Feeding habits, accommodation to man, breeding success and aspects of coloniality in the Common Gull *Larus canus*

Göran Bergman

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A population of 200–500 pairs of Common Gulls *Larus canus*, 15–55 % breeding solitarily, has been studied during 53 seasons (1933–85) in the archipelago SW of Helsinki, Gulf of Finland. The population increased until the 1960s as a consequence of increasing man-made food resources and high breeding success in the colonies. Since then, predation by *Larus argentatus, L. marinus* and *Mustela vison* has depressed the breeding success from above 1.5 to below 0.3 fledglings/clutch and the population has decreased. The solitary pairs stay within combined breeding and feeding territories, mostly near summer cottages, where the gulls find food and have become tame. Here their hatching success and, since the 1970s, their breeding success is higher than in the colonies. By breeding close to feeding localities where only small amounts of food are available, the solitary pairs avoid competition for food. If seriously disturbed the flying parents may lead their chicks to new sites up to two kilometres away. In localities where the clutch hatched successfully in the previous season, the nest site tenacity of solitary pairs is very high. The fledgling success does not influence the nest site tenacity. In colonies the nest site tenacity is lower, although the colonies themselves are stable. Defence against predators in the territory, information about food and facultative vs. obligate coloniality in larids are discussed.

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Introduction

As with many other gulls, man has improved the living conditions of the Common Gull, but his influence has not been purely beneficial. Harmful effects are the disturbance, indirectly increasing losses of eggs and young, and the predation on them by the American Mink *Mustela vison* and the Raccoon Dog *Nyctereutes procyonoides,* both foreign elements in the Finnish fauna, and the disasters caused by the increased population of Herring Gulls *Larus argentatus*. In Finland these effects are most evident in the archipelago lying off Helsinki and its suburbs, a conurbation with ca. 800 000 inhabitants. All the records used in this study are obtained from this archipelago. In Sweden effects of urbanization on the Common Gull have been studied by Pehrsson (1980) and Götmark (1982).

The following questions are examined here: Why did the population increase earlier and why is it now decreasing? Is there intra- or interspecific competition for food and how does information about food spread? Where do solitary pairs settle and where are colonies formed? Is nest site tenacity related with hatching and fledgling success? Why do solitary breeding and colonial breeding exist side by side in the Common Gull and its relatives, while some other larids are obligately colonial?

The area studied covers roughly 30 × 5 km of the coastal archipelago SW of Helsinki (Fig. 1). There are about 150 wooded islands and islets and ca. 180 treeless islets within the area. The gull populations have been dealt with earlier by Bergman (1939, 1949, 1957a, b, 1960, 1965a, b), by Kilpi (1985) and by Kilpi et al. (1980, 1984). In the mid-1930s, the number of Common Gulls breeding here was ca. 215 pairs, in the mid-1960s they had increased to ca. 500 pairs, but by 1985 they had decreased to ca. 250 pairs. In the 1930s the proportion of solitary pairs was ca. 15 %, in the 1960s ca. 20 % and in 1985 about 55 %.

The influence of man in the study area

In the 1930s, waste of the Baltic Herring, caught and cleaned within the archipelago, provided the staple food of the colonial Common Gulls in May and June. In the 1930s this fishery ceased almost completely and the colonial gulls began to forage mainly on fields and in more or less urbanized areas on the mainland. But the increasing use of the archipelago for recreation provided new food supplies for the solitary pairs. The first summer cottages were built on the inner islands about 1860, and building spread to the middle archipelago around 1910. From September 1944 to January 1956 the W half of the area was used by the USSR as the marine base of Porkala (see Bergman 1957a). Since World War II the number of summer cottages has increased rapidly. On the wooded islands of the inner and middle archipelago, there is now roughly a cottage on every 200–400 m of shoreline. In the W half of the area about half of the outer wooded islets still are uninhabited. The largest woodless islets are about 8 ha in size, and the smallest on which shore-birds may breed cover some ten square metres. Almost all woodless islets are uninhabited; 35 of them are official bird sanctuaries and landing during the breeding time is prohibited also on 30 other islets.

Almost all the protected islets and several others in the outer archipelago have been taken over by the Herring

Gull. The colonies of the Lesser Black-backed Gull *L. f. fuscus* and terns *Sterna hirundo* and *S. paradisaea* were still fairly numerous in the early 1960s, but little remains of them now (see Kilpi et al. 1985, YTV 1985). The islets that are not protected or inhabited are frequented by campers almost every weekend, and almost every day in the summer holiday period from late June to early August. Many people spend the nights in boats moored along the shores. Sailing races are held every week and in the 1980s windsurfing became common. The number of boats visiting the study area on a fine summer weekend in the mid-1930s was around 250. Now it exceeds 2 000 and the free Saturdays have made the weekends one day longer. The traffic is increased by motorboats plying between the ca. 2 000 summer cottages and the mainland. In the 1930s the boating season began late May. Now it starts 2–3 weeks earlier because modern materials allow earlier launching. All this increases the disturbance in the archipelago.

Dogs are kept in about 25 % of the summer cottages and accompany about 20 % of the boats visiting the islands. Many of these dogs are let off the leash on at least the wooded islands, though this is forbidden by the law till the end of the closed season in August. Some time after 1950 the American Mink spread into the area (see Tenovuo 1963, Lemmetyinen 1971, Vikberg 1976, Hario & Komu 1979) and since 1979 the Raccoon Dog has been recorded regularly on several large wooded islands, where the Red Fox *Vulpes vulpes* (Bergman 1965b) and the Badger *Meles meles* also occur.

Food competition

Most cottage owners are interested in protecting the birds on their ground, but the campers generally visit the islands irregularly and do not become familiar with the birds there. Gulls are therefore fed more regularly near cottages than at camping localities. Almost every solitary pair of Common Gulls seek its food near cottages. Generally they obtain only small quantities of food: some fish waste, kitchen refuse, pieces of bred, etc. An individual or a pair learn to wait for food near a feeding locality and usually eat it all before any conspecifics, except perhaps some neighbouring pairs, arrive at the feeding place. This irregular but common occurrence of small amounts of food from late May onwards in numerous localities suitable as breeding grounds has led to a fairly evenly dispersed population of solitary pairs.

If the tamest gulls, arriving first, are unable to consume all the food immediately, less tame conspecifics may join them, forming a dense flock on the ground. This is typical with food consisting of small pieces that are easy to swallow. Each individual tries to eat as much and as quickly as possible. The feeding behaviour depresses in this situation almost totally real aggressivity towards the conspecifics, though aggressive calls and postures are common. I have seen 12 Common Gulls eating together within an area with a radius of 60 cm! If there are larger food items, which cannot be swallowed at once, the gulls try to fly some metres aside with them. Other individuals may pursuit the gull carrying food (LeBaron & Heppner 1985, records on Herring Gulls). But as soon as it alights again, it may eat the food without being attacked by conspecifics. Some Common Gulls from nearby colonies may try to join the feeders, reacting as gulls usually do, to the straight rapid flight or glide of other gulls towards the feeding site. They mostly arrive too late, however, and their interest in such feeding localities remains therefore low. Large gulls (*L. marinus, argentatus* and the few remaining *fuscus*) may react to the sight of the feeding Common Gulls or the food, but seldom dare to alight immediately. If there is nothing to scare them away, they may later eat the largest food items left or dropped on the ground by the Common Gulls.

