 pr.			Wilcox
	13 VI 75	1					Houde, Biderman

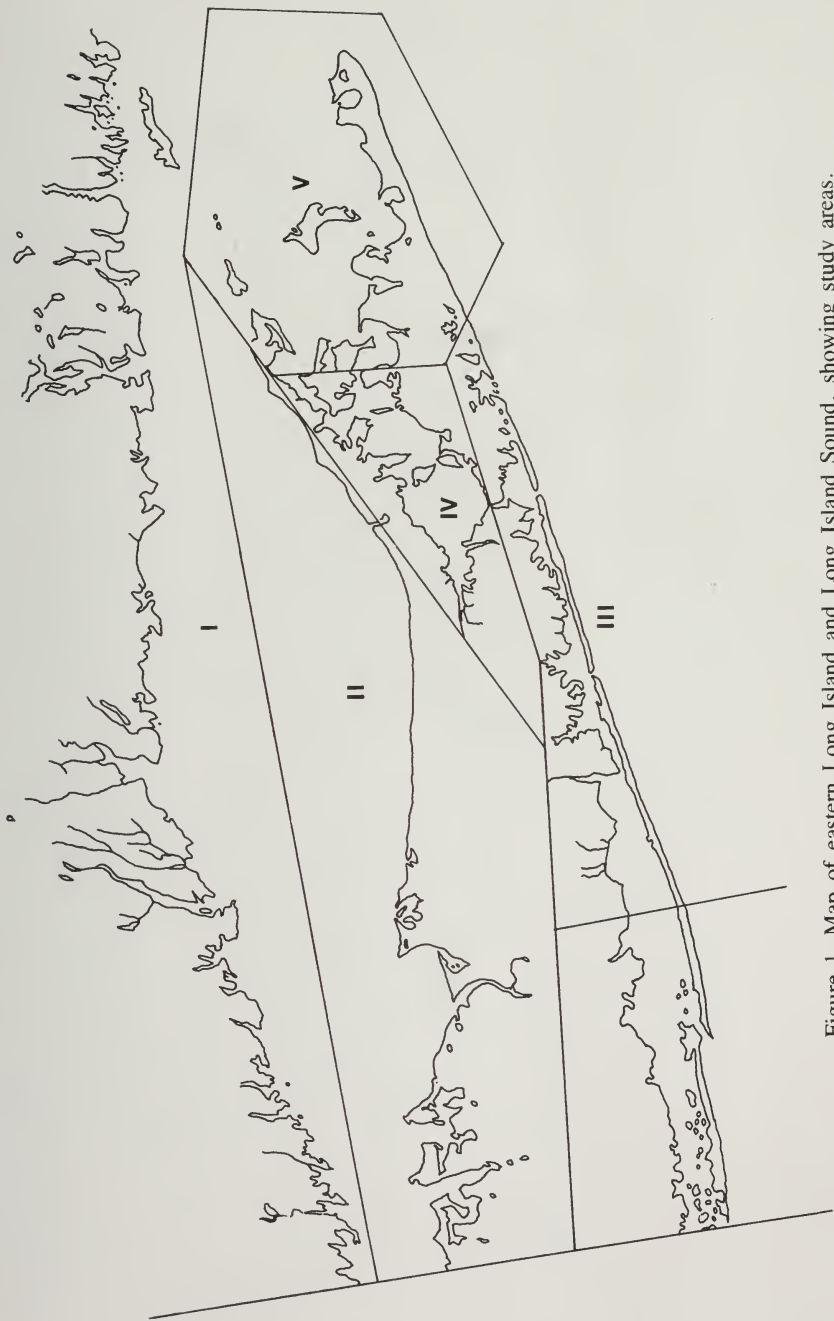
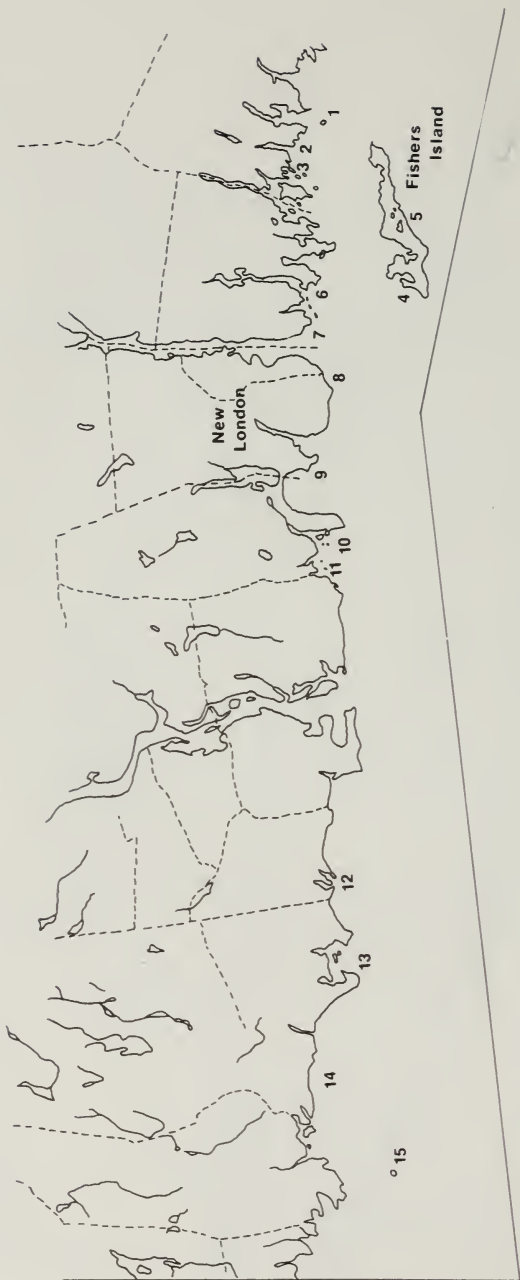


Figure 1. Map of eastern Long Island and Long Island Sound, showing study areas.





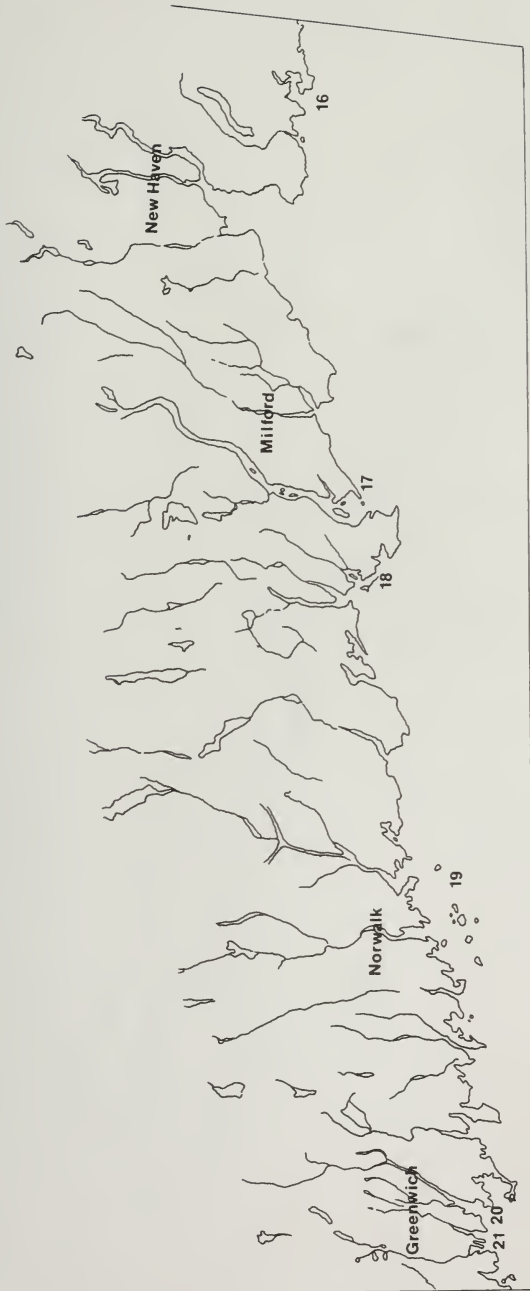
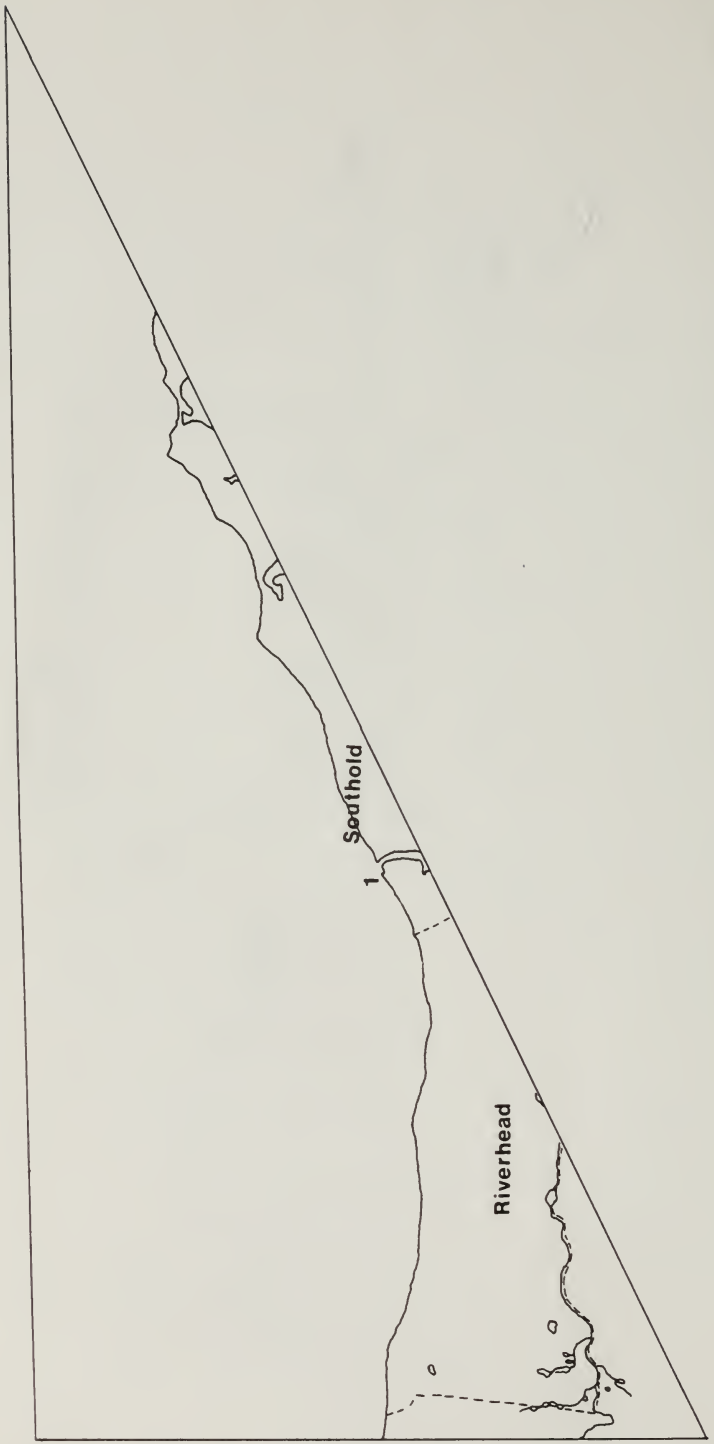


Figure 2. Map of Group I: The Connecticut coast and Fishers Island  
A. Eastern Area  
B. Western Area



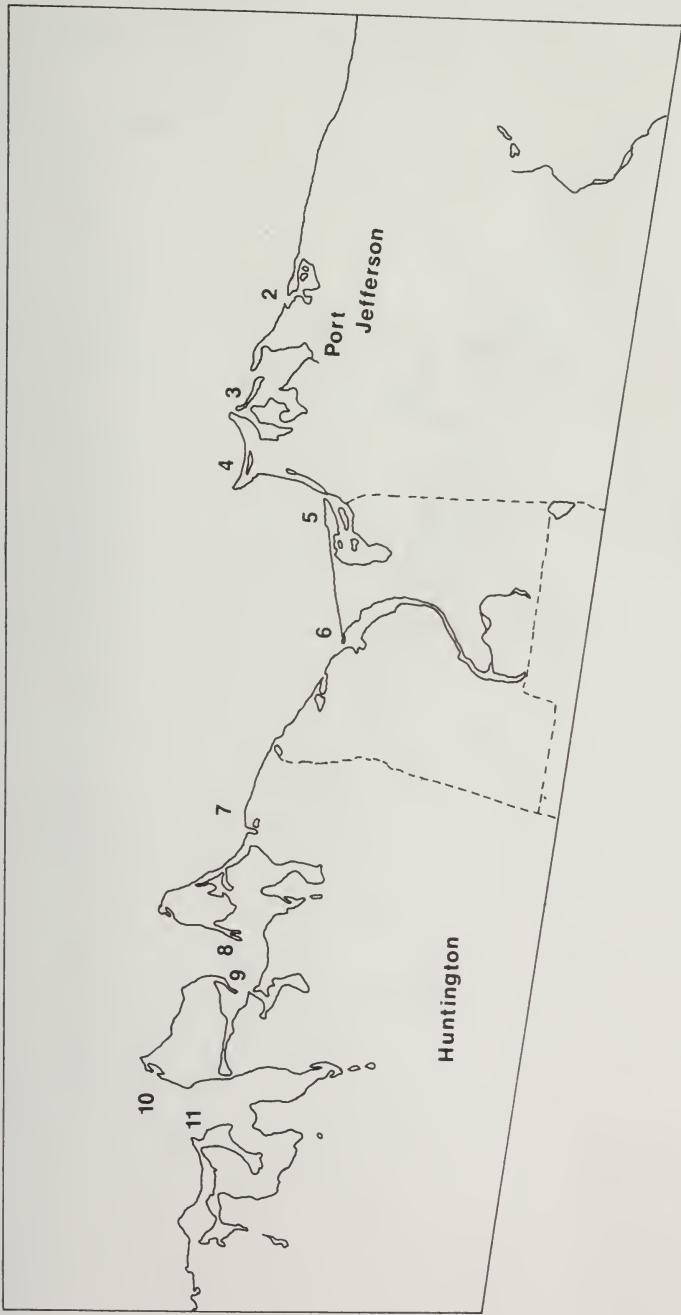


Figure 3. Map of Group II: North Shore of Long Island, east of Centre Island  
A. Eastern Area  
B. Western Area

