THE CORMORANTS OF BOSTON HARBOR AND MASSACHUSETTS BAY

by Jeremy Hatch, Boston

Cormorants are now such familiar sights in the coastal waters of Massachusetts and their roosts and nesting colonies on rocky islands are so conspicuous to both eye and nose of a passer-by that it is sometimes hard to realize that this has not always been the case. In recent years the numbers have increased rapidly, the breeding birds doubling about every three years, the wintering birds at a somewhat less hectic pace. The purpose of this paper is to document those explosive increases and to present a short account of some relevant aspects of the history, distribution, and present biology of the two species with some limited speculation about what the future may hold.

Distribution of the two species

There is little overlap between the two species' occurrence in Massachusetts: the Double-crested Cormorant (Phalacrocorax auritus) is the breeding species and is replaced in winter by the Great Cormorant (Phalacrocorax carbo). The present breeding range of the Double-crested Cormorant along the east coast of North America extends from the north shore of the St. Lawrence south to the north shore of Long Island Sound, where nests on Fishers Island were first confirmed in 1977 (Bull 1981; Erwin 1979). Elsewhere, the species is quite widely distributed within North America with four subspecies breeding from the Alaskan peninsula and the prairie provinces of Canada south to Baja California and Cuba. The Great Cor-

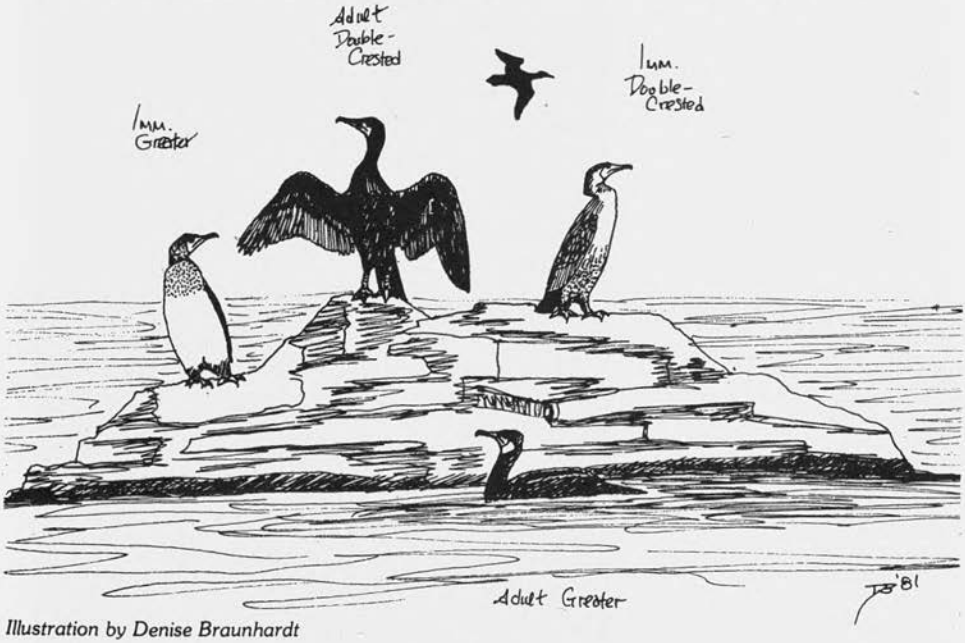

Illustration by Denise Braunhardt

morant, on the other hand, has a rather restricted New World distribution but is otherwise found world-wide. The North American population is centered on the St. Lawrence. In 1972 there were breeding colonies as far north as St. Mary Islands (50° 19'N), and south to southern Nova Scotia; a disjunct population breeds in West Greenland (Brown et al., 1975). In breeding plumage (Definitive Alternate) the Great Cormorant has several distinguishing marks, including conspicuous and unmistakable white thigh-patches. However, the one-year-old birds (despite differences in size and shape) can easily be overlooked amongst similar young congeners.

The wintering ranges of the two species overlap little: Greats are commonly reported in Christmas Counts as far south as New Jersey and the great majority of Double-crested winter south of that. Many of the breeders from Massachusetts are thought to migrate as far as Florida. Thus, although the breeding ranges of the two species overlap (in Canada), they scarcely overlap in the winter.