The Common Gull competes successfully for food with the Black-headed Gull *L. ridibundus,* its larger size compensating for its somewhat slower movements. However, the Black-headed Gull has decreased rapidly since about 1965 in the Helsinki region (from ca. 10 000 to ca. 3 000 pairs), and several minor colonies have disappeared from the study area. This has no doubt improved the food resources of the solitary pairs of Common gulls in the archipelago and may have contributed to their increase. Before 1960, a fair number of Black-headed Gulls foraged in the eastern half of the study area, partly visiting the same localities as the Common Gulls. Now the remaining ca. 400 pairs of Black-headed Gulls forage in the innermost archipelago, on the mainland and in Helsinki and these are the only localities in which Common and Black-headed Gulls now forage together. The two species attract each other when flocking to catch earthworms on fields and lawns and when foraging e.g. on garbage dumps. The two species become equally tame.

The few Common and Arctic Terns nowadays breeding in the study area are unable to compete with the Common Gulls for anything but flying ants and small pieces of fish waste thrown into the water. Common Gulls do not try to compete with Herring Gulls and Great Black-backed Gulls gathering around trawlers on the open sea.

Foraging tours and flying in formations; food signals

Ward & Zahavi (1973) initiated a discussion on colonies and roosts as information centres for food-finding (see Erwin 1978, Loman & Tamm 1980, Andersson & al. 1981, Bayer 1982, Evans 1982, Walz 1982). The only study indicating real information sharing among larids is that by Evans on the Black-billed Gull *L. bulleri.* When leaving the colony for foraging, this gull gives a special call, which releases taking off and following. According to my records at Herring and Common Gull colonies only a very pronounced taking off for a foraging tour may cause following reactions in other members of the colony. Gulls starting for foraging tours to localities far away do not take off in such a pronounced way, that other individuals follow them. Thus there is no real food

information in these colonies, but, as known since ancient times, every feeding gull (even nonspecifics) may act as a food signal for other gulls (at least as long as the difference in size is not extreme and their food therefore very different). Individuals on foraging tours may especially in the vicinity of foraging localities join conspecifics already attracted by the feeding locality and thus find new food sites. In general, all the colonial gulls in a region seem to know all the localities where food is normally available and flocking is not restricted to colony members (cf. Fordham 1968 about *L. dominicanus*).

Common Gulls intending to visit feeding localities far from the colony start silently, mostly alone and fly at normal speed. On the way they may be joined by other individuals, but this is not very common. The return flights more commonly take place in flocks, although every individual is no doubt able to find the shortest way back to the colony from the feeding localities in the normal feeding range. On the way back solitary gulls, especially Herring Gulls, try to catch with flocks flying before them. Such catching up is hardly ever seen in gulls flying early in the morning to the feeding localities. The difference may be due to the fact that returning gulls are heavily loaded and therefore more inclined to use the advantages of flying in formations. In this area it may also be due to the predominance of headwinds later in the day. Gulls returning in mist largely fly alone, but as straight towards their goal as in fair weather. Birds from different colonies may form flocks.

Gulls form lines or V formations similar to those of diving ducks and geese. Besides aerodynamic advantages, the formations probably provide the best optical contact between the individuals. The recent study by Heppner et al. (1985) has made the latter more likely than earlier. After sunset early in spring, Black-headed Gulls travel a distance of ca. 10 km in conspicuous formations from the feeding localities to roosts off Helsinki. In autumn, Common and Herring Gulls display similar flocking on the same routes.

Regular finding of food by following other individuals is — at least in Common, Herring, Lesser Black-backed and Black-headed Gull — possible only when the food sources are predictable, large and relatively stable. Such sources are almost always created by man. Exceptions are such localities as river mouths where fish migrate to the spawning ground, spawning places and (outside the Baltic) tidal shores. Most natural food sources are scattered or occur in localities that vary from day to day. In

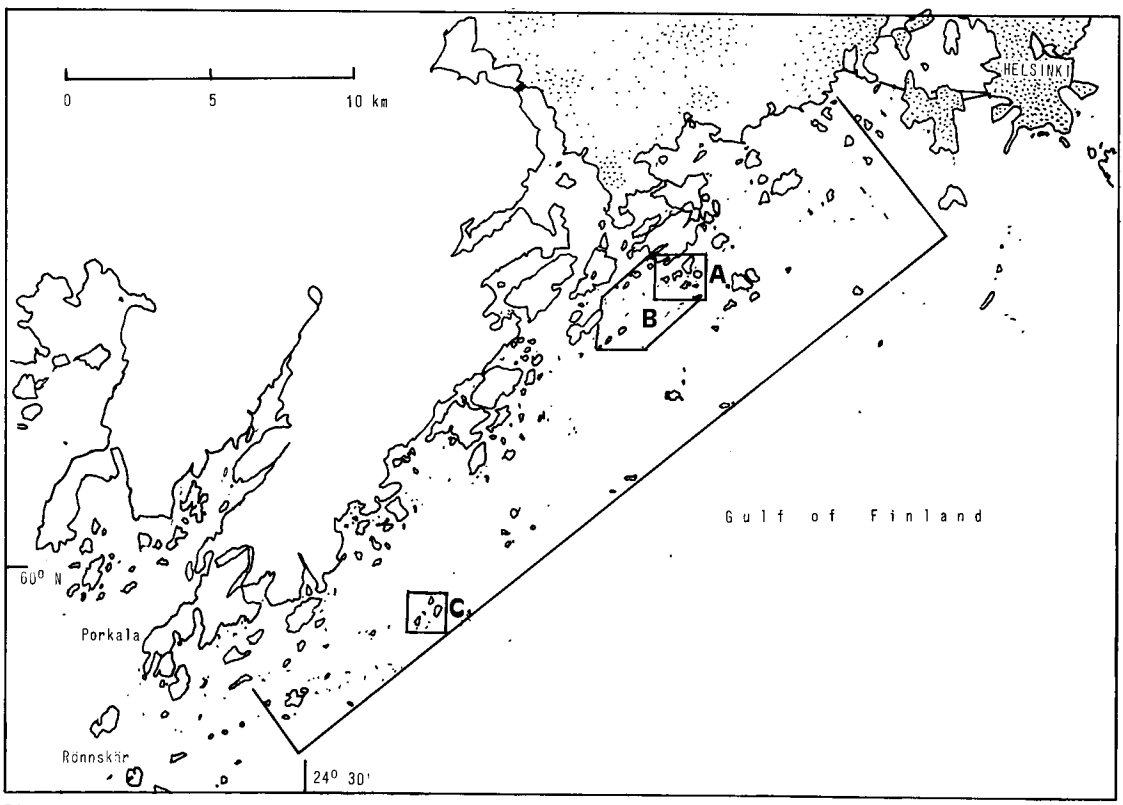

Fig. 1. The study area. A = the islet group of Kopplorna (main records in 1933–62). B = adjacent area with breeding records in the 1930s. C = the islet group of Mickelskären (records in 1963–85). See Figs. 2 and 3, pp. 69–71.

such conditions, following other individuals is mostly not adaptive. A more effective way to find food is to fly alone over wide areas. But joining individuals already feeding is advantageous (see also Erwin 1978). This important reaction may be learnt when the parents do not feed their fledged young any longer, but still attract them.

Common Gull young begin at age of about 6 weeks to visit feeding localities of their parents and other adult conspecifics. A few days later they dare to feed among the adults and some of the young individuals begin to behave aggressively against adult conspecifics. At this age they react already strongly on feeding gulls (conspecifics and other species) as food signals.

For the adult Common Gulls in the study area and on the shores of Helsinki, also Mallards *Anas platyrhynchos* and Hooded Crows *Corvus corone* gathered at food may act as signals. Food signals may be optical, acoustic and temporal cues; for examples see Bergman 1960.