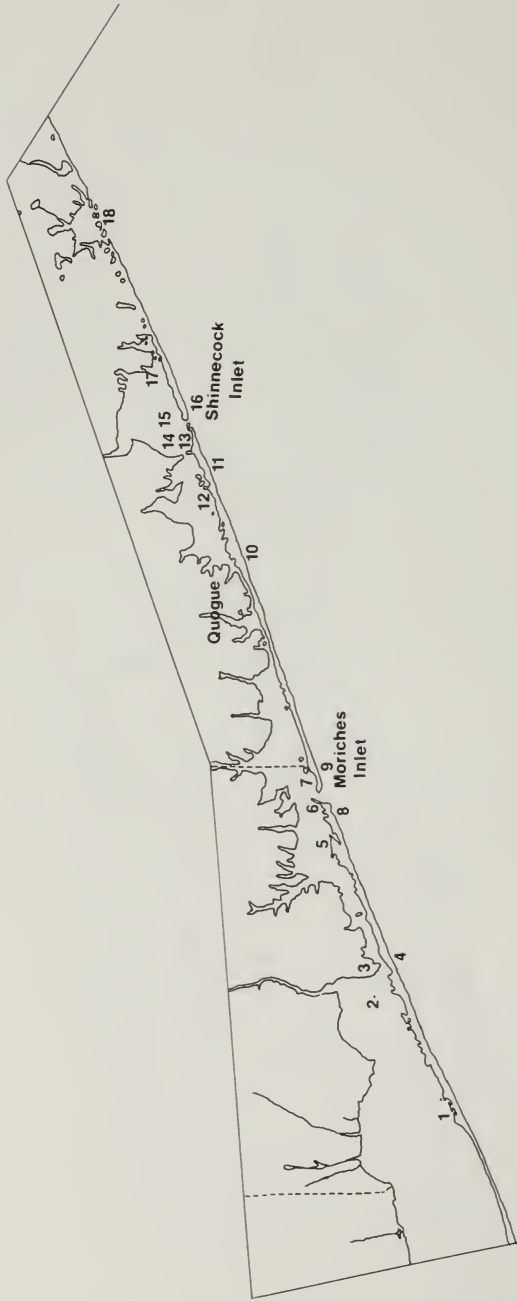


Figure 4. Map of Group III: South Shore of Long Island, east of Watch Hill, Fire Island

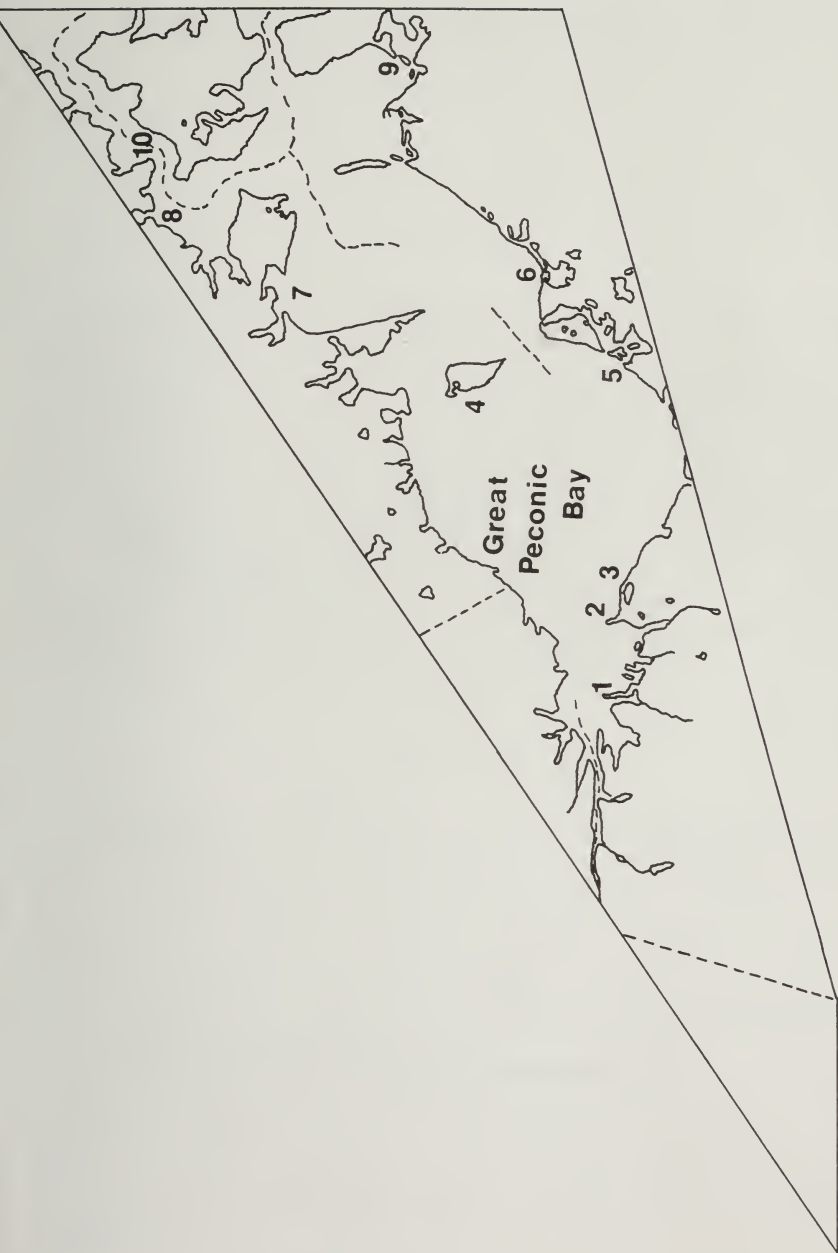


Figure 5. Map of Group IV: Peconic Bay, Long Island, east to Shelter Island

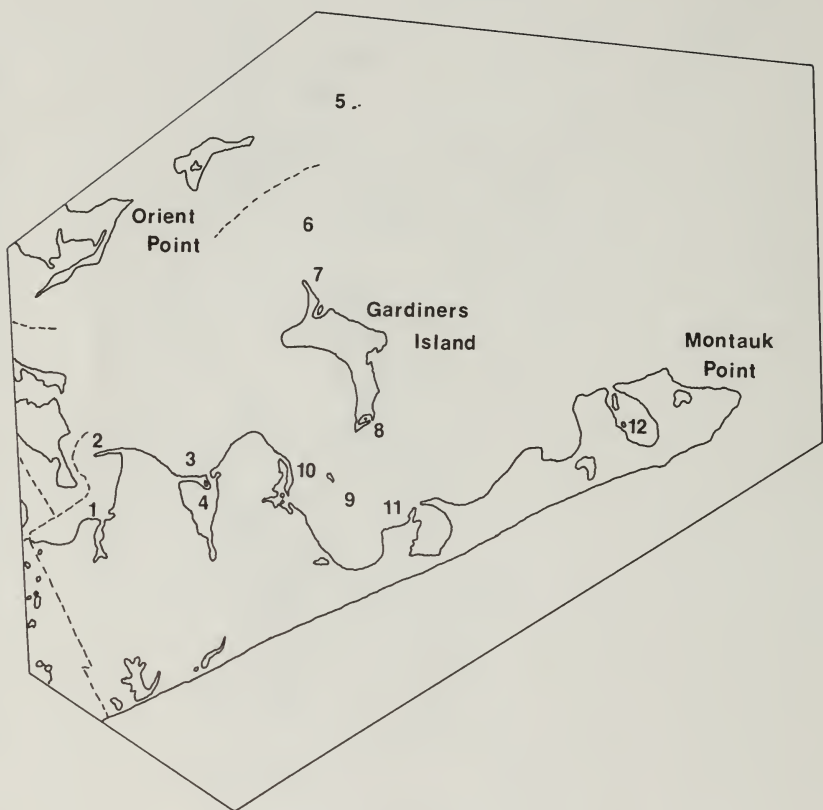


Figure 6. Map of Group IV: Extreme eastern Long Island and western Block Island Sound, except Fishers Island



# Low Productivity of Terns on Hicks Island, 1975

PETER HOUDE

## Introduction

On Hicks Island, N.Y., Common, Least, and Roseate Terns (*Sterna hirundo*, *S. albifrons* and *S. dougallii*) nest in close association with Herring and Great Black-backed Gulls (*Larus argentatus* and *L. marinus*). Over the last 30 years the range and numbers of breeding Herring and Great Black-backed Gulls have increased dramatically along the northern Atlantic coast (Drury 1973). This has often been accompanied by the displacement of other species by the gulls. Although this displacement has been noted, the events leading to it have not. In 1975 John O. Biderman and I, hoping to gain some insight into events which might lead to the displacement of one species by the other, undertook to determine what the productivity of the terns would be on Hicks Island. In this paper I describe the fate of tern eggs and young on the island.

## Study Area

Hicks Island, 41°1'N, 72°3'W, lies 2.6 miles southeast of Gardiners Island in Napeague Bay, Suffolk County, N.Y. It has an area of 20 acres and is composed entirely of sand. Wormwort (*Artemisia caudata*), Beachgrass (*Ammophila breviligulata*) and Poison Ivy (*Rhus radicans*) are abundant. Rose (*Rosa rugosa*), Giant Reed (*Phragmites communis*), Cordgrass (*Spartina alterniflora*) and Salt Hay (*S. patens*) are also present but distributed sparsely. The Meadow Vole (*Microtus pennsylvanicus*) breeds under driftwood throughout the island.

Breeding birds include Piping Plover (*Charadrius melodus*), Spotted Sandpiper (*Actitis macularia*), Herring Gull (*Larus argentatus*), Great Black-backed Gull (*L. marinus*), Common Tern (*Sterna hirundo*), Roseate Tern (*S. dougallii*), Least Tern (*S. albifrons*), Black Skimmer (*Rynchops niger*), Horned Lark (*Eremophila alpestris*), and Song Sparrow (*Melospiza melodia*).

The terns and gulls breed in four concentrations on Hicks. Most Common, Roseate, and Least Terns nest at the southern end of the island (Section A in map, Figure 1). A few Common Terns, two pairs of Roseate Terns, and several scattered pairs of Least Terns occupy the center of the island (Sections C and D). Most Herring and Great Black-backed Gulls breed south of mid-island (Section B). In addition, a few gulls of both species breed at the eastern end of the island (Section E).

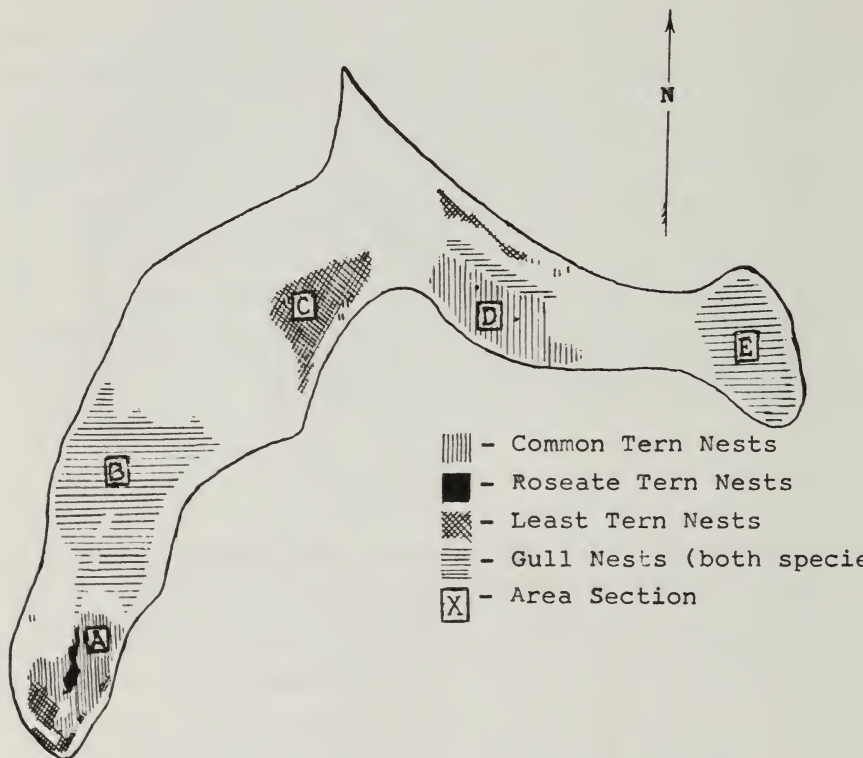


Figure 1. Map of Hicks Island and breeding concentrations.

### Methods

Between 13 June and 3 July 1975 John O. Biderman and I made a daily survey of all tern nests on the island. We devised a standard route, pacing through the colonies in ten-foot strips, to insure that no nests were

Table 1

## Fates of Eggs and Chicks of Common, Roseate, and Least Terns on Hicks Island, N.Y., 1975.

Species	Clutch Size	No. of Nests	No. of Eggs	No. of Eggs Disappeared or Broken Before Hatching	Percent of Eggs Disappeared	No. of Eggs Presumably Deserted	Percent of Eggs Deserted	No. of Eggs Hatched	Percent of Eggs Hatched	No. of Chicks Dead	Percent of Chicks Dead	No. of Chicks Banded with Plastic Leg-bands	Percent of Chicks Banded with Plastic Leg-bands	No. of Chicks Banded with U.S. Fish and Wildlife Bands	Percent of Chicks Banded with U.S. Fish and Wildlife Bands
LEAST	1 Egg	20	20	10	50	9	45	1	5	0	0	0	0	0	0
	2 Egg	85	170	118	69	24	15	28	16	2	7	0	0	0	0
	3 Egg	4	12	12	100	0	0	0	0	0	0	0	0	0	0
	Total	109	202	140	69	33	17	29	14	3**	10	0	0	4**	14**
COMMON	1 Egg	31	31	27	87	3	10	1	3	0	0	0	0	0	0
	2 Egg	69	138	102	74	23	15	13	9	1	8	11	85	0	0
	3 Egg	93	279	202	72	15	6	62	22	31	50	62	100	17	27
	Total	193	448	331	74	39**	9	78**	17	32	41	77**	99	17	22
ROSEATE	1 Egg	13	13	4	31	9	69	0	0	-	-	-	-	-	-
	2 Egg	16	32	28	88	4	12	0	0	-	-	-	-	-	-
	3 Egg	4	12	6	50	6	50	0	0	-	-	-	-	-	-
	Total	33	57	38	67	19	33	0	0	-	-	-	-	-	-
UNIDENTIFIED*	1 Egg	7	7	5	71	2	29	0	0	-	-	-	-	-	-
	2 Egg	14	28	25	89	3	11	0	0	-	-	-	-	-	-
	3 Egg	5	15	15	100	0	0	0	0	-	-	-	-	-	-
	Total	26	50	45	90	5	10	0	0	-	-	-	-	-	-

\*Eggs not distinguishable as either Common or Roseate.

\*\*These figures are larger than the sum of their constituent figures because of the addition of chicks that were not associable to any given nest (therefore, these chicks cannot be categorized by clutch size).

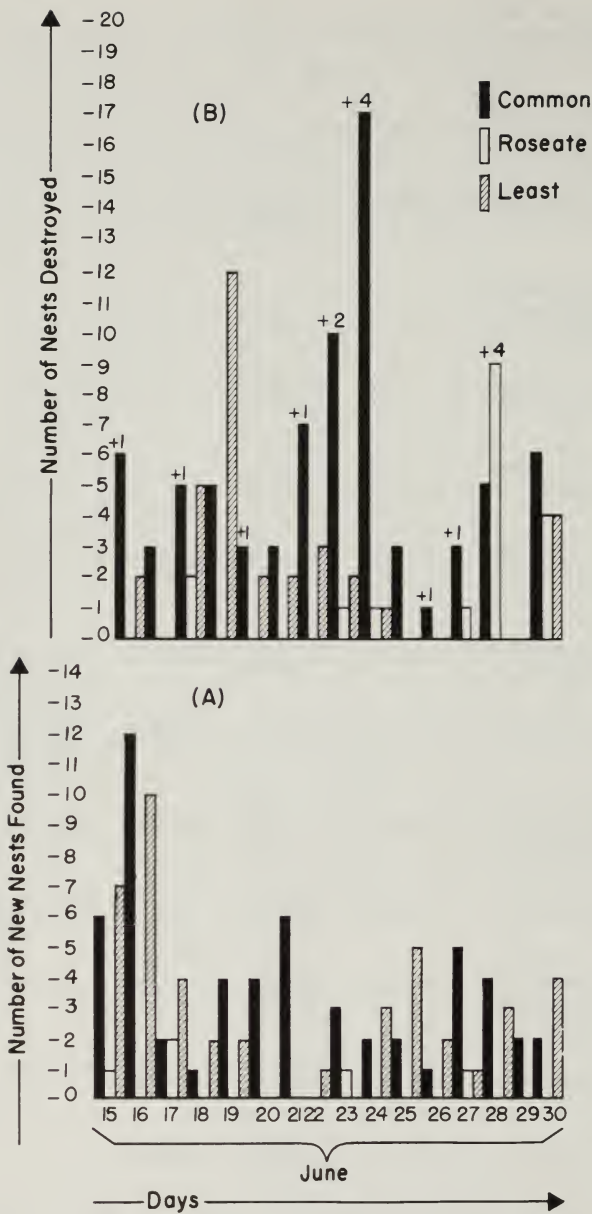


Figure 2. Common, Roseate, and Least Tern Nests, 15-30 June 1975.