History of Cormorants in Massachusetts

Cormorants are mentioned in some of the earliest written reports from New England, e.g. Josselyn (1674) who alludes to their capture and consumption by the Indians (although it is not clear which species was involved). In 1976 the bones of both Double-crested and Great cormorants were found at an Indian midden dating from about 1500 A.D. on Calf Island in Boston Harbor (Luedtke, 1980). Cormorant bones were the most numerous avian remains at the site. The Great Cormorants (2-5 of them) were all at least one year old, but the much more numerous Double-crested Cormorants included both old birds and many hatching-year birds. The young birds were all about fledging age and it was not possible to distinguish pre- and post-fledging individuals (Houde, pers. comm.). It seems most likely that breeding occurred nearby at the time.

Subsequently, the cormorants declined rapidly and they had ceased to breed in New England by the early 19th century. Drury (1973) summarizes the changes thereafter, noting that in 1834 Nuttall alluded to breeding near Boston but it is not clear if this reflected contemporary knowledge. Nests of Double-crested Cormorants in Maine were first reported in 1893 and next in 1925, from then until 1945 the growth of the population was spectacular and the species extended its breeding range to Shag Rocks, Boston Harbor by 1941, or possibly as early as 1937 (Hagar, 1941) and to the Weepecket Islands in Buzzards Bay by 1946 (Griscom & Snyder, 1955). The complaints of fishermen led to an extensive official program of control (by spraying eggs) which lasted in Maine from 1944 to 1953. During this period and until perhaps the late 60's the numbers breeding in Maine and Massachusetts remained roughly constant or increased only slowly (the scanty information is summarized in Drury, 1973, Erwin, 1979, and Korschgen, 1979).

The present situation: breeding birds

To describe the present phenomenal growth of the population of Double-crested Cormorants I use the results of my seven counts of the Boston Harbor Islands since 1974, and three counts that included all or most of Massachusetts Bay in 1972, 1977, and 1981. In 1972 Drury and Kadlee counted cormorants during an aerial survey of the east coast, intended primarily for assessment of gull populations. The numbers of birds reported (Drury, personal communication) are divided by 1.7 to estimate numbers of nests on islands where the birds were known to be nesting. The 1977 survey of all colonial waterbirds (Erwin, 1979) used a mixture of ground and aerial counts. For the cormorants the measure was nest counts made in June. In June 1981, I visited all islands in the area between Manchester and the Brewsters (Boston Harbor) and counted nests.

In 1974, when I first counted nests on the Brewsters, the Double-crested Cormorants nested on Shag Rocks and Little Calf Island. Although birds roosted elsewhere, nests were confined to these two sites until 1981 when they appeared on each side of the narrow channel between Middle Brewster and Outer Brewster (Fig. 1). The number of pairs nesting on the

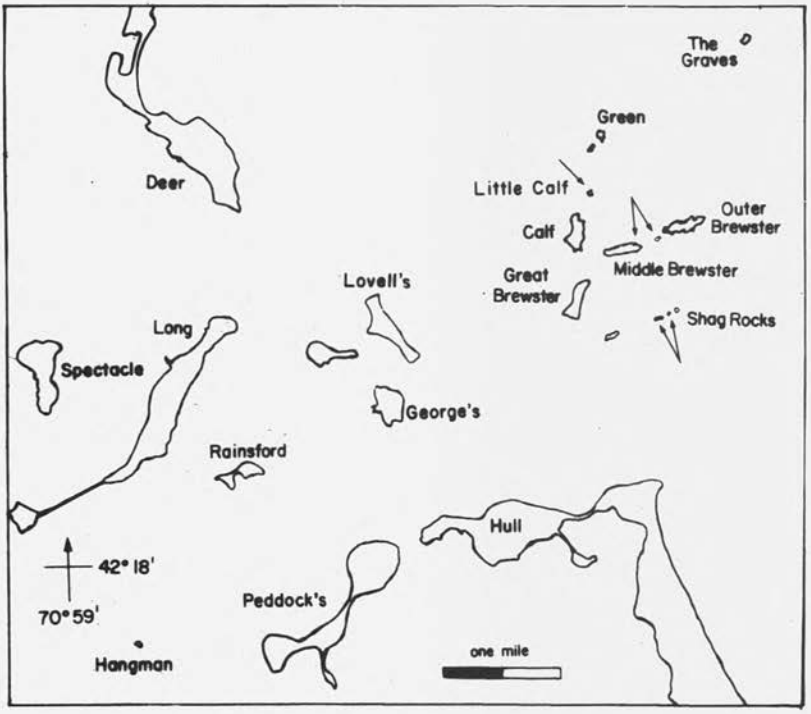

Fig. 1. Boston Harbor islands. The arrows indicate breeding colonies of Double-crested Cormorants in 1981.