The territories of solitary pairs

In the study area most solitary pairs live in combined breeding and feeding territories. The largest territories may have a ground area of several hectares and a shore of 500–1000 m, the smallest consist of a narrow (width 5–50 m) treeless shore less than 100 m in length and some watching sites in its vicinity. Pairs breeding in very small territories may have their feeding localities some hundred metres away and may in them behave strongly territorially. The increase of the population and the improved food supplies have reduced the mean size and the shoreline of these territories since the 1930s. The boundaries of the territories are not sharp. Neighbouring pairs commonly frequent each other's areas without causing any clear aggressiveness.

The increase of the solitary pairs was studied especially in and near the islet group of Kopplorna, ca. 15 km SW of Helsinki. In the 1930s there bred 10–12 pairs, in 1985 30–35 pairs (Fig. 2).

Solitary pairs settle in their territories as soon as they find enough food there in spring. In 1963–85 I studied the life of the solitary pairs chiefly in the island group of Mickelskären, 30 km SW of Helsinki (Fig. 3, main islets: Lövlandet, Norra Linlandet, Skrobban). Most of the pairs settle in their territories between 25 April and 5 May, but they may visit them in early April. If they have been fed in the territory or its nearest vicinity the previous season, they immediately approach the food provided. Individuals clearly hesitating to alight at the normal feeding place I have considered newcomers. After the number of pairs breeding in the vicinity of the feeding locality (situated by my cottage on the islet Lövlandet) had increased to 7 in 1973, no such hesitating individuals occurred in the subsequent springs. The locality was obviously settled and the pair bonds mostly stable (see p. 68).

Colonial pairs may visit their breeding grounds irregularly in early May, but settle there much later, in the colony of Norra Linlandet (25–55 pairs) never before 15 May. The difference between the settling times of solitary and colonial pairs is due to the different main feeding habits. The colonial pairs largely forage on the mainland, following ploughs in flocks to obtain earthworms and also eating newly sown grain, and commonly garbage in more or less urbanized areas. Before settling in the territories, they spend the nights in flocks on small rocks or drifting ice in the outermost archipelago. The solitary pairs spend before egg-laying the nights at the shore of the territory.

Solitary pairs normally stay in the vicinity of their breeding localities for the whole breeding season. The 3–7 pairs which bred within a radius of ca. 300 m of my summer cottage evidently never foraged further away than ca. 500 m. The longest tours were made when they saw other gulls being fed from boats or catching flying ants. Some solitary pairs breeding at the shores of Helsinki have regular feeding areas around nearby houses, sometimes several hundred metres from the shore.

Common Gulls nesting in localities where they are normally fed by man tend to stay in these territories even when such food is no longer available. This may be a disaster for the young. Such a case was recorded on Lövlandet in 1975. Four pairs used the same main feeding locality as in the previous summers. Their young hatched on 4–8 June. The parents fed the chicks with waste given by me, but on 10 June the feeding was interrupted for 15 days. The adults of two pairs stayed all day in the vicinity of the feeding locality and their young, but ignored their begging (verified on two visits). Three of the six young starved to death before 20 June, but the remaining somewhat older young found enough to eat at the waterline and survived. When kitchen waste again became available, the adults immediately began to feed their young normally. The situation was abnormal and does not allow any general conclusions, but, during occasional food shortage it may be more advantageous to maintain the female's ability to lay a replacement clutch than to prevent the death of the young.

Where enough food is available, solitary pairs tend to breed so close to each other that the group could be called a small colony. In the 1980s such groups have bred on Lövlandet, and in three localities in the inner archipelago (at Vedanäs NW of Mickelskären, and on small islets off the W point of Bergö NW of Kopplorna). The size of these groups has been 3–5 pairs. These birds do not normally undertake long foraging tours as do truly colonial pairs.

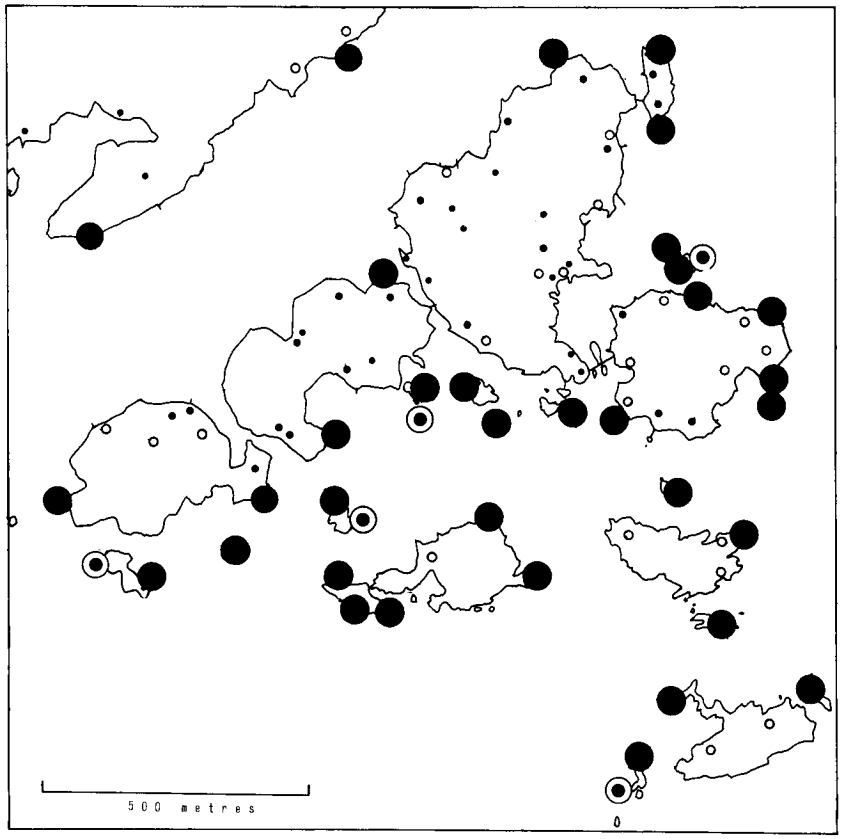

Fig. 2. Breeding localities of the Common Gull in the islet group of Kopplorna. Circled dots: in 1934–37. Black dots: in 1985. Summer cottages built before 1938 indicated with small dots, cottages built later with small circles. All larger islets wooded.

The nest sites now and earlier

Breeding in the vicinity of man and his activities has led the gulls to build nests in places differing widely from those common in the 1930s and 1940s and still mainly used where the influence of man is small (see v. Haartman 1980). This plasticity in the choice of nest site is known also elsewhere in Finland (see v. Haartman et al. 1963–67).

Food provided directly by man attracts Common Gulls and the feeder rapidly becomes a food signal for them. When waiting for food, the gulls become more and more familiar with both the feeder and the locality. Within some days they behave more or less tamely and already in the next spring they may breed close to the locality where they are fed. The nest is mostly built on a place not frequently visited by man, but there are exceptions, for instance landing stages and stones just off shores very often visited. They prefer places with a free view of the main feeding place, their watching sites and the watching site of any neighbouring pairs. This enables rapid arrival at the food and successful feeding.

In the study area the unusual nest sites include: Roofs and chimneys of buildings situated on or close to the shore (yearly ca. 10 nests); dense flat branches of shore pines (yearly at least 12 nests), the roof of nestboxes provided for waterfowl (a few cases), stone or wooden landing-stages (yearly 5–10), and (very commonly) small grassy ledges in steep shore cliffs either by the water or some metres away from the shoreline of localities commonly used by man. Boulders just off the shore are greatly favoured; on the shores of Helsinki nests of the Common Gull may be built on boulders less than 30 m from the nearest street. In several years in the 1970s a pair hatched their eggs on the moving arm of a crane in regular use in the W harbour of the town. The crane operator fed gulls, which attracted the pair to the locality. In the same harbour area, a colony of ca. 10 pairs has bred since the 1970s on the NW slope of a large fenced in coal heap 60–100 m from a highway.