Figure 3. Common, Roseate, and Least Tern Nests, 2-29 July 1975.

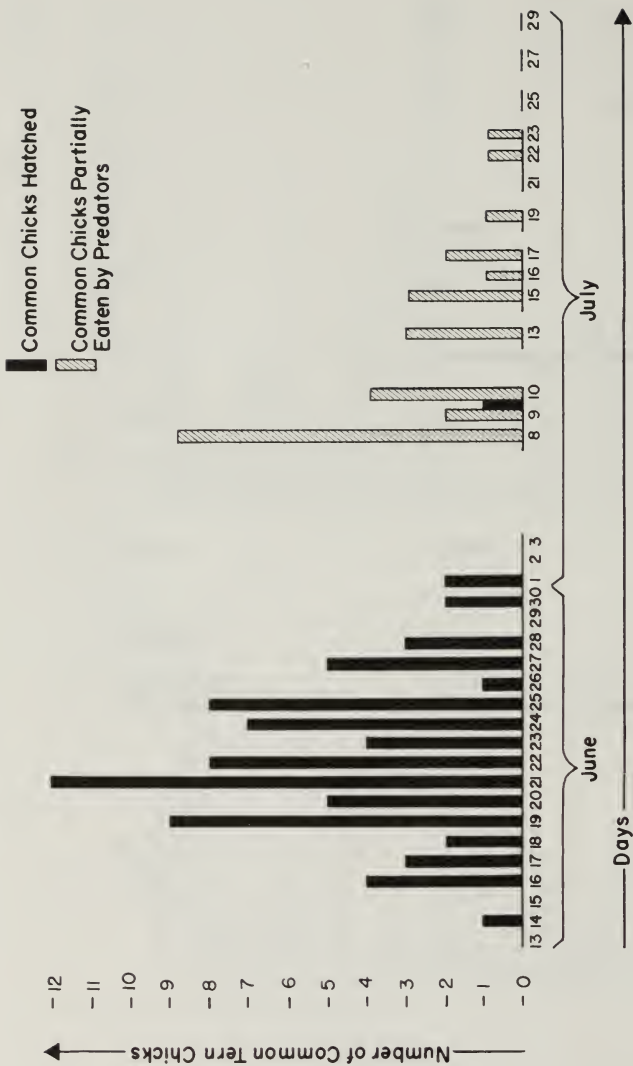


Figure 4. Common Terns hatched per day and Common Tern chicks found partially eaten by predators.



overlooked. Where Least Terns nested and where vegetation restricted our field of vision we paced in two to five-foot strips. We marked nests as we found them with numbered tongue depressors. As Common Tern chicks hatched they were given numbered plastic leg-bands. When the chicks grew old enough we rebanded them with U.S. Fish and Wildlife Service aluminum bands. Our marking methods for nests and young were similar to those used in the Great Gull Island tern colony (Hays and Risebrough, 1972). Least Terns were not banded at hatching as we did not have plastic bands that fit them.

From 8 July until 29 July 1975, we checked all nests every other day in order to minimize disturbance of the birds, except that on 11 and 12 July no survey was made because of heavy rainfall.

I collected and photographed dead terns found in the colonies as well as eggs emptied by predators. When we left the island on 29 July only three tern nests remained.

In Table 1, clutch size refers to the number of eggs found in a given nest. Dates (X axis) in Figures 2, 3, and 4 are given only for those days when a survey was made. It should be remembered that seemingly coincidental rises and drops between graphs (A) and (B) for July may actually represent accumulations of two days or more.

## Results

Upon our arrival on 13 June at Hicks we marked 107 nests of Common Terns, 29 nests of Roseate Terns, and 41 nests of Least Terns. Subsequently we found and marked an additional 86 nests of Common Terns, 4 nests of Roseate Terns, and 68 nests of Least Terns.

Eighty-six percent of the 757 tern eggs we found on Hicks Island failed to hatch. We noted that 554 (73%) eggs disappeared or were broken before the expected time of hatching. Ninety-six (13%) remained after expected time of hatching, presumably infertile or deserted by the adults. For the fate of all eggs, categorized by species, see Table 1.

A total of 107 terns (14% of the total eggs marked) hatched, all in the larger concentration (Figure 1, Section A) at the southern end of the island. A total of 78 Common Terns, from 30 nests (representing 10% of all eggs) hatched, and all but one were banded with plastic bands. Twenty-nine Least Terns from 18 nests (representing 4% of all eggs), and no Roseate Terns hatched.

Of the 107 terns that hatched we found 35 (33%) dead during our

surveys of the colonies. Thirty-two of these chicks were Common Terns (constituting 91% of the dead chicks) and three were Least Terns (constituting 9% of the dead chicks).

The 46 remaining Common Tern young that we marked with plastic bands are unaccounted for; however, we did see a number of flying young at the edge of the island which were still wearing our plastic bands.

## Discussion

Egg predation was apparently the greatest detriment to the productivity of the terns on Hicks Island. Although most eggs were simply missing, enough emptied egg shells were recovered to suggest a variety of predators. Holes through which eggs were drained varied in size and shape. Black-crowned Night Herons (*Nycticorax nycticorax*) (Collins, 1970); Crows (*Corvus brachyrhynchos*) (Croze 1970); Red-winged Blackbirds (*Agelaius phoeniceus*) (Pessino 1968); and Ruddy Turnstones (*Arenaria interpres*) (Parkes *et al.* 1971); have all been described as tern egg predators and were seen near Hicks regularly.

Herring Gulls have been described as robbers of available eggs of a number of species (Tinbergen 1960). I found footprints of individual Herring Gulls leading to nests with emptied eggs. Usually, several adjacent nests were robbed at a given time. I also found the egg of a Common Tern that showed impressions of what seemed to be the bill of a gull.

Twenty-seven of the 32 dead Common Tern young were found partially eaten. Each of them had similar wounds which leads me to believe they fell to a common predator, the Herring Gull (Houde 1977).

## Conclusion

The low productivity in the Hicks Island tern colony in 1975 was probably due to a number of avian predators, especially Herring Gulls. One could speculate that if this continued over a period of years terns nesting on Hicks Island might be reduced in numbers. The steps leading to the displacement of terns by other species are probably gradual as terns may survive for 20 years and continue to nest in the same colony. The specific influence of gulls and other individual species upon breeding terns may fluctuate yearly. Continuing studies must be made to fully understand the stability or decline of the entire colony with the passage of time.

## Acknowledgements

I would like to thank Helen Hays, Chairman of the Great Gull Island Project, for her invaluable advice and support during our survey and in the writing of this paper. I would like to take this opportunity to thank the Linnaean Society of New York and the American Museum of Natural History for the grant we received to carry out our work on Hicks Island. This paper is contribution No. 46 of the Great Gull Island Project.

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# Gull-Tern Interactions on Hicks Island, 1975

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## Introduction

In July 1975, while surveying tern colonies on Hicks Island, N.Y. (see Figure 1, Houde 1977), I noted excessive predation of tern eggs and nestlings. In an effort to determine specific predators of the terns I surveyed Herring Gull colonies on the island and observed natural and imposed interactions between gulls and terns.

## Methods

On 9, 16, and 29 July, I surveyed the gull colony at the southern end of Hicks Island, section B (Houde 1977). I paced through the colony in five-foot strips and banded a total of 130 Herring Gull nestlings. I collected and photographed regurgitated gull pellets and refuse at nest sites in order to summarize the gulls' feeding habits. Dead terns and fractured eggs I found in the tern colony were collected, photographed, and examined. Three young Herring Gulls that frequented the neighboring tern colony were collected and their stomach contents examined.

Observation blinds constructed in the periphery of the tern colony were used to observe natural and imposed interactions between the gulls and terns. The first series of trials of imposed interactions was designed to observe a gull's reaction to an unprotected tern chick. In these first three trials (1A, 18 July, 18:00-20:30; 1B, 20 July, 18:00-20:30; and 1C, 22 July, 18:00-21:00), I placed a mounted 24-day-old juvenile Common Tern near the shore of section A, the southern tern colony, and observed from a blind. In the fourth trial (1D, 22 July, 05:15-18:55), a live 13-day old Common Tern was used rather than the decoy. It was tethered in the same location.

The second type of trial was designed to observe interactions between a gull chick and a tern chick. In trial 2A, 22 July, 16:00-17:45, I restrained by tethers both a 13-day-old Common Tern chick and a Herring Gull

chick, approximately 14 days old. The radius of each tether completely overlapped that of the other. Neither allowed the chicks to wander from a defoliated plot, five feet in diameter. I built a roof over the plot to shield the chicks from the sun and from onlooking terns that would normally attack an intruding gull. The trial was performed within the southern tern colony. The gull chick was taken from well within the southern gull colony, to insure that it had no previous contact with terns. Neighboring gulls will quickly attack or eat gull chicks that wander from their nest territories (George 1963). I observed this trial from a blind.

The third trial (3A) was designed to identify nocturnal or dawn predators that I could not observe in the dark. On 22 July, 21:00 through 23 July, 08:00, I tethered a 13-day-old Common Tern at its nest site. The radius of the tether and an additional foot beyond was cleared of all rocks to a depth of five inches. I dumped loose sand over the area described so that footprints would be discernable. No observations were made during this trial.

The fourth series of trials was designed to determine whether gulls prefer not to eat tern eggs of a particular color and to observe the particular manner in which they open and empty eggs. Egg predation by Herring Gulls is well documented (Tinbergen 1960, Barry 1956). There were three trials: 4A, 25 July, 12:00-12:45; 4B, 26 July, 12:00-16:00; and 4C, 27 July, 10:00-15:00. In trial 4A, eight Common Tern eggs were placed in mock nests between the southern gull and tern colonies, sections A and B. Two eggs were dyed red, two blue, two black, and two were left their natural color. All eight were older than 28 days, the maximum period of incubation of Common Terns (Hays and LeCroy 1971) and were therefore either deserted and/or infertile. No observations were made in trial 4A. In trials 4B and 4C two red Common Tern eggs were placed in mock nests as described. Both of these eggs were 16 days old, less than the minimum incubation period of the Common Tern. In trial 4C, I placed a mounted 24-day-old juvenile Common Tern one yard away from the mock nest in order to photograph an attack on either the eggs or the decoy tern. I observed trials 4B and 4C from a blind.

### **Results: Observations**

While surveying the southern gull colony on Hicks Island I found pellets containing the remains of adult Common and Least Terns as well as



other vertebrates (Table 1). One of the Least Terns was banded and nested in the southern tern colony on Hicks.

In the southern tern colony I found 25 partially eaten Common Tern chicks near their nests and roost areas. In addition I found two more within the southern gull colony. Each of the dead young terns had superficial wounds in the parietal and quadrate regions of the head. Tufts of feathers or skin were missing from the back of the neck of most of the chicks. The scapular region was eaten from 25 of the dead terns. Scapular wounds varied in depth from just below the skin to deep within the coelom. The entrails were eaten, through the back, from those whose coelomic cavities were opened. Although many of the internal organs were eaten, the liver seemed to be the preferred part. Four of the dead chicks were found on their backs, one of these in the southern gull colony. The pectoral muscles and other conspicuous large muscle groups were eaten from these four, in addition to the injuries described above. The weaker posterior portion of the keel of the sternum was broken or missing in three of the chicks whose breast muscles had been eaten. No tooth marks could be discerned on any of the carcasses, but I nevertheless examined all vole nests on the island. I did not find feathers or any signs of birds in their nests.

The dead tern chicks were between the ages of eight and 30 days. The average age of these birds was 18 days. I extrapolated the ages of four of the chicks because they had obviously been killed before the day I found them. Their ages were: 8 days (1), 12 (1), 13 (3), 14 (2), 15 (1), 16 (3), 17 (3), 18 (1), 19 (1), 20 (1), 22 (5), 24 (1), 25 (1), 26 (2), and 30 days (1).

I recorded natural interactions between gulls and terns that I observed. The most common was the mobbing of gulls that entered the tern colony; but on 18 July, 19:00-19:03, I watched an adult Herring Gull pursue and attack an adult Common Tern. The pursuit was atypical of piracy because the gull repeatedly and forcefully struck the tern from above. The gull was not in a favorable position to retrieve falling fish.

I noted Herring Gull chicks roaming about the southern tern colony every day of our survey in July. Oddly, the young gulls did not flee from the colony when attacked by aggressive Common Terns. Common Terns will vigorously and relentlessly attack any sizeable intruder. On three occasions I found young Herring Gulls standing over the carcasses of young terns. I collected these three gulls, but found only fish and crabs in their stomachs.

The above-described evidence suggested to me that some Herring

Gulls were preying on the terns. I devised the following trials to further my knowledge of gull-tern interactions and to investigate the possibility of predation.

### **Results: Imposed Interactions**

In trial 1A I watched an adult Herring Gull attack my mounted juvenile Common Tern. The gull first bit the decoy tern in the parietal region of the head. It continued to bite and peck the decoy in the back of the neck and scapular regions. After it tore a wing off the decoy I frightened it away. This gull was easily recognized by two wounds in its head that were probably inflicted by Common Terns. At this gull's roost I found two pellets containing feathers and bones of adult Least Terns. One of the Least Terns was banded and had nested in the southern tern colony.

During trial 1B an adult Herring Gull cautiously approached the mounted juvenile tern. However, after it examined the decoy for 1¼ minutes it continued walking along the shore, showing no further interest in the decoy. In similar trials 1C and 1D no gulls approached the decoy or live Common Tern chick.

In trial 2A I confined both a young Herring Gull and young Common Tern together to observe interactions. Neither bird showed signs of aggressiveness; in fact they sat shoulder to shoulder.

In trial 4C I placed a mounted juvenile Common Tern adjacent to the mock tern nest to photograph an attack on the decoy. Three Herring Gull chicks approached within a few yards of the decoy and observed it for eight minutes. At 10:43 an adult Herring Gull arrived and approached the decoy. It first bit the decoy in the head and then continued to strike and bite it on the back of the neck and scapular region. The three gull chicks observed this and joined the adult. The young gulls picked the decoy apart, however, by pecking and ripping at all parts of it randomly.

On the morning of 23 July, I examined the half-eaten carcass of the tethered 13-day old Common Tern used in trial 3A. It had been eaten in the same characteristic manner that I described above for all dead Common Tern chicks. The loose sand showed footprints of a single gull.