Brewsters increased from about 200 in 1972 to nearly 1600 in 1981 (Fig. 2). The rate of increase (as per cent per year) is steady, with little sign of levelling off, and the annual increment in numbers is increasing rapidly. This is shown by the straight line (at least from 1976) on a semi-log plot.

The increase in numbers nesting on the Brewsters reflects growth throughout the Massachusetts population and there is no evidence that it is due to a shift of breeders from other colonies. The nearest of these colonies is at Egg Rock, Nahant and the others are between there and the Salvages off Cape Ann. The three censuses of islands in Massachusetts Bay show an increase from 6 nesting sites in 1972 to at least 13 in 1981 and of nesting pairs (or nests) from about 300 to more than 2000. Table 1 compares the 1977 and 1981 censuses. In the area surveyed in both years the population increased more than 2-1/2 times in four years and expanded to four new sites. It is likely that similar increases occurred on and

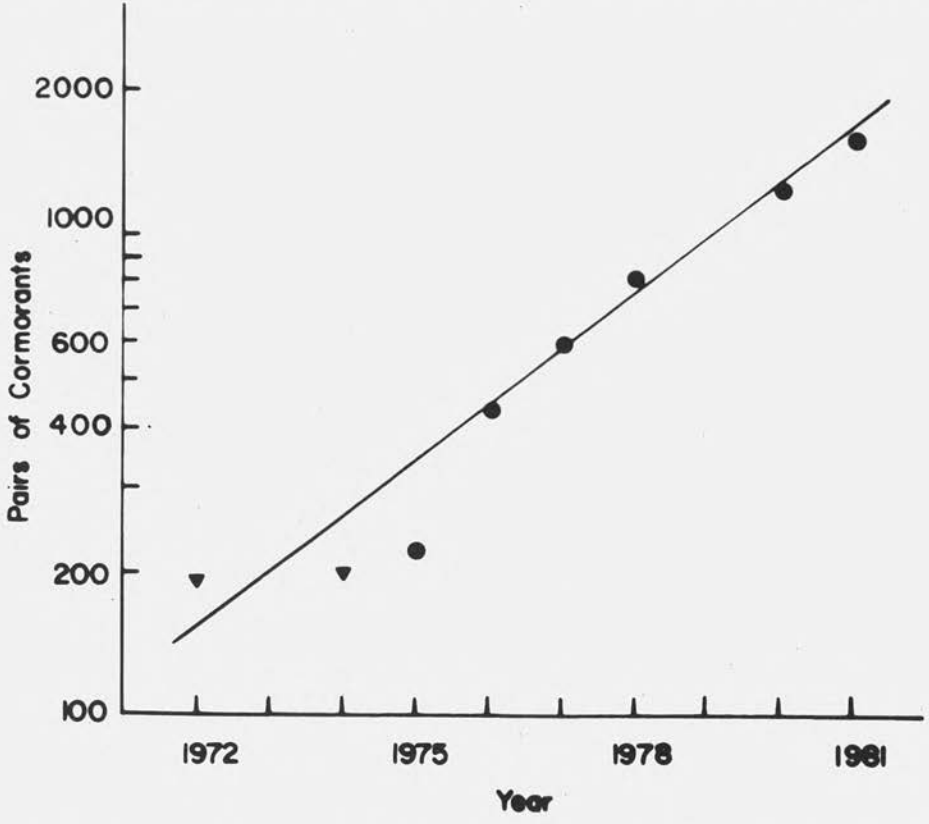

Fig. 2. Breeding pairs of Double-crested Cormorants in Boston Harbor, Massachusetts, 1972-81. Triangles refer to estimates from counts of adults; filled circles are nest counts. The straight line is fitted by eye.

near the eastern islands where breeding occurred in 1977 which were not counted in 1981 (Normans Woe, Milk and the Salvages). Similar rates of increase have been recorded for the cormorants nesting on the Weepecket islands in Buzzards Bay.