Ability to distinguish between "friendly" human visitors and others

In places where Common Gulls are fed, their flight distance for man may become as short as 1–3 m. Such tameness is mostly shown towards persons seen more or less regularly and at least sometimes feeding the gulls. Towards these persons tameness may be shown even hundreds of metres from the feeding locality. For other persons the flight distance is mostly of the order of 10–20 m.

When Common Gulls visit localities in which they see many people and much traffic, or when they breed near such places, they mostly display a flight distance of 5–10 m, even if not fed there. At the market in Helsinki, where the gulls find plenty of food, some individuals are even tamer, having watching sites just above the heads of the people.

In 1963 I began to feed gulls at my summer cottage on Lövlandet and after about a week the two gull pairs breeding there alighted for feeding 1–2 m from me and 5–10 m from the other members of my family, who also sometimes fed them. After they had lost their shyness, they sometimes displayed begging behaviour directed towards me. However, this ocurred only when other individuals had alighted close to the gull.

As they accepted me just as well in normal clothes, rainwear of different bright colours, or bathing drawers, and approached me even when I was sitting in a chair, they must recognize people by the face. They watched us almost continuously in the daytime from the sites near the cottage, sometimes also flying around the cottage and looking through the windows, having learned that we commonly fed them just after our meals. When fed again in the following spring, they behaved as tamely after some minutes as in the previous season.

Clothes and the size of people (naughty boys!) may also act as warning signals. In the territory, threatening the gulls with a stick or throwing stones at them releases aerial attacks. People resembling those who threatened the gulls are still attacked a week later if approaching the territory. Gulls and terns also learn to identify boats playing some part in their life. Such identification is not restricted to the vicinity of the breeding locality.

Shore territory

Common Gulls breeding in localities frequented by "friendly" people (people who either feed gulls, or never react on them) many times a day may take their chicks to a more peaceful place, situated on the shore and stay there until the young fledge. This shore territory is generally situated on the same islet as the nest, sometimes on a nearby islet from which the parents are able to watch the feeding places. They move to the shore territory when the chicks are 4–5 days old. The procedure is rapid (cf. the slow abandonment of the vicinity of the nest described by Koskimies 1952 and also typical of the chicks in the colony on Norra Linlandet). The parents alight on the shore and the young run to the calling parents for food. The acoustical discrimination of the calls of the parents has developed before the young leave the immediate surroundings of the nest (cf. Evans 1977 about *L. delawarensis*). When about 14 days old, the young react to the alarm calls of other species just as their parents do (on Mickelskären mainly Common and Arctic Terns, the Turnstone *Arenaria interpres* and the Redshank *Tringa totanus*).

The parents guard the young from watching sites (commonly high ones) not more than some ten metres away, trying to watch the feeding localities at the same time. The parents in a shore territory may ignore familiar people completely. In such situations the young also ignore them. I have cleaned fish nets 2–5 m from half-grown young, cleaning their plumage on a flat rock. Weak alarm calls cause the young to run into the water, where they swim in a crouched position trying to keep the disturber in sight, while hiding between stones. If the parents fly over the territory uttering alarm calls, the young swim from the shore, but return as soon as the alarm ceases.

The shoreline territory provides some protection against daytime predation and disturbance by species that avoid the vicinity of man, especially crows from other islets (local crows may be accustomed to man), large gulls and man himself (campers near cottages). It enables staying of the whole family in the vicinity of the feeding locality. But living on the shore increases the risk of nocturnal predation by mammals. Like most other birds, gulls have no effective defence against predators at night (Southern 1981). When no longer incubating eggs or small chicks, Common Gulls spend the night silently on low stones off the shore. Even in the midsummer twilight it is too dark to make aerial attacks. Keeping silent well away from the young diminishes the risk of nocturnal predation on the young; in this way the parents avoid acting as signals for finding the young. On Mickelskären I found that Common Gull parents were mostly unaware of nocturnal predation on their young by Minks if the young made no sound.

In daytime, flat rocks without stones or vegetation in the shore territory or just by the nest provide excellent opportunities for large gulls to take Common Gull chicks, providing that the gulls dare to approach the locality. However, the watching sites are mostly situated several metres above the ground and the parents are generally able to attack large gulls in time. In the daytime the Mink avoids flat open areas where it can be attacked by gulls (cf. Kruuk 1964, Lemmetyinen 1971). When the parents gather at food, they do not attack large gulls, but in this case the large gulls are generally more interested in the food revealed by the feeding Common Gulls than in their young hiding on the nearby shore. Chicks swimming off the shore when disturbed are easily and rather often taken by large gulls.

Moving to escape disturbance

Serious disturbances lead solitary pairs to take their young to new localities, up to 2 km from the breeding place. Such shifts have been caused by the easily visible nocturnal predators, the Red Fox and the Raccoon Dog, and evidently also by owls, hunting Goshawks *Accipiter gentilis,* and campers staying overnight in the territory. People throwing stones at the parents and a bird ringer's handling of the young in such a way that they cry and run away have also caused the birds to leave the territory. If the young are already in the water, the birds may move immediately, otherwise after the disturbance is over. The parents fly above the swimming chicks directing

them towards the goal, mostly situated out of sight behind other islands. The swimming is directed by intense calls and short glides in the direction of the goal (Bergman 1953b). The risk of the young being taken on the way by large gulls is nowadays great. In two of six such shifts that I have followed in the 1980s, Great Black-backed Gulls took all the young just before their probable goal was reached.

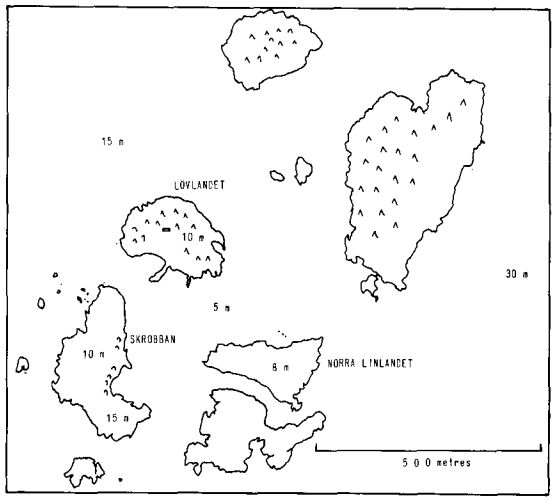

Fig. 3. The islet group of Mickelskären. The solitary pairs studied bred on the shores of Lövlandet and the northernmost part of Skrobban; a colony of 25–55 pairs bred on Norra Linlandet. Metres indicate the highest point on the islet and the approximate mean depth well off the shores.

Hatching success and production of fledglings

Hatching success of solitary pairs in the 1930s. Every clutch which produced at least one hatched and dried chick is considered to have hatched. Pairs breeding on islets within 4 km SW of Kopplorna (area B on Fig. 1) displayed a hatching success of 22 % (9 of 41 studied nests). Within the islet group of Kopplorna (Fig. 2) the success of 9 nests was recorded. In contrast to the nests SW of Kopplorna, they were all situated less than 200 m from the nearest summer cottage. They all hatched. — Thus the total hatching success was 30 %.