During trial 4A all eight colored and uncolored tern eggs were eaten. The shells bore large holes or were halved. They resembled many of the emptied eggs we found in the tern colonies on the island (Houde 1977). I am not sure that gulls were responsible for the broken eggs in this trial



because I was not there. In trials 4B and 4C the tern eggs remained unharmed.

## Discussion

Remains of Common and Least Terns in gull pellets indicate that certain gulls were eating both species. Because I found a freshly killed Common Tern chick in the southern gull colony I suspected that the gulls were responsible for killing the terns as well as for eating them. *Rigor mortis* did not appear in this chick until after I found it, and Herring Gulls were the only species I saw leave the area when I arrived.

On Great Gull Island, Herring Gulls have been observed catching and eating young Common Terns. I found a pellet containing a young Roseate Tern on Gull Island that resembled those I found on Hicks.

The attacks made on the mounted juvenile tern used in trials 1A and 4C would probably have resembled those I found in the 27 dead juvenile terns, had the decoy actually been a live tern chick. The predator's manner of attack in the trials and on the 27 tern chicks I found was routine, characteristic, and similar. The first bite was made on the head and would serve to daze or stun the intended prey. I found one live Common Tern chick with only this head injury. It had difficulty balancing when standing, was apparently blinded by the injury, and remained sedentary.

Young terns were only partially eaten, probably because the predators were driven from the colony before they finished eating. I assume so few pellets were found containing terns because of the small parts eaten, which were mostly soft tissue.

Food remains that surrounded gull nests on Hicks suggested that the adult gulls were specialized feeders and therefore I believe that only a few gulls were responsible for killing the terns. In checking various gull nests I found only crab shells at one nest, only bivalves at another nest, and only bird remains at another. Trial 4C indicates that young gulls may learn to feed on terns by observing adult gulls.

As Common Terns approach fledging age, 23-28 days (LeCroy and LeCroy 1974), they become increasingly conspicuous, and their parents are probably more often away fishing to supply the chicks' increasing appetite. Adult Herring Gulls were most often seen along the shore of the southern tern colony at dawn and dusk, when the adult terns prefer to fish. (This is why, I believe, the average age of the dead tern chicks was 18 days.) Thus the gulls would have more access to the older, unprotected chicks. This

**Table 1**  
**Gull Diet on Hicks Island**

<b>Mollusca</b>				
Oyster	<i>Ostrea virginica</i>	A		D
Razor Clam	<i>Ensis directus</i>			D
Surf Clam	<i>Spisula solidissima</i>	A		D
<b>Arthropoda</b>				
Mud Crab	<i>Panopeus herbstii</i>		B	
Spider Crab	<i>Libinia emarginata</i>	A	B C	D
<b>Teleost</b>				
Bluefish	<i>Pomatomus saltatrix</i>	A	C	D E
Porgy	<i>Stenotomus chrysops</i>	A	C	D E
Sand Eel	<i>Ammodytes americanus</i>		B	
Sea Robin	<i>Prionotus carolinus</i>	A	C	D
<b>Mammalia</b>				
Norway Rat	<i>Rattus norvegicus</i>			D E
Meadow Vole	<i>Microtus pennsylvanicus</i>		C	
<b>Aves</b>				
Wilson's Storm-Petrel	<i>Oceanites oceanicus</i>			D
Unidentified Storm-Petrel	<i>Oceanodroma</i> sp.		C	
American Kestrel	<i>Falco sparverius</i>		C	D
Chicken	<i>Gallus domesticus</i>		C	D E
Turkey	<i>Meleagris gallopavo</i>		C	D E
Common Tern	<i>Sterna hirundo</i>		C	
Least Tern	<i>Sterna albifrons</i>		C	
Herring Gull	<i>Larus argentatus</i>		C	D
Mourning Dove	<i>Zenaida macroura</i>			D
Blue Jay	<i>Cyanocitta cristata</i>		C	D
Common Grackle	<i>Quiscalus quiscula</i>		C	D
Red-winged Blackbird	<i>Agelaius phoeniceus</i>		C	D
B.h. Cowbird	<i>Molothrus ater</i>		C	
Am. Robin	<i>Turdus migratorius</i>		C	D
Gray Catbird	<i>Dumetella carolinensis</i>		C	
Unidentified warbler	<i>Dendroica</i> sp.		C	
Unidentified sparrow	—		C	
Starling	<i>Sturnus vulgaris</i>		C	
<b>Miscellaneous</b>				
Beachgrass	<i>Ammophila breviligulata</i>		C	
Aluminum can tops	—		C	D E
Toilet paper	—		C	D E
Plastic bags	—		C	D E

*The various items listed were identified by: A) observation of feeding; B) examination of stomach contents of collected gulls; C) dissection of regurgitated pellets; D) examination of items brought by gulls to their nests. Food items that were likely to be obtained from local refuse dumps or fishermen are indicated by E.*

accords with my observations that the average age of the dead tern chicks showing signs of predation was 18 days.

### Acknowledgements

I would like to thank Helen Hays, Chairman of the Great Gull Island Project, for her invaluable advice in the writing of this paper. I would like to take this opportunity to thank the Linnaean Society of New York and the American Museum of Natural History for the grant I received to carry out my work on Hicks Island. This paper is contribution No. 47 of the Great Gull Island Project.

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# A Water Bird Study of a Limited Area: Jerome Park Reservoir

WALTER SEDWITZ

## Introduction

Jerome Park Reservoir, in the northwest Bronx, New York City, is a concentration point for migrating and wintering water birds. In a desire to understand what causes changes in the numbers and habits of these birds, I began in 1962 to gather data from personal observations at the reservoir. This study continued uninterrupted into early 1976.

## Location and Structure of Reservoir

The physical aspect of the reservoir and surrounding area reveal some of the reasons for its attractiveness to water birds. A mile to the west is the Hudson River, a half-mile southwest is the Harlem River, both rivers being connected at Spuyten Duyvil. The reservoir is situated on a north-south ridge running parallel to both rivers. A chain link fence and black-top single lane road encircle the reservoir. On the east, the reservoir is bordered by educational institutions and Harris Park, a large and wide athletic field. On the south and western sides of the reservoir are two small parks and rows of apartment houses.

At the north end of the reservoir is a concrete dam which slopes gently into the water. At the top of the dam is a grassy and brushy area. The north side, the part of the reservoir closest to Van Cortlandt Park, is the section generally favored by ducks, gulls, and, occasionally, other water birds.

The Jerome Park Reservoir, at its longest, is nine-tenths of a mile. The average width is about 275 yards. It has a depth of no more than 20 feet, the bottom being concrete, the sides fieldstone. There are two filtration and chlorination stations. This reservoir, together with the Hillview and Central Park reservoirs, supplies New York City with drinking water. The water entering Jerome Park Reservoir is given the last stages of purification before entering city water taps. Because of the purity of the

water, micro-organisms and plants have little chance to proliferate. In spite of these conditions, some insects, mollusks, and fish have been found within the waters of the reservoir.

### Period, Time, and Locality of Observations

During the 14 years of records, 585 trips were made (Table 1). Ninety-five percent of the observations were made about one-half hour after dawn on clear days, and seldom later than nine o'clock. The rest were made between noon and three p.m. It was found that in the early hours the birds were undisturbed and more easily watched. During the first five years, a walk around the reservoir was the usual method for watching water birds, but it was noted that there were certain areas that the birds favored, while long stretches had few or no birds. Thereafter, the birdless areas were passed by quickly and more time was spent observing the dense flocks. Wind, ice, time of day, and season were very important factors influencing the location of the flocks.

**Table 1.** Number of Field Trips Made During the 14-Year Survey of Water Birds on Jerome Park Reservoir, by Year and Month

Number of Trips Per Year		Trips per Month					
1962*	27	1970	54	Jan.	46	Aug.	44
1963	34	1971	43	Feb.	40	Sept.	60
1964	36	1972	32	Mar.	70	Oct.	62
1965	35	1973	41	Apr.	58	Nov.	65
1966	33	1974	39	May	42	Dec.	54
1967	38	1975	48	June	21		
1968	58	1976*	3	July	23		
1969	64						
Totals		585		585			

\*Observations made for one-half year.

Between 9 December 1966 and 28 May 1967, the Jerome Park Reservoir was drained of water and accumulated mud. The bottom was flat concrete, with a network of large-diameter steel pipes. Still, the remaining pools of water as well as fresh rain water attracted ducks and gulls. Even when the bottom of the reservoir was completely dry, it continued to be



used by the gulls as a resting place. As soon as the reservoir was completely re-filled, the water birds of the spring season returned, more or less in their usual pattern.

### Species Accounts

COMMON LOON (*Gavia immer*). 26 April 1970: Three breeding plumage loons in flight over the reservoir at 8 a.m. 11 May 1975: A single bird over the reservoir at 9 a.m.

RED-NECKED GREBE (*Podiceps grisegena*). 8 January 1963: A winter-plumaged bird, at dawn on the partially frozen reservoir.

HORNED GREBE (*Podiceps auritus*). 5 February 1971: A winter-plumaged bird sitting on ice at north end of reservoir. 14 March 1971: a grebe, dead a long time, the tissues completely dried out, found outside the fence at the southeast corner.

PIED-BILLED GREBE (*Podilymbus podiceps*). 26 November 1972: A single bird near the center of the reservoir, at dawn.

MUTE SWAN (*Cygnus olor*). Seven records for this swan, between October and March, from 1969 to 1974: three of a single adult swan, two of adult pairs, one of a pair and a cygnet, one of a pair and two cygnets. In most cases, the swans were seen at Spuyten Duyvil before they showed up in the reservoir. They had been noted feeding at Spuyten Duyvil but not at the reservoir. Possibly they came to the reservoir for a change from the brackish water of the Hudson River and vicinity, to bathe and drink.

SNOW GOOSE (*Chen caerulescens*). 27 October—10 November 1974: A single dark phase bird of the year in company with a Canada Goose, seen at close range, feeding together on the grassy verge of the north and west side of the reservoir.

CANADA GOOSE (*Branta canadensis*). It is almost impossible to separate the local breeding geese from migrants, but some of the Canada Geese noted at the reservoir were the latter. The Canada Goose mentioned above in the company of the Snow Goose stayed at the reservoir for two weeks, and 70 birds flying over on 12 October 1974, can certainly be considered to have been wild geese. Geese, apparently from nearby resident flocks, were present in almost every month of this survey. However, ten geese, seen 10

October 1965, and single birds in October and November in other years, may well have been migrants.

**MALLARD** (*Anas platyrhynchos*). Over the period studied, Mallards have been the most numerous ducks. During the years 1962, 1963—1966, 1968, 1972, and 1974, Mallards were absent from late May to early August. But for the years 1967, 1969, 1971, 1973, and 1975, Mallards were noted throughout the summer. In 1971, three half-grown young were observed with three adult birds during the summer. In 1973, eight birds were seen in July, and 12 in August, possibly indicating local breeding. Mallards may have bred at the southeast corner of the reservoir, where, on the steep slope inside the fence, the thick brush and a tall grassy area create good cover. Several times at dawn during the winter, while standing above this spot, I have flushed Mallards, Black Ducks, and American Wigeons. A close-sitting bird such as the Mallard may have nested at this point.

Fluctuations of from one to 20 Mallards occurred in the months of March, April, October, and November. The months of December, January, and February showed maxima, following sudden freezes in the waterways north of the reservoir area. (Jerome Park Reservoir freezes only after several days of low temperatures.) Such maxima include: 10 January 1971: 444; no wind, no ice, temperature 25 °F; 19 January 1971: 900; no ice, temperature 2 °F; 5 February 1971: 1020; reservoir 85% frozen, small openings only at two points. However, during the periods immediately preceding and following a rise in numbers, they were present in their usual numbers of four to 12.

Mallards breed nearby—in Spuyten Duyvil, Van Cortlandt Park, Bronx Park, and other favorable spots. The birds spend most of the year in or near their breeding areas, but these waters ice up very rapidly, bringing them to Jerome Park Reservoir. As the ice recedes, the birds return to their favored grounds as rapidly as possible.

We may assume that in the spring and fall some of the Mallards are migrants passing through, mingling with local breeding birds.

**BLACK DUCK** (*Anas rubripes*). A local breeding bird, the Black Duck is similar to the Mallard in its habits on the reservoir. Rare during the summer months, by the middle of August there was a small but regular increase in numbers, continuing into September and October, when there were 20 to 30 birds, probably family groups from nearby breeding areas. A substantial increase was noted in December, with as many as 200 to 400 being recorded per day over several years. In January, the counts became erratic, but this month saw high average counts, the peak being 525.



February found numbers reduced to between 25 and 125 (an exception, 560 on 6 February 1963). In March, numbers averaged larger than in February, with 50 to 200 birds per visit. April found numbers sliding from few in mid-month to none by the end of the month.

On 20 August 1973, four adults with two grown young of about adult size, but not in adult plumage.

On 15 September 1974, 11 Black Ducks apparently feeding at the northeast inlet area next to the pumping station, skimming the surface of the water from one side to the other. The observer found hundreds of gnat-like insects hovering about him at the time, and the birds may have been sieving the hatching insects as they rose to the surface of the reservoir. I recall no other instance of the species feeding in the reservoir.

GADWALL (*Anas strepera*) were not observed at the reservoir during this survey until 1968. Birds seen thereafter seemed to be commuters from Spuyten Duyvil, where they rest and feed.

No Gadwall were recorded in January, or in May through August. October, with seven records, seems the best month for seeing Gadwall on the reservoir. There were four records for April, four for November, three for March and three for December. The species was seen as early as 29 September in 1974, and as late as 15 April in 1969. Maxima were six birds, 20 December 1968; seven, between 27-31 October 1971; and five on 5 November 1970. Pairs were seen flying from Spuyten Duyvil in the direction of the reservoir. The species is usually seen with Black Ducks or Mallards, on the north side of the reservoir, generally on the grass.

PINTAIL (*Anas acuta*). There were 12 records from October to March: five reports in December, two in November, two in March, single records in October, January, and February. Half of the sightings were of single birds. Maximum count was eight birds flying over the reservoir, 11 December 1966. The reservoir attracted the Pintail only for a few days at a time, perhaps because of the severity of the winter weather and the fierce winds that sweep the reservoir. When seen, they were always with the Mallard and Black Duck, on the north side of the reservoir.

GREEN-WINGED TEAL (*Anas crecca carolinensis*). Single males were seen on 22 October 1962, 19 January 1968, and 8 March 1970.

BLUE-WINGED TEAL (*Anas discors*). 4 October 1975: pair of Blue-winged Teal observed sleeping among the Black Ducks on the north side of the reservoir.

SHOVELER (*Anas clypeata*) Species was unrecorded until 1964, when there were four observations, with a maximum of 11 birds, increased to 13 by 7 January 1965, and 18 on 21 January 1966. There was a further increase to 65 Shovelers on 10 January 1970, 178 on 30 January 1971, and 76 on 6 February 1972. Subsequently there were smaller counts.

The largest flocks of Shovelers are found in the coldest months, December through January. Like the Mallards, the Shovelers retreat when ice and winds abate. The Shoveler is rarely, if ever, seen out of water at Jerome, and certainly has no opportunity to feed there.

AMERICAN WIGEON (*Anas americana*). From May to August, this species was absent, normally reappearing in October. In November, peak counts were recorded—as many as 85 on 25 November 1962. In January and February, their presence was irregular. In March, they were regularly seen again in numbers from four to 20, but by April the numbers were again reduced.