Table 1. Cormorant nests on islands in Massachusetts Bay: 1977 and 1981

		Both years	New in '81	Absent '81	used in '77 not counted '81
Number of islands		6	4	1	3
Number of nests	1977	1000	0	50	275
	1981	2510	116	0	---

Breeding Biology

Preferred nesting-sites in Massachusetts are rocky islands, typically within 2 miles of the mainland. This distribution is related to the depth of surrounding water. For example, there are no nests on Halfway Rock, an isolated pinnacle nearly 3 miles offshore from Marblehead, but cormorants nest more than six miles offshore on the Isles of Shoals, which are surrounded by large areas within the 10-fathom line. It is tempting to assume that this pattern relates to the food supply nearby, although cormorants will sometimes feed ten or more miles from their nests.

Some vegetation may exist within the colony during the early years of occupation but this is soon killed by the guano of the nesting birds if it has not already died from the earlier offerings of the roosting non-breeders. Throughout its range in the interior of the country, the Double-crested Cormorant commonly nests beside freshwater where the preferred sites are in trees, which are soon killed. It is interesting that Rick Heil found twenty tree-nests on House Island (off Manchester) on 4th July 1980, although none were found there (or elsewhere in Massachusetts) in 1977 or 1981.

The returning migrants arrive in Boston Harbor in late March or early in April and soon build their bulky nests of seaweed, twigs and a diverse array of flotsam and jetsam. These nests are closely spaced, so that there is not much room between them for wandering birds. In 1981 the first eggs on Shag Rocks were laid on or about 5 April, and new nests were being built at least into late May, by which time many young had hatched.

The eggs are initially pale blue in color, but are soon covered with a layer of dirty white guano, as is every other immobile thing in the colony. The most frequent clutch size on the Brewsters was 4, although 3's and 5's were common and elsewhere 2 to 7 and even up to 9 eggs have been reported (Palmer, 1962). The incubation period in Maine is reported to be 25 days (Mendall, 1936). The newly-hatched young are black and naked and appear quite hideous to most people. Thick black down soon covers the shiny black skin, but does little to improve the appearance. By the age of 3 to 4 weeks the young cormorants may wander within the colony, returning to the nest to be fed. They first fly at about six weeks and it is thought that parental care ceases when the young are about 10 weeks old.

Effects of disturbance

Visitors to cormorant colonies may have serious impacts, both through the actions of breeding birds dislodging eggs or young and through the opportunities provided for marauding gulls. When an intruder appears, the nesting cormorants first show anxious neck-stretching and often regurgitate fish before flying from the colony. Because incubating and brooding cormorants rest their eggs and small young on the webs of their feet, precipitate departure from the colony can result in these offspring being thrown out of the nest. Gulls are ever-present near the cormorant colonies, often nesting along the edges or even within them. On the Brewsters, both the Great Black-backed and Herring gulls are involved. These gulls usually keep their distance while a human visitor is present in the colony, but rapidly settle in to scavenge as the visitor moves on, and before the adult cormorants return. The gulls' first target seems to be the regurgitated fish left behind by the departing cormorants but they soon turn to the eggs and small young (in or out of nests). There may be some individual gulls that first take these in preference to the fish. The actual pattern of disturbance and the resulting impact of the gulls depends upon the relative wariness of the species and their different responses to intruders. Kury and Gochfeld (1975) report similar observations in other cormorant colonies and discuss management implications. At the colonies on the Brewsters, many of the cormorants leave their nests while an approaching boat is still seventy yards or so offshore and they do not all return until the intruder is well clear of the colony. Thus, the gulls have ample opportunity to wreak their havoc. Therefore visits to cormorant colonies are definitely not recommended. However, it is possible to see much of the activity in the colony on Little Calf Island without much disturbance by setting up a telescope on Calf Island.

Wintering birds

To assess the numbers of wintering birds I have analyzed Christmas counts. The weaknesses of such counts for monitoring population changes are well-known, but the recent changes these reveal in cormorant numbers are convincing. I have summed the total numbers seen for the various counts, because changes in counting effort (parties and party-hours) have very much less effect on the results for conspicuous sedentary seabirds than those for skulking landbirds.