Hatching success of solitary pairs in 1979–85. Of the 22 nests studied in 1984 within the islet group of Kopplorna 20 hatched (91 %). All these nests were situated less than 200 m from the nearest summer cottages. The number of cottages had increased from 23 in the mid-1930s to 37 in 1984. On Mickelskären and the archipelago to the N and NW, of the 128 nests studied in the summers 1979–80 and 1982–85 108 hatched (84 %). All nests situated near cottages. In 1981 abnormally cold and rainy weather killed almost all the young hatched in mid-June and many nests were flooded (see also Hildén et al. 1982). On 13–14 June the precipitation on Mickelskären was 34 mm, the air temperature around +5°C and the level of the sea +40 cm. Nests were flooded both on shores and by rockpools. Not being representative, the records from that year are excluded from the figures above. — Summarizing of 41 nests situated at least 300 m from the nearest cottage 9 (22 %) hatched, but of 159 nests situated closer to cottages than 300 m 137 (86 %) hatched. The difference is highly significant (χ^2=64.97, P=< 0.0001).

The breeding success of solitary pairs. Despite the increase of the hatching success, the production of fledged young has remained around 0.5–0.6 fledglings/clutch. The difficulty of finding the young and the tendency of the Common Gull to move to new localities when disturbed make these figures approximate. However, it is supported by exact studies of smaller numbers of pairs: in 1934–37 18 nests in the area SW of Kopplorna produced 10 fledglings, in 1979–80 and 1982–85 35 nests on Lövlandet produced 20 fledglings. The only striking exception was summer 1981, when the weather caused exceptionally great losses of nests and young and the production of fledglings in the whole area, including the colonies, was less than 0.1 fledgling per clutch.

The fledgling success may vary locally, pairs of Herring Gulls may settle on new localities and destroy all the Common Gull young on nearby shores, in some years there are Minks on almost all islet groups, in other years only on some islet groups, young on low flat shores are caught more often by large gulls than young staying in the shelter of boulders and vegetation.

The main reason for the low production of fledglings in the nests studied in the archipelago SW of Kopplorna in the 1930s was egg stealing by flocks of Hooded Crows (cf. Tenovuo 1963).

In late May and June I recorded flocks of 5–30 crows on almost every visit to these skerries, but they did not dare to come near the summer cottages. This explains the 100 % hatching and also better breeding success (1–2 fledglings/clutch) of the 3–4 Common Gull pairs breeding within the islet group of Kopplorna. If only successfully hatched nests are considered, the fledgling success of solitary pairs breeding in or SW of the islet group of Kopplorna was as high as about 2 per clutch.

In the 1940s and later no typical flocks of crows have been recorded in the area studied in the 1930s or elsewhere in the study area. Obviously nonbreeding crows now occur only in small numbers (never more than 4 crows seen together). In the 1960s the Herring Gull and the Great Black-backed Gull began to prey on eggs and especially on young of the Common Gull. In the 1970s and 1980s the Mink has

been the most severe predator on Common Gull young in the colonies, but it also depresses the fledgling production of the solitary pairs. Thus, predation on eggs by the crow has been replaced by predation on the young by large gulls and Minks. Of 40 solitary nests studied on Mickelskären in 1975–85, crows destroyed only three.

Reproductive success in the colonies. From the 1930s I have occassional records of the fledgling success in three colonies. They indicate success of the same order or even higher than in the 1960s in the same and in 12 other colonies. The most accurate counts were made in 1963 on 6 islets in the W half of the study area. In that year ca. 215 pairs studied produced an average of 1.8 fledglings/clutch, but in 1965 ca. 210 pairs on the same islets produced only 0.2 fledglings/clutch. Some other colonies were more successful and the mean production of fledglings/clutch in colonies of the whole area in 1965 was about one fledgling/clutch. In the late 1960s the production of fledglings had dropped to below 0.3/clutch in all colonies in the area. Some colonies produced no fledglings at all. This agrees with Hario's (1985) records from the 1980s in the sanctuary of Söderskär 25 km ESE of Helsinki. In the colony of Norra Linlandet (in the early 1960s about 55 pairs, later only 25 pairs) in 1979–85 many eggs and ca. 80 % of the hatched young were eaten mainly by one pair of Herring Gulls and one pair of Great Black-backed Gulls. Minks killed also young and the production of fledglings varied between 2 and 12 (= 0.05–0.5 fledglings/clutch). In 1986, 24 pairs produced one fledgling.

The increase of the population from the 1930s to the early 1960 was no doubt mainly due to high production of fledglings in the colonies. Now the breeding success (colonial + solitary pairs together in 1980–85 never more than 0.4 fledglings/clutch) hardly compensates the losses of adults. The population will probably continue to decrease as long as the changed and probably radically impaired food supplies of the Herring Gull (Bergman 1982) cause occurrence of more and more Herring Gulls specializing on other gulls' eggs and young (see also Hunt & Hunt 1976, Hario 1985).

Defence against nest predation

Until the 1960s the breeding success was considerably higher in the colonies than among solitary pairs. This agrees with the results obtained by Götmark & Andersson (1984), who used experimental eggs near nests of solitary pairs and at the border of a colony. However, general conclusions cannot be drawn from their or my results. All solitary pairs attract crows to some extent but by incubating they can generally prevent single crows from stealing the eggs. Accordingly, there is a good chance that a crow attracted by a solitary pair and seeking for food remains near its nest, will find many of the experimental eggs placed near such nests and eats them — or carries them away for eating them elsewhere (see Loman & Göransson 1978). Experimental eggs beside a colony may be better protected against crows, but this does not necessarily mean that eggs in real gull nests in a colony are safer than eggs in a solitary nest. In my study area all egg losses changed radically when the circumstances in the study area changed.

Solitary pairs are unable to protect their eggs against flocks of crows; already two collaborating crows succeed in stealing Common Gull's eggs. One crow pulls the tail of the incubating gull and when the gull leaves the eggs for driving it away the other crow steals the eggs. Crows may even try to steal eggs from large gulls in the same way, but without success: the gull stays on the eggs.

The size of the islet and occurrence of bushes and trees also affect crows' success in robbing nests (cf. Lemmetyinen 1971). Most solitary pairs SW of Kopplorna bred on islets larger than 0.5 ha, where crows could alight without being detected by the gulls. In the 1930s all colonies bred on islets less than 0.5 ha in size or on a small point on a larger islet. On such localities, attacks by non-incubating gulls may be sufficient to drive away flocks of inexperienced crows, but if they alight despite the attacks, they can steal eggs just as well there as from solitary nests. The proportion of egg losses may be smaller in really large colonies (hundreds or thousands of pairs) because large colonies provide excess of food in relation to the number of predators visiting them (Nisbet 1975, Fuchs 1977). Synchronized egg laying may also increase the effect of the surplus of food (cf. especially Burger 1979 on the Herring Gull), but in the Common Gulls studied (largest colonies about 70 pairs/islet) predators easily destroy almost all offspring in the colonies.

In an archipelago of the type studied, but without any human influence at all, the solitary pairs of Common Gulls would possibly have higher hatching success than that found for any category of Common Gulls during the study period. Lack of food and greater predation by birds of prey would limit the population and colonial breeding could hardly occur. As it is, since about 1965 it has been safer for the Common Gull to breed singly than in colonies in the study area.

Both the occurrence and the role of truly communal aerial attacks of colonial larids on predatory birds seem to have been overestimated. In the Common Gull colonies only those pairs whose nests or young are situated nearly in the line of flight of an approaching crow clearly react to the predator. Thus, in colonies on very small islets, a higher proportion of birds may react with attacking the predator. This may have contributed to the small egg losses in the colonies in the 1930s.

If a single crow alights in the colony, some indi-

viduals may attack the predator, but the incubating parents stay on their eggs or small young. Mostly the crow is able to walk around in the colony, hiding to some extent in ground vegetation, bushes and trees (cf. Lemmetyinen 1971). A large gull may walk from one nest or group of chicks to another, eating eggs and young and almost completely ignoring the attacks of the flying Common Gulls. If attacked in flight large gulls and inexperienced crows may change their direction and disappear, but experienced crows fly, even when strongly attacked by numerous gulls or terns (even Caspian Terns!) straight to the colony.