This is one of the few species that seem able to find sufficient food in the grassy areas of the reservoir, and it is more frequently seen on shore than in the water. Often the birds are paired, although more males than females are noted.

WOOD DUCK (*Aix sponsa*). There were three occurrences: 31 October 1967 (female); 14 January 1973 (male); 15 April 1973 (pair). Although this species breeds within half a mile, and presumably flies over, there appears to be little to attract it to the reservoir.

REDHEAD (*Aythya americana*) were sighted only three times: 15 March 1969 (female); 4 December 1969 (pair); 5 March 1972 (female). (It is possible a female Redhead might have gone undetected among several hundred active Canvasback seen at some distance.)

RING-NECK DUCK (*Aythya collaris*) In November, a few single birds were seen that tend to winter with the Scaup and Canvasback. In January there was a small increase in numbers from one to four birds. March counts were under four, with a maximum of 12 on 10 March 1968. Most were identified as males. Females, like female Redheads, might possibly have been overlooked. Highest counts occurred in 1965, 1966, and 1968, but after that only a few occurrences were noted.

CANVASBACK (*Aythya valisineria*) appears to vary in numbers with changes in weather, temperature, time of year, and perhaps with the hunting season. Each year of the study, this species came to the reservoir and remained, except when frozen out or during spring migration. The Can-

vasback was found at Jerome Reservoir from October to April, with one record on 23 September 1973, when three birds flew south over the reservoir.

We know there is very little food in the reservoir waters, so presumably the Canvasback come to the protected waters to rest. The large flocks have become acclimated to the men and machinery of the Department of Water Supply, and the birds appear unharassed and relaxed. Their low calls may be heard, and even courting actions may be observed. Canvasback apparently live in harmony with the other species on the reservoir. (Wigeon will bother the scaup but not the Canvasback.)

To avoid winds, or even a light breeze, flocks of Canvasback readily change position on the reservoir. They seem able to accommodate to drastic changes in weather, and when ice comes they either crowd into small areas of open water, seek the shelter of the stone wall or the concrete dam, or leave the reservoir.

The Canvasback flight into the reservoir is generally not a simple entry, as it is with Mallards and Black Ducks. Usually at dawn, and often for hours after, small flocks of Canvasback appear in flight above the reservoir. They come out of the south or southeast in flocks of from 10 to 50. At first the birds continue over the reservoir, going north, at a height of 500 to 600 feet. Then, presumably seeing the Canvasback already present in the waters, they turn, and lowering their altitude, fly south. At the south end of the reservoir, they turn north once again, flying now at about 50 feet. Just above the swimming Canvasback on the water, the flying flock breaks up and heads down to join those below.

The following observations are of interest:

- 11 November 1964: Among 833 Canvasback present, one albinistic female with white head, white breast, and white secondaries.
- 5 January 1966: About 10 a.m., over 1000 Canvasback flew in.
- 9 December 1966: 3:30 p.m., reservoir being emptied, 500 Canvasback huddled into the one shallow pond left at the center of the reservoir.
- 11 November 1967: 361 Canvasback, the first large flock since the reservoir was refilled.
- 24 November 1967: During one hour of watching, a total of 639 Canvasback flew into the reservoir from the southwest.
- 17 February 1968: Very strong northwest wind. All 376 Canvasback were under wall at the northwest corner, many giving calls reminiscent of faint honks of Canada Geese.

- 7 December 1969: Among the 715 Canvasback, many were diving, indicating they might have been trying to find sustenance, although no swallowing or bill movements followed when they surfaced.
- 16 December 1971: 40 Canvasback flying north at 400 feet, but did not return to land on the reservoir.
- 11 February 1973: Temperature was 10 °F, with northwest winds of 15 to 40 MPH, and clear skies. A flock of 480 Canvasback was seen at close range, gathered at the northwest corner under the reservoir wall. The waterline of each Canvasback was frozen, encrusting the birds at the breasts, flanks, and rear underparts with ice. The ice on the plumage did not appear to be a problem to the birds. (A wind-chill factor of -10 degrees was reported for this day.)
- 23 September 1973: Three Canvasback flying south past the reservoir at 200 feet, at 7 a.m.
- 12 December 1973: A single male Canvasback, among 475, dyed a brilliant red in what should have been the white parts of his plumage.
- 30 December 1973: At dawn, 46 Canvasback. Moments later, groups came in about five minutes apart for a total count of 740.

Throughout the winter months of November to February, the largest numbers were present. March found the counts decreasing, and a small number stayed into April. By October, small scatterings of birds began to be seen. The highest count during the study was on 11 December 1969, when 4235 Canvasback were present. (On 13 December 1969, two days later, only 325 birds were recorded.)

It is virtually impossible to predict rises or falls in the population of Canvasback, although the weather and other circumstances seem to have some bearing. Why will a large flock of Canvasback all take off from the reservoir with not a single bird left behind? On 9 January 1972, at 8 a.m. the entire flock of 550 flew out, an abrupt leavetaking that was noted on several other occasions, always in midwinter.

Preliminary mating attitudes were noted in the reservoir, but the full courtship pattern was never seen by the observer.

It is assumed the Canvasback leave the reservoir, probably daily, to feed and then return to the sanctuary of Jerome after feeding. The observer



has seen Canvasback leave the Hudson River and Spuyten Duyvil during the day and fly in the direction of the reservoir. Presumably the large flocks coming to the reservoir at dawn are returning from their feeding grounds.

**GREATER SCAUP** (*Aythya marila*). Separating this species from Lesser Scaup is sometimes difficult, but there are several places where both species of scaup occur and may be studied under excellent conditions. The northern portions of Manhattan bordering the Hudson and Harlem Rivers, and the south section of the Bronx extending into Long Island Sound, are such areas. The inlets and bays of south and east Bronx are salty, while the East, Harlem, Hudson Rivers and Spuyten Duyvil are mixtures of saline, brackish, and fresh waters. In winter, great flocks of Greater Scaup may be found in the Bronx area, while the rivers mentioned have a small scattered population of Lesser Scaup. There is no question that the two species occur together and we often must be satisfied that the majority of a group is one species or the other. On Jerome Park Reservoir, where optimum viewing at close range is possible, definite identification was obtained . . . 26 times, with four sightings in December, two in January, four in February, 12 in March and four in April. In almost all instances the birds were the Lesser Scaups.

**LESSER SCAUP** (*Aythya affinis*) are fairly common in Jerome Park Reservoir, occurring about the same time as the Canvasback. No Lesser Scaup were posted for any May to September period during this 14-year study. Shortly after the Canvasback appear in the fall, we find the Lesser Scaup. (The author assumes that female and immature birds in the company of Lesser Scaup are of the same species.) The hundreds of Lesser Scaup on the Harlem and Hudson Rivers appear to be the origin of the reservoir's visitors. Unlike the Canvasback, the scaup come into the reservoir without an elaborate performance. The Lesser Scaup, unlike the Greater Scaup, is an unsuspecting duck and may be watched at close range.

On the problem of identification, this observation is of interest: On 13 April 1975, at 7:30 a.m. on a clear sunny day at Spuyten Duyvil, six scaup were seen at 20 feet. At rest, the heads of the three males were flat-crowned, with a greenish iridescence, suggesting the Greater Scaup. But when the scaup swam toward the observer, as if looking for food, the males became alert and active. Up came the crest and a dark purple sheen appeared, showing that they were indeed Lesser Scaup.

When there was a disturbance around the reservoir, most often caused

by a motor vehicle, the least disturbed ducks were the Lesser Scaup. Other species flew or swam away from the intrusion, but the Lesser Scaup just edged off a bit and faced the intruder.

Lesser Scaup numbers have never been large. Generally flocks total 10 to 50 birds, although few larger gatherings have been recorded during migration: on 15 March 1963, 200; 11 March 1964, 300; 17 March 1965, 310; 27 March 1965, 395. March appears to be the peak month for Lesser Scaup moving through the reservoir area. In the fall the numbers are considerably smaller.

Twenty Lesser Scaup were watched as they flew out of the reservoir on 13 April 1965, toward the Harlem River.

Usually Canvasback and Lesser Scaup mingle freely, but on 11 December 1969, when 4235 Canvasback were present, the small flock of Lesser Scaup was completely outside the dense gathering of Canvasback.

Lesser Scaup were noted diving at times, but there were no signs of food procured. The study shows no records of flocks of Lesser Scaup flying into the reservoir during daylight hours. At dawn in winter, there were usually small numbers of these ducks scattered among the Canvasback flocks.

**TUFTED DUCK** (*Aythya fuligula*). On 15 March 1962, a male in breeding plumage was seen with a small flock of Lesser Scaup at the southwest corner of the reservoir. The bird was inspected for a half-hour at a distance of 50 yards in bright sunlight. Ring-necked Ducks were present before and after the Tufted Duck was seen, but not on the same day. The duck stayed but one day.

**COMMON GOLDENEYE** (*Bucephala clangula*) were observed three times: a female, 24 February 1968; a young male, 12 April 1970; a fully-plumaged male, 21 March 1976.

**BUFFLEHEAD** (*Bucephala albeola*). Six records, in October and November only. None of these birds stayed more than a day at the reservoir.

**OLDSQUAW** (*Clangula hyemalis*). Two records: 3 November 1969, a female, during a fierce wind storm; 28 December 1975, a female.

**RUDDY DUCK** (*Oxyura jamaicensis*). Except for the Mallard and the Black Duck, the Ruddy Duck is present in more months than any other duck. There were three August sightings and one in May, but the duck was unrecorded in June and July. While present on the reservoir regularly, its numbers were erratic, with the greatest concentrations between October

and November. From January to May the counts were small and rather steady. Often a single bird was present from March to May.

This species is one of the few ducks that apparently finds food in the reservoir. At times individuals and flocks are seen diving repeatedly, but the bird is rarely seen on the grass or concrete dam. When their numbers are small, the Ruddy Ducks fraternize with the Canvasback, and appear to swim among them. During calm weather, Ruddy Duck dot the whole surface of the reservoir with their chunky shapes.

Most of the birds in the large flocks of fall and early winter leave, but those remaining seem to be able to cope. This species has never been seen flying in or out of the reservoir during the observation hours.

**HOODED MERGANSER** (*Lophodytes cucullatus*). Two records: 26 January 1963, one male; 29 March 1970, a pair.

**COMMON MERGANSER** (*Mergus merganser*) was a regular visitor at the reservoir until the waters were drained in 1966-1967. Before that this species was seen from December to April.

The mergansers, in small flocks, kept to the center of the reservoir and dove continuously, as if for food. The birds were seen week after week with little change in numbers. The average group was eight birds, with the high count of 14 on 7 January 1965. On this date, with the weather calm and very cold, a pair of mergansers was going through courtship display.

**ICELAND GULL** (*Larus glaucooides*). There are six records: 22 December 1963, one immature; 5 January 1966, one adult; 21 January 1966, a third-year bird; 14 May 1967, an immature, gray-winged bird; 22 January 1968, one immature; 5 February 1971, an immature gray-winged bird. All were seen on the concrete and grassy north embankment.

**GREAT BLACK-BACKED GULL** (*Larus marinus*). The Great Black-backed Gull was seen in every month of the year, although some years it was absent in the summer months. However, large numbers of this gull were not ordinarily noted. Numbers fluctuated; the years 1967, 1972, and 1973 saw fewer numbers at the reservoir, while many were seen in 1965, 1968, 1970, and 1974. In August 1974, the numbers of gulls present increased. The large numbers on the Hudson River during this period were correlated with the larger numbers in the reservoir. The high counts along the Hudson River and the reservoir fell in October, and numbers were normal thereafter.

The high count for the reservoir occurred 8 January 1963—250 gulls.



On 15 December 1966, 16 Great Black-backed Gulls rested in the drained icy bottom of the reservoir.

This species likes plenty of room in the reservoir, keeping to the middle of the waters. On the dam at the north, it mingles freely with the other gulls, and shows none of the belligerent nature that it uses in cowing smaller gulls in the presence of food. When there is a disturbance, it is the first gull to leave an area, and the last to come back.

LESSER BLACK-BACKED GULL (*Larus fuscus*). On 21 July 1970, the writer observed an adult of this species in a mixed flock of Herring and Great Black-backed Gulls in the reservoir. The bird flew up, circled the flock on the water, and flew southwest toward the Harlem River. It was an adult bird, and fine weather conditions together with close-range observation made for positive identification. The observer was especially cautious as, when the gull was seen at all, it was usually in the colder months of the year.

Other observations were made between 1973 and 1975, all of birds on the grass and concrete dam at the north end. The Lesser Black-backed Gulls were always seen with Ring-billed, Great Black-backed, and Herring Gulls. On 23 December 1973, an immature and adult Lesser Black-backed Gull were seen the same day (P.A. Buckley); 7 January 1974, an adult; 7 February 1975, a nearly-adult bird.

HERRING GULL (*Larus argentatus*). As might be expected, this is the most common water bird in the reservoir, present throughout the year in varying numbers (Table 2). During the breeding season, few gulls are seen, and only for a short time. In colder times, practically every hour of daylight has Herring Gulls sitting on the water, flying overhead, or resting on the north side of the reservoir. In 1965, 1972, and 1973 no Herring Gulls were seen in June and July, but 1975 in the same months had hundreds of Herring Gulls resting on the reservoir waters. In 1966, they were absent in May and June. The year of the draining, Herring Gulls were absent from the reservoir from February to April 1967.

From May to August, small numbers of gulls visit the reservoir, but stay a short time. They fly out, generally to the southwest, after a bath and vigorous shaking.

Some notes of interest:

21 October 1962: 60% of all Herring Gulls were in the brown subadult plumage.

- 20 November 1962: 99% of a flock of 400 birds were adult. (The adults probably disperse later than the immatures, as with the herons.)
- 8 January 1963: Reservoir one-third frozen. There were over 3500 Herring Gulls present on this day, but a few days before and after there were only a few hundred.
- 5 December 1964: Of 1050 gulls, 50% were immature.
- 15 July 1966: Reservoir covered with molted feathers. 58 Herring Gulls present.
- 15 December 1966: On the muddy floor of the emptied reservoir more than 550 gulls of the three most common species, mainly Herring Gulls, in a solid flock.
- 22 October 1972: During a heavy drizzle, with a southwest wind, 1500 Herring Gulls flew in from the east-northeast, crossed over the reservoir and flew on to the southeast.

**Table 2.** Number of Herring Gulls Observed During Fourteen-Year Survey, By Month

Month	Average Number of Herring Gulls Observed Per Trip	High Count
January	350	2500
February	200	2000
March	150	2100
April	50	180
May	20	120
June	15	96
July	15	58
August	50	200
September	160	450
October	160	2500
November	1000	4800
December	800	4300

RING-BILLED GULL (*Larus delawarensis*). Although the Ring-billed Gull often outnumbers the Herring Gull on the Hudson and Harlem Rivers in winter, this is not so on the reservoir. On the Parade Grounds at Van Cortlandt Park there are generally over one hundred Ring-billed Gulls,

only several hundred yards from the reservoir. At Harris Park, east of the reservoir, hundreds of Ring-billed Gulls assemble on the grass, often to feed. Apparently the territory around the reservoir attracts many Ring-billed Gulls, but large numbers of this species are seldom observed in the reservoir. It is the author's belief that this gull prefers land to water, both for feeding and resting, unlike the Herring Gull to whom water is a necessity.