Most of the Double-crested Cormorants seen on Christmas counts are stragglers because only a handful winter in New England (and New London, Connecticut seem to be the best spot for them). The increase in wintering Great Cormorants is shown in Fig. 3. The lower curve is the sum of Quincy and Greater Boston counts; the upper curve is for seven counts between Cape Ann and Montauk, Long Island. Both of these reveal considerable fluctuations but, overall, the population tripled between 1972 and 1979. The great fall in 1980 probably re-

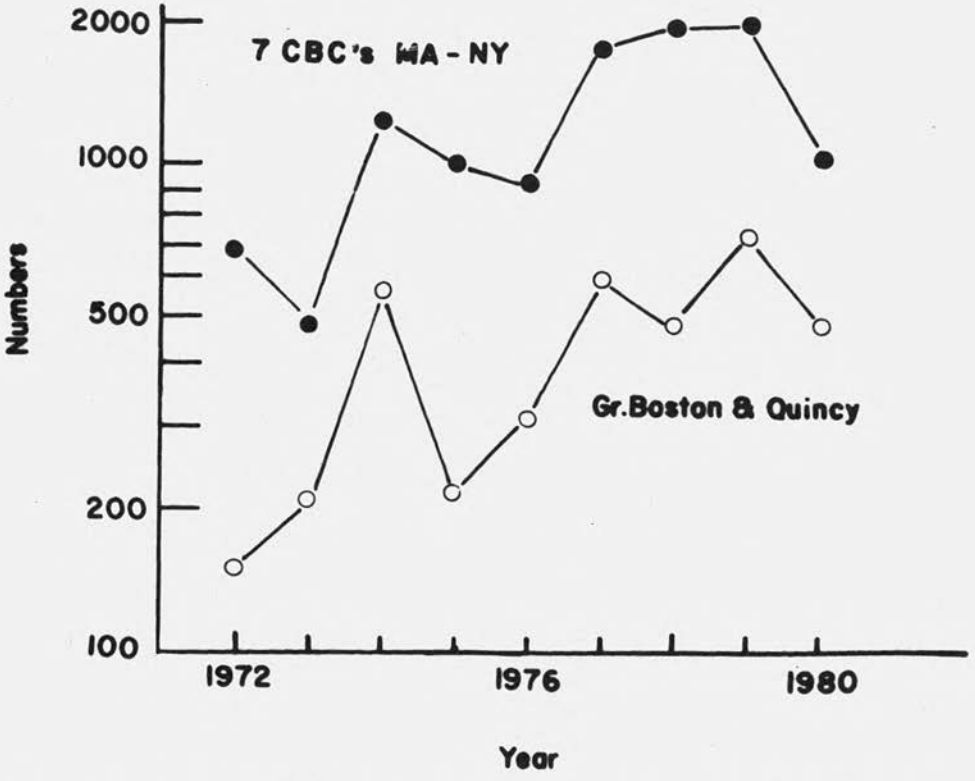

Fig. 3. Numbers of wintering Great Cormorants in New England. The numbers are derived from Christmas counts.

flects the prevalence of sea-ice that year rather than a real decline (but time will tell). This interpretation is supported by the results of the TASL census.

Relations with man

Although cormorants are the objects of a traditional vendetta by fishermen, there has not been much evidence that they are serious competitors. Analyses of the stomach contents of Double-crested Cormorants (for several states, summarized by Mendall, 1936) revealed a variety of fish, few of which are of much interest to fishermen. From more than a thousand records of marine foods (all from the Atlantic) Mendall concluded that the three most frequently eaten fish, comprising 70% of the total numbers, were sculpin, gunnel and cunner. Exceptions occur, of course, where cormorants feed on young salmon released from a hatchery, or interfere with the operation of fish-traps by driving many fish so that they entangle themselves in the netting.

Future prospects

So little is known about factors that regulate the numbers of these cormorants, or of any cormorants, that no firm predictions are possible. There is some evidence from England that local populations of the Shag (P. aristotelis) can be limited by shortage of suitable nest-sites. However, there is no reason to suspect that such a shortage is imminent in the Boston area because there are several apparently suitable sites to which the nesting cormorants can readily spread. If the population continues to grow, the Double-crested Cormorants are likely to occupy more sites in the Brewsters and some undisturbed, predator-free islets or rocks further into the harbor (Hangman Island, for example). There is no sign that the cormorant population is limited (yet?) by its food supply, at least during the breeding season, because the adults appear to spend very little time actively fishing. Overall abundance can be greatly influenced by outbreaks of disease or similar events. For example, in 1968 many shags and other seabirds died in northeast England from Paralytic Shellfish Poisoning (PSP) as a result of eating fish that had accumulated the toxins produced by Gonyaulax or other dinoflagellates (the Red Tide organisms). Such mortality has not been reported in Massachusetts, at least not on a massive scale, but the possibility certainly exists for a population crash from this or another cause. However, at present, the unavoidable conclusion is that the increase of the population is likely to continue and that the likely impact of this growth on other species has not been explored.

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