Common Gulls may fly at predators on the ground repeating their attacks every 10–25 seconds, especially if the eggs are highly incubated or they have small young, but there are great differences between pairs, even in the same stage of breeding. One pair on Norra Linlandet kept attacking a Great Blackback regularly watching 10 m from their nest, another pair breeding at the same distance from the same watching site never attacked the Blackback (records in June 1985). Middle-sized and large gulls try to protect their eggs by alighting on the nest (Bergman 1946, this study, cf. also Kruuk 1964, Fuchs 1977), only taking flight from predators which they cannot withstand on the nest. Colonies of large gulls take off for eagles (cf. Verbeek 1982, Robert & Ralph 1975, my own records) and Eagle Owls (my own records). In colonies of Common and Arctic Terns, a large proportion of the individuals take off when crows visit the colony, and all individuals do so when a Peregrine Falcon *Falco peregrinus* or a Goshawk hunts or eats its prey there (many records of Peregrines until the late 1950s, Goshawks occur still in the area).

My impression is that the protection afforded by colonies of Common Gulls against aerial predators mainly consists information about approaching enemies. This information may consist different kinds of behaviour of both conspecifics and other species. It enables birds which cannot themselves see an approaching predator to take off and attack, to settle on the eggs for protective incubation, to sneak away or to crouch, depending on the bird species and the kind of predator. Solitary pairs may obtain similar information from other bird species near their territories. I have stressed the same mechanism as an important reason for the common occurrence of ducks and waders in colonies of larids (Bergman 1957). Colonies provide protection against *Mustelidae* only during daylight in open terrain (cf. Kruuk 1964, Lemmetyinen 1971), but mustelids mostly hunt at night.

Nest site tenacity in relation to hatching and breeding success

Both published records (e.g. Tinbergen 1953) and a large body of field observations show that in gulls the pair bonds are fairly stable, at least in species which commonly breed in truly single pairs. Larids which form very dense colonies seem to have lower mate retention and weaker territory tenacity than others. Thus the mate retention in a colony of Caspian Terns *Sterna caspia* was only 25 % (Cuthbert 1985) and in the Kittiwake *Rissa tridactyla* 64 % (Coulson 1966), but in the clearly less densely breeding *L. novaehollandiae* 73 % (Mills 1973). Does the type of breeding (solitary vs. colonial) influence territory and nest site within a species as well? My records on the Common Gull indicate, that it is so. Tinbergen (1953) stresses the role of the familiar territory as a factor maintaining mate tenacity in the Herring Gull, but also reports that re-pairing after the winter commonly depends on individual recognition before settling at the breeding grounds. On Mickelskären, some Common Gulls have settled before their mates every spring; other pairs have arrived together (see p. 68), just as Tinbergen suggested. Both mates recognize their old nest site and mostly build their nest there, although large territories provide tens or even hundreds of almost identical places where the solitary pair could build. Remains of old nests may occur, but taking them away does not affect the choice (several records on Lövlandet). The same site may be used in many consecutive seasons, even if it is not of any especially attractive type, or the surrounding vegetation varies greatly. In 1985 such a nest site on Lövlandet had been used for 23 consecutive seasons (in 1984 exchange of male with the neighbouring pair, see below). Later another pair may take over the territory and build their nest in a new site. Only very attractive sites tend to be used more or less constantly even when the birds change. Thus a boulder off the N shore of Skrobban in the islet group of Mickelskären was already used regularly as a nest site in the 1890s (reported by old pilots), and I noted Common Gull nests on the same boulder in the 1930s and regularly in 1963–79.

My conclusions are based on 78 nests of solitary pairs, whose nest site and hatching success in the previous season is known with some certainty, on observations of the effects of nest predation, nest destruction and disappearance of young, on records on renesting, and on the hatching success and proportion of pairs laying eggs in previous nest sites in a colony. Additional records were obtained from 6 individuals identifiable in the field and breeding on Lövlandet or nearby shores during 2–7 seasons. They confirm the conclusions but also show an exchange of males between two neighbouring territories, in which the females laid their eggs in the old nest site. The birds were identified by wing and leg defects, rings and peculiarities in calls and behaviour.

My records suggest that Common Gulls in most cases use the same nest site in the next season as well when they have succeeded in hatching at least one chick that remains in or by the nest for at least some

days (nest site tenacity in 38 of 40 cases studied). Site tenacity does not occur when the eggs have been stolen, the small chicks killed or flocks of crows regularly destroyed nests on the breeding islet, visiting it almost daily (38 recorded cases). The fate of the young after they have left the vicinity of the nest does not seem to influence the nest site tenacity (at least 14 of the nests built in the same site belonged to pairs which in the previous year had lost all their young when halfgrown or nearly fledged in the breeding territory, a shore territory or new sites).

Some new mates may have occurred both in pairs displaying nest site tenacity and in pairs which bred in new sites, but this does not influence the reliability of the results. In 5 cases pairs whose nests had been destroyed apparently moved 100–300 m to a neighbouring islet. Nocturnal predation on young by Minks that is not observed by the parents does not influence their nest site tenacity and they may lay replacement clutch in a shore territory where Minks killed the first brood. Nest destruction or loss of young by flooding does not influence the nest site tenacity to any great degree. This corresponds to the reaction of the Black Skimmer *Rynchops niger* to flooding (Burger 1982). Flooding does not cause real aggressive behaviour and a site which has been flooded is therefore mostly not strongly associated with aggression or fear. Solitary pairs never laid replacement clutches in the first nest of the same season (but in colonies this occurred — in this respect my results differ from those of Mägi (1978) in Estonian colonies).

Thus, solitary pairs regularly avoid using old nest sites that they associate with predators, but are strongly attracted to nest sites where they have incubated their eggs successfully in the previous season.

In the colonies the situation seems to be somewhat different. In 1979–85 on Norra Linlandet ca. 50 % (at least 113 of 224) of the nests were situated in exactly the places used in the previous season (I had marked the places with stones), even when almost all the eggs and young were lost at a stage which would cause solitary pairs to desert their old nest site.

In colonies behaviour related to choice and defence of the territory predominates until the incubation begins, and pairs which have lost their eggs may hold their territory even after the eggs have been stolen or the young killed. No doubt this is the case even in pairs breeding solitarily, but in colonies this behaviour fairly often seems to prevent the gulls from reacting to a possible association between the previous nest site and the approach of predators. In colonies replacement clutches have been laid in nests robbed earlier in the same season (on Norra Linlandet obviously 5 of 11 pairs which had lost their eggs in June 1985 remained in their territories and laid a replacement clutch in the old nest). Changes in the location of the territories and exchange of mates may also be commoner in colonies than among more isolated pairs, mainly as the result of disappearance of pairs caused by age-dependent change of individual dominance (see especially Coulson 1968). Attractive nest sites may be taken over by dominant pairs with no experience of what happened there in the previous season. In small territories the attractive sites for nests are few. Several pairs may compete for them, increasing the number of sites used during consecutive seasons, but depressing the cases of real nest site tenacity.

All Common Gulls have the same innate tendency to nest site tenacity, but its realization is different in solitary pairs and in colonies. These differences are principally of the same kind as the differences between densely breeding and more dispersed colonial larids in mate retention and territory tenacity (Cuthbert 1985, Coulson 1966, Mills 1973).