When the Ring-billed Gull is within the confines of the reservoir it prefers the south end, with the Laughing Gulls, to the north portion and dam. The Ring-billed Gulls entering the reservoir, from the north or south, stop off in the water at the south end for a short time, and then fly to the dam section. They come into the reservoir in a kite-like, zig-zag descent. In bright sunlight it is an attractive sight, with white under-wing coverts flashing and fading.

On the north end of the reservoir, high counts of 300 birds have been recorded, mainly in fall and spring, but usually there are between 50 and 150 birds. Practically every month of the year finds Ring-billed Gulls on the reservoir's water or land. Like most water birds, they are scarce in the summer months, and those found are most often subadults.

BLACK-HEADED GULL (*Larus ridibundus*). 23 December 1973: an adult in winter plumage; 7 January 1974: possibly the same bird; 29 December 1974: an immature in winter plumage.

LAUGHING GULL (*Larus atricilla*) was found in ten months of the year, being absent only in January and February. Often it was seen in company with Ring-billed Gulls east of the reservoir at Harris Park, and on the south end of the reservoir. It tends to cluster in tight flocks almost entirely of this species. This gull, when present on the Harlem River, may be seen flying northeast across the Major Deegan Highway, and over Washington Heights to the reservoir, where it planes in barely over the apartment house rooftops to land in the south sector.

Laughing Gulls do not usually gather in large numbers in the reservoir; between five and 50 birds are the norm. In the late fall, over 200 have been seen in Harris Park, but such large numbers do not occur in the Jerome Park Reservoir.

Some notes of interest:

5 May 1967: With only a few shallow pools left in the drained reservoir, 500 Laughing Gulls were seen, a much larger number than was ever recorded when the reservoir was full.

14 May 1967: Reservoir one-quarter full, with 144 gulls on the water.

8 March 1970: Before sunrise, the writer heard two Laughing Gulls calling in flight but could not locate them.

31 March 1968: Two gulls of this species were seen.

By April the species was regular and not uncommon. The latter part of the month found averages of 40 birds per trip. There were high counts in May of 142 (1967) and 255 (1971). June produced but two records, both in 1968, while one was recorded in July, 1967. In August, there was a small but definite increase, with five birds per trip. During September there were up to 24 birds per trip, except in 1971 and 1972, when none were present. In October there were modest numbers, but November showed a spurt up to 233, although none was seen in November, 1971. There were two records for December: 1 December 1963, three Laughing Gulls; 7 December 1963, 20.

## SUMMARY

Over the 14-year period of this study, a total of 585 trips were made to the Jerome Park Reservoir for the purpose of monitoring the water birds there and in the surrounding area. Some species come to the reservoir in large numbers, in spite of the almost total lack of food for most of them. So attractive is the reservoir, that even non-feeding birds stay for unusual periods of time, probably feeding elsewhere and using the reservoir as a haven during daylight hours.

Because of the undisturbed nature of the reservoir, its waters and shores are excellent for the study of its protected water birds. This survey of the changes in the reservoir's bird populations and habits is a continuing project, with the present notes marking its start.

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## General Notes

### Incipient Distraction Displays of the Least Tern

Distraction displays are given by adult birds of many families when disturbed at the nest by an apparent or potential predator. The displays render the parent more conspicuous and are believed to redirect the hunting activities of a potential predator toward the adult and away from the nest or young (Armstrong 1954, 1956; Simmons 1952; Skutch 1955). Simmons has characterized avian diversionary displays as of either the rodent-run or the injury-feigning type, although mixtures and alternations of these behavior patterns occur. In rodent-run behavior an adult bird runs rapidly in a crouched position, while in injury-feigning it appears to struggle on the ground often with one or both wings and/or the tail fanned.

Distraction displays occur mainly among birds nesting on or near the ground. Although they are commonly used by shorebirds (e.g. Simmons 1952) and by skimmers (Pettingill 1937; Gochfeld pers. obs.), they are seldom reported for the Laridae, perhaps because the colonial nesting habit offers the opportunity to use other anti-predator strategies such as aggressive defense of the nest. Some species of Laridae that are not particularly aggressive themselves (e.g., the Sandwich Tern, *Sterna sandvicensis*) nest in dense aggregates and may benefit by associating with more aggressive species (Cullen 1960). A distraction display has been recently reported for the Brown Noddy, *Anous stolidus* (LeCroy 1976).

Least Terns (*Sterna albifrons*) have a moderately strong aggressive response which varies among colonies, with size, density, and habituation to humans; they usually do not give a well-developed distraction display. Wolk (1974) observed only one case during studies in Least Tern colonies. Usually when an intruder approaches to within 25 to 50 meters of such a colony the nesting birds take flight and begin circling over the intruder. On several occasions, however, exceptional behavior has been noted, and I report here what appear to be incipient distraction displays observed at several terneries on the south shore of Nassau and Suffolk counties, N.Y. (see Gochfeld 1973, 1974, 1976, for locations and description of colonies).

In June and July 1971, I studied a colony of 120 Least Tern nests at Cedar Beach, rated moderately dense (mean nearest neighbor distance less than 6 meters). In this colony I noted six nests where adults behaved atypically. At five of these nests the adults tolerated my approach to between 5 and 10 meters, much greater tolerance than that typical of the



colony. These birds finally rose and walked away from the nest slowly, deliberately and conspicuously, in an upright posture, with neck extended and nearly vertical. The birds walked from two to about 10 meters before taking flight, whereupon they became lost among the circling terns. At the sixth nest the bird stood up, jumped up as if taking flight, fell back next to the nest, and then struggled, jumping up and down three or four times, resting, and then repeating the jumping. The entire episode lasted about 15 seconds, as I stood seven meters from the nest. Without my taking an additional step the bird then took flight. The possibility that it was sick cannot be eliminated.

In 1972 I looked for similar cases in a more widely-spaced colony (mean nearest neighbor distance among 70 nests was more than six meters), but saw none. In such colonies nests are more difficult for an intruder to locate (Tinbergen *et al.* 1967), and one might expect distraction displays to be more likely to occur (*cf.* Armstrong 1954, Simmons 1952). A 15-nest colony with relatively dense packing (mean nearest neighbor distances less than 5 meters) contained two nests at which atypical behavior was observed. One adult gave a conspicuous departure on three occasions, each time waiting until I was within seven meters of the nest. Another bird gave an ephemeral version of the display, standing and waiting at the nest while I stood within 10 meters, then taking about three steps, and finally flying. This behavior might not have been noticed had I not been looking for it.

In 1973 I looked casually for such behavior in four colonies with a total of over 100 nests, including colonies where unusual nest departure behavior had been noted in previous seasons. However, I saw no cases. In 1974 at Cedar Beach I found several occurrences in a 61-nest colony (with mean nearest neighbor distance greater than five meters). During a two-week period I repeatedly observed conspicuous departure by two marked birds, and a third bird gave a conspicuous departure once. A fourth bird gave a good example of injury-feigning, flying about 10 meters from the nest, landing forward on its breast, and flopping briefly with partially extended wings. I stood next to the nest for 60 seconds, and the adult repeated this display three times, the last time with its wings extended to about two-thirds of maximum extent. The same or a different bird gave a low intensity version of this display on another occasion. At three other colonies with a total of about 30 nests, I saw no additional cases of unusual nest departure. In 1975 and 1976 little time was devoted to studying Least Terns, but during brief census visits to several colonies, some with more than 400 nests, I saw no cases of unusual departure.

I have mentioned here observations of conspicuous nest departure by at least 10 adult Least Terns in four colonies, and two cases of injury-feigning. On many occasions I have looked for such behavior in vain, and conclude that it is not common among Least Terns. It might easily be overlooked during casual visits to colonies, particularly if visits are confined to early or late portions of the breeding cycle.

Regardless of how such behavior patterns arise, it is likely that the tendency to perform a display, or to perform it at a given intensity, varies with external stimuli, with the reproductive state of the bird, and with other unknown individual factors. It is premature to relate such behavior to the stage of the reproductive cycle of the Least Tern (but see Armstrong 1947; Skutch 1955). However, I noted unusual nest departure mainly during late stages of incubation, and did not note it when chicks were present. I currently consider deliberate or conspicuous departure to be a distinctive behavior pattern, and interpret it as a variant or incipient form of distraction display. The interpretation is strengthened by observations of the two cases of typical injury-feigning among the Least Terns.

The displays mentioned here were of relatively low intensity and were performed by birds that had tolerated human intrusion to within 10 meters of the nest. Whether the behavior has adaptive value at present is unclear. Armstrong (1956) notes that since predators are likely to be discerning they will select for perfection of distraction displays by capturing individuals with inadequate displays. Selection might favor increased intensity of displays, and low intensity or incipient displays are likely to occur only transiently in the evolutionary history of a species. Since aggressive behavior of Least Terns on Long Island is usually inadequate to deter human intruders, an alternative behavior pattern could be beneficial, particularly in view of the very high chick mortality that has been reported for the species (*e.g.* Hardy 1957).

The relation between nest spacing and use of distraction displays deserves further attention. One can predict that selection in favor of distraction displays would act more strongly in more widely dispersed colonies where aggression is less likely to be effective. To date no relation between spacing of nests and frequency of displays is apparent for the Least Terns. Distraction displays should be most valuable where the terns nest in small groups or alone. Finally it would be desirable to measure whether fitness is actually enhanced by such displays, and if so, whether the incipient displays have adaptive value in some way proportional to intensity and development.



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## Hoary Bat in Niantic, Connecticut, in January

An adult Hoary Bat (*Lasiurus cinereus*) of unknown sex was found dead on a driveway in New London Co., Conn., just outside the town of Niantic, on 6 January 1976, by Diane Erlich. The bat had probably not been dead for long, since it was neither stiff nor frozen, although the temperature had been near 0° F. for several days. There was some blood around the nose of the bat, but there was not enough to confirm that it had died of a head injury. The specimen is now in the collection of the author.

The only other January record for this species on the northeast coast is that of a female collected on 16 January 1969, in Far Rockaway, N.Y., by John Bull, and kept alive for several days before dying of unknown causes. This specimen is now in the collection of the American Museum of Natural History (AMNH 215250). There is also one record of a Hoary Bat in Pennsylvania in February; Hamilton (1943, p. 97) mentions an individual seen flying at midday during a thaw.

The Hoary Bat is known to be a migratory species, but the timing and routes of its migrations, particularly in the fall, are not well understood. In July, Hoary Bats are distributed throughout the United States and southern Canada. Migration begins in August and by October most of the bats have left the summer range. Those remaining are found as far north as Washington on the west and Vermont on the east coast, and there are a few inland records from Idaho, Michigan, and Ontario. Most, however, are further south in Arizona, New Mexico, and Texas. In the west the latest Washington record is 16 October, and the latest Oregon record is 18 October (Dalquest 1943). There are a number of October records for the northeastern states, as well as three for Iceland, the latter discussed by Koopman and Gudmundsson (1966). These Iceland specimens were collected on 9 October 1943, 8 October 1957, and 1 October 1964; also discussed is a 9 December 1957 record. These bats probably wandered from the northeast coast of North America during migration, or were blown by winds. The occurrence of an endemic subspecies in Hawaii, spring and fall records of the North American subspecies in Bermuda (Van Gelder and Wingate, 1961), and other extralimital records, indicate a tendency to wander. The latest eastern record, before the two January records, is for 2 December from Long Island, N.Y. (Van Gelder and Wingate, 1961).

The winter range of the Hoary Bat is poorly known. The species is known to winter in southern California, and a few individuals of the North

American subspecies (*L. c. cinereus*) have been collected in southern Mexico (Davis and Carter 1962). Mexican records, however, are rare, perhaps because the area has not been well studied from this point of view (Findley and Jones 1964). In the east, Hoary Bats have been collected in Louisiana in January and February (Lowery 1974, p. 122).

From the evidence it is not possible to make a definite statement about the status of the Hoary Bat in the Northeast in winter. Two January records in seven years and a few December records hardly provide sufficient evidence that some individuals of the Hoary Bat are nonmigratory. It is a possibility, however. Among North American birds some individuals of migratory species, for example the Song Sparrow (*Melospiza melodia*), remain all winter on the breeding grounds. It is possible that the migration of Hoary Bats is similarly incomplete. It is more likely, however, that the January bats were either late migrants or were physically unable to reach the wintering grounds. Without further study of the fall migratory pattern of the Hoary Bat, it is impossible to be more conclusive.

### Acknowledgments

I would like to thank John Farrand, Jr., who read the manuscript, for his constructive criticism; Mr. and Mrs. Harvey Gaylord, on whose driveway the bat was found, for their hospitality and delicious brunch on 6 January; Helen Hays for her ideas and assistance; and Dr. Karl Koopman, who read the manuscript repeatedly, for his help and suggestions.

This is contribution No. 48 from the Great Gull Island Project.

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Cordelia T. Grimm, 950 Park Avenue, New York, New York 10028

## *Report of the Secretary for the Year 1974-1975*

At the annual meeting of the Society on 12 March 1974, the following officers were elected for the ensuing year:

<i>President</i>	Helen Hays
<i>Vice-President</i>	Robert Dickerman
<i>Recording Secretary</i>	Roger Pasquier
<i>Corresponding Secretary</i>	Alice Oliveri
<i>Treasurer</i>	Helen Hirschbein
<i>Editor</i>	Robert Wolk

At the regular meeting on 26 March the Society elected as members of the Council for a period of three years: Lois Heilbrun, Robert Paxton, and Helene Tetrault.

At the regular meeting on 24 September the Society elected Lilla Hind as a member of the Council to fill out the one-year unexpired term of Paul Buckley who had resigned.

During the year 17 regular meetings, three informal summer meetings, and four special meetings were held. The programs for the regular meetings were as follows:

12 March 1974 (Annual Meeting)	<i>Galapagos-Wild Eden</i> , Roger Tory Peterson
26 March	<i>An Environmentalist Looks at the Hudson River</i> , David Seymour
9 April	<i>Manomet Bird Observatory</i> , Kathleen Anderson
23 April	<i>Crocodile, Conservation, and Ecology</i> , Wayne King
14 May	Scheduled speaker could not appear
28 May	<i>Jamaica Bay</i> , Jane Henzi
10 September	<i>Meshie: Adaptation by a Young Chimp to a Human Family</i> , Harry L. Shapiro. Also shown <i>The Baobab Tree</i> , film.
24 September	<i>Birds from the Rio Grande to the Arctic</i> , Michael Lindshaw
8 October	<i>Breeding Falcons in Captivity</i> , Thomas Cade
22 October	<i>American Bird Names: A Study in Fowl Language</i> , Ernest Choate

- 12 November *The Continuing Mysteries of Pigeon Homing*, William Keeton
- 26 November *What do Swallows Gain by Nesting Colonially?*, Stephen T. Emlen
- 10 December *A Year's Activities at the Winston Guest Waterfowl Collection*, John DeJose
- 14 January 1975 *Christmas Counts 1974*, chaired by Roger Pasquier
- 28 January *A Naturalist Down Under*, Hobart Van Deusen
- 11 February *The Urania Affair*, Neal Smith
- 25 February *Birds of the Galapagos*, Stuart Keith

The programs for the special meetings were:

- 14 March 1974 *The Ipswich Sparrow on Sable Island*, Ian McLaren
- 25 June *Ecology of the Birds of the Philippines*, Dioscoro Rabor
- 1 October *Himalayan Birding Adventure*, Ben King
- 15 October *Birds from Peru, Brazil and Paraguay*, Peter Alden

Helen Hays, chairman of the Committee on the Great Gull Island Project, reports:

About 8,000 terns nested on Great Gull in 1974. The colony appears to be expanding. Of known age adults trapped on the island this summer we have good samples of birds hatched in 1969, 1970, and 1971. To create more areas for terns to nest we removed mats of vegetation in sections of the island bordering the north and south beaches as well as the eastern end. These areas were then flooded with sea water for five-, eight-, and 12-hour periods. We hope in this way to saturate the soil with salt so the areas remain free of vegetation this spring.