Facultative and obligate coloniality

The Common Gull and its closest relatives — the *L. argentatus-fuscus-hyperboreus-marinus* group — are facultatively colonial. Some other larids are obligately colonial, forming very dense colonies; their solitary pairs settle only in colonies of other larids, which compensate for the lack of conspecifics (Hildén 1965). Götmark (1982) has surveyed the theories about why gulls tend to breed in colonies, but the mechanisms which maintain facultative coloniality have not been discussed, although the formation of colonies has been followed in several areas, not least in the archipelago SW of Helsinki (Bergman 1982).

The Common Gull and its relatives breed in large colonies only where rich food resources are available. Man-dependent food resources are new, and although predictable, they may change rapidly, even within the life span of a gull. The optimal colony size (the size and density producing the highest number of fledglings/clutch) of man-dependent gull populations varies with the amount of food available within the feeding range of the gulls, and with many other circumstances, some of which are related to the activities of man. A large number of studies indicate that the breeding success in really large colonies of facultatively colonial gulls is generally lower than in small colonies and among solitary pairs (Paynter 1949, Parsons 1971, 1976, Hunt & McLoon 1975, Hunt & Hunt 1976, Beaman 1978, Burger 1979, Hand 1980, Hjernquist 1980, Bergman 1982, Butler & Butler 1982, Coulson et al. 1982). Colonies tend to increase above their optimal size. Contributory factors are a long subadult period, strong colony tenacity and the long life span of the gulls.

When colonial breeding is no longer successful — the food sources may disappear or the breeding success may decline permanently for some other reason — pairs from the colony or colonies (in obligately colonial species groups of pairs) begin to disperse

elsewhere. If the landscape in the surroundings does not correspond well to the innate or learned requirements of the species, the dispersing pairs tend to settle in the vicinity of the colony, because they are attracted by the pairs that remain there. The dispersed pairs may use the same food resources as the members of the old colony (further aggravating the general food situation and reducing breeding success still more). Food specialization may also develop in members of the old colony, enabling it to exist longer than would otherwise be possible. But when the breeding region provides a great number of attractive breeding grounds, pairs may settle far from the colony, choosing localities in which they find food near the breeding place and mostly having a combined breeding and feeding territory. The spacing of dense larid colonies as a result of predation on eggs and young has already been described by Tinbergen (1953 and 1967), Cullen (1960), Hunt & Hunt (1975) and Duncan (1978). By reducing the number of pairs in a colony of Herring Gulls, Coulson et al. (1982) were able to restore its breeding success and renew the colony tenacity. In an archipelago with nearly unlimited numbers of suitable breeding grounds the settling of pairs that leave the colony is determinated by the occurrence of food, interspecific sociality and to some extent also competing species.

An advantage which probably preserves facultative coloniality is that it facilitates or even causes expansion into areas that may provide excellent food sources for solitary pairs (example: Common Gulls at summer cottages) but not for a colony.

When solitary pairs are successful, their number may increase. Their selection of breeding grounds providing enough food leads to a high breeding success. The high breeding success is, at least in solitary pairs of Common Gulls, also due to the predators' tendency to gather at the colonies and to the fact that the solitary pairs do not undertake long time- and energy-consuming foraging tours (long foraging tours may be profitable only if undertaken to known foraging localities), and possibly partly because both parents spend almost the whole day near the breeding locality, increasing the protection against predators. If the food available near the breeding locality allows an increase in the number of solitary pairs the gull may begin to feed communally and within some years a colony may be formed. Later this new colony may increase so much that the food is no longer sufficient, predation on eggs and young may increase and cannibalism of young may occur. A new wave of dispersion will then follow, and so on. The species displaying facultative coloniality are able to alternate between solitary breeding and colonial breeding. This alternation has evidently prevented the development of the extremely dense breeding which occurs in obligately colonial species and to which the territory defence of the obligate colonials has become adapted. The most radical defence method is sudden complete desertion of the already laid eggs and the locality itself (Cullen 1960), occurring in large terns.

It seems probable that obligate coloniality has developed mainly in species breeding by lakes, rivers, coastal bays and open coasts with very few islets. The birds forage over wide areas, where their main natural food only occasionally gathers, enabling many individuals to feed at the same locality. Their very dense colonies may provide shelter against small predators, and they enable breeding of great populations on very restricted localities within an acceptable distance from large but dispersed food resources. These species have become so strongly adapted to the extreme sociality allowing successful breeding in these types of landscapes that even when suitable habitats are more common, they gather in a few (or only one!) large and dense colonies.

Obligately colonial species do not easily colonize new types of habitats. Thus Black-headed Gulls still breed only in habitats which have many features in common with bays with reeds and small flat grassy islets surrounded by reed. Although they feed and become very tame elsewhere, they will settle on, for instance, rocky islets in the outer archipelago only when attracted by other species. On the other hand Herring and Common Gulls easily accept habitats and nest sites very different from their normal ones. Obligately colonial species are also characterized by strong group adherence (McNicholl 1975). For instance, Caspian Terns, Sandwich Terns *S. sandwicensis* and Black-headed Gulls will mostly desert their locality completely when disturbed (Bergman 1953a, 1980, Cullen 1960, Väisänen 1973). A single par may sometimes stay, but only if a colony of other larids remains in the locality. In the study area I have recorded 3 such solitary pairs of the Caspian Tern and one of the Black-headed Gull.

In the study area the influence of man has compressed the stages of development from solitary breeding to colonial breeding and back to at least some degree of solitary breeding in both the Common Gull and the Herring Gull. At least the development in the study area confirms that even small gulleries, which in areas with richer and more varied marine production could possibly form without the influence of man, attract predatory species much more than do solitary pairs. Thus solitary breeding may be induced and maintained even when the size of the populations is not influenced by man-made food resources.

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Selostus: **Kalalokin ruokailutottumuksista, pesimätuloksesta, suhtautumisesta ihmiseen sekä yhdyskuntapesimiseen liittyvistä kysymyksistä.**

Tutkimus perustuu Espoon ja Kirkkonummen saaristossa tehtyihin havaintoihin vuosilta 1933–1985. Seutu oli vielä

1930-luvulla verrattain rauhallinen, mutta ammattikalastusta oli runsaasti. Kalalokkiyhdyskuntia oli silloin vain kuudella luodolla ja nämä lokit hyötyivät etenkin silakan kalastuksesta. Yksittäisparit, joita 1930-luvulla oli n. 15 % n. 215 parin kannasta, elivät ja tulevat edelleen toimeen etupäässä pesimäpaikkansa lähiympäristöstä löytyvästä ravinnosta. Kun ammattikalastus sodan jälkeen väheni ja saariston virkistyskäyttö voimakkaasti kasvoi, yhdyskunnittain pesivät kalalokit alkoivat ruokailla yhä enemmän mantereella ja yksittäispareja alkoi yhä useammin pesiä kesämökkien lähettyvillä. Häirintä kesämökkisaarilla on pienempää kuin ulkoilukäytössä olevilla luodoilla ja lisäksi lokkeja usein ruokitaan kesämökkien lähettyvillä. Kalalokit kesyyntyvät, tunnistavat niitä ruokkivat ihmiset kasvojen perusteella ja muistavat tuntomerkit yli talven. Tällaiset yksittäisparit pesivät mm. laitureilla, rantasaunojen katoilla, rantamäntyjen oksilla ja etenkin pienten rantajyrkänteiden ruohomättäissä.