Studies of the social systems and ecology of Spotted Sandpipers, Common Yellowthroats, Red-winged Blackbirds, and Song Sparrows continued in 1974.

Robert Wolk, Editor, reports that the *Proceedings* are now in page proofs and will be published this spring.

The Constitution Committee, under the chairmanship of Donen Gleick, completed the proposed constitutional revisions and by-laws. These were submitted to the membership of the Society and approved.

The Library Committee, chaired by Lilla Hind, reports that the new



rules instituted last year are working well. The library received gifts of several books during the year which are appreciated.

With Jane Plunkett in the chair, the Conservation Committee in the spring and summer of 1974 was active in behalf of the Jamaica Bay Wildlife Refuge. There has been reassurance from both Joe Antosca, the Director of Gateway National Recreation Area and a Linnaean member, and Dr. Paul Buckley, an executive of the National Park Service, that a qualified manager will be at Jamaica Bay before nesting season of 1976. President Hays and many other members of the Society have been active on a committee advising the Park Service. The chief concern of this committee is that a manager be appointed to oversee the work at the sanctuary so that it be maintained as a fragile park.

Last spring the Conservation Committee put on an anti-erosion demonstration in Central Park under the guidance of committee member Sarah Elliott. The Park Department gave full cooperation.

Jane Plunkett resigned after several years of service and Richard Sichel became chairman of the Conservation Committee in January 1975. The Committee is giving its attention to Jamaica Bay as well as problems on Long Island beaches, Staten Island, and other areas.

The Field Work Committee, under the chairmanship of Guy Tudor, conducted a June bird count.

The Field Trip Committee under Chairman Lilla Hind ran a full program of field trips which included a trip to Great Gull Island, a Delmarva Memorial Day weekend, and a Montauk Point Thanksgiving weekend. There were also several pelagic trips led by Thomas Davis. The system of a registrar for each trip was continued this year, with members sharing the work of co-ordinating the trips.

The Centennial Committee, chaired by Richard Harrison, is working on plans for the celebration of our Centennial in 1978.

The Society wishes to thank Mr. and Mrs. Richard Harrison for their generosity in allowing the use of their home for Council and committee meetings throughout the year.

During the year we were saddened to learn of the deaths of several of our members, among them: Allan D. Cruickshank, Orville Crowder, Margaret Morse Nice, and Peter Paul Kellogg.

During the year, Nikko Tinbergen was made an Honorary Member.

Sixty-one persons were elected to active membership, four to supporting, and three to life membership.

The membership in all classes is as follows: Active 403, Associate 72, Supporting 7, Life 25, Fellows 10, Honorary 5; making a total membership of 522.

Respectfully submitted,  
Lilla M. Hind  
for Alice Oliveri,  
*Corresponding Secretary*

## *Report of the Secretary for the Year 1975-1976*

At the annual meeting of the Society on 11 March 1975, the following officers were elected for the ensuing year:

<i>President</i>	Robert Dickerman
<i>Vice-President</i>	Lois Heilbrun
<i>Recording Secretary</i>	Joseph DiCostanzo
<i>Corresponding Secretary</i>	Lilla Hind
<i>Treasurer</i>	Helen Hirschbein
<i>Editor</i>	Catherine Pessino

At the regular meeting on 25 March the Society elected as members of the Council for a period of three years: Berry Baker, Sarah Elliot, and John Farrand, Jr. Roger Pasquier was elected to fill out the two-year unexpired term of Lois Heilbrun who had been elected Vice-President.

During the year 16 regular meetings, three informal summer meetings, and one special meeting were held. The programs for our regular meetings were as follows:

11 March 1975 (Annual Meeting)	<i>The Right Whales of the South Atlantic</i> , Roger Payne
25 March	<i>The Philosophical and Legal Aspects of Endangered Species Laws</i> , Earl Baysinger
8 April	<i>Ruff Lek Behavior</i> , Julie Wentworth
22 April	<i>An Ornithologist Looks at the Economy</i> , Bert Murray
13 May	<i>A New Look at Africa</i> , Richard Sloss and Emanuel Levine
27 May	<i>The Hudson River: Good, Bad and the Future</i> , Dominic Perrone
9 September	<i>The International Committee on Bird Protection: Its Role and Performance</i> , Roland C. Clement
23 September	<i>Florida's Brown Pelicans, Abundant Yet Endangered</i> , Ralph W. Schreiber
14 October	<i>The Atitlan Grebe of Guatemala: Studies of an Endangered Species</i> , Anne Le Bastille
28 October	<i>Orientation and Social Behavior in Nocturnal Migrants</i> , Ronald P. Larkin

- |                 |  |
|-----------------|--|
| 11 November     | <i>Nesting Ecology of North American Herons</i> , Joanna Burger            |
| 25 November     | <i>Iceland Natural History</i> , Lilla Hind                                |
| 9 December      | <i>Peru—Jungle, Mountains and Desert</i> , Howard P. Brokaw                |
| 13 January 1976 | 1975 Group Slide Show—open to all members                                  |
| 27 January      | <i>Behavioral Studies of Chacma Baboons</i> , Ruth E. Buskirk              |
| 10 February     | <i>Paramo—Tropical Tundra of South America</i> , François Vuilleumier      |
| 24 February     | <i>Bird Species Diversity in Trinidad Mora Forests</i> , Thomas E. Lovejoy |

The program for the special meeting on 8 March 1976: *Hawaiian Honeycreepers*, Douglas Pratt.

Helen Hays, Chairman of the Great Gull Island Project, reports:

I would like to take this opportunity to thank members of the Society for their generous support last spring. Contributions to the project totaled \$1,264, a sum greater than in any previous year. Your response was most gratifying and we hope you will continue your support.

In 1975 only two abnormal young were found in over 3,900 young terns checked during the field season. One-half as many thin-shelled eggs were counted as had been noted in 1974. In 1976 Robert W. Risebrough will analyze samples of unhatched eggs as well as fish collected near the Island for chlorinated hydrocarbons and other pollutants. He will compare levels of PCB, DDT, and mercury in the material collected in 1976 with levels found in 1970 samples of eggs and fish from Gull Island to find whether restrictions on the use of agricultural chemicals have resulted in lower levels of these pollutants in Long Island Sound.

Five hundred pairs of adult Common Terns were trapped in 1975, more than any other year to date. The trapped adults included good samples of birds three to six years old which were originally banded on Gull Island and have returned to breed.

The Conservation Committee, chaired by Roger Pasquier, reports that the Committee spoke for the Society on many issues this year. Among them were President Ford's nominee for Secretary of the Interior, the landing of SST's at Kennedy Airport, transfer of wildlife ranges to the Bureau of Land Management, and the proposed Kaiparowits Power Plant. Closer to home, members of the Committee attended many meetings related to Jamaica Bay Wildlife Sanctuary, and hearings on a proposed

landfill project at one of Jamaica Bay's tributaries. Plans to alter tern colony sites, at Cedar Beach and Silver Point on Long Island, are being watched closely, with many letters and telephone conversations between members of the Committee and others involved on both sides of the projects.

The Central Park Bird Sanctuary Committee, also chaired by Roger Pasquier, reports that during the winter of 1974-1975, the Committee created a landscaping plan which would make the Sanctuary at the 59th Street Lake more attractive to birds. In the current year the Parks Department implemented those parts of the plan it could afford. The Committee has visited the Sanctuary several times to assess the effectiveness of the Parks Department's work and has met with the design office of the Park's Department to make further suggestions. The Committee is particularly anxious to preserve part of the extensive cattail stand that has sprung up in the last two years at the edge of the Sanctuary.

Field Trip Committee Chairman Gretel Neuberger reports a very successful year, which included trips to favorite spots as well as some new places. The highlight of the year was the four-day trip to Cape Hatteras in October by chartered bus, including a one-day pelagic on a chartered boat, Shady Lady. Two other high spots of the year were the July trip to Gardiners Island and Great Gull Island and the weekend trip in February to Ithaca to visit the Cornell Laboratory and learn about their Peregrine Falcon breeding program. The Committee wishes to thank the registrars who gave so generously of their time and the drivers without whom most of the trips would not have been possible.

Editor Catherine Pessino reports:

*The Proceedings of the Linnaean Society of New York #72* was received from the printers in the summer of 1975. It was mailed to all classes of membership in the fall.

At its first meeting held in September, the Committee agreed to publish the *Proceedings* every two years, the next one to appear in 1976 with one following in 1978. Papers are now being received and reviewed for publication.

An issue of *Transactions* is to be published in 1979. It will contain papers presented at our Centennial Symposium.

The Library Committee, chaired by Lilla Hind, reports that the library has again been culled for books to be sold at auction in order to make room for new acquisitions. The auction will be held in the fall at a date to be announced later. Robert Dickerman recently installed casters on our

library cabinet so it can be rolled out into the meeting room making it more readily available for use by members.

The Membership Committee, under Chairman Sheila Madden, has been active in greeting people and securing new members.

Members of the Centennial Committee, consisting of Chairman Helen Hays, Robert Arbib, Berry Baker, Thomas Davis, Robert Dickerman, Eugene Eisenmann, Sarah Elliot, Richard Harrison, Lois Heilbrun, Lilla Hind, Mary LeCroy, Roger Pasquier, Catherine Pessino, and Helene Tetrault, are working on programs for our Centennial Year, 1978. The plans include a special program for the Annual Dinner in March, a special field trip in June or July, and a symposium in October. An announcement of the plans will be made in the September 1976 *News-Letter*.

The Society wishes to thank Mr. and Mrs. Richard Harrison for their generosity in allowing the use of their home for Council and various committee meetings throughout the year.

The Linnaean Society will host the Annual Meeting of the New York State Federation of Bird Clubs to be held at the Holiday Inn in Hempstead, Long Island, the weekend of 30 September-3 October 1976.

During the year we were saddened to learn of the death of Charles Vaurie, a Life Member who joined the Society in 1944.

Fifty-one persons were elected to active membership, one to supporting, three to associate, and four members became life members during the year.

Membership in all classes is as follows: Active 373, Associate 80, Supporting 9, Life 31, Fellows 9, Honorary 5; making a total membership of 507.

Respectfully submitted,  
Lilla M. Hind  
*Corresponding Secretary*



## *Report of the Secretary for the Year 1976-1977*

At the annual meeting of the Society on 9 March 1976, the following officers were elected for the ensuing year:

<i>President</i>	Robert Dickerman
<i>Vice-President</i>	Lois Heilbrun
<i>Recording Secretary</i>	Joseph DiCostanzo
<i>Corresponding Secretary</i>	Lilla Hind
<i>Treasurer</i>	Helen Hirschbein
<i>Editor</i>	Catherine Pessino

At the regular meeting on 23 March the Society elected as members of the Council for a period of three years: Anthony Lauro, Mary LeCroy, and Sheila Madden.

During the year 15 regular meetings and three informal summer meetings were held. The programs for regular meetings were as follows:

9 March 1976 (Annual Meeting)	Films from the Archives of the American Museum of Natural History, Alan Ternes
23 March	<i>The West Indian Manatee, Conservation and Ecology</i> , Howard W. Campbell
13 April	<i>Update: Jamaica Bay Wildlife Refuge</i> , R. Clay Cunningham
27 April	<i>How Birds Sing</i> , James Gullledge
11 May	<i>Studies of Boat-billed Herons</i> , John Biderman
25 May	<i>Evolutionary Patterns in Avian Nests and Eggshells</i> , Henry Pelzl
14 September	<i>A Naturalist in the Venezuelan Andes</i> , David Ewert and Michel Kleinbaum
28 September	<i>Speciation in Australian Birds</i> , Julian Ford
26 October	<i>Atlantic Puffin Project</i> , Stephen W. Kress
9 November	<i>Zoological Survey of Dutchess County, N.Y.</i> , Erik Kiviat
23 November	<i>Arctic Island, A Matter of Time</i> , Canadian Broadcasting Company film
14 December	<i>Ancient Egypt: Wildlife of Tombs &amp; Temples</i> , Lester L. Short

- 11 January 1977     *Second Annual Slide Show* by members, Moderator: Thomas H. Davis, Jr.
- 25 January         *Searching for Wintering Kirtland's Warblers*, Mary H. Clench
- 8 February         *The Colonial Bird Register*, Donald A. McCrimmon
- 22 February        *Social Systems & Sexual Chauvinism Among Butterflies*, Henry Horn

Helen Hays, Chairman of the Great Gull Island Project, reports:

In 1976 2,000 adult Common Terns were trapped on Great Gull Island. Of these 78 percent had been banded previously and 24 percent were birds of known age. Total pairs trapped reached 800, a record number for the Project to date.

A few abnormalities were encountered during the season, most of which were embryonic defects discovered by opening eggs which failed to hatch.

Timothy Schmidt from the Bodega Marine Laboratory in California took samples of sea water to be tested for pollutants. Robert W. Risebrough, also of the Bodega Marine Laboratory, will test young and eggs collected on the island in 1976 to compare levels of various contaminants with those in young sampled in 1970.

The Conservation Committee, chaired by Roger Pasquier, reports:

Preservation of the New York area's diminishing wetlands and tern nesting sites remained the principal focus of the Conservation Committee this year. The Committee sent letters to appropriate authorities expressing the Society's concerns and suggestions on the following issues: the General Management Plan for Gateway National Recreation Area, with particular emphasis on Jamaica Bay Wildlife Sanctuary and the wild area at Breezy Point where terns still nest; a housing development at Fresh Creek, a tributary of Jamaica Bay, where plans call for the filling in of some wetlands; construction of a sewage pipeline through the Cedar Beach, L.I., tern colony; and planting of grasses on Great Island in South Oyster Bay, L.I. that makes the area unusable by nesting terns. In addition to sending letters, members of the Committee attended meetings and hearings on some of these issues.

The Committee was also concerned about several Central Park issues: the removal of a stand of shrubbery attractive to birds in order to plant pine trees; the damage caused by the Schaeffer concerts at the Wollman Rink; and the removal of Japanese knotweed where Wood Thrushes were nesting in the Ramble. Letters were sent to the appropriate people, and the Committee was assured that the plant removals would not occur again. The Chairman of the Committee attended the

monthly meetings of the Central Park Community Fund Consultive Group, an organization trying to work with the Parks Department to improve horticultural conditions in Central Park.

The Central Park Bird Sanctuary Committee, also chaired by Roger Pasquier, reports:

The Committee continues to follow and advise on landscaping plans for the southeastern corner of Central Park, which includes the Bird Sanctuary. New York City's current fiscal condition prevents the implementation of either these plans or the second stage of the Committee's landscaping plan for the Sanctuary itself. The plan's first stage—removing deadwood and plantings competing with trees or shrubs of greater values to birds—was executed in 1975. The Chairman met during 1976 with the Park Committee of Community Planning Board 8, which has some jurisdiction over the area, to discuss the Park Department's overall plan for that section of Central Park.

Field Trip Committee Chairman Gretel Neuberger submits the following report:

Once again I wish to take this opportunity to thank all the excellent Leaders who gave so generously of their expertise, and the Registrars who spent many hours by their telephones, often performing incredible feats of juggling riders with rides. I am especially grateful to Herbert Baden who filled in at the last minute on two separate occasions as backup Registrar.

We had enough cars on all trips to accommodate those of us without wheels; a vote of gratitude is due to the drivers and to the owners of scopes who so generously step aside while the rest of us queue up behind. It is due to all these people that the field trips have been such a success.

During the past 12 months we had 25 scheduled field trips with a total of 577 participants for an average of 23 per trip. Two new trips this year, Block Island and Mongaup Reservoir, had large turnouts and the Bronx Park Zoo, Delmarva, Great Gull Island, Hackensack Meadows, and Hook Mountain trips again drew 30 or more participants. Lists of birds seen on all trips are available. There are another 13 trips on the current schedule including the nine-day trip to southern Florida in April.

This year we initiated a \$2 registration fee for all trips requiring room reservations, boat rentals, or other extraordinary expenses.

Finally, I wish to thank the entire Committee for all its help and support in making the Linnaean Field Trips for 1976-1977 come to pass.

Editor Catherine Pessino reports the *Proceedings* for the three years ending March 1977 will be going to press at the end of the month. The date of issue is expected to be 1 July 1977.

The report from Lilla Hind, Chairman of the Library Committee, states:

Last spring the library was again sorted and culled in order to make room for new additions which would be helpful to members. An auction was held on 12 October 1976. The proceeds from this sale and the previous one in 1974, amounting to approximately \$900, are to be used to purchase new titles.

A Selection Committee, chaired by Robert Paxton, with Luanne Clark, John Farrand, Jr., Guy Tudor, and Mark Weinberger, has prepared a list of suggested titles for purchase.

My thanks to Helene Tetrault and Joseph DiCostanzo who helped keep the library open and active at our meetings.

The report from Sheila Madden, Chairman of the Membership Committee, is:

The increase in the number of guests attending each regular meeting during the past year has kept the Membership Committee very busy, and many of these newcomers have been added to the membership rolls.

In addition, our field trips have afforded a good opportunity to meet several interested prospects, a number of whom have also been recruited to our ranks.

In general, I feel we have contributed to enlarging the membership somewhat, and much of the credit should go to the members of my committee: Herbert Baden, Margaret Clark, Marie Longyear, José Machado, and Jean Mailey. My thanks to them and to all the members who have helped the membership drive.

Helen Hays, Chairman of the Centennial Committee, reports:

Three events in 1978 will mark the 100th Anniversary of The Linnaean Society of New York. Sarah Elliott is preparing a special program of skits for the annual dinner meeting; Lilla Hind is organizing a late spring field trip to Churchill; and we have invited the Colonial Waterbird Group to meet in New York in the fall. The Society plans to publish the papers given at this meeting as a *Transactions*.

There will be lots of work to prepare for these events and we welcome offers of assistance from members.

The Society again wishes to thank Mr. & Mrs. Richard Harrison for their generosity in allowing the use of their home for Council and various committee meetings during the year.

The Linnaean Society was host at the Annual Meeting of the New York State Federation of Bird Clubs in Hempstead, L.I., the weekend of 30 September-1 October 1976. The meeting was attended by more than 100 people and several field trips were run each day, including a pelagic trip on Sunday.

During the year we were saddened to learn of the deaths of Roger Barton, G. Francis Beatty, Charles Rogers, Bradford Story, and Hobart Van Deusen.

Fifty-seven persons were elected to active membership, one to supporting, five to associate, and two members became life members during the year.

Membership in all classes is as follows: Active 388, Associate 93, Supporting 8, Life 32, Fellows 12, Honorary 7, making a total membership of 537, including 3 holding dual memberships.

Respectfully submitted,  
Lilla M. Hind  
*Corresponding Secretary*

## *Report of the Treasurer for the Year Ending 28 February 1975*

FUNDS ON HAND 1 March 1974 .....	\$8,829.38
INCOME	
Dues .....	\$2,848.50
Bequest, E. R. Janvrin .....	1,000.00
Contributions .....	37.00
Contributions in memory of H. Hale .....	10.00
Sale of publications (see note) .....	270.10
Sale of library books .....	141.00
Ticket sales 1974 annual dinner .....	2,292.00
Ticket sales 1975 annual dinner .....	696.00
Redeposit overdue outstanding checks .....	65.23
Miscellaneous .....	14.45
Interest on savings .....	473.06
TOTAL .....	\$7,847.34
DISBURSEMENTS	
Meetings .....	\$1,677.71
Annual dinner 1974 .....	2,308.39
Annual dinner 1975 .....	132.05
<i>News-Letter</i> : Printing .....	398.00
Mailing and postage .....	453.79
Additional printing costs: Schedule of events .....	230.00
Field cards .....	1,051.00
Dues notices .....	26.95
Stationery .....	144.75
Constitution .....	103.58
Additional postage: Constitution .....	81.88
General .....	92.61
Memberships and subscriptions .....	108.00
Purchase of book for library .....	18.72
Miscellaneous .....	50.39
TOTAL .....	\$6,877.82
FUNDS ON HAND 1 March 1975	
Checking account	
First National City Bank .....	\$1,025.82
Savings account	
Century Federal Savings & Loan	
Association of Long Island .....	1,037.28
Charles A. Urner Memorial Fund	
Union Dime Savings Bank .....	1,206.20
Revolving Publications Fund	
Emigrant Savings Bank .....	6,529.60
TOTAL .....	\$9,798.90



*Note:* \$51.72 from *News-Letter* subscriptions and sales into general operating budget; \$218.38 from sales of other publications (field cards, \$116.13; *Transactions* VII, \$54.00; *Transactions* VIII, \$4.00; *Proceedings* 58-62, \$1.25; *Proceedings* 71, \$25.00; G. Carleton reprint, \$11.00; miscellaneous, \$7.00) into revolving publications fund.

Respectfully submitted,  
Helen Hirschbein, *Treasurer*

*Auditors:*  
Irving Cantor  
Richard Sichel

## *Report of the Treasurer for the Year Ending 29 February 1976*

FUNDS ON HAND 1 March 1975 ..... \$9,798.90

INCOME

Dues .....	\$3,549.50
Contributions .....	193.00
Sales of publications (see note) .....	463.10
Ticket sales 1975 annual dinner .....	900.00
Ticket sales 1976 annual dinner .....	650.00
Miscellaneous .....	36.18
Interest on savings .....	357.63
Permission fee for use of Linnaean Society material ..	10.00

TOTAL ..... \$6,159.41

DISBURSEMENTS

Meetings .....	\$997.19
Annual dinner 1975 .....	1,667.32
Annual dinner 1976 .....	48.95
<i>News-Letter</i> : Printing .....	368.00
Mailing and postage .....	390.27
Additional printing costs: Schedule of events .....	227.00
Proceedings #72 .....	4,543.20
Stationery .....	129.50
Additional postage: Schedule of Events .....	51.47
<i>Proceedings</i> #72 .....	79.17
Great Gull Island Project .....	64.96
General .....	183.41
Committee expenses .....	60.46
DVOC exchange expenses .....	20.25
Memberships and subscriptions .....	257.90
Miscellaneous .....	54.10
Deposit: Federation N.Y. State Bird Clubs 1976	
annual meeting .....	250.00

TOTAL ..... \$9,393.15

FUNDS ON HAND 1 March 1976

Checking account	
First National City Bank .....	\$1,589.55
Savings account	
Century Federal Savings and Loan	
Association of Long Island .....	1,093.98
Charles A. Urner Memorial Fund	
Union Dime Savings Bank .....	1,272.12
Revolving publications fund	
Emigrant Savings Bank .....	2,609.51

TOTAL ..... \$6,565.16

*Note:* \$27.00 from *News-Letter* subscriptions and sales into general operating budget; \$436.10 from sales of other publications (field cards, \$157.10; *Transactions* III, \$6.00; *Transactions* VII, \$42.00; *Transactions* VIII, \$4.00; *Proceedings* #71, \$35.00; *Proceedings* #72, \$182.00; G. Carleton reprint, \$8.00; miscellaneous, \$2.00) into revolving publications fund.

Respectfully submitted  
Helen Hirschbein, *Treasurer*

*Auditors:*  
Irving Cantor  
Emanuel Levine

## *Report of the Treasurer for the Year Ending 28 February 1977*

FUNDS ON HAND 1 March 1976 .....		\$6,565.16
INCOME		
Dues .....	\$3,809.50	
Contributions .....	369.20	
Sales of publications (see note) .....	348.96	
Ticket sales 1976 annual dinner .....	845.00	
Ticket sales 1977 annual dinner .....	741.00	
Sale of library books .....	1,044.50	
Miscellaneous .....	57.59	
Federation of New York State Bird Clubs annual meeting .....	154.12	
Interest on savings .....	285.97	
TOTAL .....		\$7,655.84
DISBURSEMENTS		
Meetings, including 1976 annual .....	\$1,151.52	
Annual dinner 1976 .....	1,362.68	
Annual dinner 1977 .....	32.95	
<i>News-Letter</i> : Printing .....	385.50	
Mailing and postage .....	656.29	
Schedule of Events: Printing .....	259.00	
Postage .....	65.00	
Additional postage .....	320.27	
Office supplies and miscellaneous expenses .....	75.42	
Great Gull Island Project .....	101.70	
Field Trip Committee .....	66.96	
Memberships .....	180.85	
TOTAL .....		\$4,658.14
FUNDS ON HAND 1 March 1977		
Checking account		
Citibank N. A. ....	\$1,717.39	
Savings account		
Century Savings and Loan Association of Long Island .....	2,160.24	
Charles A. Urner Memorial Fund .....	1,341.85	
Union Dime Savings Bank .....	3,080.59	
Revolving publications fund		
Emigrant Savings Bank .....	1,262.79	
Library fund		
Century Savings and Loan Association of Long Island .....	1,262.79	
TOTAL .....		\$9,562.86

*Note:* \$13.00 from *News-Letter* subscriptions and sales into general operating

budget; \$335.96 from sales of other publications (field cards, \$136.96; *Transactions* VII, \$34.00; *Transactions* VIII, \$8.00; *Proceedings* #71, \$40.00; *Proceedings* #72, \$112.00; back *Proceedings*, \$5.00) into revolving publications fund.

Respectfully submitted,  
Helen Hirschbein, *Treasurer*

*Auditors:*  
Irving Cantor  
Emanuel Levine

## *In Memoriam*

Mr. Roger Barton, 1976  
Mr. C. Francis Beatty, 1976  
Dr. Peter Paul Kellogg, 1975  
Dr. Locke L. Mackenzie, 1977  
Mr. Charles H. Rogers, 1977  
Mr. Bradford Story, 1976  
Mr. Hobart M. Van Deusen, 1976  
Dr. Charles Vaurie, 1975  
Mr. Laidlaw O. Williams, 1976

## *Memorials*

### **Peter Paul Kellogg**

For more than four decades the name of Peter Paul Kellogg was associated with the recordings of bird songs and other natural sounds in the wild.

First as a student at Cornell, then as professor of ornithology and bio-acoustics, Kellogg established the Library of Natural Sounds which now contains over 30,000 recordings—including almost one-fourth of all bird species in the world.

Kellogg broke into the field of sound-recording in 1929 when he and M.P. Keane built a parabolic reflector to be used to concentrate the sound of the singing bird.

In 1966, Kellogg retired from the Cornell University Laboratory of Ornithology, which he had helped found, but continued his work on bird songs.

Paul, as he was known to all, died at 75 on 30 January 1975. He had been a member of the Society for almost 20 years and spoke several times at meetings.



## Hobart M. Van Deusen

Although a curator in the Department of Mammalogy of the American Museum of Natural History for many years, Van's first love in the field of natural history was birds. He made several expeditions to the New Guinea area during his career as a mammalogist but in the field he continued to observe birds.

He was a member of the Uner Ornithological Club, the New Jersey Audubon Society, and for 43 years a member of our Society. He served as Vice-President of the Linnaean Society and lectured frequently at its meetings. More recently he had organized a bird club in his retirement home in New Hampshire.

Van was a quiet, gentle man, friendly and charming, his mind constantly inquiring, enjoying simple things that he came across each day, expressing delight at the autumn foliage or over a new bird at the feeder.

He is survived by his wife, Dawn Van Deusen, a son, Hobart, Jr. by his first wife, and three grandchildren

## Charles Vaurie

Dr. Charles Vaurie, a Life Member of the Linnaean Society, died on 13 May 1975. At the time of his sudden death he was a Curator Emeritus in the Department of Ornithology at the American Museum of Natural History and was actively engaged in ornithological research both at the Paris Museum and in New York. An extensive memorial by Dr. Lester Short (*Auk*, 1976, 93:620-625) details his professional ornithological pursuits and his many important publications.

Older members of the Linnaean Society will remember Charles and his wife Patricia, and their active birding in Central Park in the 1940's. While in more recent years they were less active in the Society, their interest in birds in the field remained high. Bird observations were always a part of their trips to various parts of the world to study specimens in various museums or for Pat to collect insects in the field for her studies.

In recent years they had spent their summers in the Pennsylvania countryside, having remodeled a one-room schoolhouse into an imaginative and comfortable summer home. One of Charlie's greatest delights was to show friends things of interest in the surrounding countryside—Hawk

Mountain in which he had been much interested since its inception, his very special location for seeing Grasshopper Sparrows, a nearby reservoir with many water birds, the wild flowers and the beautiful Pennsylvania Dutch country.

Owls were his favorite birds and he delighted in telling his friends about owls in folklore and myth—one of many subjects about which he had extensive knowledge. He also enjoyed finding owls in the field, and one episode, which has practically become folklore itself, involves a trip to Pelham Bay and Bronx Park in which Charlie proposed to show owls to Eugene Eisenmann. The trip was a great success and Charlie had managed to show Gene *every* species of owl one could expect except a Saw-Whet. Just as they were about to return home, Charlie spied a hedge and said it looked like a likely spot for a Saw-Whet. Inspection proved him correct, and they ended the day with a perfect score—a record seldom equalled!

## *Publications Available*

*Proceedings of The Linnaean Society of New York for the Twelve Years Ending March 1970*, No. 71, includes:

- Supplement to Birds of the New York Area, John Bull
- Supplement to the Birds of Central and Prospect Parks, Geoffrey Carleton
- Series of papers on Great Gull Island Project, Lois Hussey Heilbrun, Donald Cooper, Helen Hays and Catherine Pessino \$5.00

*Proceedings of The Linnaean Society of New York for the Four Years Ending March 1974*, No. 72, includes:

- Four papers on Common and Least Terns, Barbara W. Massey, Robert G. Wolk, Milton E. Davis, Michael Gochfeld and Darrell B. Ford \$7.00

Reprint from *Proceedings of The Linnaean Society of New York, 1958*, Nos. 66-70, The Birds of Central and Prospect Parks, Geoffrey Carleton \$1.00

*Transactions of The Linnaean Society of New York*, No. 7, 1955

- The Species of Middle American Birds, Eugene Eisenmann \$2.00

*Transactions of The Linnaean Society of New York*, No. 8, 1962

- Development of Behavior in Precocial Birds, Margaret Morse Nice \$2.00

Miscellaneous: The Birds of Great Gull Island, David Duffy and Catherine La Farge \$2.00

To order send a check or money order (plus 20 percent toward postage and handling) to: The Secretary, The Linnaean Society of New York, % American Museum of Natural History, Central Park West at 79 Street, New York, New York 10024.











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