Kanta kasvoi yhdyskuntien hyvän poikastuoton (1.5–1.8 lentopoikasta/pesue) turvin n. 500 pariksi (15 yhdyskuntaa ja n. 100 yksittäisparia), mutta 1970-luvun alusta yhdyskuntien koko ja lukumäärä ovat jatkuvasti pienentyneet. Syynä ovat harmaalokkien paine pesimäluodoilla, ulkoilun aiheuttama häirintä sekä harmaa- ja merilokin ja 1970-luvun puolivälistä lähtien myös minkkien aiheuttamat muna- ja poikastappiot. Yhdyskuntien pesimätulos on nykyään vain 0–0.3 lentopoikasta/pesue. Yksittäisparien lentopoikastuotto on koko tutkimuskautena ollut 0.5–0.6 lentopoikasta/pesue. Poikkeuksena oli kylmä ja sateinen kesä 1981, jolloin melkein kaikki yksittäisparienkin poikaset kuolivat kesäkuussa. Koska nykyään runsaat puolet kannasta eli n. 120 paria pesii yksittäin, koko kannan poikastuotto on 0.3–0.4, mikä ei riitä kannan ylläpitämiseen. 1930-luvulla varisparvet tuhosivat n. 70 % yksittäisparien munapesistä, nyt munavaiheen tappiot ovat vain n. 15 %, mutta poikastappiot ovat vastaavasti kasvaneet.

Lähes luonnontilaisessa saaristossa yksittäisparien ruokailu- ja pesimäreviirit olivat ennen huomattavasti laajemmat kuin nykyään. Niissä oli monesti rantaviivaa yli 500 m. Nykyään sellaiset parit jotka elävät ihmisen tarjoaman ravinnon turvin voivat tyytyä alle 100 metrin rantaviivaan.

Yksittäisparit asettuvat pesimäpiireillensä selvästi aikaisemmin kuin yhdyskunnittain pesivät parit. Tämä johtunee siitä, että yhdyskuntalokit etenkin keväällä ruokailevat parvissa mantereella, yksittäisparit taas pesimäpiireillään. Yksittäisparien pelottomuus ja nopea saapuminen ruokailemaan sulkevat kauempana pesivät lajikumppanit ja isommat lokkilajit pois ravintokilpailusta pesimäpiirillä.

Kalalokilla ei ole kykyä "kertoa" lajikumppaneilleen kaukana sijaitsevan ravintolähteen sijaintia, mutta nopea lento kohti yleensä näkyvissä olevaa ravintoa ja ruokailevia lokkeja on tärkeä ravintosignaali, joka aiheuttaa muidenkin yksilöiden lentämistä ruokailupaikalle. Matkalla yhdyskunnasta ruokailupaikalle ja pesimäajan ulkopuolella ruokailupaikoista yöpymispaikoille kalalokit, kuten muutkin lokit, voivat yhtyä parviksi. Syyt parvessa lentämiseen ovat sosiaalisia ja toisinaan aerodynaamisia, mutta tämä tapa ei liity suoranaisesti ravinnon hakuun.

Yksittäisparit ovat yleensä pesäpaikkauskollisia, mutta jos munapesä tai pienet poikaset ryöstetään pesäpaikalla emojen läsnäollessa pariskunta seuraavana keväänä lähes poikkeuksetta tekee pesänsä uuteen paikkaan. Pesän tuhoutuminen tulvassa tai poikasten menehtyminen rankkasateeseen pesällä tai muusta syystä pesäpaikan ulkopuolella ei yleensä aiheuta luopumista vanhasta pesäpaikasta. Pisin todettu aika, jona sama pesäpaikka on ollut käytössä, on 23 kesää (ainakin toinen linnuista on kuitenkin vaihtunut). Kesämökkien läheisyydessä poikaset yleensä kasvatetaan rantaviivan läheisyydessä, josta on helppo häirinnän ajaksi siirtyä veteen, mutta joka lisää minkin mahdollisuuksia löytää poikaset. Vakavat yksittäisparien häirinnät voivat aiheuttaa poikasten kuljettamisen toiseen paikkaan, joka saattaa sijaita yli kilometrin päässä. Hautomalla emo voi estää yksittäisten varisten pesänryöstöyritykset, mutta ei torjua maassa liikuskelevien isojen lokkien aiheuttamia muna- ja poikastappioita. Lokit eivät lainkaan pysty torjumaan yöllisiä pesärosvoja tai petoja. Yöpymällä poikaskautena rannan edustalla olevilla kivillä erillään poikasistaan emot eivät läsnäolollaan paljasta poikasten oleskelupaikkaa yöllä liikkuville pedoille, mutta eivät myöskään itse huomaa esim. minkkien yöllisiä tuhoja. Lokit voivat jopa tehdä uusintapesän siihen paikkaan, jossa minkki on tappanut ensimmäisen poikueen.

Yhdyskunnissa ei tapahdu varsinaisia yhteishyökkäyksiä pesärosvoja vastaan. Välittömästi uhattujen pesimäpiirien emot ovat muita aktiivisempia. Tämä saattaa olla osasyynä siihen, että yhdyskuntien pesimätulos 1930-luvulla usein oli yli 2 lentopoikasta/pesä. Siihen aikaan kaikki yhdyskunnat sijaitsivat hyvin pienillä luodoilla, joiden kaikki parit reagoivat saapuviin pesärosvoihin. Kalalokit eivät kuitenkaan tee syöksyjä samanaikaisesti. Jos toinen emo osallistuisi varsinaisiin hyökkäyksiin, se ei voisi hautomalla suojata muniaan. Vain sellaiset viholliset, joita lokit eivät lainkaan pysty torjumaan, kuten merikotka, huuhkaja, kanahaukka ja muuttohaukka, aiheuttavat yleisempää lentoonlähtöä. Sen sijaan kalalokki pystyy usein torjumaan lentävän merilokin aikeet siepata poikasia eikä merilokki aiheuta yleistä lentoonlähtöä.

Yhdyskunnissa pesivät kalalokit suhtautuvat pesien tuhoutumiseen toisin kuin yksittäisparit. Niissäkin yhdyskunnissa joissa lähes kaikki munat tai pienet poikaset tuhoutuvat pesimäpiireillä, n. 50 % pesistä on seuraavana vuonna samoissa paikoissa kuin vuotta aikaisemmin. Ilmeisesti sosiaaliset vaikutteet dominoivat yksilöiden käyttäytymistä siinä määrin etteivät edellisen vuoden huonot kokemukset kovinkaan paljon vaikuta pesäpaikan valintaan. Jopa uusintapesye voi sijaita samassa pesäkuopassa kuin tuhoutunut ensimmäinen pesye.

Syy siihen, että kalalokki ja sen lähimmät sukulaiset (harmaalokkiryhmä monine lajineen) voivat pesiä sekä yksittäispareina että yhdyskunnittain, tuntuu olevan se, että pesimätulos isoissa yhdyskunnissa on monestakin syystä keskimäärin heikompi kuin yksittäisparien pesimätulos. Koska yhdyskunnat yleensä ovat riippuvaisia ihmisen tuottamasta ravinnosta niitä on ollut harvassa ennen kuin ihminen alkoi vaikuttaa lokkien ravinnonsaantiin. Kun ravinto loppui tai yhdyskunta muuten olosuhteisiin nähden tuli liian isoksi, se hajaantui yksittäispareiksi, mutta myöhemmin saattoi syntyä uusia yhdyskuntia siellä missä ravintotilanne ja pesärosvotilanne salli. Näin pesimistapa vaihteli yksittäispesimisen ja yhdyskuntapesimisen välillä eikä erikoistumista pesimiseen hyvin tiheissä yhdyskunnissa pystynyt kehittymään. Hyvin tiheissä yhdyskunnissa pesivät lajit ovat ilmeisesti kehittäneet pesimätapansa olosuhteissa, joissa oli vain harvakseen riittävää suojaa tarjoavia pesimäpaikkoja, joihin oli pakko sopeutua.

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